Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Bari Apparels Ltd.
Address of the Factory	: 91/92, Rupnagar Inds. Estate, Block # K, Section # 2, Mirpur, Dhaka.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Structural Inspection	: 2015-10-07
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-10-07
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-10-07
BGMEA Membership No.	: 1130

BASIC INFORMATION:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: RCC Beam Slab Frame
iii.	Floor System	: RCC Beam Slab
iv.	Floor Area	: Ground floor = 3477 sft , Entire building = 23770 sft (Approx.)
v.	No. of Stories	: 5 floors + GF (6 Storey) Started in 2005 and 2007 respectively.
vi.	Construction Year	: Construction starting in 1990.
vii.	Foundation Type	: Not confirmed
viii.	Design Drawings	: Not available
ix.	Soil Investigation Report	: Not available
x.	construction Materials	: Brick Aggregated.
xi.	Generator	: Generator is located outside the main building at the north-east corner.

RECOMMENDATIONS FOR CORRECTIVE ACTION: Column was found to be moderately stressed due to cantilever portion which may pose risk to operations in the factory. During the assessment, various non-conformities were found for which mid-term and long term corrective actions have been recommended.

Short Term (Immediate) : N/A

Mid Term (6-weeks) : 1. Factory Engineer to review design, loads and columns stresses in area identified above.

2. Verify insitu concrete stresses either by 100mm dia. cores or existing cylinder strength data for the A-4, A-5, B-4 and B-5 columns or 100mm dia. cores from any columns.

3. As built architectural and engineering drawings to be prepared and submitted for approval by appropriate authorities. 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 recommendations.

Long Term (6-months) : 1. 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:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	N/A
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity*	• The minimum clear width of the pathway should be 0.9 meter • Remove all temporary items from all escape routes, aisles and passageway. • Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. - 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 all floor and to keep the record for re filling & properly tagged. • Place the extinguisher near the path of exit travel & easily accessible • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan & should kept record properly. • The first aid hose and standpipe performance should be checked periodically and properly tagged. • Provide additional firefighting equipment like sand & water buckets near exit or easily accessible area for first phase firefighting. • Combustible materials should keep away from electrical appliances and all the lighting in 5th floor (finishing section) must have protecting covers and wiring must be in conduits.

Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Prepare proper plan and design for one more exit in ground floor north-east side to ensure the easy way to outside of building. • 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. • Prepare proper plan & design for another staircase. - Minimum clear width should be 0.9 meter. Or unlock the exterior stair to discharge from 1st floor to discharge level. • 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. • Provide 2 hour fire rated construction at unprotected opening window, which is adjacent to external staircase. • 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 final evacuation route of stair-2. • 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 rest of the operational areas. • 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 fire license / permit from issuing authority • Obtain building approval from issuing authority • Cover all units / floors in a valid fire license

	• Obtain the boiler license from the proper issuing authority. • Obtain the boiler operator license from the proper issuing authority.
Long Term (The remedial works indicated must be carried out within a period of 6 months)	• Implement the plan and design for one more exit at ground floor. • Install another staircase as per plan and design. - Minimum clear width should be 0.9 meter. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route of stair-2. • Provide 4 hours fire rated barriers with 2 hours fire rated door at 5th floor boiler, which located at the adjacent to rest of the operational areas. • 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 area and travel distance as per RMG guideline. • Stand pipe supplying first aid hose should have minimum pressure of 200 KPa. • Provide dedicated storage tank for firefighting operation

(B): Recommendations for Electrical Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• Over current protection devices (Circuit breakers) should be installed at all distribution panels.
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity)*	• Re-locate oil / fuel tanks away from control panels in generator room.

Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• 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 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. • Individual Fuse protection should be provided to every 15/20 A socket. • 1. All stranded conductors > 6mm2 to be provided with cable sockets. 2. All stranded conductors < 6 mm2, at exposed end should be soldered / crimped. • 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 DB. Ensure that all the electrical connections are properly secured with lugs. • Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation. • Avoid bunch of cable at MCCB/MCB and 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 DB 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. • 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 DB. Ensure that all electrical panels provided with proper and separate earth potential.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Provide 4 hour fire rated walls all around the transformer / generator room on ground level. • 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 board (MDB). • 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. • 1. Wooden 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/SDB)'s with non-flammable materials. In addition: 1. Ensure that all distribution boards / Switchgears to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs to be blocked properly. • 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.

	2. Ensure that connections between conductors / equipment's 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.