Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Diana Garments (Pvt.) Ltd.
Address of the Factory	: 199/1, Mili Supper Market, Ibrahimpur, Cantonment, Dhaka. Dhaka-1206.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Structural Inspection	: 2015-09-06
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-09-06
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-09-06
BGMEA Membership No.	: 895

BASIC INFORMATION:

i. Building Usage Type	: Readymade garments factory.
ii. Structural System	: R.C.C slab structure.
iii. Floor System	: Beam-slab floor system.
iv. Floor Area	: Basement level area of Building-1 is 4630 sq. ft. and total area Of Building-1 is 40240 sft. Basement area of Building-2 is 3620 sft, total area of the Building-2 is 26780 sq. ft. Plinth Level area of Building-3 is 820 sq. ft. And total area of Building-3 is 4914 sq. ft.
v. No. of Stories	: Two 6- Storey with one basement and one 6 –Storey RCC Building.
vi. Construction Year	: Unknown.
vii. Foundation Type	: Footing foundation as per design drawing for Building-1 and Building-2. Foundation type for Building-3 was not identified Due to absence of all technical documents.
viii. Design Drawings	: Available for Building-1 and Building-2 but not available for Building-3.
ix. Soil Investigation Report	: Available for Building-1 & Building-2 (The factory Building-1 Has approval for 6-storied industrial RCC building with one Basement from Cantonment board, Dhaka, on 24th October, 1999 and the factory Building-2 has approval for 6-storied Industrial RCC building from Cantonment board Dhaka, on 19th September, 2013 but no approval was found for basement of Building-2 and the factory Building-3).
x. construction Materials	: Brick Aggregated.
xi. Generator	: Located at ground floor of the Building-3.

RECOMMENDATIONS FOR CORRECTIVE ACTION: Specific columns were found as highly stressed column due to small section of column in large cantilever area at west side of Building-1, west and east side of Building-2 and east west corner & at grid C-2 of Building-3 which may pose high risk to operation in the factory. During the assessment, some non-conformity was found for which immediate, mid-term and long term corrective actions are recommended.

Short Term (Immediate)	:1. Areas above the over stressed column not to be used for storage. 2. Factory Engineer to review design, loads and columns stresses in all column. 3. V Verify insitu concrete stresses by taking 100mm diameter cores from at column of grid D1 & G1 of basement floor (Building-1), at N7, N5,N6, A4 & A6 of basement floor (Building-2) and at C2 & A1 of ground floor (Building-3). Verify reinforcement grade, diameter and number of bars in column. 4. A Detail Engineering Assessment of Factory to be commenced, see attached Scope.
Mid Term (6-weeks)	:1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity. 2. Detail Engineering Assessment to be completed 3. As- As-built architectural and structural drawings to be prepared for Building-3, Basement of Building-2 and shed on roof of Building-1 and submitted for approval by appropriate 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)	: 1. Continue to implement load plan.

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 • Rearrange the evacuation pathway to ensure the minimum width. • Remove all temporary items from all escape routes, aisles and passageway. • 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.

Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• 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 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. • Exit door should have minimum clear width 0.9 meter. • Prepare proper plan and design for fire rated barrier for 2 hour fire rating separated corridor with 1.5 hrs fire rated door at ground floor. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor substation and generator room, which located at the adjacent to final exit. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 1st floor boiler room in building-1, which located at the adjacent to production 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. • 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. • Replace existing 1 inch hose pipe with 1.5 inch hose pipe to meet the requirement of RMG guideline. • 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.

Long Term (The remedial works indicated must be carried out within a period of 6 months)	• All stairway to have direct access to outside of the factory building, which requires 2 hour fire rated construction with 1.5 hour fire rated door at ground floor for fire separated corridor. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor substation and generator room, which located at the adjacent to final exit. • Implement the plan for fire separation 4 hours fire walls and 2 hours fire rated self-closing doors in basement level in building-1. • Provide 4 hours fire rated barriers with 2 hours fire rated door at 1st floor boiler room in building-1, which located at the adjacent to production areas. • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. • 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*):	N/A
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity)*	N/A

Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• 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. • Refill the silica gel. Ensure that accessories of transformers like breathers, vent pipe, buchholz relay, and silica gel must be in order at substation. • Provide rubber mats of adequate size in front of all distribution panels. • Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of HT / LT panels. • 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. • 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 proper separate earthing/grounding to transformer. Ensure that transformer body frame to have two separate and distinct connections to the earth / ground. • Provide proper separate earthing/grounding to generator. Ensure that generator 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.

Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• 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. • Area of substation / transformer to meet requirements of Table 4.3 of RMG Guideline; the area should be 45 m2, or relocate the substation/ transformer room. • Maintain the minimum height of 3.6 m for the substation room. Increase the height or relocate it. • Provide 4 hour fire rated walls all around the transformer / generator room on ground level. • Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 48m2, or relocate the generator room. • Provide calibrated Ammeters / Voltmeters at distribution boards (LT). • Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted). • 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.