

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Bramaks Limited
Address of the Factory	: Rahman Tower (2nd floor), Muradpur, Rail gate, Chittagong. Bangladesh
Present Status of the Factory	: Under operation
Structural Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Structural Inspection	: 2015-05-28
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-07-29
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-07-29
BGMEA Membership No.	: 3117

BASIC INFORMATION:

The present Garment factory is a commercial building with beam column frame structural system. The following information was noted:

- i. Building Usage Type : Garment Factory.
- ii. Structural System : R.C.C Building.
- iii. Floor System : Flat Slab with periphery Floor System.
- iv. Floor Area : The typical plinth area is 10321.7 sft. and total production floor
Is 51,608.5sft
- v. No. of Stories : 9-Storey
- vi. Construction Year : 2003
- vii. Foundation Type : Deep Foundation
- viii. Design Drawings : Available (Approval from Chittagong Development Authority
On 19th January, 2009 for 9-Storey with one semi basement
Commercial building)
- ix. Soil Investigation Report : Available
- x. Construction Materials : Stone Aggregate.
- xi. Generator : Other shed which adjacent with main building at northern side.

RECOMMENDATIONS FOR CORRECTIVE ACTION: Columns were found in over stressed condition due to over load and inadequate member capacity which may pose risk to the operations in the factory. During the assessment, various non-conformities were found for which immediate, mid-term and long term corrective actions are recommended.

The recommendations for **Structural Safety** corrective action are:

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| Short Term (Immediate) | : 1. Factory Management to remove any storage loading from column supporting floors.
2. Factory Engineer to review design, loads and columns stresses in area identified above.
3. Verify in situ concrete stresses by 100mm dia. cores for A1 and E4 columns. |
| Mid Term (6-weeks) | : 1. A Detail Engineering Assessment of Factory to be commenced, see attached Scope. |

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2. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
3. Detail Engineering Assessment to be completed.
- Long Term (6-months) : 1. Continue to implement load plan
2. Building Engineer needs to check existing flat slab system. Lateral system is required to ensure stability of the structure.

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"> • Factory management should be checked alarm call points & manual alarm system periodically and maintained the record properly. • Provide additional firefighting equipment like sand & water buckets near exit or easily accessible area for first phase firefighting. • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire 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"> • Prepare proper plan and design for one more exit in a way not to exceed the maximum travel distance. • 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 all stairs with other tenants floor, should be outward opening, side-swing, self-closing, non-lockable 2 hours fire rated self-closing door & 4 hours fire rated wall in all stair way encloses. (Also require fire rated door at the floor occupied by other tenants) • Prepare design for installation of fire rating smoke proof enclosure. 2 hours fire rating doors for exit should not be less than that of 4 hours fire resistance rating of the walls of the smoke proof fire rated entry

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	<p>lobby at all floor with other tenants.</p> <ul style="list-style-type: none">• Prepare proper plan and design for fire rated barrier for 4 hour fire rating separated corridor and 2 hour 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 generator room which located adjacent to stair -02 final exit.• Produce proper design and plan for 2 hours fire rated wall for open area.• Prepare proper plan and design for 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.• 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 addressable fire alarm and control panel. (Also needs to cover the floors occupied by other tenants)• 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 plant for dedicated fire pump with alternate backup power supply.• Prepare plan and design for dedicated water storage tank for firefighting operation.• Prepare proper design and plan for fire lifts equipped with approved intercommunication (including two way voice communications) with the fire command station or control room on the ground floor lobby of the building.• Complete full design and plan for providing fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor.• Power backup supply should be provided for fire alarm system.• Visual alarm should be placed at the generator room.• Implement to a single fire safety management system with approvals from all tenants in the factory building.
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<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"> • Implement the plan and design for one more exit . • Install smoke proof fire rated entry lobby at emergency stairways to separate from the area of incidence. (Also require fire rated entry lobby at the floor occupied by other tenants). • All stairway to have direct access to any designated refuge area which requires 4 hour fire rated construction and 2 hour fire rated door at ground floor for fire separated corridor to finished directly to outside. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located adjacent to stair -02 final exit. • Implement the design for 2 hours fire rated walls for open area. • Provide 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area. • Install automatic detection system with automatic fire alarm and control panel. (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 • Install fire lifts equipped with approved intercommunication (including two way voice communications) with the fire command station or control room on the ground floor lobby of the building. • Provide fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor.
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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>	<p>N/A</p>
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<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"> • 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</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"> • Provide rubber mats of adequate size in front of all distribution panels. • Install heat detection in the generator room. • 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 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 and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation. • Avoid bunch of cable at 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 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 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.

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	<ul style="list-style-type: none"> • Provide adequate earthing to body and doors to all DBs. Ensure that all electrical panels provided with proper and separate earth potential.
<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"> • 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. • 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. • For buildings > 20m high, provide at least one vertical shaft of 200 x 400 mm for every 1500 sqm. Floor area. • 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 DB's with non-flammable materials. In addition: 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.