

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: RONY KNITWEAR (PVT) LTD
Address of the Factory	: Dewanpara, Kashipur, Fatullah, Narajanganj-1400
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 7 June, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 7 June, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 7 June, 2015
BKMEA Membership No.	: 58

BASIC INFORMATION:

There were 3 structures in the factory premises: Building 1 is a 6-Storey+Semi-Storey RCC building, Building 2 is a 2-Storey under-construction RCC building and Shed 1 is a single Storey shed building. The structural system of Building 1 is a 2-way beam-column framing at all the floor levels. The following information was noted:

- i. Building Usage Type : Dyeing & Knitting Factory (Garments).
- ii. Structural System : **Building 1:**
RCC 2-way beam - column frame + truss frame roofing at 2 building bays.
Building 2:
RCC 2-way beam - column frame.
Shed 1:
Truss shed on RCC columns.
- iii. Floor System : **Building 1:**
Beam slab system + truss frame roofing at 2 building bays.
Building 2:
Beam slab system.
Shed 1:
GI sheet on truss shed..
- iv. Floor Area : **Building 1:**
Plinth Area (ground floor) = 7872 sft (Approx.)
Total working floor area = 52,056 sft (Approx.)
Building 2:
Plinth Area (ground floor) = 8820 sft (Approx.)
Total working floor area = 21,735 sft (Approx.)
Shed 1:
Plinth Area (ground floor) = 7,015 sft (Approx.)
- v. No. of Stories : **Building 1:** GF + 5-Storey + Semi-Storey
Building 2: GF + Mezzanine Floor + 1-Storey
Shed 1: Single Storey
- vi. Construction Year : **Shed 1:** Construction started in 1993
Building 1: Construction started in 2003
Building 2: Construction started in 2013
- vii. Foundation Type : Building 1: Not Known.
Building 2: Cast-In-Situ RCC Pile foundation

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- viii. Design Drawings : Approval drawings not found.
- ix. Soil Investigation Report : Available
- x. Construction Materials : Stone Aggregated.
- xi. Generator : East side of the Building 1 at ground floor.

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) :
 1. Factory Management to remove any storage loading from column supporting floors of Building 1 and maintain maximum live load not greater than 25.0 psf on the working floors.
 2. Factory Engineer to review design, loads and columns stresses of the total building (Building 1).
 3. Verify in-situ concrete stresses by 100mm dia. cores for D5 & A4 columns of Building 1.
 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 of Building 1, giving consideration to floor capacity and column capacity.
 2. Detail Engineering Assessment to be completed.
 3. As-built architectural and structural drawings of buildings 1 and 2 and Shed 1 to be prepared 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 inconsistencies between the structural design and the as-built construction.
- Long Term (6-months) :
 1. Continue to implement load plan for Building 1.
 2. Factory Engineer to review structural design of Building 2 columns giving consideration to column slenderness. The factory to carry out necessary steps as per suggestion of the factory engineer regarding slender columns.

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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"> <input type="checkbox"/> The minimum clear width of the pathway should be 0.9 meter <input type="checkbox"/> Remove all temporary items from all escape routes, aisles and passageway. <input type="checkbox"/> Direct route of access to required exits should be provided through stairway which is maintained free of combustibles. <input type="checkbox"/> 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 <input type="checkbox"/> Factory management should be checked alarm call points, alarm & detection system periodically and maintained the record properly. <input type="checkbox"/> Provide fire extinguisher at Building-1 (All floors), Building-2 & Shed and to keep the record for re filling & properly tagged. <input type="checkbox"/> Place the extinguisher near the path of exit travel & easily accessible <input type="checkbox"/> The first aid hose and standpipe performance should be checked periodically and properly tagged. <input type="checkbox"/> Provide additional firefighting equipment like sand & water buckets near exit or easily accessible area for first phase fire fighting. <input type="checkbox"/> Combustible materials should keep away from electrical appliances and all the lighting in storage area must have protecting covers and wiring must be in conduits. <input type="checkbox"/> 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>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare proper plan and design for one more exit in a way

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(The remedial works indicated must be carried out within a period of 6 weeks)

not to exceed the maximum travel distance or if the factory designs to equip with an automated fire alarm, portable fire-fighting system and appropriate standpipe and hose system through the entire building the length of travel should not be exceed 60 meter.

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 staircase.

- Minimum clear width should be 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 2 hours fire rated doors for in all stair way encloses of Building-1.

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 lobby.

Prepare proper plan and design for fire rated barrier for 1 hour fire rating separated corridor 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 at the adjacent to evacuation route of stair-2 (Building-1).

Produce proper plan and design for another exit door at mezzanine floor.

Prepare proper plan and design for 2 hrs fire rated barrier with 1.5 hrs fire rated door for yarn store & wastage store and also 4 hrs fire rated barrier with 2 hrs fire rated door for chemical store.

Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at Shed chemical store, generator room and boiler room, which located at the adjacent to rest of the operational 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

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	<p>with power back-up supply & illumination should be a minimum of 10 lux for stairway.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Produce design and plan for automatic detection system with automatic fire alarm for Building-2 & Shed and addressable fire alarm system for Building-1. <input type="checkbox"/> Install Manual activation call point at all exit routes <input type="checkbox"/> Provide adequate nos. of smoke detectors to cover the whole factory building (Building-1 (All floors) & Shed.) <input type="checkbox"/> Prepare proper design and plan for dedicated fire pump with alternate backup power supply. <input type="checkbox"/> Replace existing 1 inch hose pipe replace with 1.5 inch hose pipe to meet the requirement of RMG guideline. <input type="checkbox"/> Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline. <input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> Visual alarm should be placed at the generator room. <input type="checkbox"/> Obtain building approval from issuing authority <input type="checkbox"/> Cover all units / floors in a valid fire license <input type="checkbox"/> Update the boiler license from the proper issuing authority
<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"> <input type="checkbox"/> Implement the plan and design for one more exit or implement with an automated fire alarm, portable fire-fighting system and appropriate standpipe and hose system through the entire building. <input type="checkbox"/> Install staircase as per plan and design. - Minimum clear width should be 0.9 meter. <input type="checkbox"/> Install smoke proof fire rated entry lobby at emergency stairways to separate from the area of incidence. <input type="checkbox"/> All stairway to have direct access to outside of the factory building which requires 4 hour fire rated construction at ground floor for fire separated corridor. <input type="checkbox"/> Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to evacuation route of stair-2 (Building-1). <input type="checkbox"/> Execute another exit door at mezzanine floor.

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	<ul style="list-style-type: none"> <input type="checkbox"/> Provide 2 hrs fire rated barrier with 1.5 hrs fire rated door for yarn store & wastage store and also 4 hrs fire rated barrier with 2 hrs fire rated door for chemical store. <input type="checkbox"/> Provide 4 hours fire rated barriers with 2 hours fire rated door at Shed chemical store, generator room and boiler room, which located at the adjacent to rest of the operational area. <input type="checkbox"/> Install automatic detection system with automatic fire alarm for Building-2 & Shed and addressable fire alarm system for Building-1. <input type="checkbox"/> Install dedicated fire pump with alternate backup power supply. <input type="checkbox"/> Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline. <input type="checkbox"/> Stand pipe supplying first aid hose should have minimum pressure of 200 KPa. <input type="checkbox"/> Provide dedicated storage tank for firefighting operation <input type="checkbox"/> 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. <input type="checkbox"/> 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>	N/A
<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"> <input type="checkbox"/> 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"> <input type="checkbox"/> Provide adequate illumination for generator room. <input type="checkbox"/> All unwanted materials should be removed from Generator room. <input type="checkbox"/> Provide rubber mats of adequate size in front of all distribution panels. <input type="checkbox"/> Install smoke detection and provide firefighting equipment in

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	<p>the substation and generator room.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of LT panels. <input type="checkbox"/> Individual Fuse protection should be provided to every 15/20 A socket. <input type="checkbox"/> 1. All stranded conductors > 6mm² to be provided with cable sockets. <input type="checkbox"/> 2. All stranded conductors < 6 mm², at exposed end should be soldered / crimped. <input type="checkbox"/> Provide supports for main service line complete with adequate insulation. <input type="checkbox"/> 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. <input type="checkbox"/> Provide cable connections with properly soldered / welded lugs at MDB/DB/SDBs. Ensure that all the electrical connections are properly secured with lugs. <input type="checkbox"/> Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation. <input type="checkbox"/> Avoid looping and 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. <input type="checkbox"/> Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. <input type="checkbox"/> Seal the cable penetrations through walls adequately with fire resistive elements. <input type="checkbox"/> 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</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"> <input type="checkbox"/> Provide adequate ventilation arrangements for indoor generator room. <input type="checkbox"/> Provide 4 hour fire rated walls all around the generator room on ground level. <input type="checkbox"/> 1. Wooden switchboards / panel boards should be replaced by non-flammable materials. <input type="checkbox"/> 2. Prefer switchboards made of non-flammable materials. <input type="checkbox"/> Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted). <input type="checkbox"/> Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical

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	<p>wiring should be covered in proper conduit pipes.</p> <ul style="list-style-type: none"><input type="checkbox"/> 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 MDB panels / Switchgears to be vermin / damp proof.2. Ensure all unused holes / openings in DBs to be blocked properly.<input type="checkbox"/> 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.<ol style="list-style-type: none">2. Ensure that connections between conductors / equipments 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
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