

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: A PLUS INDUSTRIES LIMITED.
Address of the Factory	: Plot-28, Sec-7, Milk Vita Road, Mirpur, Dhaka; Bangladesh
Dhaka Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Structural Inspection	: 10 December, 2013
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 10 March, 2014

Basic Information: The present garment factory is a commercial building with beam-column frame system. The following general information was noted:

i. Building Usage Type	: Garment factory
ii. Structural System	: R.C. Beam and Column frame with a 2-way spanning solid slab
iii. Floor System	: Beam slab
iv. Floor Area	: Unavailable
v. No. of Stories	: 6 storied
vi. Construction Year	: 1988
vii. Foundation Type	: Shallow foundation
viii. Design Drawings	: Available (Stamped and signed in June 1988 by RAJUK)
ix. Soil investigation Report	: Available (Dated in June 2013)
x. Construction Materials	: Unavailable
xi. Generator	: Outbuilding

Recommendations for Corrective Action: The recommendations of corrective action for both Structural and Fire & Electrical Safety are as follows:

The recommendations for Structural Safety corrective actions are:

Immediate (Now):

1. Maintain current use of the floors and don't change use or increase occupation, either of which could increase loading.
2. Factory Engineer to review design, loads and columns stresses in area identified above.
3. Verify insitu concrete stresses either by cores or existing cylinder strength data for cores from 4 columns.
4. A Detail Engineering Assessment of Factory to be commenced, see attached Scope.

Mid Term (Within 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. Building engineer to inspect slabs in room near washrooms.

Long Term (Within 6 Months):

1. Continue to implement load plan.

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2. Monitor cracks on beams. Conduct regular inspection of cracks. Investigate if cracks are only in the plastering.
3. If cracks grow larger, removing all items above the slab and close working areas below the affected areas. Engage an engineer to investigate, repair and strengthen the beams.
4. Addition structures should be designed and upgraded to support code loads by the building Engineer, or they should be vacated and removed.
5. Manage drainage from above levels to downpipes to avoid structural corrosion due to continuous moisture.
6. Mitigate water source from washrooms and roof. Manage drainage, waterproof system and isolating layer.
7. If required, specify a treatment system for corrosion and concrete repair.
8. Building 's Engineer to ensure the structure is not loaded beyond capacity. We recommend limit stack height to 1.80m (1.50x1.50m area) and keep 0.60-0.70 m cleared strip around. Limit height to 1.80 m for loose clothing.
9. Building Engineer to create controlled loading plans for all floors.
10. Building engineer to check the structure and its supports and propose additional reinforcements and stability system.
11. Building engineer to check, collect information and produce accurate and complete as-built documentation soonest.

The recommendations for Fire Safety corrective actions are:

Immediate (Within 1 month):

1. Keep egress paths and stairs clear of storage.
2. Replace all gates / sliding doors along the means of egress with side-hinged, swinging egress doors. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
3. Provide exit signs above all exits to the exterior and all doors to the exit stairs.
4. Regularly test the emergency lighting system on each floor and replace/repair lights as needed.

Short Term (Within 3 Months):

1. Separate the hazardous materials / flammable liquid storage room by a minimum 2- hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
2. Separate the boiler, generator and transformer room by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
3. Provide minimum 1.5-hr fire rated doors and seal all unprotected openings to separate the exit stairs from work areas and other building spaces on all floor levels. Ensure that the fire doors are self-closing and positive latching and that they are provided with fire exit (panic) hardware where serving production floors. If fire doors are required to be held open for functional reasons, provide automatic closing devices tied to the fire alarm system.
4. Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.

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5. Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction. Where separate storage rooms may not be feasible, provide defined storage areas and limit the storage arrangement as follows:
 - Maximum height of 2.4m and maximum area of 23m²
 - If sprinkler protected: maximum height of 3.66m and maximum area of 93m².Separate areas of unenclosed combustible storage by a minimum clear distance of 3m.
6. Provide minimum aisle widths of 36-in.
7. Specify appropriate upgrade based on conditions: - Provide a minimum 2-hr fire rated exit corridor between the day-care room and exit stair.
8. Reconfigure the egress arrangement to reduce the maximum common path of travel to not more than 30 m.
9. Provide additional exits.
10. Provide handrails on at least one side of exit stair.
11. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
12. Test the emergency lighting system on each floor and provide additional emergency fixtures to provide adequate illumination along the means of egress. Provide a minimum illumination of 10 lux at the floor level within exit stairs and exit discharge paths and minimum 2.5 lux along exit access aisles.

Mid Term (within 6 Months):

1. Provide additional notification appliances such that the fire alarm system is audible throughout the building in accordance with NFPA 72.
2. Replace the single-station smoke alarms with automatic smoke detectors tied into the fire alarm system. Configure the fire alarm system to initiate occupant notification upon activation of any two smoke detectors in addition to the manual fire alarm stations.

Long Term (More than 6 months):

1. Replace the fire alarm system with a new, listed addressable fire alarm system in accordance with NFPA 72.

The recommendations for Electrical Safety corrective actions are:

Immediate (Within 1 month):

1. Remove all wrapped combustible material from cable. Cables/wirings passing through permanent wall must be protected installing pipes and remaining gaps must be sealed with fire resistant materials. Cable tray/raceway shall be installed for the support of the cable throughout its length.
2. Check for loose earthing-connection and take necessary action accordingly.
3. Install cable tray or riser to support the cables entering and leaving the electrical panel to reduce cable strain on cable termination point. Provide cable gland according to the respective cable size for cable entry and exit so that the cables are not stressed on the sharp edges of the hole of panels.

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4. Install the cables tray or duct with cover (metallic) for the protection of the cable laid on floor. Ensure the cables are tightly latched inside the ladder/tray and provide covers made of non-combustible material preferably metallic sheet to protect the cables' insulation from any physical damage as well as prevent the ingress of debris, dust and lint.
5. Cables must be protected and supported and installed through safe and prescribed routes. Cables laid on external walls of the building must be supported on covered ladders and cable trays in complete length of cables. Seal all the penetrations using appropriate fire rated material and ensure the cable insulation does not get damaged during sealing work.
6. Transformer room must be regularly cleaned and maintained as part of the routine maintenance. Disconnect the transformer from the electrical system before maintenance work and cleaning.
7. Shut down the transformer and replace the silica gel or perform maintenance to remove moisture from it. Consult with transformer servicing company before performing the task. Establish a routine maintenance & inspection program for transformer as well as all other electrical equipment to ensure any future repetition of the occurrence.
8. Fill the Breather oil cup with transformer oil up to the required level as instructed by the manufacturer. Consult with transformer servicing company before performing the task. Establish a routine maintenance & inspection program for transformer as well as all other electrical equipment to ensure any future repetition of the occurrence.
9. Arrange periodic inspection to identify the overloading, loose connection, unbalanced load which may cause the excessive heat-rise and take action accordingly.
10. Provide earth connection for body and doors of metallic distribution boards using green cables preferably braid so that the metallic door remains at zero potential all the time.
11. Remove all the combustible materials, kept near electrical equipment. Generator Battery must be place done the battery stand made of noncombustible material (steel fabricated, acid proof).
12. Broken conduit must be replaced with new standard PVC conduit.
13. Provide phase separators between poles of MCCB made of noncombustible materials preferably use rubber having enough dielectric strength to insulate phases from each other.
14. Establish a routine cleaning program to keep neat and clean the transformer room. Shut down the power of the transformer and clean the exterior of the transformer at scheduled period.

Short Term (Within 3 Months):

1. Multiple cables connecting at a MCCB terminal must be removed. Individual circuit breaker must be used for each load according to the respective cable-size.
2. Remove all the multiple connections made at a single point of bus bar and connect individual branch cables to individual points on bus bar using individual lug according to the respective cable size.
3. Wooden board/combustible material should not be used in any electrical wiring system. Use any combustible material to mount any electrical devise.

Mid Term (Within 6 months):

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1. Excess length of service cables must be trimmed and install a vertical cable tray or ladder with protective cover to support and protect the HT cable. Route the HT cable removing acute bend throughout its whole length.
2. Provide cable gland at the base plate of panels according to the respective cable size for cable entry and exit so that the cables are not stressed on the sharp edges of the hole of panels. Provide covers (of noncombustible material) if any additional gap remains after installing cable glands.

Long Term (More than 6 months): NA