

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Apex Group
Address of the Factory	: Chandora, Kaliakoir, Gazipur , Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 19-June-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 16-June-14

BASIC INFORMATION:

There are 25 buildings in the factory premises out of which twelve are main production buildings and thirteen are ancillary buildings. The buildings are named as: 1) ASKML building, 2) Dying shed, 3) Dying finishing shed-1, 4) Dying finishing shed-2, 5) Raising shed, 6) ASKML knitting shed, 7) Winding shed, 8) Dying shed, 9) ATPML building, 10) Chemical store building, 11) Apex Lingerie building, 12) Dying shed (Apex Lingerie), 13) Corporate office building, 14) Childcare & medical building, 15) Fire pump building, 16) Acid shed, 17) Generator shed (Yarn dying), 18) Pump shed (Yarn dying), 19) Boiler shed (Yarn dying), 20) Workers dining (Apex Lingerie), 21) Generator and work shop shed (ATPML), 22) Boiler shed (ATPML), 23) Generator building (ATPML), 24) Stenter MC Building, 25) Mosque. The following general information was noted:

i.	Building Usage Type	: Garment Factory
ii.	Structural System	: RCC & PEB
iii.	Floor System	: Flat plate, Steel building & beam column system is available
iv.	Floor Area	: 1304926 sq. ft
v.	No. of Stories	: 1) ASKML building 5 storied 2) Dying shed- single storied 3) Dying finishing shed single storied 4) Dying finishing shed-2 single storied 5) Raising shed single storied 6) ASKML knitting shed single storied 7) Winding shed single storied 8) Dying shed 3 storied 9) ATPML building 7 storied 10) Chemical store building 8 storied 11) Apex Lingerie building: 6 storied, 12) Dying shed: single storied 13) Corporate office building 4 storied 14) Stenter M/C Building 2 storied 15) Mosque 4 storied Remaining ten buildings are single story having.
vi.	Construction Year	: 1999-2013
vii.	Foundation Type	: All foundation are isolated footing
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available.
x.	Construction Materials	: Reinforced Concrete & steel
xi.	Generator	: Ground Level

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises of Short Term, Mid Term and Long Term basis are as follows:

The recommendations for Structural Safety corrective actions are:

Immediate : NA

Short Term: (3 Weeks) :

- i. Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded. The designated Load Manager shall oversee this program and ensure it is enforced.
- ii. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load Manager who is located onsite full time at the factory, is trained in calculating operational load characteristics of the specific factory. The Factory Load Manager shall serve as an ongoing resource to RMG vendors and be responsible to ensure that the factory operational loads do not at any time exceed the factory floor load limits as described on the Floor Load Plans.
- iii. Apex Textile And Printing mills Ltd (B-1): Conduct semi-destructive core test to validate the insitu concrete compressive strength of structural elements.

Mid Term (6 Weeks) :

- i. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard and have it posted in all required location.
- ii. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required for the Stenter Machine Building, ASKML Washing Plant, and Apex Textile and Printing mills, ASKML knitting Building.
- iii. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20
- iv. Have a qualified structural engineer confirm that capacity to support the load is available. Load Plans complying with Alliance Standard Part 8 Section 8.20.4.3 should also be developed.
- v. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
- vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- vii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- viii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- ix. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- x. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads. If

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- provisions have not been made, have a qualified structural engineer develop a remediation plan.
- xi. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
 - xii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard and have it posted in all required location.
 - xiii. Have a qualified structural engineer prepare a load plan for each floor and have the floors marked for designating storage area as per the developed load plan.
 - xiv. "Remove deteriorated expansion joint material and provide new approved material at the expansion joint."
 - xv. Under guidance from a qualified structural engineer arrange geotechnical investigation at close vicinity of the structure and make the report available for review.
 - xvi. Repair the exterior façade system to prevent water intrusion.
 - xvii. Have a qualified structural engineer provide further analysis of the identified cracks to determine the appropriate course of corrective action.

Long Term (6 Months) :

- i. Provide a protective coating at the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have protective coating approved by the Alliance or a qualified structural engineer. Or provide 2% slope on the exposed surfaces to prevent the accumulation of water.
- ii. Provide Certificates of Occupancy for review.

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Find out cause of overheating and take proper action including replacing cable or equipment where necessary.
Short Term (3 Weeks)	
Mid Term (6 Weeks)	<p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Provide means of ventilation for the substation room. Consult a qualified electrical engineer to determine the required ventilation rates based on the installed equipment. Provide dedicated neutral for each circuit.</p> <p>Provide capacity information labels (Maximum current rating, no of circuit breakers etc.) for distribution boards. Provide additional light fixtures to increase illumination levels provided in the BNBC.</p> <p>Provide mechanical guards for electrical equipment where necessary.</p> <p>Ensure switchboards and/or distribution boards are kept free of dirt and debris</p> <p>Provide means of ventilation for the generator room. Consult a qualified electrical engineer to determine the</p>

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	<p>required ventilation rates based on the installed equipment. Provide covers or blanks to conceal all live internal components of switchboards and distribution boards.</p> <p>As per BNBC section 2.11.5.4 ensure clear and permanent identification marks are painted in all distribution boards, switchboards, sub main boards and switches.</p> <p>Ensure the means of identification is obtained by separate color coding, marking tape, tagging, or other approved means.</p> <p>Light fixtures without protective covers (otherwise known as naked lights) shall not be allowed in storage areas or in any area where the Inspector of the Factories Rules (1.6.3.7) Part 53 disallows these fixtures. Install signs posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p> <p>Appropriate type and number of firefighting equipment is not installed inside the generator room.</p> <p>Ensure meters and other electrical devices installed on the main electrical equipment are operational.</p> <p>Ensure required equipment and safety signage is posted within the room.</p>
<p>Long Term (6 Months)</p>	<p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Reference NFPA 70e for example program requirements.</p> <p>Ensure underground cables for electrical distribution in the premises or garden or compound of the building are encased in GI or PVC pipes and laid in earth trenches of sufficient depth as per BNBC 2.5.7.2.</p> <p>Make sure fuel storage tanks located within the building have a maximum combined capacity of 2500L (660 gal) or less.</p> <p>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system.</p> <p>Install switchboards and/or distribution boards in compliant locations so that operation is not hampered due to limited access.</p> <p>Ensure switchboards and/or panel boards are not installed above gas stoves or sinks or within 2.5m of any washing unit in washing rooms or laundries.</p> <p>Consult with a qualified Electrical Engineer and ensure electrical cables are sized according to capacity of circuit breakers.</p>

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	<p>Remove multi looping of cables at circuit breakers within distribution boards.</p> <p>Connect all metal in the building to the building earthing/grounding system such as metal rebar in concrete, metal frame of building, or metal water pipe.</p> <p>Ensure proper layout diagram of the lightning protection system and ensure vertical conductors are appropriately spaced. Consult with an expert electrical engineer and prepare drawing for lightning protection including risk index and make sure your system is secured against lightning.</p> <p>Ensure proper layout drawing of the lightning protection system and consult with an Expert electrical engineer to make sure your system has the appropriate number of down conductors installed based on the building size.</p> <p>Ensure cable joints through porcelain/PVC connectors with PIB tape wound around joint.</p> <p>Ensure The lightning protection ground terminals are bonded to the building or structure grounding as per Alliance Standards Part 10 Section 10.11 Lightning Protection.</p> <p>Provide cable sockets for stranded conductors having a nominal cross-sectional area 6mm² or greater.</p> <p>Complete thermographic scans at least on a three year cycle. Thermographic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems & Rotating Equipment and NFPA 70B or a comparable standard.</p> <p>Contact with transformer manufacturer regarding report of PCB containment of transformers and consider replacing transformers with harmful substances to reduce health hazards.</p> <p>Lead telecommunication or antenna cables separately to the main point of service. Power and telecommunications cables must have separate entrance.</p> <p>Ensure all electrical cable properly terminated at its point of termination.</p> <p>Install phase separators between terminal connections at the noted locations.</p>
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The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all combustibles stored underneath the cutting tables at the noted
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	locations.
Short Term (3 Weeks)	Install non-lockable side hinged outward swinging type fire-rated emergency exit doors in all buildings. Remove all hasps, locks, slide bolts, and other locking devices.
Mid Term (6 Weeks)	<p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees.</p> <p>Remove existing aisle marking and draw new marking fulfilling the minimum aisle width requirement of 0.9m (36in). Relocate the machines accordingly if necessary.</p> <p>Develop a testing and maintenance program that ensures the operation of all exit signs is verified at least once per year. If battery-operated signs are used, these lights shall be tested on a monthly basis. Functional testing of battery powered signs shall be provided for a minimum 90 minutes once per year.</p> <p>Conduct fire drills on a quarterly basis as outlined in BNBC Part 4 Appendix A for all garment facilities. Fire drills shall be conducted under the direction of a Fire Safety Director.</p> <p>Apply to department of explosives for the chemicals stored beyond the approved limit of existing license.</p>
Long Term (6 Months)	<p>Provide 2 hr fire-resistive rated construction barriers at exit enclosures of Four story ASKML building, Seven story ATPML building, Eight story chemical store building, Six story Apex Lingerie building, Four story corporate office building & 1 hr fire-resistive rated construction barriers at exit enclosures of 3 story dying shed. Also fit side-swinging, self-closing, non-lockable fire doors of 1.5 hr rating in Four story ASKML building, Seven story ATPML building, Eight story chemical store building, Six story Apex Lingerie building, Four story corporate office building & 1 hr rating in 3 story dying shed at exit enclosures that swing in the direction of egress. Consult a qualified fire protection engineer to design the required rated construction barriers.</p> <p>Have a qualified engineer review the pump capacity and ensure hydraulic calculation is done which can be supported by this pump. Also, identify all other performance data and ensure conformity to NFPA 14, 20, 22 and 25 standards. If current pump does not meet NFPA 20 standard then replace with a new fire pump that meets the standard.</p> <p>Sprinklers shall be spaced and installed following the requirements of NFPA 13.</p> <p>Provide a shaft enclosure of required rating by constructing the enclosure with rated material of required thickness. Protect the openings of shaft</p>

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	<p>enclosures by providing rated opening protectives.</p> <p>Have a qualified engineer review the pump capacity and ensure hydraulic calculation is done which can be supported by this pump. Also, identify all other performance data and ensure conformity to NFPA 14, 20, 22 and 25 standards. If current pump does not meet NFPA 20 standard then replace with a new fire pump that meets the standard.</p>
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