

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Chestnut International Ltd.
Address of the Factory	: Hazi Azmot Ali Plaza, Degerchala, Hurricane Bus, Stand, N/U, Gazipur, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 7 th June, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 7 th June, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 7 th June, 2015
BGMEA Membership No.	: 6001

BASIC INFORMATION:

The assessed factory building is a 6- Storey RCC building. The structural system of the building is RCC beam column frame and beam slab floor system. The following general information was noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column frame system.
iii. Floor System	: RCC beam slab floor system.
iv. Floor Area	: Floor area is 26000 sft (Chestnut International Ltd.)
v. No. of Stories	: 6-Storey.
vi. Construction Year	: Building was built in one phase (2007-2008).
vii. Foundation Type	: Isolated column footing foundation.
viii. Design Drawings	: Available- Structural design drawing, soil test report, approval drawing, and machine layout plan. Not available-, architectural design drawing, as built structural drawing, material test report, floor load plan
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick Aggregate.(beam, column and slab)
xi. Generator	: Ground floor (separate building).

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)	: None.
Mid Term (6-weeks)	: <ul style="list-style-type: none">• Factory Engineer to review design, loads and columns stresses in area identified.• 2. Verify in situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for [the identified columns] or [100mm dia. cores from 4 columns].
Long Term (6-months)	: <ul style="list-style-type: none">• Structural engineer has to survey this factory and prepare as built structural drawing, floor load plan and prepare/update

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calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure. Also manage corrected approval from concern authority.

- 2. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

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"> • All the firefighting equipment's need to test with proper documents. • Factory needs to have sufficient number & width (0.9m) of marked aisles at all floor of the production building. • Lights in storage area needed to be installed with protective covers and conduits. • Kitchen area needs to be installed fixed temperature type detectors and portable fire extinguishers as per guideline. • Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions and comply with the following conditions: <ul style="list-style-type: none"> (a) The color and design of lettering, arrows and other symbols on exit signs needs to be in high contrast with their background; (b) Words on the signs needs to be at least 150 mm with a stroke of not less 20 mm; (c) The source of illumination, contrast, intensity and luminance needs to be at least 50 lux, 0.5, 5.0 foot-candles and 0.2 cd/m² respectively. • Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack.

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<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"> • Needs to have as built drawing with floor machine layout showing means of escape with proper dimension. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher • All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key. • Provide continuous guards and handrails on both sides of the entire stairs. • Illuminated emergency light needs to be covered in all floors, exits, staircases and aisles of all the factory buildings or sheds. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than 2.5 lux at floor level. • Emergency back-up power needs to be connected for critical fire safety system and not less than 30 minutes in case of failure of power supply.
<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"> • Factory needs to have a proper pre-plan for fire service & civil department. • Final exit route-1(Stair-1 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from yarn store at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area. <p>Final exit route-2(Stair-2 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from yarn store at ground floor by 2 hours rated construction with 1.5 hours rated door/opening and need to be protected from 4 hours rated construction with 2 hours rated doors/opening from generator room, also need to have the protected escape route till to reach safe refuse area.</p> <ul style="list-style-type: none"> • All the storage area(Yarn store of GF and Accessories store of 1st floor) need to be protected by 2 hours fire rated construction with 1.5 hours fire rated doors/opening

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	<ul style="list-style-type: none">• Boiler room needs to be fire separated with iron and sample section by 4 hours rated construction and 2 hours rated opening.• Generator room needs to be fire separated with 4 hours fire rated enclosure and 2 hour rated opening with final exit-2 having direct access from outside.• All the stairs(Stair 1&2) need to be protected with fire and smoke resistant enclosures & opening (2 hours rated enclosure and 1.5 hour rated door)and provide the protected route from all though the stairway to the final exits• Factory need to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline• The factory need to install manually operated electrical fire alarm system and automatic fire alarm system.• manual Also need to install operated electrical alarm system in the• working floor with single or multiple call boxes located on each floor including other tenanted floors of the building as per NTPA Guideline• Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline• Install standard standpipe and hose system as well as fire pump system to ensure required hose pressure at the highest and most remote part of the building.• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.• Factory needs to install dedicated fire pump with sufficient capacity and backup power.• Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900ltr x 75min=142500 liters water storage tank.
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(B): Recommendations for Electrical Safety corrective actions:

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<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating ($>$ ambient+ 40°C) and take proper action.
<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"> Provide two separate and distinct connections of earthing for the generator. Ensure all distribution boards (including panel door) are earthed properly. Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.
<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"> Post safety signage and install fire-fighting equipment in the generator room. Also ensure graded rubber mats are provided at required locations. Provide Instruction board for first aid and artificial respiration in the generator room. Ensure distribution board has a minimum clearance of 1 m (39 in) in front. Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth busbar of distribution boards and ensure continuous earth path is back to main building intake. Rewire to avoid the use of multiple cables at bus bar terminal and from incoming and outgoing side of MCB's/MCCB's. Ensure all electrical cables are sized according to capacity of circuit breakers. Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. Seal the openings remaining after wiring system passes through the elements of building construction according to the degree of fire resistance.

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	<ul style="list-style-type: none"> • Connect all metal in the building to the building earthing system. • Ensure Lighting fixtures are supported properly from the structure. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating { ambient+(20⁰C-40⁰C)} and take proper action.
<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"> • Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data. • Inspect electrical panel boards on an annual basis. • Ensure overhead service connections to the building are led via adequate size and type of service masts. • Ensure the generator room has adequate fire separation from the factory building. • Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities. • Ensure distribution boards have no opening and all live internal components are concealed properly. • Provide dedicated & adequate size of neutral with proper identification for each applicable circuit from the neutral busbar of distribution boards and ensure continuous earth path is back to main building intake. • Ensure each distribution board is provided with a circuit list and means of identification is provided as per list. • Provide adequate support and mechanical guards for electrical equipment and wiring where necessary. • Make cable channel dust free and provide adequate covers on it. • Ensure exposed wiring are run horizontally with proper mechanical support and avoid wiring at an angle or

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	<p>hanging way with improper support.</p> <ul style="list-style-type: none">• Provide proper cable terminator/connector for stranded conductors at its point of termination.• Install separate distribution boards for lighting and power circuits.• Provide individual fuse or miniature MCB for each 15/20A socket outlet.• Install lightning protection system on the building confirming its requirements and adequacy.
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