

## **Summary of Preliminary Assessment on Structural, Fire and Electrical Safety**

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Name of the Factory	: Crystal Martin Knitwear Bangladesh Ltd. (Building-1)
Address of the Factory	: Halder Complex, Plot # 459 (New), Teknagpara, Chowrasta, Gazipur, Bangladesh.
Present Status of the Factory	: Not in Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 29 <sup>th</sup> July, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 29 <sup>th</sup> July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 29 <sup>th</sup> July, 2015
BGMEA Membership No.	: 4813

### **BASIC INFORMATION:**

There are two “ten storied” buildings in the factory premises. Both the Buildings are occupied by the Crystal Martin Knitwear Bangladesh Ltd. Both of them are used as rental basis by the factory owner. This report represents only the Structural integrity Assessment of Building-01.

The present garment factory (Building-1) is a ten storied industrial building with dual system (beam-column frame structure, flat plate system). The following general information was noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: Dual system (beam-column frame structure & flat plate system).
iii. Floor System	: Flat plate and Beam slab floor system.
iv. Floor Area	: Total floor area is 202,000 sft. (Approximate)
v. No. of Stories	: 10-Storied.
vi. Construction Year	: 1998-2000
vii. Foundation Type	: Isolated column footing foundation.
viii. Design Drawings	: Available document: Structural design drawing, approval drawing, architectural design drawing, material test report. Not available- Soil test report, floor load plan, machine layout plan.
ix. Soil Investigation Report	: Unavailable.
x. Construction Materials	: Stone chips and brick chips ( column), brick chips (beam, slab)
xi. Generator	: At ground floor (Building 2).

### **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) : None.

Long Term (6-months) :

- Building Engineer need to survey this factory. Prepare as built structural drawing, soil test report, and floor load plan. Prepare/update calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure.

The recommendations for **Fire & Electrical Safety** corrective action are:

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### (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>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<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"> <li>• Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for.</li> <li>• Factory need to have proper testing plan &amp; record of fire safety equipment.</li> <li>• Factory needs to be installed with portable fire extinguishers in all working floors at least 1 number after every 100 feet distance.</li> <li>• Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9 m 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.</li> </ul>
<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"> <li>• All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.</li> <li>• Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension.</li> <li>• Factory need to have a valid fire license with covering full occupied area &amp; clearly mention the coverage area in the license.</li> <li>• Fire manager/Director need to have safety training from proper authority &amp; worker of the factory should as far as possible be trained for use fire equipment.</li> <li>• 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.</li> <li>• Factory needs to provide handrail on both sides of all the stairways.</li> <li>• Factory needs to be installed with adequate illuminated</li> </ul>

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	<p>emergency lighting in floors, exits &amp; stairs. (Escape route).</p> <ul style="list-style-type: none"> <li>• Factory need to install sufficient capacities standby generator and connected to supply power for staircase and corridor Lighting, fire lifts, standby fire pump, pressurization fans and blowers, smoke extraction and damper systems in case of failure of normal electricity supply and must having the minimum capacity to serve for 1 hour with the NTPA requirements.</li> <li>• Factory need to install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.</li> </ul>
<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"> <li>• Factory needs to have a proper pre-plan for fire service &amp; civil department.</li> <li>• Final exit route-1(Stair-1 route) needs to be protected from lift by 2 hours fire rated construction with 1 hours fire rated auto closing door at each floor level including ground floor and needs to be protected by 4 hours rated construction and lobby with 2 hours fire rated door/opening at each floor level entrance including ground floor also needs to have the protected escape route till to reach safe refuse area.</li> <li>• Final exit route-2-6(Stair-1-6 route) need to be protected by 4 hours rated construction and lobby with 2 hours fire rated door/opening at each floor level entrance including ground floor and needs to have the protected escape route till to reach safe refuse area.</li> <li>• Storage area (Finished goods store) needs to be protected by 4 hours rated construction with lobby and 2 hours rated opening or doors from the stair-1 at 1st floor level of the building-1.</li> <li>• Factory need to protect the generator room from the final exit-2 at south-west portion which is located at ground floor of the building by 4 hours rated construction with 2 hours fire rated door/opening.</li> <li>• Factory need to protect the sub-station room from the final exit-02 of the building by 4 hours rated construction with 2 hours fire rated door/opening.</li> <li>• Stairs-1 needs to be protected by 2 hours fire rated construction and 1 hours fire rated auto closing door from the lift at each floor level and needs to be</li> </ul>

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	<p>protected by 4 hours fire rated construction with lobby and 2 hours fire rated door at each floor level entrance, also need provide the protected route from all though the stairway to the final exits.</p> <ul style="list-style-type: none"><li>• Stairs-2 to 6 needs to be protected by 4 hours fire rated construction with lobby and 2 hours fire rated door and need provide the protected route from all though the stairway to the final exits.</li><li>• Factory needs to protect the lift with 2 hours rated enclosure &amp; 1hour rated auto closing fire door</li><li>• Factory need to install fire lift with backup power including having 1 hour fire rated &amp; auto closing fire door in 2 hours fire rated lift core with backup power &amp; having minimum capacity of 545 kgs.</li><li>• All the stairs need to be protected with a 4 hours fire resistant and smoke proof lobby (4 hours rated enclosure and 2 hour rated door) at each floor entrance and provide the protected route from all though the stairway to the final exits.</li><li>• Factory need to install centralized and automatic fire detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.</li><li>• The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building.</li><li>• Factory needs to install control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline</li><li>• Factory needs to install proper standpipe system with having at least 100 mm dia of riser.</li><li>• Factory needs to install 1 riser per 1000 m2 of floor area &amp; 38 mm diameter of hoses with variable nozzle.</li><li>• Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 Kpa.</li><li>• Factory needs to be installed with Siamese connection</li></ul>
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	<p>for to the standpipe system located outside the building and accessible to the fire department connection.</p> <ul style="list-style-type: none"> <li>• Factory needs to have dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</li> </ul>
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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>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<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"> <li>• Ensure all distribution boards (including panel door) are earthed properly.</li> <li>• Ensure inspection of all earthing system is being completed and documented.</li> </ul>
<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"> <li>• Install appropriate number and type of safety signage and fire-fighting equipment at substation. Also ensure graded rubber mats are provided in front of all distribution boards.</li> <li>• Provide Instruction board for first aid and artificial respiration in the substation room.</li> <li>• Ensure the substation room has adequate illumination level as per standard.</li> <li>• Fill the transformer breather with fresh Silica gel and oil cup with fresh Oil.</li> <li>• Provide dedicated &amp; 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.</li> <li>• Connect all metal in the building to the building earthing system.</li> </ul>
<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"> <li>• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</li> <li>• Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</li> </ul>

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	<ul style="list-style-type: none"><li>• Inspect electrical panel boards on an annual basis.</li><li>• Ensure the substation room has adequate fire separation from the main building.</li><li>• Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</li><li>• Ensure all high tension cables are laid following standard cable laying techniques.</li><li>• Ensure distribution boards have no opening and all live internal components are concealed properly.</li><li>• Provide dedicated &amp; adequate size of neutral with proper identification for each applicable circuit.</li><li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li><li>• Ensure wiring systems are selected and erected so that no damage is caused by the ingress of water.</li><li>• Install lightning protection system on the building.</li></ul>
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