

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

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Name of the Factory	: <b>Well Designer (Washing Unit) Ltd.</b>
Address of the Factory	: A-23, S-6, BSCIC Industrial Estate, Kalurghat, Chittagong, Bangladesh
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 16 Jun 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 15 Jun 2014 & 11 Jun 2014

### **BASIC INFORMATION:**

The present garment factory is comprises of a 3 Main Buildings 1 Ancillary Buildings. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : Building is a Moment Resisting Frame with monolithic beam slab.
- iii. Floor System : Beam slab type in RCC Building
- iv. Floor Area : 477919 SF.
- v. No. of Stories : 1) Six Story RCC main production building-1: 6 (Grade + 5)  
2) Ten Story RCC main production building: 10 (Grade + 9)  
3) Six Story RCC main production building-2: 6 (Grade + 5 + Occupied Roof).
- vi. Construction Year : 1) Six Story RCC main production building-1: Finished in 2004, 2) Six Story RCC main production building-2: Finished in 2005, 3) Ten Story RCC main production building: Finished in 2006, 4) Single story prefab ETP shed: Finished in 2005
- vii. Foundation Type : Foundation is combined footing with wooden pile foundation and pile Foundation.
- viii. Design Drawings : Available.
- ix. Soil investigation Report : Available
- x. Construction Materials : RCC (Stone & brick chips).
- xi. Generator : Ground Floor

### **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.

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Mid Term (6 Weeks)

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- i. Engage a qualified structural engineer to perform a detailed assessment within 6 weeks. The assessment should include core testing to assess concrete strength.
- ii. Conduct destructive testing or core samples under the guidance of qualified engineer.
- iii. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate these water tanks. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
- iv. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading and storm surge.
- v. Complete further testing on areas of deterioration in order to understand the level of corrosion and weakening of the member and have a qualified structural engineer develop a remediation plan.
- vi. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- vii. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- viii. The management should ensure that the construction practices and safety being adhered to as per BNBC or standard.
- ix. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- x. 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
- xi. 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.
- xii. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- xiii. Remove the blockages from the existing expansion joints. A qualified structural engineer should be involved for maintenance of expansion joints.
- xiv. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- xv. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- xvi. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

Long Term (6 months)

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- i. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- ii. Repair the exterior façade system to prevent water intrusion.
- iii. 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. Alternatively, provide a 2% slope on the exposed surface to prevent accumulation of water
- iv. Apply for issuance of Certificate of Occupancy and pursue the matter to obtain the same

### The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Find out the cause of overheating and take proper action.
Short Term (3 Weeks)	<p>All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system. The required marking can be by color code, the words “emergency system,” or any other method that identifies the box or enclosure as a component of the emergency system.</p> <p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Keep records of completed training available on site.</p> <p>Ensure light fixtures without protective covers are not installed in storage areas or in any area where the Inspector of the Factories Rules (1.5.3.5) Part 53 disallows these fixtures.</p>
Mid Term (6 Weeks)	<p>Provide earthing connection to all exposed-conductive parts (metal) related to/in close proximity to electrical equipment/installation and utility service such as metallic water/gas/steam pipes etc. such that all the metals remain at a substantially same potential of building earthing system.</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>Need to separate the multiple and looping cables either using proper size of circuit breakers or connecting separately on bus bars as per requirements.</p> <p>Provide dedicated neutral for each circuit.</p>

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Long Term (6 Months)	<p>Complete thermo graphic scans at least on a three year cycle.</p> <p>Thermo graphic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems &amp; Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Have a qualified Electrical Engineer design a lightning protection system according to the BNBC requirements. Have a licensed electrician install the designed system.</p>
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### The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove collapsible gate and extend the path of egress.
Short Term (3 Weeks)	<p>Remove all hasps, locks, slide bolts, or other locking devices at the noted locations.</p> <p>Separate the kitchen with 1 hour rated construction and install listed cooking equipment.</p>
Mid Term (6 Weeks)	<p>Develop a testing and maintenance program that ensures the operation of all exist 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 30 min once per year.</p> <p>Post the occupant load for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Develop a testing and maintenance program that ensures the emergency power for exit signs is tested at least once per year. If battery operated signs are used, these lights are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year.</p> <p>Develop an emergency evacuation plan which includes duties and responsibilities of various people/groups, interfacing between groups and fire brigade, headcount and identification of trapped victims, physically disabled people and their rescue, etc. and all components required by the Alliance Standards and communicate the plan to all employees. The evacuation plan shall include provisions to assist physically disabled persons. A list of all employees with physical disabilities shall be kept by the Fire Service Director.</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer. The systems are to be compliant with the requirements of NFPA 14.</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress in six story RCC main production building [Well Designers Ltd, Sanzi Textiles Ltd. and Well Fashion Ltd.] as required in Alliance</p>

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	<p>Standards Part 13 Section 13.4.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations as per Alliance Standard Part 6 Section 6.9 Stairs.</p> <p>Apply to BSCIC, Chittagong for issuance of occupancy certificate and pursue the matter to expedite.</p>
<p>Long Term (6 Months)</p>	<p>Provide a shaft enclosure of 2 hr rating by constructing the enclosure with rated material of required thickness. Protect the openings of shaft enclosure by providing 1.5 hr rated opening protectives.</p> <p>Provide 1 hr fire protective opening assemblies in 1 hr rated exit enclosure. Provide 1.5 hr fire protective opening assemblies in 2 hr rated exit enclosure. Install approved fire rated doors that are listed, permanently labeled, automatic-closing, in compatible fire rated frames with latching hardware.</p> <p>Replace all collapsible, sliding in means of egresses with side-hinged swinging type doors of proper width and rating.</p> <p>Openings in fire resistance rated walls shall be protected in accordance to the Alliance standard 4.6 with BNBC Part 4 Section 2.5. If these openings are not required, close these.</p> <p>Provide 2 hr fire-resistive rated construction barriers at exit enclosures. Fit outward opening, side-swinging, self-closing, non-lockable fire doors of 1.5 hr rating in all stairwell enclosures as per Alliance 4.6. Install rated, listed, labeled fire doors that have been approved by the Alliance. Consult a qualified fire protection engineer to design the required rated construction barriers.</p> <p>Install one listed fire pump system to supply the demand of the sprinkler and standpipe systems for all buildings. Submit product data, drawings and hydraulic calculations and secure Alliance approval before purchase and construction.</p> <p>Install an automatic sprinkler system throughout the ten storied building designed by a qualified fire protection engineer. The hydraulic design of the sprinkler system has to be pre-approved by CoE of Alliance. The test and performance report of the installed system has to be submitted to Alliance for review. Final inspection and testing shall be witnessed by Alliance according to clause 5.3.</p> <p>Install Class I fire department valves at the floor landings in each stair per NFPA 14. Install a standpipe system at required locations designed by a qualified fire protection engineer. The system is to be compliant with the requirements of NFPA 14. The hydraulic calculations should be reviewed by Alliance and review to be completed prior to start of work. All standpipe system installations shall be submitted for review by the Alliance for review</p>

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	<p>prior to commencement of installation according to 5.4.3.2.</p> <p>Opening should be sealed and should have 3 hr rating.</p> <p>Construct a 2 hour fire rated exit passageway to connect the stair shaft to exterior discharge.</p> <p>Construct required rated barrier for the open exit passageway in accordance with Alliance Standard Part 6 Section 6.14.</p> <p>Remove the collapsible gate and demolish the extended portion if possible.</p> <p>Exit access corridors serving an occupant load exceeding 30 are to be separated by walls having a fire resistance rating of 1 hr in accordance with 4.5 or remove the storage from the adjacent space.</p> <p>Get at least 25 percent of workers trained and certified in fire fighting, first aid, and rescue training by the proper authority.</p> <p>Replace the door from its existing position toward the inside the floor so that door does not swing out over the stairs.</p> <p>Where sprinklers are installed throughout a floor, area smoke detection is not required per Section 5.7.3.1 of Alliance Standard. Otherwise, automatic area smoke detectors are required throughout G2 buildings per Section 5.7.3.6 of Alliance Standard. Provide adequate number of detectors based on coverage of a detector specified by manufacturer. Maximum possible coverage of a detector is 900 sft (if not confined by bays) as per NFPA 72. Each zone indicated in control panel shall cover 22500 sft area or less.</p> <p>Install fire department connections where required and in compliance with the Standard. According to Alliance Standard 5.5.4 fire department outlet connections shall be provided to allow fire department pumper vehicles to draw water from ground-level or underground water storage tanks. Connections shall match the Fire Service and Civil Defense hose thread standard.</p> <p>Separate occupancies with rated construction as per Section 3.4.2.1 of Alliance Standard. Provide fire-resistive rated construction barriers between different types of occupancy with following Table 4.4.1 of Alliance Standard or Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Replace all non-compliant doors and frames in the means of egress with doors that are listed, approved, automatic-closing, side-swinging, fire rated doors in compatible fire rated frames with latching panic hardware. Then provide reentry as per the Alliance Standards Part 6 Section 6.8.</p> <p>Install illuminated exit signs at entrances to exits and along the path of egress anywhere the continuation of egress is not obvious or there is a change in the direction of the path of</p>
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	<p>travel.</p> <p>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7 as demanded in Alliance Standard Part 13 Section 13.10.3.</p> <p>Provide handrails on both side of each stairway. Provide handrail of height between the range 865 mm (34 in.) and 965 mm (38 in.).</p> <p>Increase the parapet height to 42 inches in the six story RCC main production building [Well Designers Ltd, Sanzi Textiles Ltd. and Well Fashion Ltd.].</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B. In general, this program should address process of request and approval authorities, necessary checks prior approval, standby fire watch and fire fighting equipment, sounding of alarm procedure, duration and expiry of permit and re-approval procedure etc.</p> <p>Establish an inspection, testing, and maintenance program for the fire pump. Program shall comply with NFPA 25.</p>
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