

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: So Nice Garments (Pvt.) Ltd.
Address of the Factory	: G.P GA 185/A (4th & 5th Floor), Mohakhali, Gulshan, Dhaka, Bangladesh.
Present Status of the Factory	: Under operation
Structural assessment conducted by	: Alliance.
Date of Structural Inspection	: 13-Mar-2014.
Fire & Electrical assessment conducted by:	Alliance.
Date of Fire & Electrical Inspection	: 13-Mar-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	: Mixed Use Building.
ii.	Structural System	: RCC beam slab structure.
iii.	Floor System	: Beam slab.
iv.	Floor Area	: Total floor area is 42000 sft.
v.	No. of Stories	: 7 Storied RC Building with partial roof top shed, but the 4th to 6th floors are rented by the factory operator
vi.	Construction Year	: 1990-1992
vii.	Foundation Type	: unknown.
viii.	Design Drawings	: Not available.
ix.	Soil investigation Report	: Not available.
x.	Construction Materials	: Brick aggregate with 40 grade rebar.
xi.	Generator	: Ground Floor.

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural, Fire and Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

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.
Mid Term (6 Weeks)	:
	i. Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure including core testing to assess concrete strength. Concrete strength shall be assessed by

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taking at least 4 nos. of 4 inch diameter cores from the area of concern. If cores are to be taken from column, it is advisable to take it from an upper level where the stresses are low (for practical reasons 3 inch cores may be taken from columns). In addition, UPV shall be used to have concrete strength in sufficient number of columns in the lower tiers so that a level of confidence is achieved. The calibrated results of core tests and UPV shall be used to determine a reliable value of concrete strength in columns. The size and diameter of steel rebar in most of the columns of two lowest tiers shall be authentically determined using a Ferro scanner or similar device. In order to confirm the diameter of embedded bars as obtained from Ferro scanner, the Assessor may have to remove the concrete cover in one or two locations.

- ii. Under guidance from a qualified structural engineer arrange geotechnical investigation at close vicinity of the structure and make the report available for review.
- iii. Have a qualified structural engineer provide further analysis and testing of the noted settlement and crack issues. If required, a remediation plan shall also be provided by the qualified structural engineer.
- iv. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- v. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
- vi. 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
- 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. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- ix. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- x. Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan.
- xi. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- xii. 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.
- xiii. Have a qualified structural engineer develop Floor Loading Plans as per the requirements of Part 8 Section 8.20.5.3.

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- xiv. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xv. Provide Certificates of Occupancy for review.

Long Term: (6 Months) :

- i. Necessary remediation after completion of DEA.
- ii. 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.

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Storage underneath the cutting table shall be kept clear of combustibles at all times.</p> <p>Replace all combustible part of the stairs with noncombustible materials.</p>
Short Term (3 Weeks)	<p>Keep doors lock free in the direction of egress under any conditions. All hasps, locks, slide bolts, and other locking devices shall be removed where available.</p>
Mid Term (6 Weeks)	<p>Fire Department pre-planning has not been completed yet. Complete fire department pre-planning activities with the local Fire Service and Civil Defense in accordance with Alliance Standard, Part-13, Section-13.1.1(2).</p> <p>Install an automatic fire alarm and detection system for the facility. System shall comply with the Alliance Standard and NFPA 72. Consult a qualified fire protection engineer and/or authorized fire alarm company to design and install the system. Centralized fire alarm and detection system and the control panel of this system shall be monitored by a central station monitoring service or directly connected to the Fire Service and Civil Defense. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defense can be set up, a person needs to be assigned to contact the fire department in the event of fire alarm activation. An annunciator need to be located in a constantly attended location to alert this person.</p> <p>Occupant loads were not posted in any assembly and production floor as demanded in Alliance Standard Part 6 Section 6.4.4. 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 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 90 min once per year.</p>

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	<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 or, since battery back up is used, these lights are required to be tested on a monthly basis.</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress.</p> <p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees.</p> <p>Fire drills need be conducted on a quarterly basis as outlined in BNBC Part 4 Appendix A for all garment facilities with records keeping. All occupants of the building need to be participate in the fire drill. Those fire drill need to be conducted under the direction of a Fire Safety Director.</p> <p>Stair designation signs need to be provided at each floor entrance from the all stairs to the floor in English and Bengali. Signs need to be indicating the name of the stair and the floor level. Signs shall be posted adjacent to the door.</p> <p>No occupancy certificate available for the building in the factory premises. Apply to RAJUK for issuance of occupancy certificate and pursue the matter to expedite.</p> <p>Training programs need to be implemented and documented in accordance with the Alliance Safety Training Curriculum.</p> <p>All applicable permits need to be up to date.</p>
<p>Long Term (6 Months)</p>	<p>Provide fire rated doors in all exits. The new fire rated door will side-hinging swinging outward opening type, with auto closure and panic bar and without locking arrangement as per Alliance Standards Part 6 Section 6.8 Doors and Gates. Width of the door need to be calculated as per alliance standard section 6.5 and minimum width of new fire rated door will 1.00 m as per BNBC Chapter 4 section 3.9.3. Every door in a stair enclosure serving more than 4 stories needs to provide with re-entry provision as per Alliance Standards Part 6 Section 6.8 Doors and Gates. Consult a qualified fire protection engineer to design the required rated construction barriers with opening protection.</p> <p>Provide minimum number of two (02) stairs as required in a factory building from Ground floor to roof. As the building is seven (07) story and maximum occupant load is 120 in sewing section at 4th floor, two stairs are satisfactory. Extend stair-02 up to the roof from 5th floor. Before construction the structural integrity of the building needs to be evaluated by a qualified structural engineer that the new part of the stair will not create any adverse effects to the building.</p>

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	<p>Provide 2-hour fire-resistive rated construction barriers at exit enclosures with 1.5-hour fire-rated opening protection (Door, window, etc.) Provide fire-resistive rated (0.75-hour for boiler room and 1.5 hour for generator room) opening protection (Door, Window, Hatch Cover, etc.) at opening and penetration through fire rated walls and/or assemblies or enclose the unprotected openings by fire-restrictive rated barrier as per requirements. Consult a qualified fire protection engineer to design the required rated opening protection.</p> <p>Modify or install the standpipe System (Class-I and class-II) to meet the requirements of Alliance standard's section 5.4. Consult a qualified fire protection engineer before modify or installing a new system.</p> <p>Provide 2-hour fire-resistive rated construction barriers at exit enclosures with 1.5-hour fire-rated opening protection (Door, window, etc.). The new fire rated door will be side-hinging swinging outward opening type, with auto closure and panic bar and without locking arrangement. Minimum width of new fire rated door will 1.00m. Every door in a stair enclosure serving more than 5 stories needs to provide with re-entry provision. Doors need to be free from general locking arrangements. Consult a qualified fire protection engineer to design the required rated construction barriers with opening protection.</p> <p>Install a dedicated fire pump in accordance with NFPA 20 to supply the demands of water to the connected fire protection systems along with a stored source of water sufficient to meet the demands as per NFPA 22.</p> <p>Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. Devices should be part of an automatic fire alarm and detection system for the facility. All fire alarm installations shall be submitted for review by the Alliance prior to commencement of installation. Consult a qualified fire protection engineer to design the system.</p> <p>Once non-compliant doors are replaced, provide re-entry to floor levels from the stairwells in accordance with Allainace Standard Section 6.8.3.</p> <p>Install fire extinguishers based on hazard type in accordance with BNBC Part 4 and NFPA 10.</p> <p>Once a dedicated fire pump is installed, establish an inspection, testing, and maintenance program for the fire pump. Program must comply with NFPA 25.</p> <p>Once compliant standpipe system is installed, install signage at required locations and on required equipment. Signage must comply with NFPA 14.</p> <p>Provide occupied roofs with the minimum number of exits (stairs) required as a story. As the building is seven (7) stories a minimum of 2 stairs are required to serve the floor</p>
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	<p>as per occupant load calculation. Extend stair-02 up to roof from 5th floor. Before construction the structural integrity of the building needs to be evaluated by a qualified structural engineer that the new part of stair will not create any adverse effects to the building.</p> <p>Install handrails on the both side of the stairs. A minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.) as measured from the leading edge of the tread need to be maintained when installing new handrails. The spacing between vertical members will not exceed 200 mm (8 inch).</p> <p>Provide fire-resistive rated construction barriers between hazard types in accordance with Alliance Standard Sections 3.4 and 4.5. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install Illuminated exit signs with backup power and continuous graphics 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 travel.</p> <p>Provide an emergency power source, either by battery back or up or by connecting to the emergency power system, for illuminated exit signs.</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers. Program needs to comply with the requirements of NFPA 10 chapter 7.</p> <p>Install emergency lighting for all paths of egress in accordance with Alliance Standard Section 6.7. Illumination needs to be a minimum of 10 lux for all corridors, exit doors and stairways. Illumination for aisles needs to be a minimum of 2.5 lux. Egress lighting shall be provided with emergency power or supplemented with battery powered lights that provide a minimum of 10 lux for not less than 30 minutes in the event of failure of normal lighting.</p> <p>As the training and awareness level is different between factory occupants and residential occupants it is recommended to develop an evacuation plan and awareness program for the residential building. Also both the buildings should operate under the same emergency management system. Analyzing the facts it will be safer to install a new emergency exit stair dedicated for the factory.</p> <p>Provide Fire Department (Siamese) connections in accordance with Alliance Standard Section 5.5.4. Connections shall match the Fire Service and Civil Defense hose thread standard.</p> <p>Repair or replace damaged piping at the noted locations. Repairs and replacements need to be comply with NFPA 14 and NFPA 25.</p> <p>Establish an inspection, maintenance, and testing program for the standpipe and hose system. Program will be in accordance with the requirements of NFPA 25 Chapter 6</p>
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	<p>Standpipe and Hose Systems Table 6.1.1.2</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Provide continuously illuminated exit sign at all required exits and along egress paths, especially where path has a change of direction. Exit signs may be illuminated either by lamps external to the sign or by lamps contained within the sign. The source of illumination shall provide not less than 50 lux at the illuminated surface with a contrast of not less than 0.5. Approved self-luminous signs which provide evenly illuminated letters having a minimum luminance of 0.2cd/m² may also be used.</p> <p>Create a Fire Safety Director position and fill the position with an individual that has had sufficient training to be able to carry the required duties.</p> <p>Need to provide training and certification for the required number of people in firefighting, first aid, and rescue training by an appropriate authority in accordance with the Alliance Safety Training Curriculum.</p> <p>Establish written corporate and plant policies on housekeeping to ensure scheduled cleaning for floor, wall, ceiling, supply and return air ventilation systems. Promptly reschedule skipped cleanings. Provide a documented line of authority for authorizing a cleaning delay and rescheduling.</p>
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The recommendations for Electrical Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Remove all combustibile material from within the generator room. Also, keep the generator room clean and free of unnecessary materials.</p> <p>Disconnect the panel from the electrical service and clean interior components of all dust and debris. Seal all openings within the enclosure to prevent dust and debris from entering.</p>
<p>Short Term (3 Weeks)</p>	<p>Install two distinct earth connections with minimum 35 sqmm cable (green) for generator frame earthing.</p> <p>Develop and implement an electrical safety program. Include key topes such as lock out tag out procedures, personal protective equipment requirements, etc. Reference NFPA 70e for example program requirements.</p> <p>Establish a routine maintenance and testing program for the emergency generator. The program shall be based on all of the following:</p> <ol style="list-style-type: none"> a. Manufacturer's recommendations b. Manufacturer's Instruction manuals c. Requirements of NFPA 110 Chapter 8

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Mid Term (6 Weeks)	<p>Install metal enclosed board instead of wooden board according to the standard.</p> <p>Provide permanent identification marking mentioning name of panels (i.e. SDB-01, Sewing Floor) on a durable material sheet posted on the panels' door.</p> <p>Provide covers (metal) to conceal all live internal components of switchboards and/or distribution boards.</p> <p>Install a spare circuit breaker to block the space (kept open after taking out a breaker).All unused live cable must be removed.</p> <p>Provide electrical graded rubber mats with the specifications of 650 V-protection and required area (accommodating at least two person or depending on the panels' length).</p> <p>Provide earthing connection to all electrical equipments and apparatus.</p> <p>Provide lugs for cable termination at bus- bars and circuit breakers (MCCB).</p> <p>Have a qualified electrical engineer develop as-built electrical drawings providing detailing key components of the electrical system.</p>
Long Term (6 Months)	<p>Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements.</p> <p>Inspect electrical switchgear and panel boards on an annual basis to ensure that the equipment is in good working condition.</p> <p>Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with Inter National Electrical Testing Association (NETA). All transformers, switchgears etc. shall be subject to an insulation resistance measurement test to ground after installation but before any wiring is connected. Insulation tests shall be made between open contacts of circuit breakers, switches etc. and between each phase and earth.</p> <p>Check all the cables and circuit breakers and sort out the higher rated circuit breakers. The rated current of a protective device (MCB, MCCB, fuse) must not exceed the current carrying capacity of any conductor in the circuit.</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 NFPA70B or a comparable standard.</p>