ALLIANCE
FOR BANGLADESH WORKER SAFETY

INITIAL STRUCTURAL INTEGRITY ASSESSMENT REPORT (SIAR)

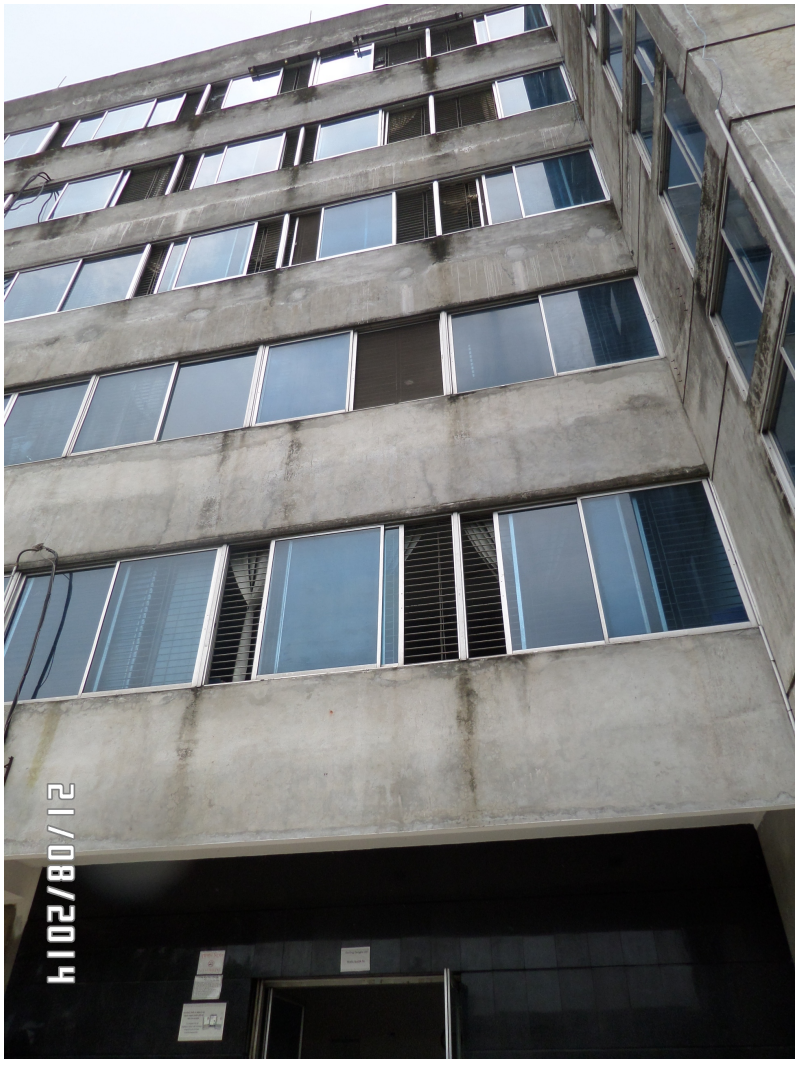
Factory Name:	**Sterling Designs Ltd**
Address:	**Ward No-07 Biswaspara Chandra Kaliakoir, Gazipur Gazipur Dhaka Bangladesh**
Assessor:	**BD Technologies**
Date:	**21 Aug 2014**

Introduction to the Report

The following report contains a site profile and summary of non-conformities identified during an onsite assessment commissioned by the Alliance for Bangladesh Worker Safety (Alliance) and conducted by a third-party Qualified Assessment Firm (QAF). The assessment was conducted against the Alliance for Bangladesh Worker Safety Assessment Protocols (APs) and Fire Safety and Structural Integrity Standard, which is harmonized with the factory assessment guidelines developed by Bangladesh University of Engineering and Technology (BUET) for the Bangladesh National Tripartite Plan of Action (NTPA). The goal of the Alliance process is to provide clear and practical technical requirements by which Bangladeshi Ready Made Garment (RMG) Factories producing for Alliance members may be consistently and fairly evaluated for fire, structural, and electrical safety in a non-duplicative manner. Each assessment will prompt action plans that will be used by RMG factories to systematically and sustainably improve safety conditions for garment workers. Beyond tracking and reporting on action steps taken in a transparent manner, the Alliance organization and its members will seek to further support factory improvements through technical assistance, training, implementation support for functional Worker Committees, and in some cases financial assistance and wage support for workers if factories are closed for remediation.

The contents of the report do not constitute a guarantee of compliance with the applicable laws, the Alliance Standard or the absolute or continued safety against fire, electrical and/or structural integrity issues that may lead to injury or loss of life. The report is designed to provide a non-exhaustive summary of risk issues, based on a limited sampling and duration of time onsite by the named QAF. Neither the QAF nor the Alliance can certify or guarantee the quality, outcome, or effectiveness of actions taken in response to the report.

For more information and report feedback please go to: www.bangladeshworkersafety.org.



GENERAL INFORMATION

General Information	
Factory Name:	Sterling Designs Ltd
Address:	Ward No-07 Biswaspara Chandra Kaliakoir, Gazipur Gazipur Dhaka Bangladesh
Country:	Bangladesh
Province:	Dhaka
City:	Gazipur
Zip Code:	1752
Audit Duration:	8 Hours
Re-Audit:	Re-Audit After 0 Months
Draft Report Date :	August 26, 2014
Final Report Date :	September 29,2014
Are all Action Items From Previous Assessment Completed?:	N/A
Buildings in Complex :	Total 8 building in complex.
Number of Building Levels (Stories) :	Building #1: Main Factory Building (6 levels, height = 62 ft.)
Approximate Building Area (SF) :	Total Area = 203,356 sft (Building#1 = 32000 x 6 = 192,000 sft, Shed# 1= 5790 sft, Shed# 2 = 252 sft, Shed# 3 = 840 sft, Shed# 4 = 748 sft, Shed# 5 = 450 sft, Shed# 6= 1320 sft, Shed# 7 = 1920 sft),
Date of Building Construction :	Building #1(2005)
Date of Last Building Renovation/Addition :	No renovation/addition
Is the Building mixed use?:	No
Ancillary Structures in Complex :	Total 7 Ancillary Structures in Complex
Number of Ancillary Levels (Stories) :	There were 7 ancillary building. Among them only shed-1 was two storied and rest of them were single storied and height = 10 ft.
Approximate Ancillary	Shed# 1= 5790 sft, Shed# 2 = 252 sft, Shed# 3 = 840 sft, Shed# 4 = 748 sft, Shed# 5 = 450 sft, Shed# 6=

Structures Area (SF) :	1320 sft, Shed# 7 = 1920 sft.
Number of Occupants :	Building#1-Main Factory Building (ground floor =450, 1st floor = 105, 2nd floor = 830, 3rd floor = 820, 4th floor = 820, 5th floor = 445)
Exterior Facade Description :	Brick masonry infill walls between structural elements (beams, slabs, columns) with aluminium framed glass windows
Structural System Description :	Reinforced concrete moment resisting frames with slabs between beams and beams between columns. Foundation system consists of Pile Foundation & Isolated Footing Foundation.
Issues were not found during the structural integrity assessment that required the Emergency Escalation Protocol (and referral to NTC Review Panel)?:	Yes

ASSESSMENT FINDINGS

Structural System Design		
Question:	Are the available FoS for the columns adequate based on Preliminary calculation?	
Priority Level:	High	
Non-Compliance Level:	3	
Description:	Column FoS calculations are based on a concrete compressive strength of 2,370 psi (Alliance Standard minimum for Stone Chips Aggregate - nondestructive compressive strength testing conducted as part of this assessment indicated a higher strength, but the Standard value was used to be conservative***). Reinforcement configuration was verified via ferro-scanning. Main Building FoS results, 42 psf floor live load: Central Column - 1.91, Corner Column - 3.71 & Edge Column - 1.54. The value FoS for edge column are not safe. *** Rebound (Schmidt) hammer testing was conducted to measure the compressive strength within columns.	
Source of Findings:	Uploaded Document: Column FoS calculation spreadsheet, Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure. This assessment should include destructive core testing to validate the in-situ concrete compressive strength of structural elements.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Provide results of preliminary calculations in space provided. a) column capacity; FoS > 1.86 - Safe b) column capacity; FoS 1.5 -1.86 - Needs Evaluation c) Column capacity; FoS 1.25-1.5 - Needs Evaluation d) Column capacity; FoS <1.25 - Unsafe In case of a critically low FoS (<1.25), consider Immediate Escalation Protocol	
Question:	Are credible structural design documents available for review and kept on site?	
Priority Level:	Medium	
Non-Compliance Level:	3	
Description:	A few structural documents for the main factory building are available for review and kept on site but are not credible as per BNBC Part 6 Section 1.9 and the requirements of Part 8 Section 8.19/8.20 of the Alliance Standard. There is no material test report (lack of core cutting, ferro scan, or other NDT/SDT, etc) available to support material strength shown in as built drawing.	
Source of Findings:	Document Review: Document reviewed during site visit on 21st August 2014. , Visual Assessment: Visual Assessment on Site visit 21st August 2014.	

Suggested Plan of Action:	Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19/8.20 of the Alliance Standard. The documents should be prepared for all buildings within the factory complex.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 8 Section 8.19 Required Structural Documentation for New and Existing Factories	
Question:	Can credible structural documentation indicating general conformance with 2006 BNBC or other comparable applicable international model building code be produced?	
Priority Level:	Medium	
Non-Compliance Level:	3	
Description:	Credible structural documentation indicating general conformance with 2006 BNBC or other comparable applicable international model building code could not be produced.	
Source of Findings:	Document Review: Document reviewed during site visit on 21st August 2014. , Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	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.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Reference Alliance Standards Part 8 Section 8.2 Structural Integrity of Existing Factory Buildings	
Question:	Can documentation be provided that the building is compliant with the requirements for wind loading and storm surge loadings as detailed in BNBC Part 6 Section 1.5.3?	
Priority Level:	Medium	
Non-Compliance Level:	3	
Description:	No credible documentation are available to indicate the building is compliant with the requirements for wind loading and storm surge loadings as detailed in BNBC Part 6 Section 1.5.3.	
Source of Findings:	Document Review: Document reviewed during site visit on 21st August 2014. , Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind and storm surge loadings.	
Suggested Deadline Date:	15 Sep 2014	

Standard:	2006 BNBC Part 6 Section 1.5. Compliance may be waived if the Factory Owner provides satisfactory evidence of a cyclone operations plan that includes full evacuation of the factory in advance of any approaching cyclone"	
Question:	Have provisions been made in floors or decks for a concentrated load (such as heavy equipment, water tanks, stored materials, etc) applied at a location wherever this load acting upon an otherwise unloaded floor would produce stresses greater than those caused by a uniform load?	
Priority Level:	Medium	
Non-Compliance Level:	3	
Description:	The roof top communication tower creates a concentrated load. No evidence was available to indicate that the structural impact of these concentrated loads was considered.	
Source of Findings:	Photograph: Roof top communication tower, Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	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.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 8 Section 8.13 and 8.14	
Question:	Where density of operations, storage of materials, or equipment weights require live load capacity in excess of 2.0 kN/m2 (42 psf), do the design documents confirm that the required load capacity exists? Or has the load capacity been analytically confirmed and certified by an Alliance-qualified structural engineer?	
Priority Level:	Medium	
Non-Compliance Level:	3	
Description:	Design live load was not mentioned in the available structural drawings. The Finished Goods storage at 1st floor and the Accessories Store at 3rd floor of main building were evaluated and determined to create loading conditions in excess of 2.0 kN/m2 (42 psf).	
Source of Findings:	Photograph: Finished goods storage at 1st floor, Accessories Store at 3rd floor, Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	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.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standards Part 8 Section 8.15 Minimum Floor Design Loads	

Question:	Are Certificates of Occupancy available for review?
Priority Level:	Low
Non-Compliance Level:	2
Description:	No certificates of occupancy are available for review.
Source of Findings:	Visual Assessment: Visual Assessment on Site visit 21st August 2014.
Suggested Plan of Action:	Provide Certificates of Occupancy for review.
Suggested Deadline Date:	15 Sep 2014
Standard:	Alliance Standard Part 8 Section 8.3 Preliminary Structural Assessment

Structural System Construction

Question:	Have all areas of needed maintenance, including areas with efflorescence, dampness, standing water on rooftops, and corrosion been addressed.
Priority Level:	Medium
Non-Compliance Level:	2
Description:	The following areas of needed maintenance are not addressed: dampness in exterior wall.
Source of Findings:	Photograph: Dampness in exterior wall., Visual Assessment: Visual Assessment on Site visit 21st August 2014.
Suggested Plan of Action:	Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
Suggested Deadline Date:	15 Sep 2014
Standard:	Alliance Standard Part 8 Section 8.26 Durability and Maintenance

Question:	Are all non-structural elements suspended from, attached to, or resting atop the structure adequately anchored and braced to resist earthquake forces?
Priority Level:	Medium
Non-Compliance Level:	2
Description:	The following elements were noted to contain inadequate anchorage and/or bracing against seismic forces: -Storage racks at 1st, 3rd, & 4th Floor. -Communications tower at rooftop
Source of Findings:	Photograph: Storage racks at 4th Floor., Visual Assessment: Visual Assessment on Site visit 21st August 2014.
Suggested Plan of	Adequately anchor and brace all non-structural elements to resist earthquake

Action:	forces to comply with the BNBC and Alliance Standard.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standards Part 8 Section 8.18 Seismic Bracing of Key Non-Structural Elements and 2006 BNBC Part 6	
Question:	Are expansion joints provided at appropriate intervals on the exterior façade?	
Priority Level:	Low	
Non-Compliance Level:	2	
Description:	There is an expansion joint on the floor but it is not shown in the façade.	
Source of Findings:	Photograph: Expansion joint in the floor, Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	Have a qualified structure engineer identify the locations where a expansion joint is needed and then have a remediation plan developed.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 8 Section 8.2 Structural Integrity of Existing Factory Buildings	
Question:	Is expansion joint material free from cracking and other forms of deterioration?	
Priority Level:	Low	
Non-Compliance Level:	2	
Description:	There is cracking in the expansion joint material.	
Source of Findings:	Photograph: Cracking in the expansion joint material, Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	Remove deteriorated expansion joint material and provide new approved material at the expansion joint.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 8 Section 8.26 Durability and Maintenance	
Structural Safety Programs		
Question:	Is a program in place to ensure that the live loads for which a floor or roof is or has been designed will not be exceeded?	
Priority Level:	Medium	
Non-Compliance Level:	2	

Description:	There is no program in place to ensure that the live loads for which a floor or roof is or has been designed will not be exceeded.	
Source of Findings:	Visual Assessment: Site visit on 21st August 2014.	
Suggested Plan of Action:	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.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 13 Section 13.7 and Part 8 Section 8.9.	
Question:	Have Load Plans been prepared for each floor documenting the actual maximum operational loading that is intended and/or allowable on each floor.	
Priority Level:	Low	
Non-Compliance Level:	3	
Description:	Load Plans have not been prepared for each floor documenting the actual maximum operational loading that is intended and/or allowable on each floor.	
Source of Findings:	Document Review: Document reviewed during site visit on 21st August 2014. , Visual Assessment: Visual Assessment on Site visit 21st August 2014.	
Suggested Plan of Action:	Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 8 Section 8.10 Floor Loading Plans (Load Plans)	
Question:	Are Floor Load Plans posted as required?	
Priority Level:	Low	
Non-Compliance Level:	3	
Description:	Floor Load Plans are not posted as required.	
Source of Findings:	Visual Assessment: Site visit on 21st August 2014.	
Suggested Plan of Action:	Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard. Floor load plans should be visibly posted on all levels of the building.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 8 Section 8.20.5.3	
Question:	Is a designated representative (Factory Load Manager), who is onsite full time, trained regarding the structural floor capacity, and serves as an ongoing	

	vendor resource and monitor of operational factory floor loadings?	
Priority Level:	Low	
Non-Compliance Level:	3	
Description:	There is no designated representative (Factory Load Manager), who is onsite full time, trained regarding the structural floor capacity, and serves as an ongoing vendor resource and monitor of operational factory floor loadings.	
Source of Findings:	Visual Assessment: Site visit on 21st August 2014.	
Suggested Plan of Action:	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 loading limits as described on the Floor Loading Plans.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standards Part 8 Section 8.9 Factory Load Manager	
Question:	Are areas used for storage of work materials and work products, clearly marked to indicate the acceptable loading limits as described in the Load Plan for that floor?	
Priority Level:	Low	
Non-Compliance Level:	2	
Description:	Areas used for storage of work materials and work products are not clearly marked to indicate a acceptable loading limits.	
Source of Findings:	Visual Assessment: Site visit on 21st August 2014.	
Suggested Plan of Action:	Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 8 Section 8.11 Floor Load Markings	