

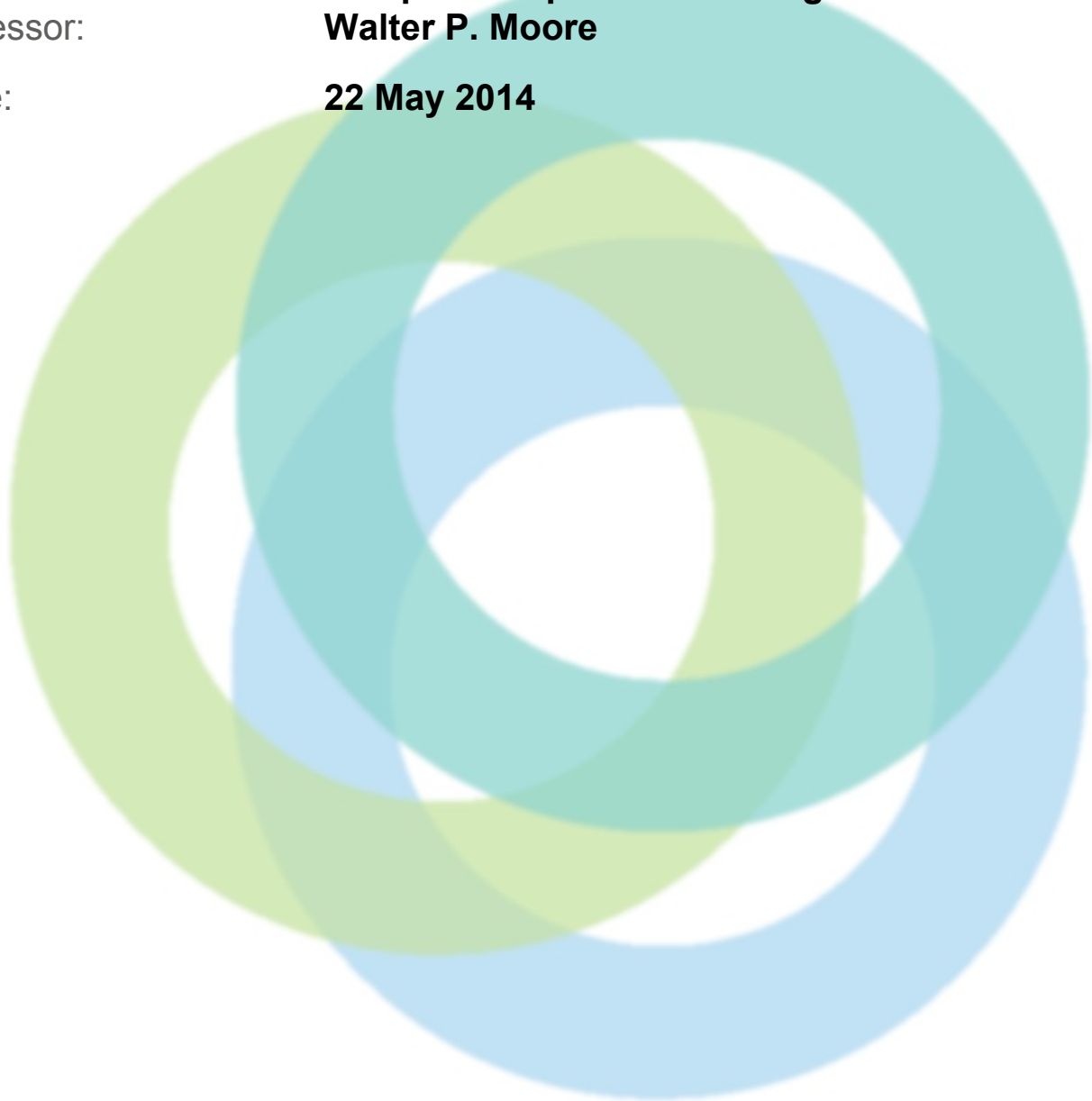
# INITIAL STRUCTURAL INTEGRITY ASSESSMENT REPORT (SIAR)

Factory Name: **Denimach Limited**

Address: **Kewa Mouja, Ward# 5, Gorgoria Masterbari, Sreepur,  
Gazipur Gazipur Dhaka Bangladesh**

Assessor: **Walter P. Moore**

Date: **22 May 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](http://www.bangladeshworkersafety.org).





## GENERAL INFORMATION

General Information	
Factory Name:	Denimach Limited
Address:	Kewa Mouja, Ward# 5, Gorgoria Masterbari, Sreepur, Gazipur Gazipur Dhaka Bangladesh
Country:	Bangladesh
Province:	Dhaka
City:	Gazipur
Zip Code:	1740
Audit Duration:	1.5 Days
Re-Audit:	Re-Audit After 0 Months
Draft Report Date :	May 23, 2014
Final Report Date :	June 10, 2014
Are all Action Items From Previous Assessment Completed?:	N/A
Buildings in Complex :	3: 1) Main, 2) Washing, 3) Utility
Number of Building Levels (Stories) :	Main: G+6+R+SR, Washing: G+M+2+R, Utility: G+M+R+SR
Approximate Building Area (SF) :	427,000 SF
Date of Building Construction :	2007 (all buildings)
Date of Last Building Renovation/Addition :	Current Construction: Administration Wing of Main Building; Construction of 4th elevated floor of Washing Building. Washing Building Extension built in 2011.
Is the Building mixed use?:	No
Ancillary Structures in Complex :	4: 1) ETP, 2) Boiler Shed, 3) Waste Shed, 4) Security House
Number of Ancillary Levels (Stories) :	G+R (all ancillary structures)
Approximate Ancillary	Unknown

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**ALLIANCE**  
FOR BANGLADESH WORKER SAFETY

Structures Area (SF) :	
Number of Occupants :	Main: 7000; Washing: 1700; Utility: <25
Exterior Facade Description :	Brick in-fill walls (all factory buildings)
Structural System Description :	Reinforce Concrete Columns monolithic with concrete beams and slabs (all factory buildings)



## ASSESSMENT FINDINGS

### Structural System Design

Question:	Are Certificates of Occupancy available for review?	
Priority Level:	Low	
Non-Compliance Level:	1	
Description:	No certificates of occupancy were available for review	
Source of Findings:	Document Review: No certificates of occupancy were available for review	
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	
Question:	Structural Engineer of Record	
Priority Level:		
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Provide the name and firm of the structural engineer of record.	
Question:	Architect of Record	
Priority Level:		
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		



Suggested Deadline Date:		
Standard:	Provide the name and firm of the architect of record.	
Question:	Are credible structural design documents available for review and kept on site?	
Priority Level:	Medium	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.19 Required Structural Documentation for New and Existing Factories	
Question:	Is a Geotechnical Report available for review and kept on site?	
Priority Level:	Low	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.2 Structural Integrity of Existing Factory Buildings	
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:	1	
Description:	Building Code not identified	
Source of Findings:	Document Review: Building Code not identified	
Suggested Plan of	Provide letter from EOR indicating building code used for design	




Action:		
Suggested Deadline Date:	15 Sep 2014	
Standard:	Reference Alliance Standards Part 8 Section 8.2 Structural Integrity of Existing Factory Buildings	
Question:	If built after 2006, can documented compliance with the seismic and wind requirements of the 2006 BNBC be provided?	
Priority Level:	Medium	
Non-Compliance Level:	1	
Description:	Seismic and Wind requirements not indicated on drawings	
Source of Findings:	Document Review: Seismic and Wind requirements not indicated on drawings	
Suggested Plan of Action:	Provide letter from EOR indicating seismic and wind criteria used for design	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standards Part 8 Section 8.17 Design for Lateral Loads and 2006 BNBC Part 6 Section 1.5	
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:	1	
Description:	Wind loading and storm surge loading requirements not indicated on drawings	
Source of Findings:	Document Review: Wind loading and storm surge loading requirements not indicated on drawings	
Suggested Plan of Action:	Provide letter from EOR indicating wind loading and surge loading requirements used for design	
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:	Has evidence of structural integrity been provided using a Preliminary Structural Assessment?	
Priority Level:	High	



Non-Compliance Level:	
Description:	
Source of Findings:	
Suggested Plan of Action:	
Suggested Deadline Date:	
Standard:	Reference Alliance Standards Part 8 Section 8.2 Structural Integrity of Existing Factory Buildings
Question:	If the structure has been previously expanded, was the structural impact on the entire structure analytically evaluated and confirmed by a qualified structural engineer.
Priority Level:	Medium
Non-Compliance Level:	2
Description:	No structural documentation for: Washing Building Extension, Steel Mezzanine Extension for AC System Support, Steel Roof at Utility Building, Bridge between Main Building and Utility Building
Source of Findings:	Document Review: No structural documentation for: Washing Building Extension, Steel Mezzanine Extension for AC System Support, Steel Roof at Utility Building, Bridge between Main Building and Utility Building
Suggested Plan of Action:	Provide certified as-built drawings for Washing Building Extension, Steel Mezzanine Extension for AC System Support, Steel Roof at Utility Building, and Bridge between Main Building and Utility Building. Provide letter from EOR indicating that the impact on the structure from these additions has been considered.
Suggested Deadline Date:	15 Sep 2014
Standard:	Reference Alliance Standards Part 8 Section 8.1 Applicability of Building Code.
Question:	Structural System Type as defined by 2006 BNBC Part 6 Chapter 1 Table 6.1.2.
Priority Level:	
Non-Compliance Level:	
Description:	
Source of Findings:	
Suggested Plan of Action:	



Suggested Deadline Date:		
Standard:	2006 BNBC Part 6 Chapter 1 Table 6.1.2	
Question:	What is the Structural Configuration?	
Priority Level:		
Non-Compliance Level:	1	
Description:	Main Building Structural Configuration is irregular. Washing Building and Utility Building are regular.	
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	2006 BNBC Part 6 Chapter 1 Section 1.3.4	
Question:	Is a clear and redundant load path to resist lateral loads provided?	
Priority Level:	Medium	
Non-Compliance Level:	2	
Description:	Lateral Load Resisting System is unclear in steel roofs located at Main Building, Washing Building Extension, Utility Building, Waste Shed, Boiler Shed.	
Source of Findings:	Visual Assessment: Lateral Load Resisting System is unclear in steel roofs located at Main Building, Washing Building Extension, Utility Building, Waste Shed, Boiler Shed.	
Suggested Plan of Action:	Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standards Part 8 Section 8.17 Design for Lateral Loads and 8.3.3. 2006 BNBC Part 6 Section 1.5	
Question:	Are the available FoS for the columns adequate based on Preliminary calculation?	
Priority Level:	High	
Non-Compliance Level:		
Description:		



Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
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:	Results of ferro-scanning for confirmation of steel rebar in the columns of the lowest tier were satisfactory.	
Priority Level:	Medium	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.3 Preliminary Structural Assessment	
Question:	What are the full dead and live loads of the floor slabs and decks?	
Priority Level:		
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Provide information regarding the dead and live loads of the floor slabs and decks.	
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:	
Description:	
Source of Findings:	
Suggested Plan of Action:	
Suggested Deadline Date:	
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:	2
Description:	Main Building: Storage Racks at 2nd Floor of Admin Wing reaches ceiling (10 boxes). Main Building: Isolated areas of storage boxes on 1st through 6th Floor may exceed design Live Load. Washing Building: Boxes of loose denim stacked 9 feet high at 1st Floor Destroy Section
Source of Findings:	Visual Assessment: See attached photos
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



**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:	Ponding at Washing Building Roof (3rd Floor) Ponding at Utility Building Roof near Cooling Towers
Source of Findings:	Visual Assessment: See attached photos
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:	The exterior façade is free of cracking.
Priority Level:	Low
Non-Compliance Level:	
Description:	
Source of Findings:	
Suggested Plan of Action:	
Suggested Deadline Date:	
Standard:	Alliance Standard Part 8 Section 8.2
Question:	Are expansion joints provided at appropriate intervals on the exterior façade?
Priority Level:	Low
Non-Compliance Level:	
Description:	
Source of Findings:	
Suggested Plan of Action:	
Suggested Deadline Date:	
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:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.26 Durability and Maintenance	
Question:	Is the building free of active signs of water intrusion or ponding due to lack of performance of the façade system?	
Priority Level:	Low	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.26 Durability and Maintenance	
Question:	Are the performance of key structural elements such as columns, slender columns, flat plates and transfer structures satisfactory?	
Priority Level:	High	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.3.3	



Question:	Is the structural system free of settlement cracking, excessive perimeter separations, and unlevel floors attributable to foundation settlements?	
Priority Level:	High	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Reference Alliance Standards Part 8 Structural Design Section 8.2 Structural Integrity of Existing Factory Buildings	
Question:	Is the structural system free of deflections (sagging), rotations (twisting), perceivable vibrations, or other noticeable movements of the structure?	
Priority Level:	High	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Reference Alliance Standards Part 8 Structural Design Section 8.2 Structural Integrity of Existing Factory Buildings	
Question:	Is the structural system free of distress, separations, or cracking that indicates lack of performance or overstress of the lateral load-carrying system?	
Priority Level:	High	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline		



Date:		
Standard:	Alliance Standard Part 8 Section 8.3.3	
Question:	Is the structural system free of distress, settlement, shifting, or cracking in columns or walls?	
Priority Level:	High	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.3.3	
Question:	Have any previous repairs to correct structural deficiencies or to reinforce the existing structure been completed?	
Priority Level:		
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:		
Question:	Was masonry-chip aggregate concrete (MCAC) used in the construction of the building?	
Priority Level:		
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		



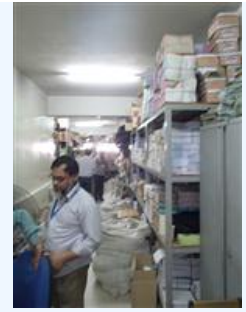
Suggested Deadline Date:		
Standard:	Reference Alliance Standards Part 7 Building Materials Section 7.2 Masonry-chip aggregate concrete (MCAC)	
Question:	If yes, have the structural members constructed with MCAC been investigated by an appropriate program of in-situ testing and representative destructive testing or core samples?	
Priority Level:	Medium	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Reference Alliance Standards Part 7 Building Materials Section 7.2 Masonry-chip aggregate concrete (MCAC)	
Question:	Are any structural elements constructed with MCAC exposed to rainfall or other sources of water sealed with a protective coating to prevent water intrusion?	
Priority Level:	Medium	
Non-Compliance Level:		
Description:		
Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standards Part 7 Building Materials Section 7.2 Masonry-chip aggregate concrete (MCAC).	
Question:	Are structural steel members free of corrosion, physical damage or other types of deterioration?	
Priority Level:	Medium	
Non-Compliance Level:		
Description:		



Source of Findings:			
Suggested Plan of Action:			
Suggested Deadline Date:			
Standard:	Alliance Standard Part 8 Section 8.26		
Question:	For post-tensioned reinforced concrete systems or elements, cored holes have not compromised the post-tensioned strands.		
Priority Level:	High		
Non-Compliance Level:			
Description:			
Source of Findings:			
Suggested Plan of Action:			
Suggested Deadline Date:			
Standard:	Not Applicable		
Question:	Is the structure free from any major/progressive distress?		
Priority Level:	High		
Non-Compliance Level:			
Description:			
Source of Findings:			
Suggested Plan of Action:			
Suggested Deadline Date:			
Standard:	Alliance Standards Part 8 Section 8.3.3		



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:	Racks requiring bracing: Main Building - 1st through 6th Floor; Washing Building - 1st Floor; Utility Building - Mezzanine and Ground Floor
Source of Findings:	Visual Assessment: See attached photos
Suggested Plan of Action:	Adequately anchor and brace all non-structural elements to resist earthquake 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:	If the building is currently being renovated or expanded, are the Construction Practices and Safety requirements of Section 9 being followed?
Priority Level:	Medium
Non-Compliance Level:	
Description:	A building next to the Main building was currently under construction during our visit. The requirements of Section 9 appeared to be followed.
Source of Findings:	





Suggested Plan of Action:	
Suggested Deadline Date:	
Standard:	Alliance Standard Part 9 Construction Practices and Safety.
<b>Structural Safety Programs</b>	
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:	2
Description:	Load Plans have not been prepared. Factory Representative noted that Loads Plans are in the process of being developed.
Source of Findings:	Worker Interviews: Factory Representative noted that Loads Plans are in the process of being developed.
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:	2
Description:	Floor Load Plans have not yet been developed
Source of Findings:	Worker Interviews: Floor Load Plans have not yet been developed
Suggested Plan of Action:	Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
Suggested Deadline Date:	15 Sep 2014
Standard:	Alliance Standard Part 8 Section 8.20.5.3
Question:	Are floor loads in compliance with posted plans?
Priority Level:	Medium
Non-Compliance Level:	
Description:	



Source of Findings:		
Suggested Plan of Action:		
Suggested Deadline Date:		
Standard:	Alliance Standard Part 8 Section 8.10 Floor Loading Plans (Load Plans).	
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:	Floor Load Plans have not yet been prepared	
Source of Findings:	Worker Interviews: Floor Load Plans have not yet been prepared	
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	
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:	1	
Description:	Factory Representative has noted that Floor Load Plans are in process of being developed.	
Source of Findings:	Worker Interviews: Factory Representative has noted that Floor Load Plans are in process of being developed.	
Suggested Plan of Action:	Continue developing Floor Load Plans.	
Suggested Deadline Date:	15 Sep 2014	
Standard:	Alliance Standard Part 13 Section 13.7 and Part 8 Section 8.9.	
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:	2
Description:	No Factory Load Manager has been designated
Source of Findings:	Worker Interviews: No Factory Load Manager has been designated
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:	For post-tensioned reinforced concrete systems or elements, is a program in place to ensure post-tensioned strands are located before core drilling begins?
Priority Level:	Medium
Non-Compliance Level:	
Description:	
Source of Findings:	
Suggested Plan of Action:	
Suggested Deadline Date:	
Standard:	Alliance Standard Part 8 Section 8.26 Durability and Maintenance