Pier 70 Building Survey

Historic Buildings
Conditions and Assessment
Carey & Co. and OLMM, Inc
May 2008

Pier 70
San Francisco, California

Historic Building
Conditions Survey and Assessment
May 22, 2008

A. Introduction

The purpose of this report is to develop conceptual-level cost estimates for building reuse that can assist the master-planning team in determining order-of-magnitude construction costs for the selected historic structures at Pier 70. Carey & Co. worked with the M. Lee Corporation, cost estimators, and OLMM, structural engineers and to a limited extent the other Pier 70 consultant teams to prepare this assessment. For the building evaluations, OLMM analyzed structural systems, and Carey & Co. studied architectural, preservation, and conservation issues. Port staff, EPS, and Roma, have assisted in identifying appropriate adaptive re-use assumptions.

B. Methodology

Carey & Co. conducted field surveys in March and April of 2008 to inspect the fifteen buildings specified by the Port of San Francisco. Port staff provided escorts for Carey & Co., OLMM and the Martin Lee Corp. The Carey & Co. survey included an examination of historic site features around the individual buildings, internal and external finishes, and specific historic elements. Based on these surveys Carey & Co. has provided a set of recommendations that includes general instructions for rehabilitation and, where appropriate, a specific set of repair instructions to aid in cost estimation.

Each item surveyed by Carey & Co. received a generalized rating. These designations are meant to serve as shorthand for understanding the overall condition of specific architectural elements. The ratings range from:

Poor:	The space or component is missing or unserviceable and requires replacement or major repair
Fair:	The space or component is worn or deteriorated and requires repair
Good:	The space or component is intact and sound and requires minor repairs
Excellent:	The space or component is serviceable condition and requires minimal or no repair

The review of existing documents included the 1944 Bethlehem Steel Company plans and information binders on specific buildings made available by the Port Of San Francisco.

To facilitate cost estimation of individual buildings, Carey & Co. architectural reports and OLMM structural reports have been integrated into one building-specific report.

Building 113/114

Buildings 113-114 – Union Iron Works Machine Shop
Bldg. 113 Industrial Structure: 81,864 GSF
Bldg. 114 Industrial Structure: 8,000 GSF
Built: 1885/1886 connector building in 1914
Construction Type: Concrete and Brick Masonry- Steel and some wood frame
492' x 175.5 and 62' tall

Building 113/114 stands on the south side of 20th Street. The earliest remaining structure on site, it was designed by Civil Engineer Dr. D. E. Melliss. The eastern portion was completed in 1885, and the western, in 1886. The two structures were joined by a connector in 1914.

This two-block long industrial structure consists of the two original unreinforced brick buildings, and the central reinforced concrete connector (figure 49). Building 113/114 measures 492' long by 175'-6" wide by 62' tall, and contains 89,686 square feet of floor space. Both brick structures have high gable roofs with monitors, projecting piers, arched windows and simple corbelled cornices. A lower, double gable section extends the western portion south creating an "L." While the two sides of the building are similar in form, scale and materials; fenestration, bay width and rooflines differ from side to side.

Building 113 includes all of the 81,964 square foot area beneath the high, single gable as well as the northern portion of the double gable structure (including an 8,800 square foot mezzanine); Building 114 comprises only the 7,722 square foot area beneath the southern gable of the double gable portion.

EXTERIOR

Exterior Walls – Concrete Connector
Condition: fair
Description:

- Board-formed concrete connector with cementitious plaster stucco
- Detailed ornamentation along cornice.

Condition:

- Concrete connector cement plaster damaged
- Some spalling and water damage

Recommendation:

- Re-stucco 10% concrete connector
- Restore concrete connector plaster. Cement Plaster Repair:
  1. Review laboratory reports on cement plaster to determine appropriate mix.
  2. Patch small cracks, less than 1/16" wide, with a thin slurry coat consisting of finish coat ingredients.
  3. For larger cracks, or holes, address underlying substrate deterioration problems first, then patch with new cement plaster to match surrounding material.
  4. Remove cement plaster as required to fully address underlying concrete or brick masonry substrate damage prior to patching.
  5. Undercut adjacent sound cement plaster to create a key for the new repair material.
  6. Following repairs, prepare and paint the building with a high-quality, non-epoxy breathable coating such as acrylic latex.
- Clean and restore concrete connector ornamentation. Cement Plaster Cleaning
  1. Determine type and source of stain. If the stain is ferrous metal

corrosion, locate the metal and determine the cause of the corrosion. Staining may be the first clue that reinforcing rod within the wall is corroding. If the stain is efflorescence, determine and eliminate the source of water.

2. Remove non-historic, non-functional metal attachments. Patch subsequent holes as described above under Cement Plaster Repair.
3. Remove stains using the gentlest means possible. Test the area first to make sure the base material is not harmed and that significant painted materials are not affected. Begin using low pressure washing methods (100-300psi) with a fan tip and a natural bristle or nylon brush. Mild detergent or tri-sodium phosphate solutions should be tried next.
4. Where the cement plaster is painted, the cleaning and stripping of paint will be required to make repairs. The presence of lead-based paint will also affect the choice of removal method.
5. Use proprietary chemical cleaners designed for cement plaster only if necessary. For biological growth, the pressure wash may contain proprietary biocides. Non-liquid products such as "Peel-Away" may be preferred, since they have fewer environmental impacts.

Exterior Walls – Brick Masonry

Condition: poor

Description:

- Load-bearing brick masonry with paint covering the walls

Condition:

- Crumbled bricks, masonry damage
- Severely deteriorated layer of paint

Recommendation:

- Clean Brick Masonry Walls and remove existing paint. Brick Masonry Cleaning:
  1. Brick masonry contains efflorescence, staining from animal deposits, staining from rust, biological growth, and grime.
  2. Test clean soiled brick in an unobtrusive area using the gentlest means possible
  3. Use low pressure water washing methods (100-300psi) with a fan tip and stiff natural bristle or nylon brush. Mild detergents may be applied next. Use proprietary chemical cleaners designed for brick masonry, only if necessary.
  4. Where masonry is painted, the cleaning and stripping of paint will be required to make repairs. The presence of lead-based paint will also affect the choice of removal method.
  5. For biological growth the pressure wash may contain proprietary biocides.

- Repoint 75% exposed mortar joints. Brick Masonry Repointing:
  1. Analyze mortar to establish original composition. Specify repair mortar matching original.
  2. Rake out all loose or deteriorated mortar. Repoint with new mortar to match original color, texture, joint profile and chemical composition.
  3. Replace deteriorated sealant between door and window frames and other adjacent non-masonry cladding materials.
- Replace 5% damaged bricks on exterior. Brick Masonry Replacement:
  1. Remove and salvage sound brick / remove deteriorated bricks, retaining some to pulverize for color-matched patch materials. (Note that most masonry observed at Peir 70 is either load-bearing or non-veneer solid masonry. Brick replacement should be coordinated with the structural engineer regarding shoring requirements).
  2. Replace brick, using historic bricks wherever possible. New custom bricks may be required to match the historic material.
  3. Lay new brick flush with adjacent surface.
  4. Apply new bedding mortar to match original color, texture, joint profile and chemical composition.

Windows:
Condition: Fair
Description:
- 11' x 20' arched wood frame wood sash windows
- Top operable

Condition:
- 10-15% damaged sash

Recommendation:
- Restore wood sash windows: Wood sash window restoration:
  1. Survey existing condition of all wood windows.
  2. Remove all dirt, debris, and miscellaneous attachments.
  3. Remove paint to obtain clean surface.
  4. Replace deteriorated wood elements in kind as required.
  5. Restore window to proper operation.
  6. Install new hardware, where missing, to match original.
  7. Install new glazing where cracked or missing.
  8. Prepare wood surfaces, prime, and paint.
  9. Where wood windows are deteriorated, but repairable, remove the unit to a controlled shop condition for element replacement and / or epoxy consolidation.
  10. Where severely deteriorated beyond repair, replace in-kind with a new unit.

Doors
Condition: fair
Description:
- Several roll-up vehicle doors

Condition:
- Most appear operable

Recommendation:
- Determine if historic contributor or non-contributor
- If historic, retain roll-up vehicle doors

ROOF
Membrane
Condition: poor
Description:
- CGI Steel panels with ventilators and strip skylights

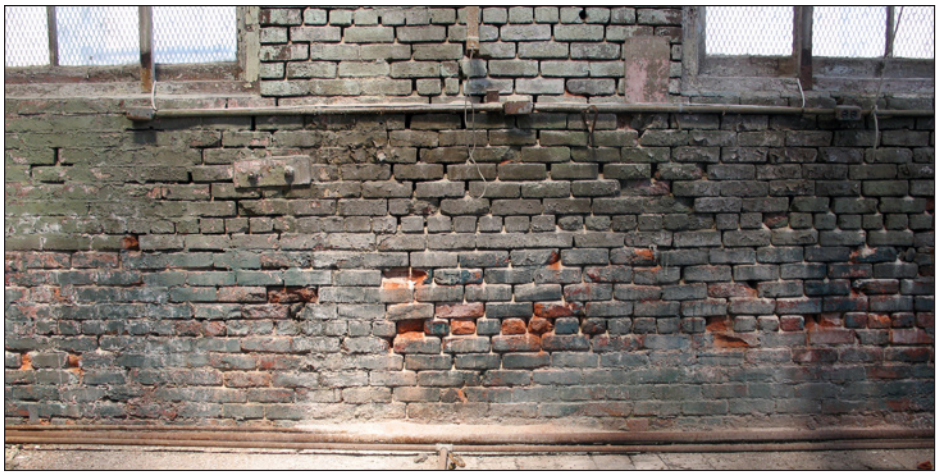
Condition:
- Panels exhibit significant rust and decay
- Water penetration on floor

Recommendation:
- 100% New CGI roof

Skylights
Condition: Unknown
Description:
- Translucent corrugated panels on 113 roof for strip skylights

Condition:
- Skylight panels not clearly visible from ground, but they do not appear to be in good condition.

Recommendation:
- 100% new translucent skylight panels.



INTERIOR

Interior walls
Condition: poor
Description:
- Load-bearing brick masonry walls

Condition:
- Deteriorated mortar
- Soft brick

Recommendation:
- 75% repoint. Brick Masonry Repointing:
  1. Analyze mortar to establish original composition. Specify repair mortar matching original.
  2. Rake out all loose or deteriorated mortar. Repoint with new mortar to match original color, texture, joint profile and chemical composition.
  3. Replace deteriorated sealant between door and window frames and other adjacent non-masonry cladding materials.
- 15% brick replacement. Brick Masonry Replacement:
  1. Remove and salvage sound brick / remove deteriorated bricks, retaining some to pulverize for color-matched patch materials. (Note that most masonry observed at Peir 70 is either load-bearing or non-veneer solid masonry. Brick replacement should be coordinated with the structural engineer regarding shoring requirements).
  2. Replace brick, using historic bricks wherever possible. New custom bricks may be required to match the historic material.
  3. Lay new brick flush with adjacent surface.
  4. Apply new bedding mortar to match original color, texture, joint profile and chemical composition.

Floor
Condition: poor
Description:
- Multi-layered floor – asphalt over wood block over concrete
- Numerous service pits and trenches

Condition:
- Wood blocks saturated with oil and chemicals
- Uneven surface

Recommendation:
- Remove all existing wood block
- Pour 100% new concrete slab floor

Service Pits
Condition: Good
Description:
- Numerous service pits penetrate Building 113's ground floor

Condition:
- Service pits appear to be structurally sound

Recommendation:
- Retain service pits in adaptive reuse of building if possible. It may be necessary to cover over the service pits.

Trusses
Condition: good
Description:
- Multiple different truss and buttress types support roof and craneways

Condition:
- Some chipping paint

Recommendation:
- Repaint. Ferrous Metal Corrosion and Coating Treatments:
    1. Remove rust and most of the surrounding paint. Determine the extent of failure, corrosion and surface detailing before determining the removal method. Potential methods include wire brushing, grit blasting, or chemical methods. The presence of lead-based paint will also affect the choice of removal method.
    2. Remove all loose, flaking and deteriorated paint and corrosion to bare metal.
    3. Degrease surfaces and prime immediately.
    4. Paint Selection:
        Option One: spot prime with industrial corrosion-inhibiting primer, followed by two coats of oil based paint.
        Option Two: high performance coatings, such as zinc-rich primers, and epoxy coatings should be considered to allow for longer lasting protection. Note: These coating typically require highly clean surfaces and special application conditions that can be difficult to achieve at some sites.

Columns & Craneways

Condition: good

Description:

- Round cast-iron columns
- Multiple craneway systems

Condition:

- Chipping paint

Recommendation:

- Repaint columns & craneways. Ferrous Metal Corrosion and Coating Treatments:
  1. Remove rust and most of the surrounding paint. Determine the extent of failure, corrosion and surface detailing before determining the removal method. Potential methods include wire brushing, grit blasting, or chemical methods. The presence of lead-based paint will also affect the choice of removal method.
  2. Remove all loose, flaking and deteriorated paint and corrosion to bare metal.
  3. Degrease surfaces and prime immediately.
  4. Paint Selection:

     Option One: spot prime with industrial corrosion-inhibiting primer, followed by two coats of oil based paint.

     Option Two: high performance coatings, such as zinc-rich primers, and epoxy coatings should be considered to allow for longer lasting protection. Note: These coating typically require highly clean surfaces and special application conditions that can be difficult to achieve at some sites.

Office Space

Condition: fair

Description:

- Interior offices at concrete connector
- Detailed woodwork - doors, windows, furniture

Condition:

- Minor wood damage
- Chipping Paint
- Window damage

Recommendation:

- Repaint 100% woodwork
- Re-glaze windows
- Repair 10% detail woodwork. Interior Wood Element Repair
  1. Survey the interior areas for missing or damaged elements. Where the damage is the result of water intrusion, repair the water intrusion source before making wood repairs.
  2. Where wood elements are split, splintered, or gouged, repair using a Dutchman patch of the same kind of wood with the same grain orientation. Finish to match the surrounding wood.

3. Where wood elements are attached to a failed substrate, catalogue and de-mount the wood finish materials, repair the substrate and reinstall the wood elements.
4. Where varnished wood finishes have failed from sun exposure or the presence of moisture, strip the damaged finish and refinish to match surrounding material.
5. Wood elements that are damaged or deteriorated beyond repair should be replaced to match the original sectional profile, wood type, grain direction, color, and finish.
6. Protect adjacent in-tact areas, or restored areas from ongoing construction work.

Light Fixtures
Condition: fair
Description:
- Some pendant lights remain

Condition:
- Check to see if historic

Recommendation:
- Retain if historic, otherwise replace

Historic Equipment
Condition: Good
Description:
- Historic pieces of industrial equipment including overhead cranes, jib cranes, shop equipment, etc.

Condition:
- Much of the equipment appears in working order.

Recommendation:
- Retain any working equipment for continued use or historic displays.

Accessibility
- Building at grade so ground floor accessible
- Mezzanines require lift or elevator

Reuse Scenario:
- East end – public assembly use / cultural use – space remains open
- West end – office use with one inserted floor / central bay remains open / existing mezzanine remains
- 114 portion for food / restaurant use

Existing areas:
Ground floor (113 + 114) .....78511 sq ft
Mezzanine (113).....8800 sq ft

Proposed areas
Ground floor. .....78511 sq ft
Enclose Mezzanine (113).. .....8800 sq ft
Construct new 2nd floor (113) .... 9120 sq ft

PORT OF SAN FRANCISCO · PIER 70 · BUILDING 113/114
SEISMIC REVIEW

Prepared by:

OLMM Consulting Engineers
1404 Franklin Street, Suite 350
Oakland, CA 94612

1.1 Introduction

This report summarizes the findings and recommendations of a qualitative seismic and structural assessment of the Port of San Francisco Building 113/114. The structural assessment included a site visit, review of available architectural drawings, available previous reports and structural/ seismic assessment in accordance with Tier 1 of the ASCE/SEI 31-03. The purpose of this assessment is to note decay of existing structural materials (when readily visible), to identify potential seismic deficiencies, and to develop recommendations for further investigations, analyses and retrofit.

1.2 List of Available Documents

1. "Seismic Evaluation and Concept Level Retrofit Design for Building 113" by URS, dated January 2002.

2. "Geotechnical Evaluation Building No. 113", by URS, dated 12/18/2001.

3. Architectural Drawings (6 sheets), by Bethlehem Steel Co., Shipbuilding Division, San Francisco Yard, CA., dated February, 1973 with latest revision dated 6-1-79.

4. Structural Drawings (6 sheets), by URS, not dated.

1.3 Site Visit

A site visit of the building was performed on April 23, 2008. We were accompanied by the staff of Carey & Co. during this visit. The main purpose of the site visit was to visually assess the physical condition of the building and, in particular, focus on the lateral force resisting elements. Following items were assessed during the site visit:

1. Type and materials of building construction.
2. Presence of lateral bracing elements.
3. Visible cracks or distress in structure and signs of settlements

The site visit did not include any measurements, testing, or removal of finishes.

1.4 Basis of Assessment

The Standard ASCE/SEI 31-03, American Society of Civil Engineers, *"Seismic Evaluation of Buildings,"* 2003, was used as the basis of our qualitative seismic evaluation. There are two seismic performance levels defined in ASCE/SEI 31-03: Life Safety Performance and the Immediate Occupancy Performance. We have based our evaluation on the Life Safety Performance level which is typical for buildings of this type and which is defined as "the building performance that includes significant damage to both structural and nonstructural components during a design earthquake, though at least some margin against either partial or total collapse remains. Injuries may occur, but the level of risk for life-threatening injury and entrapment is low." The basic structural checklist from ASCE/SEI 31-03 for this building is attached as Appendix A.

1.5 Review of Existing Drawings, Reports and Site Observations

Building 113/114 was constructed in three phases. The three phase are referred to in this report as Portion A, B and C as shown on Figure 1 and Photo 1 through 4. It is essentially a one-story unreinforced brick shear wall (URM) structure except for portion B, which was constructed with reinforced concrete shear wall as seen in Photo 4. The southwest corner of the Building 113 is referred to as Building 114 as shown on Figure 1 and Photo 2. There is a partial height unreinforced brick wall between Building 113 and Building 114.

The vertical load carrying system of the building consists of light gage roof metal deck spanning between purlins made of steel channels. The purlins are supported on steel trusses spaced at 18' on center, which in turn are supported on bearing walls at the perimeter and steel columns at the interior of the building. The perimeter bearing walls are unreinforced brick walls (URM) except for reinforced concrete walls at Portion B. Interior columns are either cast iron or rolled steel shapes. The roof framing appears adequate to support existing dead loads plus current code live loads without strengthening.

The lateral force resisting system of the building consists of roof metal deck diaphragms and URM or reinforced concrete shear walls at exterior. The existing lateral force resisting system appears to have many seismic deficiencies. The existing roof diaphragm appears inadequate for seismic lateral forces. The roof diaphragm is interrupted with continuous skylights, resulting in inadequate transfer of lateral forces. The exterior URM walls have many windows which create an inadequate seismic load resisting system. The height-to-thickness ratio of the URM wall piers exceeds that allowed by code. The flexibility of these walls can lead to excessive structural damage and / or partial collapse of the building if it is subjected to strong seismic ground motions. The exterior URM walls have some diagonal and vertical cracks in multiple locations. The URM walls do not

Photo 1 Above: View of North Side (Showing Portion C)

Photo 2 Below: View of South Side (Showing Building 114 and Portion C)

appear to be detailed to resist out-of-plane loads. The anchorage of the brick walls to the roof diaphragms for out-of-plane seismic loads appears inadequate. Therefore, the brick walls can pull away from the roof framing causing roof framing to lose vertical support.

There is a mezzanine level at the northwest end of the building as shown on Figure 1 and Photo 9, between the ground and roof. The wood frame mezzanine does not appear to have its seismic lateral resisting system nor is it anchored to the lateral-force-resisting elements of the building.

According to existing reports, Building 115, a concrete shear wall building, was constructed adjoining Building 114 with a common concrete wall as shown in Photo 10 and Figure 1. Therefore, the two buildings are structurally connected and the common concrete wall shares roof dead loads as well as seismic lateral forces.

Building 113/114 was previously analyzed and evaluated in 2002 by URS. The evaluation found that the building has several specific weaknesses that would prevent the building from meeting the Life Safety Performance Level based on the requirement of Chapter 16C of the San Francisco Building Code. URS report also presented seismic strengthening concepts for the building.

Photo 3 Above: View of East Side (Showing Portion A)

Photo 4 Below: View of North Side (Showing Portion B and C)

Based on information contained in the geotechnical report by URS, the existing foundations consist of continuous brick/concrete and stone block footing at the perimeter walls, and concrete spread footings at the interior columns.

1.6 Conclusions and Recommendations

Given the vintage of the building, many structural elements will not meet the provisions of the current building code. Main seismic deficiencies from our review are summarized below.

1. The existing diaphragm appears inadequate for seismic loads.
2. The roof diaphragm is interrupted with continuous skylights, resulting in inadequate transfer of lateral forces.
3. The exterior URM walls have many windows which create an inadequate seismic load resisting system and can lead to excessive structural damage and / or partial collapse of the building during strong seismic ground motions.
4. The anchorage of the URM walls to the roof diaphragms for out-of -plane load appears inadequate.

Photo 5 Above: View of West Side (Showing Portion C)

Photo 6 Below: Deteriorated Exterior Brick Bearing Wall

5. The wood frame mezzanine does not appear to have its seismic lateral resisting system nor is it anchored to the lateral-force-resisting elements of the building.
6. Building 115 was constructed adjoining Building 114 with a common concrete wall. Therefore, the two buildings are structurally connected and the common concrete wall shares roof dead loads as well as seismic lateral forces.

In our professional opinion any proposed renovation or modernization of the building should include the following:

1. A detailed seismic evaluation of the building to quantitatively estimate the seismic deficiencies and to develop seismic retrofit measures. Since Building 113/114 and 115 are structurally connected together at south end, their seismic evaluation and retrofit may require consideration of both buildings or add seismic joint to separate Building 115 from Building 113/114.
2. Since structural drawings and geotechnical report for the building are not complete, the seismic evaluation would also require some site measurements and validation of geotechnical report by URS.

Photo 7 Above: Roof Truss and Roof Metal Deck

Photo 8 Below: Existing Crane Girder Horizontal Bracing

3. For preliminary planning and cost-estimating purpose, the seismic strengthening may consist of:

    - Add new metal deck to replace existing roof metal deck and increase strength of connections of roof diaphragm to seismic force resisting elements.
    - Add new collector elements around roof diaphragm opening to adequately transfer lateral forces.
    - Strengthening the URM walls with shotcrete walls or add new steel braced frames to resist seismic forces in both transverse and longitudinal directions.
    - New shotcrete walls or steel braced frames will require new foundations to provide adequate support for seismic loads.
    - Add new ties to brace mezzanine to main building.

Photo 9 Above: Mezzanine at Northeast Corner Portion C)

Photo 10 Below: Common Concrete Wall Between Bldg 113/114 and 115

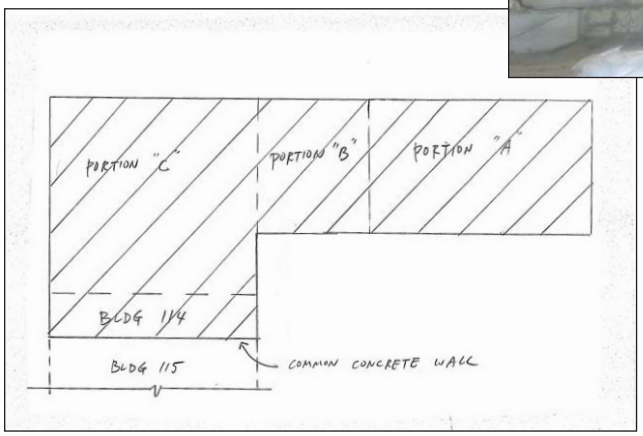


Figure 1: Building Layout

1.7 Limitations and Disclaimer

This report includes a qualitative seismic assessment of the building. It should be noted that no structural drawings for the building was available. Obvious seismic deficiencies identified visually during site visits or by review of available architectural drawings are summarized in this report.

However, users of this report must accept the fact that deficiencies may exist in the structure that could not be identified in this limited evaluation. Our services have consisted of providing professional opinions, conclusions, and recommendations based on generally accepted structural engineering principles and practices existing at this time.

Appendix A

Basic Structural Checklist for
BUILDING TYPE URM: Unreinforced Masonry Bearing Walls with Flexible Diaphragms (ASCE/SEI 31-03)
Tier 1 Assessment

Legend:

C: Complies
NC: Does not Comply
N/A: Not Applicable or Not Known

BUILDING SYSTEM

C✓	**NC**	**N/A**	LOAD PATH: The structure shall contain a minimum complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1)
C	**NC✓**	**N/A**	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4 percent of the height of the shorter building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.1.2)
C	**NC✓**	**N/A**	MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)
C	**NC**	**N/A✓**	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80% of the strength in an adjacent story above or below for Life-Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1)
C	**NC**	**N/A✓**	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70% of the stiffness in an adjacent story above or below or less than 80% of the average stiffness of the three stories above or below for Life-Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2)
C	**NC**	**N/A✓**	GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30% in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses. (Tier 2: Sec. 4.3.2.3)
C✓	**NC**	**N/A**	VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)
C	**NC**	**N/A✓**	MASS: There shall be no change in effective mass more than 50% from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)

metal connection hardware shall be deterioration, broken, or loose.(Tier 2: Sec. 4.3.3.1)

C **NC✓** **N/A** MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7)

C **NC✓** **N/A** MASONRY JOINTS: The mortar shall not be easily scraped away the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8)

C **NC✓** **N/A** UNREINFOCED MASONRY WALL CRACKS: There shall be no existing diagonal cracks in the wall elements greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.11)

LATERALFORCE RESISTIGN SYSTEM

C✓ **NC** **N/A** REDUNDANCY: The number of lines of shear walls in each principal directior shall be greater or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

C **NC✓** **N/A** SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30psi for clay units and 70 psi for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.5.1)

CONNECTIONS

C **NC✓** **N/A** WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connection shall have adequate strength tc resist the connection force calculated in Quick Check procedure of Section 3.5.3.7 (Tier 2: Sec. 4.6.1.1)

C **NC** **N/A✓** WOOD LEDGERS: The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers. (Tier 2: Sec. 4.6.1.2)

C **NC✓** **N/A** TRANSFER TO SHEAR WALL: Diaphragm shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2: Sec. 4.6.2.1)

C **NC** **N/A✓** GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 4.6.4.1)