

BUILDING RAPID EVALUATION SAFETY ASSESSMENT FORM

I) General

Inspection Number-(1700-SUPER-006-2007-1)

Inspector's Name: D. Wilson, M. Li

Affiliation: C+D Engineers

Inspection Date (MM/DD/YYYY): 3/16/07

Start Time: 2:52pm

End Time: 2:58pm

Purpose of Inspection-Periodic Insp.

(II) Building Description and Structural Rating

<u>Building Description:</u>	<u>Overall Rating:</u>
<p>Name: Pier 70 Building #6</p> <p>Address/Location:</p> <p>Facility Code 1700 Lease No.</p> <p>No. of Stories: 1</p> <p>Construction: Wood <input type="checkbox"/> Concrete <input type="checkbox"/> Steel Masonry</p> <p style="margin-left: 40px;"><input type="checkbox"/> Combination</p> <p>Support: <input checked="" type="checkbox"/> Over Water <input type="checkbox"/> On Land</p> <p>Occupancy: Commercial Office Industrial</p> <p>Assembly Residential Emergency Serv. <input type="checkbox"/> Other</p>	<p>Green:</p> <p>Yellow:</p> <p><input checked="" type="checkbox"/> Red:</p>

Rating Criteria:

Green – Unrestricted use. May require some minor repair, or minimal barricading.

Yellow – Restricted use. May require further review, may require load limits, limiting access and barricading until repairs completed.

Red – Unsafe notice. Shall be barricaded to prevent public access and use.

Detailed Building Description (If available)

- 1) One story building
- 2) Vacant and barricaded industrial building
- 3) Metal roofing on metal purlins with steel truss framing on steel columns
- 4) Steel bracing along longitudinal direction of building
- 5) Pile supported concrete slab at end of building near water (northwest side)

(III) Condition Assessment

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Condition	Yes	No	More Review Needed
1) Collapse, partial collapse, off foundation		X	
2) Major building element significantly damaged		X	
3) Severe cracking of walls, obvious distress		X	
4) Parapet or other falling hazard		X	
5) Severe ground or slope movement present		X	
6) Other hazard present	X		

Comments-

- 1) Broken glass and debris present
- 2) West side wall open to water
- 3) Large steel and concrete debris blocking south side of building
- 4) Most windows are broken
- 5) Sea wall at foundation appears to be in poor condition

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(IV) Recommendations/Actions Required:

(A) Immediate Actions-

(1) Load restrictions-

TBD by Port

(2) Barricades/Closures-

Not Required

(B) Long Term Actions

The following actions are required by the Tenant

(1) Detailed Structural Evaluation Required? TBD at Port internal strategy meeting.

(2) Repair Plans

(i) Submit Repair Plans by_____

(ii) Secure all permits (including BCDC, ARMY Corps, CEQA, Historic review etc)

TBD by Port

(V) Attachments-

(A) Photographs

(B) Structural Rating Map

(C) Architectural Assessment by Carey & Co. Inc., dated May 2008

(D) Structural Assessment by OLMM Inc., dated May 2008

Notes- (1) FFFF=4 digit facility ID,

(2) SSS=Structure ID,

(3) YYYY-Year of Inspection,

(4) X=1 for first inspection in the current year, X=2 for second inspection in the current year, etc.

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Figure 1: Partial south elevation



Figure 2: Partial south elevation

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Figure 3: Partial south elevation



Figure 4: Interior, looking west

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Figure 5: South wall, overhang

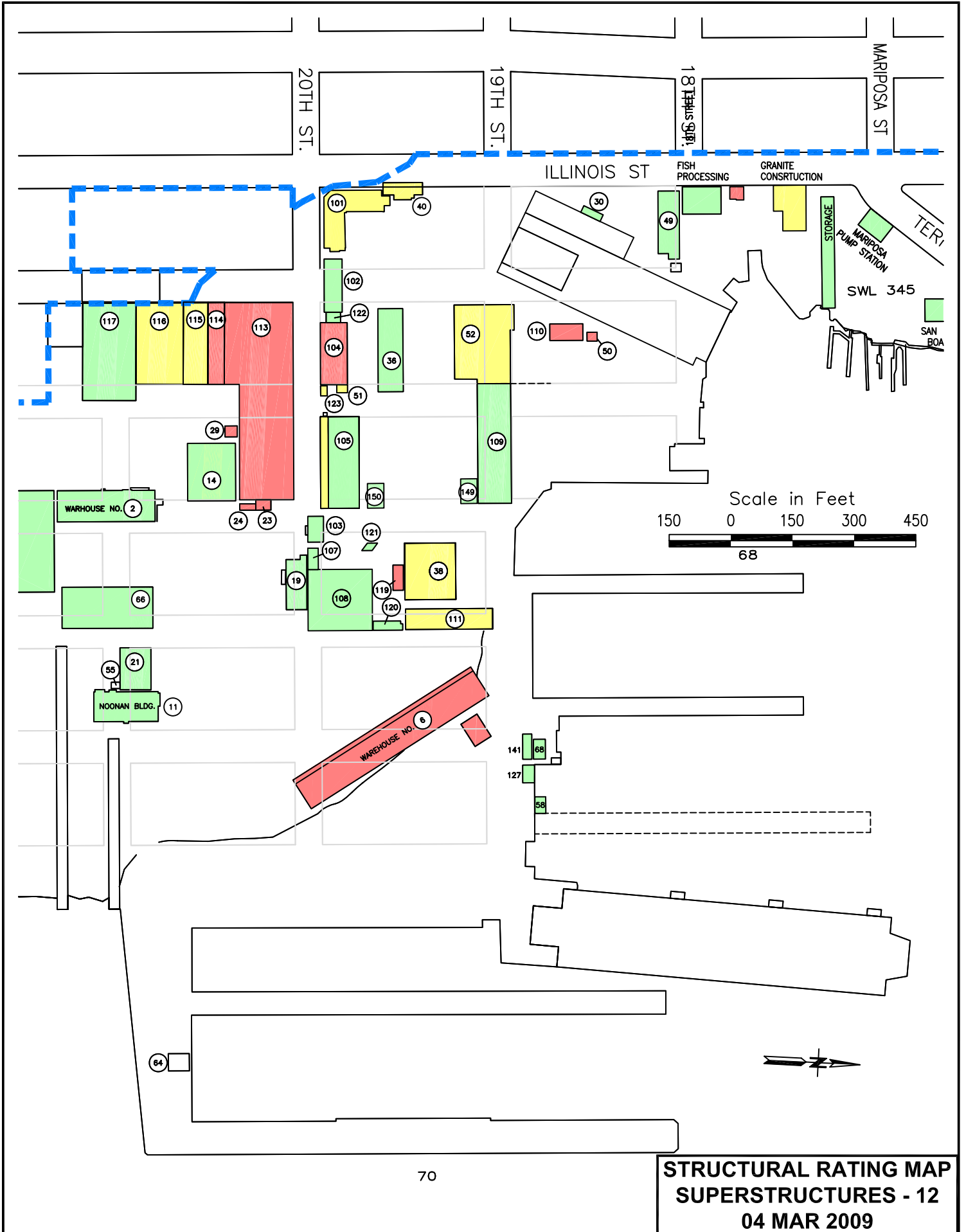


Figure 6: Southwest corner

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Figure 7: Damaged seawall



Building 6



Building 6 - Warehouse No 6

37,707 GSF

Built: 1941

Construction Type: Steel Frame

Current use: vacant

512' by 172'

Description:

Light warehouse No. 6 ran between dry-dock No. 5 and the now in-filled southern slip area. It is adjacent to the bay to the east and is diagonal to the Pier70 grid. Built on vacant land and tidal flats, it was associated with several smaller and now demolished sheds. A BAE materials layout and storage yard now surrounds the building to the east and south. Built in 1941, the architect and engineer are unknown, but this structure was likely designed and built by government personnel as part of the WWII effort.

Note that the building partially sits on piers over San Francisco Bay. Some of the piers are damaged or missing from deterioration.

Exterior Walls

Condition: Poor

Description:

- CGI panels attached to steel frame with 1/8" wire pin

Condition:

- Significant decay in CGI panels, particularly on bay side
- Heads on wire pins exhibit severe deterioration

Recommendation:

- Replace 60% CGI wall panels.
- Restore 40% CGI wall panels. CGI restoration treatment:
 1. Survey existing condition of all galvanized metal corrugated metal panels and flashing or trim elements.
 2. Clean metal of all loose paint and rust. Tight rust may remain (rust that is not flaking). Use gentlest means possible to avoid damaging metal substrate. Avoid wet-cleaning methods.
 3. If substantial cross-section of panel has been lost due to rust, replace in-kind.
 4. Replace dented and damaged components in kind to match original.
 5. Repair small holes by soldering, or by application of epoxy filler formulated for use on ferrous metal (i.e. auto body putty or plumbers epoxy).
 6. Wipe with mineral spirits, prime clean metal with specially formulated zinc rich, rust consolidant primer, and paint with two finish coats of compatible oil-based paint. (Note that the majority of CGI at Pier 70 has not been previously painted).
- Reattach 100% CGI wall panels with self-tapping screws. CGI reattachment treatment
 1. Identify existing interior c-channel attachment location.
 2. Using ferrous, self-tapping screws, drill through low ridge of CGI panel into c-channel flange.





Windows:

Condition: *Poor*

Description:

- Two bands of steel sash multi-lite windows on NE and SW elevations
- Windows cover approximately 50% of gable ends.

Condition:

- Window panes 90% destroyed
- Steel sash exhibits surface rust but appears functional

Recommendation:

- Replace window panes
- Restore steel sash windows: Steel sash multi-lite window – restoration:
 1. Survey existing condition of all steel sash window components.
 2. Remove dirt and deteriorated glazing putty.
 3. Wire brush steel elements to remove rust.
 4. Restore free movement to all operable units.
 5. Install new glazing putty.
 6. Clean existing hardware. Install new hardware where missing to match original.
 7. Install new glazing where required to match existing original glazing.
 8. Prepare steel surfaces, prime with rust inhibitive primer, and paint with two top coats.
 9. Where steel sash windows are bowed, remove the unit and straiten under controlled shop conditions and re-install.
 10. Where severely deteriorated from rust induced cross sectional steel loss, replace in-kind with a new unit.

Doors

Condition: *Fair*

Description:

- 16 freight/cargo doors on overhead tracks line the SW elevation
- Vehicle doors on NW and SE elevations.



Condition:

- Doors locked in position so evaluators were unable to move
- Appeared operable

Recommendation:

- Restore to working condition. Steel door restoration:
 1. Replace missing hardware and components.
 2. Replace window panes and reglaze view windows where necessary.
 3. Clean existing hardware and kickplates.
 4. Remove existing varnish surface where worn
 5. Prepare surfaces, prime and repaint.



ROOF

Membrane

Condition: Poor

Description:

- CGI panels attached to steel frame with 1/8" wire pin

Condition:

- Significant decay in CGI panels, particularly on bay side
- 5% of panels missing
- Heads on wire pins exhibit severe deterioration

Recommendation:

- Replace 100% CGI roof panels.



Flashing

Condition: Poor

Description:

- Galvanized box flashing at gable ends

Condition:

- Significant rusting
- NW gable flashing has become partially detached

Recommendation:

- Replace 100% flashing



INTERIOR

Interior walls

- See exterior walls

Floor

Condition: good

Description:

- Monolithic concrete slab

Condition:

- No significant structural cracking

Recommendation:

Patch minor surface cracks. Concrete Crack Treatment:

1. Remove any loose material. Test with wooden mallet to identify loose or unstable area.
2. Repair cracks less than 1/16" wide with mixture of cement and water
3. Repair cracks greater than 1/16" wide with mixture of cement, sand, and water. Field test crack prior to patching to determine if the crack should be routed (widened and deepened) minimally prior to patching. Patch material must be compatible with surrounding material as determined in laboratory tests described above.
4. Apply coating to match existing or as determined by paint analysis. Coating must be vapor permeable to avoid trapping moisture within walls.
5. If a crack is determined to be a structural deficiency, epoxy injection or other structural remedies may be required.

Structural steel columns and trusses

Condition: good

Description:

- Riveted built-up plate columns and beams
- Condition of roof structure not visible from ground

Condition:

- Some surface rust
- Some trusses and cross-bracing exhibit minor bending and distortion, possibly from earthquake forces

Recommendation:

- Use scissiors lift to determine structural integrity of trusses
- Remove surface rust. Repaint with rust consolidant. 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.

Accessibility

Ramps to loading docks should provide wheelchair access to ground floor. The slope of the ramp will need to be verified and possibly adjusted.

Reuse Scenario:

- Cost at cold shell with substructure and retrofit

PORT OF SAN FRANCISCO · PIER 70 · BUILDING 6
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 6. The structural assessment included a site visit, review of the available reports and architectural drawings, and structural/seismic assessment in accordance with Tier 1 of the ASCE/SEI 31-03. The purpose of this assessment is to identify decay or weakening 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. “Rapid Structural Evaluation” by Creegan & D’Angelo, dated 03/16/2007.
2. “Structural Report” by ABR Engineers, dated 12/20/2000.

It should be noted that no structural drawings showing the member sizes, thickness, or connections were available. Soil report for the site was also not available.

1.3 Site Visit

A site visit of the building was performed on April 2, 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.

1.5 Review of Existing Drawings and Site Observations

Building 6 is a 512' long, 72' wide, 52' tall, industrial-vernacular rectangular steel warehouse with corrugated metal siding and a gable roof.

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, which in turn are supported on steel built-up columns at the perimeter of the building. Most of roof metal deck and steel trusses show signs of corrosion. Portions of the roof have completely deteriorated. There are large openings in the roof at multiple places.

The lateral force resisting system of the building consists of roof metal deck diaphragm and steel brace frames that occur in only the longitudinal direction of the building as seen in Photo 2 and 3. In the transverse direction of the building, there are no apparent seismic lateral resisting elements except for weak axis column bending. The existing lateral force resisting system appears to have many seismic deficiencies. The existing roof diaphragm appears inadequate for code seismic lateral forces. Clerestories walls between high and low roofs prevent the roof diaphragm from behaving as a single continuous diaphragm, resulting in inadequate transfer of lateral forces. The braced frames consisting of steel double angle braces do not appear to be adequate for seismic loading and connections. The connections at the column base are not constructed to perform in a ductile manner, and can fail suddenly.

Based on information contained in existing reports, the foundation consists of timber piles with concrete pile cap and an interconnected grade beam system. However, there is no soil report available for the building site. During the site visit we observed signs of cracking and rebar spalling in the ground floor slab at multiple locations. Some timber piles are missing below the column pile cap based on previous reports. This could result in portions of the building to lose vertical support posing potential life safety hazard.

Photo 1 Below:
View of South Side



Photo 2 Above:
Brace Frame at South Side

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. Structural steel shows signs of corrosion at many locations due to seawater exposure. Ongoing maintenance will be required.
2. Portions of the roof deck have completely deteriorated.
3. The existing diaphragm appears inadequate for seismic loads.
4. The discontinuous roof diaphragm with a clerestory window between high and low roofs is not adequate to transfer lateral forces.
5. Braced frames in longitudinal direction are inadequate for seismic loads.
6. In the transverse direction of the building, there are no apparent seismic lateral resisting elements except for weak axis column bending.
7. The ground floor concrete slabs have cracking and rebar spalling at multiple locations.
8. Some timber piles are missing below the column pile cap.



Photo 3 Above:
Brace Frame at North Side



Photo 4 Below:
Brace Connection at
Column Base

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.
2. Since structural drawings for the building are not available, the seismic evaluation would have to be preceded by detailed site measurements to prepare as-built structural drawings and geotechnical investigations to determine the existing soil conditions and recommendations for foundation support.
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 steel braces in the clerestory between the high roof and low roof where the roof diaphragm is discontinuous.
 - Add new steel braced frames to resist seismic forces in both transverse and longitudinal directions.

Photo 6 Below:
Roof Truss and Metal Deck



Photo 5 Above:
Deteriorated Roof Framing

- New steel braced frames will require new foundations to provide adequate support for seismic loads.
- Remove loose concrete, clean or replace rebar, and patch concrete at ground floor.
- Provide new piles to replace missing timber piles.

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 S2A: Steel Braced Frames 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** **DETERIORATION OF STEEL:** There shall be no visible rusting, corrosion, cracking, or other deterioration in any of the steel members or connection in the vertical- or lateral-force-resisting elements. (Tier 2: Sec. 4.3.3.3)

LATERAL FORCE RESISTING SYSTEM

C✓ **NC** **N/A** **AXIAL STRESS CHECK:** The axial stress due to gravity loads in columns subjected to overturning forces shall be less than $0.10F_y$ for Life Safety and Immediate Occupancy. Alternatively, the axial stress due to overturning forces alone, calculated using the Quick Check procedure of Section 3.5.3.6, shall be less than $0.30F_y$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.3.2)

C✓ **NC** **N/A** **REDUNDANCY:** The number of braced frames in each principal direction shall be greater or equal to 2 for Life Safety and Immediate Occupancy. The number of braced bays in each line shall be greater or equal to 2 for Life Safety and 3 for Immediate Occupancy (Tier 2: Sec. 4.4.3.1.1)

C **NC✓** **N/A** **AXIAL STRESS CHECK:** The axial stress in the diagonals, calculated using the Quick Check procedure of Section 3.5.3.4, shall be less than $0.50F_y$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.3.1.2)

C **NC** **N/A✓** **COLUMN SPLICES:** All column splice details located in braced frames shall develop the tensile strength of the column. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.3.1.3)

CONNECTIONS

C **NC✓** **N/A** **TRANSFER TO STEEL FRAMES:** Diaphragms shall be connected for transfer of loads to the steel frames for Life Safety, and the connections shall be able to develop the lesser of the strength of the frames or the diaphragms for Immediate Occupancy. (Tier 2: Sec. 4.6.2.2)

C✓ **NC** **N/A** **STEEL COLUMNS:** The columns in lateral-force-resisting frames shall be anchored to the building foundation for Life Safety, and the anchorage shall be able to develop the lesser of the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation for Immediate Occupancy (Tier 2: Sec. 4.6.3.1)