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12-17-2018

**UCSF Building Seismic Ratings**  
**654 Minnesota Street, San Francisco**

CAAN #3043  
654 Minnesota St, San Francisco, CA 94107  
UCSF Campus: UCSF Mission Bay



12/17/18



Plan



From Southeast

Rating summary	Entry	Notes
UC Seismic Performance Level (rating)	II	Findings based on drawing review and ASCE 41-17 Tier 1 evaluation <sup>1</sup>
Rating basis	ASCE 41-17	Benchmark Building for Immediate Occupancy
Date of rating	2018	
Recommended UCSF priority category for retrofit	N/A	
Ballpark total project cost to retrofit to IV rating	N/A	
Is 2018-2019 rating required by UCOP?	Yes	According to UC Seismic Program Guidebook Version 1.1, building qualifies for presumptive rating
Further evaluation recommended?	No	

<sup>1</sup> The evaluations at UCSF translate the Tier 1 evaluation to a Seismic Performance Level rating using professional judgment discussed among the Seismic Review Committee. Non-compliant items in the Tier 1 evaluation do not automatically put a building into a particular rating category, but such items are evaluated along with the combination of building features and potential deficiencies, focused on the potential for collapse or serious damage to the gravity supporting structure that may threaten occupant safety.

### **Building information used in this evaluation**

- Structural Retrofit Drawings by DASSE Engineers, “654 Minnesota Renewal,” dated 2007-04-30 (19 Sheets).
- Structural Retrofit Calculations by DASSE Engineers, “654 Minnesota Renewal,” dated 2007-03-02, (283 pages)
- Supplemental Structural Retrofit Calculations by DASSE Engineers, “654 Minnesota Renewal,” dated 2007-04-30, (104 pages)

### **Additional building information known to exist**

- Select drawings for 2008 Tenant Improvement Project
- Due Diligence report by MBT Architecture dated 2005-05-27
- Structural Peer Review report by Degenkolb of 654 Minnesota Street Renewal project dated 2007-02-12

### **Scope for completing this form**

The review was based on a study of the retrofit drawings by DASSE and was guided by the assessment methodology of ASCE 41-17. Design forces required for ASCE 41-17 Immediate Occupancy were compared with retrofit design forces and found to be comparable. Several site visits were conducted in September and October 2018 by Maryann Phipps while investigating observed distress in 3<sup>rd</sup> floor framing.

### **Brief description of structure**

This three-story building at 654 Minnesota Street was designed in 1981 under the 1975 San Francisco Building Code. The 1st and 2nd floors are 30,000 sqft each, and the 3<sup>rd</sup> floor (penthouse) is 6,000 sqft (total area is 66,000 sqft). The building was retrofit in 2007 by UCSF for the purpose of housing a data center, police station and Emergency Operations Center.

Foundation system: The building is located on a gently sloping site. The foundation consists of shallow footings, some bearing on rock and some on engineered fill. The building has perimeter continuous wall footings and a 4” concrete slab-on-grade.

Structural system for vertical (gravity) load: The 1<sup>st</sup> floor consists of a concrete slab-on-grade. The 2<sup>nd</sup> floor consists of metal deck with concrete fill supported by open web steel joists. The main roof/3<sup>rd</sup> Floor consists of plywood sheathing over glulam framing. The penthouse roof consists of wood framing and plywood sheathing.

Structural system for lateral forces: The original lateral system consisted of exterior 6-1/2” concrete shear walls in the first and second stories at the building perimeter. The penthouse was originally constructed with plywood shear walls. The 2007 retrofit provided new interior concrete shear walls with new concrete footings in each direction at the first floor, new interior chevron braced frames in each direction at the second level, and new plywood shear walls at the third level. In addition, the retrofit included diaphragm strengthening at the third level and supplemental out-of-plane wall anchorage. The 2007 retrofit was designed in accordance with FEMA 356 considering the “Immediate Occupancy” target performance objective.

The building is generally in good condition, however, there has been observed damage at select gravity members. There are four wood beams at the 3<sup>rd</sup> floor (original roof) that have cracked under gravity loading. These beams are currently under repair to restore their strength.

Building Code: Original Building was designed in accordance with the 1975 San Francisco Building Code; the 2007 retrofit was designed in accordance with FEMA 356 for the “Immediate Occupancy” target performance objective.

Building Condition: The building is generally in good condition, however, there has been observed damage at select gravity members. There are four wood beams at the 3<sup>rd</sup> floor (original roof) that have cracked under gravity loading. These beams are currently under repair to restore their strength.

**Brief description of seismic deficiencies and expected seismic performance including structural behavior modes**

Because the retrofit was designed in accordance with FEMA 356 considering the “Immediate Occupancy” target performance objective, the building is considered a “Benchmark Building” per ASCE 41-17 Section 3.3 and Table 3-3 and is therefore technically deemed to comply with the provisions of ASCE 41-17 for the Immediate Occupancy performance level.

The building was retrofit to limit nonlinear response in the Design Earthquake. Damage is expected to include nail pull-out and local damage in the plywood shear walls in the penthouse level since the two-story base of the building is considerably stiffer than the penthouse story. Some local damage to the chevron braced frames can be expected in the second story. Concrete shear wall cracking is expected in some walls in the first and second stories. Because the building lateral system is highly redundant, structural damage is not expected to limit post-earthquake use.

**Summary of review of non-structural life-safety concerns, including at exit routes. <sup>2</sup>**

None identified.

UCOP non-structural checklist item	Life safety hazard?	UCOP non-structural checklist item	Life safety hazard?
Heavy ceilings, feature or ornamentation above large lecture halls, auditoriums, lobbies or other areas where large numbers of people congregate	None	Unrestrained hazardous materials storage	None
Heavy masonry or stone veneer above exit ways and public access areas	None	Masonry chimneys	None
Unbraced masonry parapets, cornices or other ornamentation above exit ways and public access areas	None	Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.	None

**Basis of Seismic Performance Level Rating**

The building was retrofit to enable it to be used following an earthquake. The building’s lateral system is highly redundant and regular. Structural damage is not expected to limit post-earthquake use.

**Recommendations for further evaluation or retrofit**

No further evaluation or retrofit is recommended.

**Peer review comments on rating**

Three of the four structural members of the UCSF Seismic Review Committee (SRC) recommend a rating of II based on the retrofit performance objective, redundant lateral system, and expectations for limited nonlinear response. One member preferred a rating of III, which is the permissible presumptive rating according to the UCOP Guidebook, since all details of the lateral system were not subject to a detailed evaluation explicitly considering nonlinear response.

Additional building data	Entry	Notes
Latitude	37.7620	
Longitude	-122.3911	
Are there other structures besides this one under the same CAAN#	No	
Number of stories above lowest perimeter grade	3	
Number of stories (basements) below lowest perimeter grade	0	

<sup>2</sup> For these Tier 1 evaluations, we do not visit all spaces of the building; we rely on campus staff to report to us their understanding of if and where non-structural hazards may occur.

Building occupiable area (OGSF)	66,000	Gross square footage
Risk Category per 2016 CBC 1604.5	IV	Police and Emergency Operations Center
Building structural height, $h_n$	43 ft	Structural height defined per ASCE 7-16 Section 11.2
Coefficient for period, $C_t$	0.02	Per ASCE 41-17 equation 4-4
Coefficient for period, $\beta$	0.75	Per ASCE 41-17 equation 4-4
Estimated fundamental period	0.34 sec	Per ASCE 41-17 equation 4-4
<b>Site data</b>		
975 yr hazard parameters $S_s, S_1$	1.384,0.535	
Site class	C	
Site class basis	Geotech Parameters	UCSF Group 1 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Site parameters $F_a, F_v$	1.200,1.465	
Ground motion parameters $S_{cs}, S_{c1}$	1.660,0.783	
$S_a$ at building period	1.661	
Site $V_{s30}$	640 m/s	
$V_{s30}$ basis	Geotech Parameters	UCSF Group 1 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Liquefaction potential/basis	No	UCSF Group 1 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Landslide potential/basis	No	UCSF Group 1 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Active fault-rupture hazard identified at site?	No	UCSF Group 1 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Site-specific ground motion study?	No	Site-specific study was conducted for the adjacent site
<b>Applicable code</b>		
Applicable code or approx. date of original construction	1975 SFBC	1975 San Francisco Building Code was based on the 1973 UBC
Applicable code for partial retrofit	None	No partial retrofit known
Applicable code for full retrofit	FEMA 356	2007 Design for Immediate Occupancy Performance Objective
<b>Model building data</b>		
Model building type North-South	S2, C2, W1	Steel braced frames and concrete shear walls; plywood shear walls in penthouse
Model building type East-West	S2, C2, W1	Steel braced frames and concrete shear walls; plywood shear walls in penthouse
FEMA P-154 score	n/a	Not included because this is a Post-Benchmark building
<b>Previous ratings</b>		
Most recent rating	III (Good)	Rated by UCSF SRC. There was no differentiation at the time between ratings of I, II, or III.
Date of most recent rating	2013	

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2 <sup>nd</sup> most recent rating	-	
Date of 2 <sup>nd</sup> most recent rating	-	

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3 <sup>rd</sup> most recent rating	-	
Date of 3 <sup>rd</sup> most recent rating	-	

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<b>Appendices</b>		
ASCE 41 Tier 1 checklist included here?	No	Benchmark Building
Floor plans included?	Yes	

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Appendix A  
Additional Images



Figure 1. – Floor Plan