Campus: UCSF
Building Name: Clinical Sciences Building
CAAN ID: 2251
Auxiliary Building ID: NA

UNIVERSITY OF CALIFORNIA

Date: 1/5/2020

FORM 1
CERTIFICATE OF SEISMIC PERFORMANCE LEVEL
☒ **UC-Designed & Constructed Facility**
☐ **Campus-Acquired or Leased Facility**

BUILDING DATA
Building Name: Clinical Sciences Building
Address: 521 Parnassus Ave., San Francisco
Site location coordinates: Latitude 37.7627 Longitudinal -122.4594

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING"): III

ASCE 41-17 Model Building Type:
a. Longitudinal Direction: C2: Concrete Shear Walls
b. Transverse Direction: C2: Concrete Shear Walls

Gross Square Footage: 108,007
Number of stories *above* grade: 8
Number of basement stories *below* grade: 0

Year Original Building was Constructed: 1933
Original Building Design Code & Year: UBC-1930
Retrofit Building Design Code & Code (if applicable): 2019, CBC-2013

SITE INFORMATION
Site Class: C Basis: (Forell/Elsesser, 9/15/2015, S0.00)
Geologic Hazards:
Fault Rupture: No Basis: Forell/Elsesser, 9/15/2015
Liquefaction: No Basis: Forell/Elsesser, 9/15/2015
Landslide: No Basis: Forell/Elsesser, 9/15/2015

ATTACHMENT
Original Structural Drawings: (Medical School Building University of California San Francisco, Walter Leroy Huber, 4/14/1932, S1) or
Seismic Evaluation: NA
Retrofit Structural Drawings: (UCSF Clinical Sciences Building Seismic Renovation, Forell/Elsesser, 9/15/2015, S0.00)

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CERTIFICATION & PRESUMPTIVE RATING VERIFICATION STATEMENT

I, Maryann T. Phipps, a California-licensed structural engineer, am responsible for the completion of this certificate, and I have no ownership interest in the property identified above. My scope of review to support the completion of this certificate included both of the following ("No" responses must include an explanation):

a) the review of structural drawings indicating that they are as-built or record drawings, or that they otherwise are the basis for the construction of the building: ☑ Yes ☐ No
b) visiting the building to verify the observable existing conditions are reasonably consistent with those shown on the structural drawings: ☑ Yes ☐ No

Based on my review, I have verified that the UCOP Seismic Performance Level (SPL) is presumptively permitted by the following UC Seismic Program Guidebook provision (choose one of the following):

☐ 1) Contract documents indicate that the original design and construction of the aforementioned building is in accordance with the benchmark design code year (or later) building code seismic design provisions for UBC or IBC listed in Table 1 below.

☐ 2) The existing SPL rating is based on an acceptable basis of seismic evaluation completed in 2006 or later.

☑ 3) Contract documents indicate that a comprehensive[1] building seismic retrofit design was fully-constructed with an engineered design based on the 1997 UBC/1998 ***or later*** CBC, and (choose one of the following):

☒ the retrofit project was completed by the UC campus. Further, the design was based on ground motion parameters, at a minimum, corresponding to BSE-1E (or BSE-R) and BSE-2E (or BSE-C) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 CBC ***or later*** for EXISTING buildings, and is presumptively assigned an SPL rating of IV.
☐ the retrofit project was completed by the UC campus. Further, the design was based on ground motion parameters, at a minimum, corresponding to BSE-1 (or BSE-1N) and BSE-2 (or BSE-2N) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 ***or later*** CBC for NEW buildings, and is presumptively assigned an SPL rating of III.
☐ the retrofit project was not completed by the UC campus following UC policies, and is presumptively assigned an SPL rating of IV.

[1] A comprehensive retrofit addresses the entire building structural system as indicated by the associated seismic evaluation, as opposed to addressing selective portions of the structural system.

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CERTIFICATION SIGNATURE

AFFIX SEAL HERE

Maryann T. Phipps	President
Print Name	Title
S2995	6/30/2020
CA Professional Registration No.	License Expiration Date
Maryann T. Phipps	1/5/2020
Signature	Date

1/5/2020

Estructure, (510) 235-3116, 1144 65th St Suite A, Oakland
Firm Name, Phone Number, and Address

Table 1: Benchmark Building Codes and Standards

Building Type[a,b]	Building Seismic Design Provisions	
	UBC	IBC
Wood frame, wood shear panels (Types W1 and W2)	1976	2000
Wood frame, wood shear panels (Type W1a)	1976	2000
Steel moment-resisting frame (Types S1 and S1a)	1997	2000
Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1988[g]	2000
Buckling-restrained braced frame (Types S2 and S2a)	[f]	2006
Metal building frames (Type S3)	[f]	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	[f]	2000
Steel plate shear wall (Type S6)	[f]	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997[h]	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	[f]	2003
Reinforced concrete moment-resisting frame (Type C1)[i]	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	[f]	[f]
Tilt-up concrete (Types PC1 and PC1a)	1997	2000
Precast concrete frame (Types PC2 and PC2a)	[f]	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	[f]	[f]
Unreinforced masonry (Type URMa)	[f]	[f]
Seismic isolation or passive dissipation	1991	2000

Note: This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-1E.

Note: UBC = *Uniform Building Code*. IBC = *International Building Code*.

[a] Building type refers to one of the common building types defined in Table 3-1 of ASCE 41-17.

[b] Buildings on hillside sites shall not be considered Benchmark Buildings.

[c] not used

[d] not used

[e] not used

[f] No benchmark year; buildings shall be evaluated in accordance with Section III.J.

[g] Steel eccentrically braced frames with links adjacent to columns shall comply with the 1994 UBC Emergency Provisions, published September/October 1994, or subsequent requirements.

[h] Cold-formed steel shear walls with wood structural panels only.

[i] Flat slab concrete moment frames shall not be considered Benchmark Buildings.

Basis for Rating

The retrofit of CSB was designed to achieve the following four performance objectives:

HAZARD LEVEL	STRUCTURAL PERFORMANCE LEVEL	NONSTRUCTURAL PERFORMANCE LEVEL
BSE-R	S-3	N-D
BSE-C	S-5	N-E
GA	S-2	N-B
GB	S-2	N-B

A nonlinear response history analysis was performed, and peer reviewed, to demonstrate compliance with the project design criteria. Hazard levels used for the project are defined in the table below.

In accordance with the 2019 California Building Code, Table 317.5 and the UCOP Seismic Policy, Seismic Performance Level rating III requires the following:

HAZARD LEVEL	STRUCTURAL PERFORMANCE LEVEL	NONSTRUCTURAL PERFORMANCE LEVEL
BSE-1	S-3	N-C
BSE-2	S-5	N-D

Structural Criteria

The controlling structural criterion for the project was S-2 (Damage Control) in the GB hazard (most likely maximum earthquake). Since the GB hazard is larger than the BSE-1 hazard and the structural performance level checked was more stringent, by inspection the design satisfies the BSE-1/S-3 performance objective.

The current BSE-2 hazard level is larger than the original BSE-C hazard level by a maximum of 11%. Structural Engineer of Record, Steve Marusich, indicated that the new walls generally satisfy S-4 performance in the BSE-C hazard (see email dated August 20, 2019). This is roughly equivalent to a slightly higher hazard with a slightly lower performance level. Thus, the design is judged to satisfy the BSE-2/S-5 performance objective.

The drift in the BSE-2 hazard is theoretically 11% larger than the maximum 1% drift used as the upper limit for BSE-C hazard level. The most significant related question is protection of the exterior concrete façade. Drift was specifically limited to 1% in the BSE-C hazard level to protect the wall from posing a significant safety hazard. Since the wall has low axial load (there is a complete steel frame in the exterior wall), the ASCE-41 acceptable total drift for collapse prevention (S-5) is 2%. Consequently, the slightly higher drift associated with BSE-2 can be accommodated and the performance objectives associated with BSE-1 and BSE-2 are judged to be satisfied.

Nonstructural Criteria

All of the major nonstructural components were installed with the renovation project conform to the 2013 CBC. Thus, they are deemed to comply with the BSE-1/N-C and BSE-2/N-D criteria.

For these reasons, a Seismic Performance Rating of III is recommended.

By: Maryann Phipps, S.E.
Estructure
1/29/2020

HORIZONTAL SPECTRAL ACCELERATIONS, Sa							
PERIOD SECONDS	BSE-1 g	BSE-R g	BSE-C g	GA g	GB g	BSE-1N[1]	BSE-2N[1]
0.01	0.45	0.42	0.77	0.52	0.62		
0.03	0.62	0.45	0.84	0.57	0.69		
0.05	0.79	0.53	0.98	0.68	0.81		
0.10	1.13	0.77	1.43	1.01	1.18		
0.20	1.13	0.94	1.73	1.26	1.47	1.25	1.88
0.30	1.13	0.85	1.59	1.14	1.40		
0.40	1.13	0.76	1.43	0.99	1.23		
0.50	1.13	0.67	1.28	0.83	1.07		
0.60	1.13	0.58	1.12	0.70	0.94		
0.75	0.91	0.49	0.97	0.57	0.80		
1.00	0.68	0.39	0.79	0.43	0.63	0.59	0.89
2.00	0.34	0.19	0.41	0.18	0.32		
3.00	0.23	0.12	0.28	0.11	0.21		
4.00	0.17	0.09	0.21	0.07	0.15		
5.00	0.14	0.07	0.17	0.06	0.12		

[1] Spectral accelerations from "UCSF Group 2 Buildings Geotechnical Characteristics and Geohazards" prepared by John Egan 2019. With John Egan's concurrence, values for Medical Sciences Building (next door) were used for CSB.

From: Steve Marusich <S.Marusich@forell.com>
Date: Tuesday, August 20, 2019 at 1:06 PM
To: "mphipps@estruc.com" <mphipps@estruc.com>, Michael Bade <Michael.Bade@ucsf.edu>
Cc: Simin Naaseh <S.Naaseh@forell.com>
Subject: RE: New Seismic Rating for CSB

Dear Maryann and Michael,

CSB easily meets a rating of IV per the UCOP Seismic Safety Policy; however, a case could be made for a rating of II or III. The controlling structural criterion for the project was S-2 (Damage Control) in the GB hazard (most likely maximum earthquake). To qualify for a rating of II, the building must satisfy performance objectives S-2 (Damage Control) and N-B (Position Retention) for the BSE-R hazard and S-4 (Limited Safety) and N-D (Not Considered) for the BSE-C hazard. Since the GB hazard is 50% larger than the BSE-R for the same S-2 criteria, the building meets the first structural performance target. All of the major non-structural components are new and conform to the 2013 CBC. The only existing non-structural component remaining is the existing concrete façade, which is protected by the low-drift design (less than 1.0% in the BSE-C hazard). I believe this is consistent with the intent of the UCOP rating system. We did not specifically check N-4 performance for the BSE-C hazard; but this would only affect the BRBs, as they are the only deformation controlled components. Looking at the BSE-C results, the BRBs meet the criteria for S-4 performance with the exception of one wall. All other structural components (walls, collectors, diaphragms and foundations) and were designed as force controlled at the BSE-C hazard.

In summary, I would have recommended a rating of II at the original time of the design. Since then the ground motions have increased by about 15%-20% at Parnassus. Given this hazard increase, I would recommend a rating of III for CSB at this time.

Let me know if there are any questions on the above.

Regards,

Steve

HORIZONTAL SPECTRAL ACCELERATIONS, Sa					
PERIOD SECONDS	BSE-1 g	BSE-R g	BSE-C g	GA g	GB g
0.01	0.45	0.42	0.77	0.52	0.62
0.03	0.62	0.45	0.84	0.57	0.69
0.05	0.79	0.53	0.98	0.68	0.81
0.10	1.13	0.77	1.43	1.01	1.18
0.20	1.13	0.94	1.73	1.26	1.47
0.30	1.13	0.85	1.59	1.14	1.40
0.40	1.13	0.76	1.43	0.99	1.23
0.50	1.13	0.67	1.28	0.83	1.07
0.60	1.13	0.58	1.12	0.70	0.94
0.75	0.91	0.49	0.97	0.57	0.80
1.00	0.68	0.39	0.79	0.43	0.63
2.00	0.34	0.19	0.41	0.18	0.32
3.00	0.23	0.12	0.28	0.11	0.21
4.00	0.17	0.09	0.21	0.07	0.15
5.00	0.14	0.07	0.17	0.06	0.12