Rating form completed by:

ESTRUCTURE
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Maryann Phipps, Darrick Hom

Text in green is to be part of UCSF building database and may be part of UCOP database

07-24-2019

REGISTERED PROFESSIONAL ENGINEER
MARYANN T. PHIPPS
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EXP. 6/30/20
STRUCTURAL
STATE OF CALIFORNIA

7/24/2019

UCSF Building Seismic Ratings

Aldea San Miguel 12

CAAN #2312
165 Johnstone Drive, San Francisco, CA 94131
UCSF Campus: Parnassus

Plan


West Elevation

Rating summary	Entry	Notes
UC Seismic Performance Level (rating)	IV	Findings based on drawing review and ASCE 41-17 Tier 1 evaluation[1]
Rating basis	Tier 1	ASCE 41-17
Date of rating	2019	
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	
Further evaluation recommended?	No	

Building information used in this evaluation

- Structural drawings by Thomas F. Fitzgerald, "Married Student Housing," dated 1958-04-14 (13 sheets).

Additional building information known to exist

- None

[1] 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.

Scope for completing this form

Structural drawings for original construction were reviewed and an ASCE 41-17 Tier 1 evaluation was performed.

Brief description of structure

The building has an area of approximately 7,800 square feet. It was designed in 1958 by Thomas F. Fitzgerald. The building is 3-stories but the bottom story is only a partial story as the building is built into the hillside. The main floor plate is rectangular in plan 108 ft by 28 ft east-west.

Identification of Levels: Partial basement, below grade on the north side of the building, is designated Basement on the original drawings; First Floor; Second Floor; Roof.

Foundation system: Due to the sloping site, the foundation consists of concrete strip footings supported on drilled concrete caissons a minimum of 6'-0" embedment (Reference sheet RS2).

Structural system for vertical (gravity) load: The gravity-load-carrying system consists of wood flooring (straight sheathing at the roof, plywood at the floors) supported by wood joists spanning to wood stud walls.

Structural system for lateral forces: The diaphragm consists of wood straight sheathing at the roof and plywood sheathing at the floor levels. Vertical elements of the lateral-force-resisting system consists of let-in-braces, gypsum wallboard shear walls and plywood shear walls. The let-in braces occur only at the top floor in the longitudinal direction. The gypsum wallboard shear walls are only used at the top floor in the transverse direction.

Building Code: This building was designed in accordance with the 1956 SFBC

Building Condition: Good. No significant structural distress or damage observed.

Building Response in 1989 Loma Prieta Earthquake: No damage reported and determined safe for occupancy in a report by Impell Corporation, "Performance of UCSF Buildings During the October 17, 1989 Loma Prieta Earthquake," dated November 17, 1989.

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

Potential seismic deficiencies identified by the Tier 1 procedure include the following:

- The interior plywood shear walls in the longitudinal direction are discontinuous at the first floor.
- In a quick check of the lateral-force-resisting system, the shear walls do not have adequate shear capacity. See further evaluation of the lateral system below.
- Due to window openings, the exterior longitudinal walls have aspect ratios greater than 2:1.
- On the downhill slope of the building, the exterior longitudinal walls have aspect ratios greater than 1:1 due to window openings.

Further evaluation of the adequacy of the vertical lateral forces was conducted distributing the lateral forces at all three floors and evaluating the elements in each direction. See the table below for a summary of forces.

In the longitudinal direction, at the top story, the let-in braces were ignored and it was assumed that the force is resisted by the exterior plywood shear walls. At the ground floor, it was assumed one-quarter of the lateral force was distributed to the foundation directly due to the hillside slope, one-half was distributed to the middle shear wall, and one-quarter was distributed to the downhill slope exterior wall.

In the transverse direction, at the top story, it was assumed that the interior gypsum wallboard walls participated to cut down the span and aspect ratio of the straight-sheathed diaphragms. At the ground level, it was assumed that half the force was distributed to the foundation directly due to the hillside slope, while the other half is resisted by the plywood shear walls.

Longitudinal Direction						
Story	**Story Shear (k)**	**Length of Wall (ft)**	**Ms factor**	**Average shear stress (plf)**	**Quick check shear capacity (plf)**	**Pass?**
2nd	296	71	4.5	926	1000	Y
1st	472	131	4.5	800	1000	Y
Ground	130	50	4.5	578	1000	Y
Ground	259	96	4.5	600	1000	Y
Ground	130	Force distributed to the foundation due to hillside slope				

Transverse Direction						
Story	**Story Shear (k)**	**Length of Wall (ft)**	**Ms factor**	**Average shear stress (plf)**	**Quick check shear capacity (plf)**	**Pass?**
2nd	296	224	4.5	294	100	N
1st	472	112	4.5	937	1000	Y
Ground	259	56	4.5	1000	1000	Y
Ground	259	Force distributed to the foundation due to hillside slope				

Structural deficiency	**Affects rating?**	**Structural deficiency**	**Affects rating?**
Lateral system stress check (wall shear, column shear or flexure, or brace axial as applicable)	Y	Openings at shear walls (concrete or masonry)	N
Load path	N	Liquefaction	N
Adjacent buildings	N	Slope failure	N
Weak story	N	Surface fault rupture	N
Soft story	N	Masonry or concrete wall anchorage at flexible diaphragm	N
Geometry (vertical irregularities)	Y	URM wall height-to-thickness ratio	N
Torsion	N	URM parapets or cornices	N
Mass – vertical irregularity	N	URM chimney	N
Cripple walls	N	Heavy partitions braced by ceilings	N
Wood sills (bolting)	N	Appendages	N
Diaphragm continuity	N		

Summary of review of non-structural life-safety concerns, including at exit routes. [2]

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

[2] 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.

Basis of Seismic Performance Level Rating

The subject building benefits from being lightweight conventional wood-framed construction. Based on the historic performance of similar buildings, the risk to life safety is judged to be exceedingly small. All lateral elements (gypsum wallboard, plywood, and let-in bracing) are expected to participate in resisting earthquake shaking and are well-distributed throughout the building plan. Based on the anticipated seismic demands, the elements are judged to be adequate to protect against collapse. The hillside condition is mitigated by the first raised floor being directly tied to the uphill foundation at 12' on center as well as the presence of transverse plywood shear walls.

Recommendations for further evaluation or retrofit

No further evaluation or retrofit is recommended.

Peer review comments on rating

The structural members of the UCSF Seismic Review Committee (SRC) reviewed the evaluation on June 25, 2019 and are unanimous that the rating is IV.

Additional building data	Entry	Notes
Latitude	37.7582	
Longitude	-122.4556	
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	
Building occupiable area (OGSF)	7800	Calculated
Risk Category per 2016 CBC 1604.5	II	
Building structural height, h_n	29 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, β	0.75	Per ASCE 41-17 equation 4-4
Estimated fundamental period	0.25 sec	Per ASCE 41-17 equation 4-4
Site data		
975 yr hazard parameters S_s, S_1	1.549,0.611	
Site class	C	
Site class basis	Geotech Parameters	UCSF Group 2 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Site parameters F_a, F_v	1.200,1.400	
Ground motion parameters S_{cs}, S_{c1}	1.854,0.853	
S_a at building period	1.858	
Site V_{s30}	730 m/s	
V_{s30} basis	Estimated	UCSF Group 2 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Liquefaction potential/basis	No	UCSF Group 2 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Landslide potential/basis	No	UCSF Group 2 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)

Active fault-rupture hazard identified at site?	No	
Site-specific ground motion study?	No	
Applicable code		
Applicable code or approx. date of original construction	Built: 1958 Code: 1956 SFBC	Code identified on Sheet S1
Applicable code for partial retrofit	None	No partial retrofit known
Applicable code for full retrofit	None	No full retrofit known
Model building data		
Model building type North-South	W1 : Wood Light Frames	
Model building type East-West	W1: Wood Light Frames	
FEMA P-154 score	N/A	Not included here because we performed ASCE 41 Tier 1 evaluation.
Previous ratings		
Most recent rating	IV	In spreadsheet. Basis for rating is unknown
Date of most recent rating	10/7/2013	
2nd most recent rating	-	
Date of 2nd most recent rating	-	
3rd most recent rating	-	
Date of 3rd most recent rating	-	
Appendices		
ASCE 41 Tier 1 checklist included here?	Yes	Refer to attached checklist file

Appendix A

Additional Images

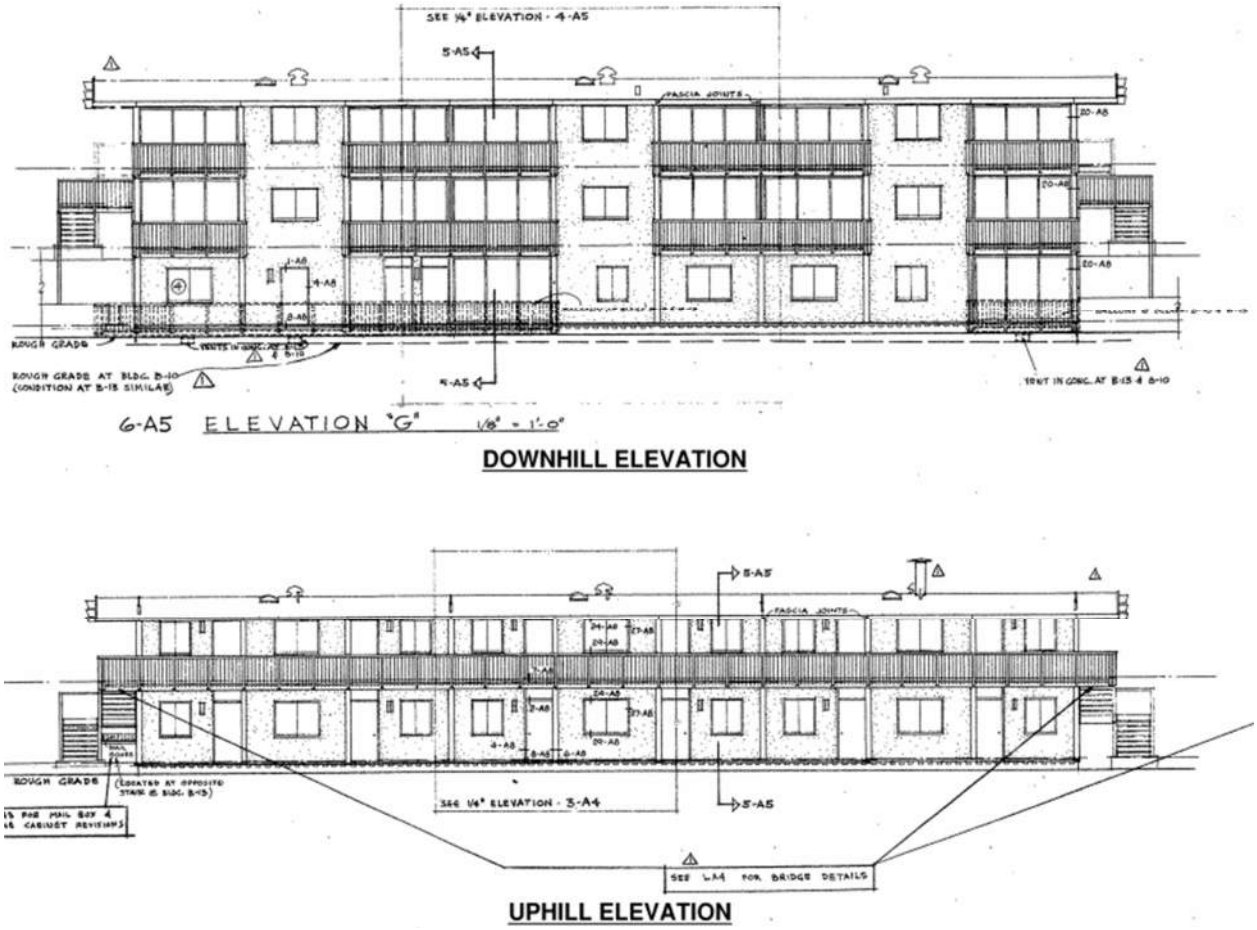

Figure 1. – Exterior Longitudinal Elevations

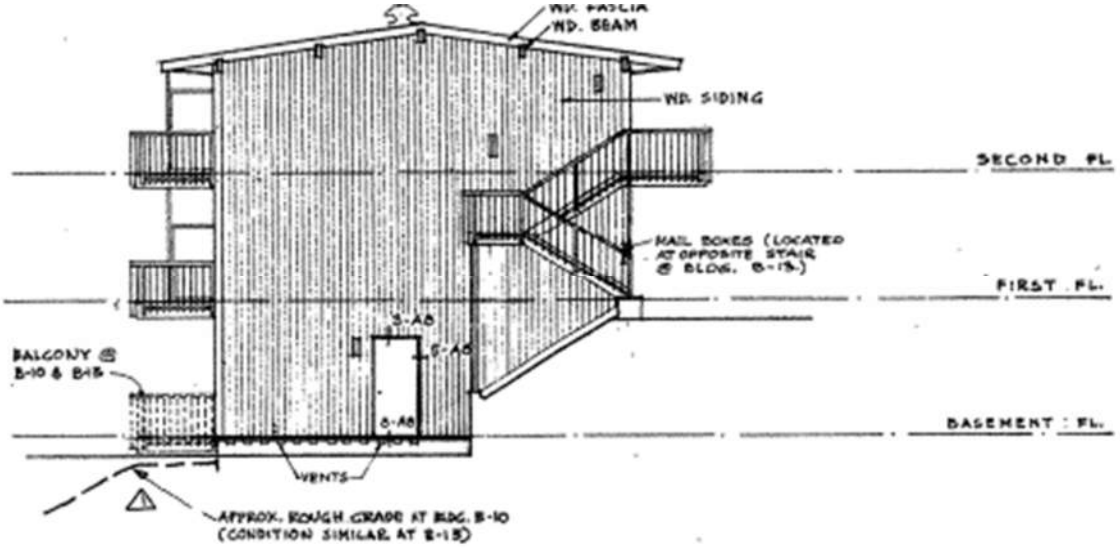

Figure 2. – Exterior Transverse Elevation (Typical Both Sides)

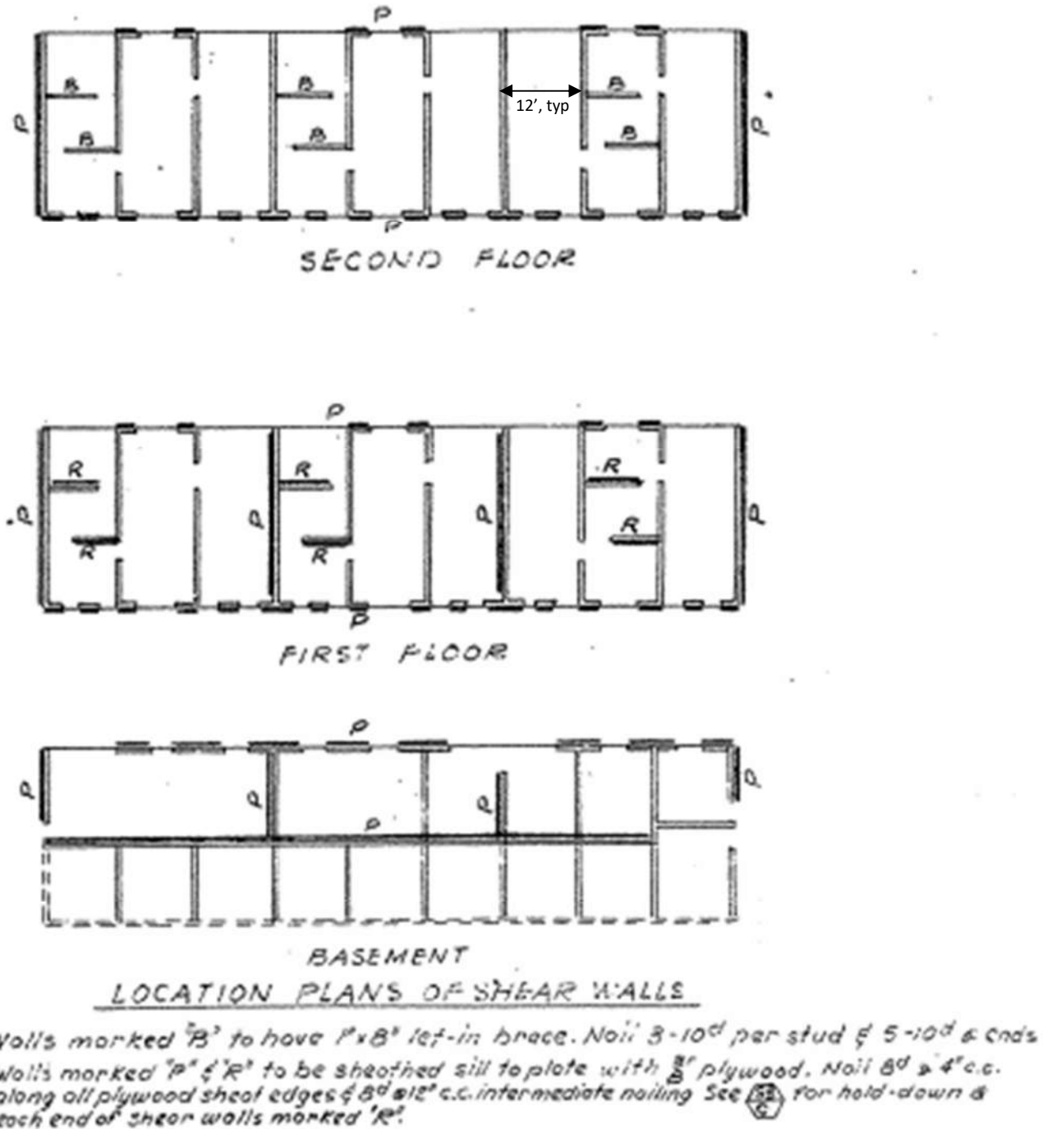

Figure 3. – Location of Vertical Lateral-Force-Resisting Elements

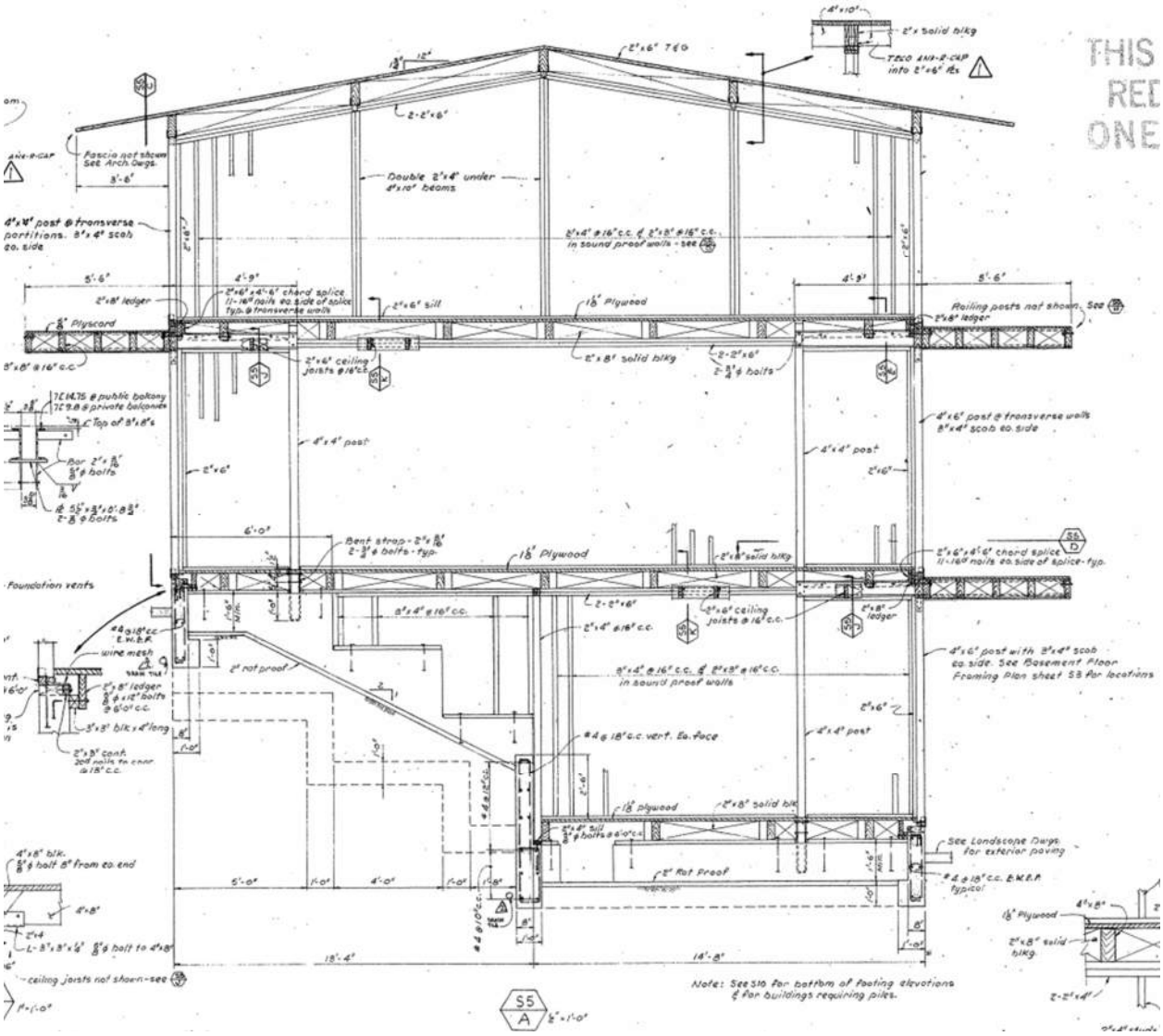

Figure 4. – Structural Transverse Building Section

Figure 5. – Exterior of the West Side

Figure 6. – Stairway on South Side

Figure 7. – Second Floor Balcony on West Side

Figure 8. – First Floor Balcony on West Side

Figure 9. – Stairway on North Side

Figure 10. – Exterior of North Side

Figure 11. – Balconies on East Side

Figure 12. – Balconies and Walkway on West Side

Figure 13. – Underneath Stairway on South Side

Figure 14. – Vents on Base of First Floor on West Side

Figure 15. – Stairway on South Side

Appendix B

ASCE 41- 17 Tier 1 Checklists (Structural)

UC Campus:	UCSF Parnassus			Date:	June 26 2019		
Building CAAN:	2312	Auxiliary CAAN:		By Firm:	EStructure		
Building Name:	Aldea San Miguel Building 12			Initials:		Checked:	
Building Address:	165 Johnstone Drive, San Francisco, CA			Page:	1	of	3

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

LOW SEISMICITY

BUILDING SYSTEMS - *GENERAL*

C	NC	N/A	U	Description
◉	○	○	○	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1) **Comments:**
◉	○	○	○	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.25% of the height of the shorter building in low seismicity, 0.5% in moderate seismicity, and 1.5% in high seismicity. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2) **Comments:**
○	○	◉	○	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3) **Comments:**

BUILDING SYSTEMS - *BUILDING CONFIGURATION*

C	NC	N/A	U	Description
◉	○	○	○	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above. (Commentary: Sec. A2.2.2. Tier 2: Sec. 5.4.2.1) **Comments:**
◉	○	○	○	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2) **Comments:**
○	◉	○	○	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3) **Comments:** Interior longitudinal walls are discontinuities at the first floor.

Note: **C =** Compliant **NC =** Noncompliant **N/A =** Not Applicable **U =** Unknown

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

C	NC	N/A	U	
◉	○	○	○	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4) **Comments:**
◉	○	○	○	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5) **Comments:**
◉	○	○	○	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6) **Comments:**

MODERATE SEISMICITY (COMPLETE THE FOLLOWING ITEMS IN ADDITION TO THE ITEMS FOR LOW SEISMICITY)

GEOLOGIC SITE HAZARD

C	NC	N/A	U	Description
◉	○	○	○	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2m) under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1) **Comments:**
◉	○	○	○	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1) **Comments:**
◉	○	○	○	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1) **Comments:**

Note: **C =** Compliant **NC =** Noncompliant **N/A =** Not Applicable **U =** Unknown

UC Campus:	UCSF Parnassus			Date:	June 26 2019		
Building CAAN:	2312	Auxiliary CAAN:		By Firm:	EStructure		
Building Name:	Aldea San Miguel Building 12			Initials:		Checked:	
Building Address:	165 Johnstone Drive, San Francisco, CA			Page:	3	of	3

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

HIGH SEISMICITY (COMPLETE THE FOLLOWING ITEMS IN addition TO THE ITEMS FOR MODERATE SEISMICITY)

FOUNDATION CONFIGURATION

C NC N/A U	Description
◉ ○ ○ ○	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3) **Comments:**
◉ ○ ○ ○	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4) **Comments:**

Note: **C =** Compliant **NC =** Noncompliant **N/A =** Not Applicable **U =** Unknown

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

LOW AND MODERATE SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

C	NC	N/A	U	Description
◉	○	○	○	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1) **Comments:**
○	◉	○	○	SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the following values: (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1) Structural panel sheathing: 1,000 lb/ft (14.6 kN/m) Diagonal sheathing: 700 lb/ft (10.2 kN/m) Straight sheathing: 100 lb/ft (1.5 kN/m) All other conditions: 100 lb/ft (1.5 kN/m) **Comments:** Further evaluation of vertical lateral elements done to distribute forces at top and bottom to evaluate elements at the top and bottom stories- see report for summary.
◉	○	○	○	STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1) **Comments:**
◉	○	○	○	GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used for shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1) **Comments:**
○	◉	○	○	NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1) **Comments:** Exterior longitudinal walls have aspect ratios greater than 2:1.

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

C	NC	N/A	U	
◉	○	○	○	WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2) **Comments:**
○	◉	○	○	HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-1. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3) **Comments:** Longitudinal walls at ground level on downhill side have aspect ratios greater than 1:1.
◉	○	○	○	CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4) **Comments:**
○	◉	○	○	OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5) **Comments:** Exterior walls have openings, resulting in aspect rations greater than 1.5-to-01.

CONNECTIONS

C	NC	N/A	U	Description
○	○	◉	○	WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3) **Comments:**
◉	○	○	○	WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3) **Comments:**
○	○	◉	○	GIRDER-COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1) **Comments:**

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

HIGH SEISMICITY (COMPLETE THE FOLLOWING ITEMS IN ADDITION TO THE ITEMS FOR LOW AND MODERATE SEISMICITY)

CONNECTIONS

	Description
C NC N/A U ● ○ ○ ○	WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less with acceptable edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3) **Comments:**

DIAPHRAGMS

	Description
C NC N/A U ● ○ ○ ○	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1) **Comments**
C NC N/A U ● ○ ○ ○	ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1) **Comments:**
C NC N/A U ● ○ ○ ○	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2) **Comments:** Aspect of roof straight sheathing is compliant when interior gypsum wallboard walls are considered in the transverse direction.
C NC N/A U ● ○ ○ ○	SPANS: All wood diaphragms with spans greater than 24 ft (7.3 m) consist of wood structural panels or diagonal sheathing. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2) **Comments:** Span of roof straight sheathing is 12 feet when interior gypsum wallboard walls are considered in the transverse direction.

UC Campus:	UCSF Parnassus			Date:	June 26, 2019		
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Building Name:	Aldea San Miguel Building 12			Initials:		Checked:	
Building Address:	165 Johnstone Drive, San Francisco, CA			Page:	4	of	4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

C	NC	N/A	U	
○	○	◉	○	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft (12 m) and have aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2) **Comments:**
◉	○	○	○	OTHER DIAPHRAGMS: The diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5) **Comments:**

Note: **C** = Compliant **NC** = Noncompliant **N/A** = Not Applicable **U** = Unknown

Appendix C

UCOP Seismic Safety policy Falling Hazards Assessment Summary

UC Campus:	UCSF Parnassus			Date:	06/26/2019		
Building CAAN:	2312	Auxiliary CAAN:		By Firm:	Estructure		
Building Name:	Aldea San Miguel 12			Initials:	JP	Checked:	MTP
Building Address:	165 Johnstone Drive, San Francisco, CA 94131			Page:	1	of	1

UCOP SEISMIC SAFETY POLICY
Falling Hazard Assessment Summary

	Description
P ☐ N/A ☒	**Heavy ceilings, features or ornamentation above large lecture halls, auditoriums, lobbies, or other areas where large numbers of people congregate (50 ppl or more)** **Comments:**
P ☐ N/A ☒	**Heavy masonry or stone veneer above exit ways or public access areas** **Comments:**
P ☐ N/A ☒	**Unbraced masonry parapets, cornices, or other ornamentation above exit ways or public access areas** **Comments:**
P ☐ N/A ☒	**Unrestrained hazardous material storage** **Comments:**
P ☐ N/A ☒	**Masonry chimneys** **Comments:**
P ☐ N/A ☒	**Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.** **Comments:**
P ☐ N/A ☒	**Other:** **Comments:**
P ☐ N/A ☒	**Other:** **Comments:**
P ☐ N/A ☒	**Other:** **Comments:**

Falling Hazards Risk: *Low*

Note: P= Present, N/A = Not Applicable; Falling Hazards Risk: Low, Moderate, or High

Appendix D

Quick Check Calculations

Estructure

Subject	Prepared by	Page
ASCE 41-17 Tier 1 Evalulation	DBH	1
Project	**Reviewed by**	**Date**
UCSF Tier 1 Seismic Ratings	MTP	6/26/19

ASCE 41-17 PSEUDO LATERAL FORCE AND FORCE DISTRIBUTION

Number of Stories	n = 3		
C_t Factor	C_t = 0.02	Wood shear walls	
β Factor	β = 0.75	Wood shear walls	
C Factor	C = 1.4	Table 7-3	
S_s Factor	S_s = 1.549	Seismic Maps	
S_1 Factor	S_1 = 0.611	Seismic Maps	
F_a Factor	F_a =1.2	Soil profile type S_C	
F_v Factor	F_v = 1.4	Soil profile type S_C	
	h_r = 29.25 ft		w_r = 83 kips
Heights from base	h_2 = 19 ft	Story weights	w_2 = 76 kips
	h_1 = 9.5 ft		w_1 = 40 kips

(15 psf roof + 5 psf walls) x 118' x 35'

(15 psf flr + 10 psf walls) x 108' x 28'

(15 psf flr + 10 psf walls) x 108' x 14.8'

Building Weight	$W = sum(w_r, w_2, w_1)$ = **199** kips
Period	$T = C_t \times (h_r^{\beta})$ = **0.25** sec
Spectral Values	$S_{XS} = S_s \times F_a$ = **1.86**
	$S_{X1} = S_1 \times F_v$ = **0.86**
Spectral Acceleration	$S_{a1} = S_{X1} / T$ = **3.40**
	$S_a = if(S_{a1} > S_{XS}, S_{XS}, S_{a1})$ = **1.86**
Base Shear	$V = C \times S_a \times W$ = **518** kips
Distribution of Base Shear	
Roof Factor	$k_1 = 1 + ((T-0.5)/(2.5-0.5))$ = **0.88**
	$k_2 = if(k_1 > 2, 2, k_1)$ = **0.88**
	$k = if(k_2 < 1, 1, k_2)$ = **1.00**
Denominator	$WH = sum((w_r \times h_r)^k, (w_2 \times h_2)^k, (w_1 \times h_1)^k)$

Story Forces

$F_r = ((w_r \times h_r)^k/WH) \times V =$ **296** kips

$F_2 = ((w_2 \times h_2)^k/WH) \times V =$ **176** kips

$F_1 = ((w_1 \times h_1)^k/WH) \times V =$ **46** kips

Story Shears

$V_2 = F_r =$ **296** kips

$V_1 = V_2 + F_2 =$ **472** kips

$V_G = V_1 + F_1 =$ **518** kips