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Heavenz Kaur, Jay Yin

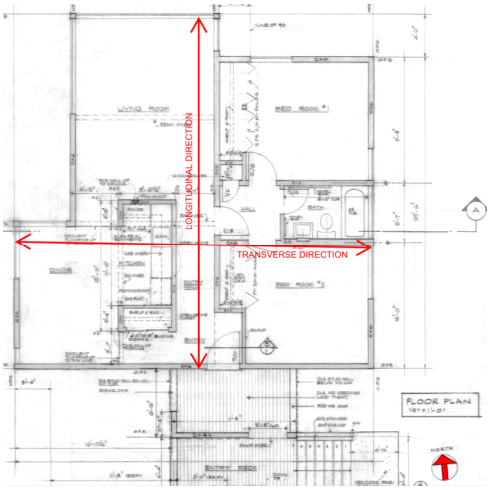
Text in green is to be part of UC Santa Cruz building database and may be part of UCOP database

UC Santa Cruz building seismic ratings

Stevenson Preceptor House

CAAN 7174
532 Stevenson Service Road, Santa Cruz, CA 95064
UCSC Campus: Main Campus

DATE: 2020-10-31



Rating summary	Entry	Notes
UC Seismic Performance Level (rating)	V (Poor)	
Rating basis	Tier 1	ASCE 41-17[1]
Date of rating	2020	
Recommended UC Santa Cruz priority category for retrofit	Priority B	Priority A=Retrofit ASAP Priority B=Retrofit at next permit application
Ballpark total construction cost to retrofit to IV rating[2]	Low(<$50/sf)	
Is 2018-2019 rating required by UCOP?	Yes	No prior building rating available.
Further evaluation recommended?	Yes	None

[1] We translate this Tier 1 evaluation to a Seismic Performance Level rating using professional judgment. Non-compliant items in the Tier 1 evaluation do not automatically put a building into a particular rating category, but we evaluate such items 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. See Section III B of the UC Seismic Safety Policy and Method B of Section 321 of the 2016 California Existing Building Code.

[2] Per Section 3.3.I of the UC Seismic Program Guidelines (https://www.ucop.edu/construction-services/facilities-manual/resource-directories-rds/rd4-project-programmatic-guidelines/rd-4-3.html#a10), the cost includes all construction cost necessitated by the seismic retrofit, including restoration of finishes and any triggered work on utilities or accessibility. It does not include soft costs such as design fees or campus costs. The cost is in 2019 dollars.

Building information used in this evaluation

- Original architectural drawings by Joseph Esherick and Associates "Provost House & Married Preceptor's Apartment" as-builts dated 1 Aug 1966, Sheets 8 - 9.
- Original structural drawings by Rutherford and Chekene "Provost House & Married Preceptor's Apartment" as-builts dated 1 Aug 1966, Sheets S3.
- University of California building database information, “Stevenson College House” provided by Jose Sanchez (UCSC) on 2020-3-13.

Additional building information known to exist

- None

Scope for completing this form

Reviewed structural drawings and performed a site visit to confirm record drawings. Evaluated nonstructural life-safety hazards during site visit. Completed an ASCE41-17 Tier 1 evaluation. We made a site visit on Jun 5th, 2019. We looked for potentially hazardous nonstructural components during the site visit. No nonstructural hazards were identified.

Brief description of structure

Stevenson Preceptor house is a single-story wood shear wall building with a crawl space. The roof profile has a step in elevation at mid-span that occurs across the entire length of the building. This step in the roof elevation is supported by a bearing wall below. The house is characterized by large windows in all exterior walls and clerestory windows at the roof level. The building also has large floor cantilevers that support two exterior walls with windows. The cripple walls in the crawl space are supported by continuous wall footings.

Identification of levels:
First Floor: Living quarters

Foundation system: Continuous concrete strip footings.

Structural system for vertical (gravity) load: The gravity system is composed of 3x roof decking supported by wood walls that are supported by the floor framing. The floor framing is composed f 2x wood joists supported on cripple walls (in the crawl space) that are continuous to the foundation.

Structural system for lateral forces: The lateral system of the building is composed of 3x decking that forms the roof diaphragm supported on 2x4 wood walls sheathed with 3/8” plywood that form the shear walls. Some of the shear walls are continuous to the foundation through the crawl space and some are discontinuous and terminate at the first-floor framing. The first-floor diaphragm is composed of 2x framing sheathed with 3/8” plywood. The cripple walls in the crawl space are sheathed with 3/8” plywood and the sill plates are bolted to the concrete footings for shear transfer.

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

Nonlinear behavior is expected to occur in the roof diaphragm at the vertical offsets and in the floor diaphragm where it supports the discontinuous shear walls.

Identified seismic deficiencies of the building include the following:

Structural feature or potential deficiency	Finding
Load Path	A disruption in load path occurs at the two discontinuous shear walls located at the floor cantilevers.
Vertical Irregularities	Two shear walls are discontinuous and terminate at the first floor level rather than continue to the foundation.
Wall Openings	There are large wall openings in shear walls that are not supported by plywood panels on both sides and no special detailing has been provided around the openings (such as straps) for adequate load transfer.
Diaphragm Continuity	The roof profile has a 4 ft (approx.) step at the midspan of the roof diaphragm that is not supported by a shear wall, and the detailing does not seem to show that lateral load can be adequately transferred across this step in elevation to shear walls on the other side of the building.
Diaphragm Span	The roof diaphragm is composed of 3x6 wood decking that spans about 30 ft and violates the span limitation (24 ft) of straight sheathing.

Structural deficiency	Affects rating?	Structural deficiency	Affects rating?
Lateral system stress check (wall shear, column shear or flexure, or brace axial as applicable)	N	Openings at shear walls (concrete or masonry)	N
Load path	Y	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)	N	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	Y		

Summary of review of non-structural life-safety concerns, including at exit routes.[3]

None

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 observed	Unrestrained hazardous materials storage	None observed
Heavy masonry or stone veneer above exit ways and public access areas	None observed	Masonry chimneys	None observed
Unbraced masonry parapets, cornices or other orna-mentation above exit ways and public access areas	None observed	Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.	None observed

[3] 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 the type and location of potential non-structural hazards.

Discussion of rating

The rating of V assumes that the shear walls are structurally sound, such that they are not a collapse risk at 2/3 BSE-2E earthquake level. The building cannot be rated IV (Fair) as It does not satisfy the detailing requirements needed for adequate seismic load transfer.

Recommendations for further evaluation or retrofit

Further evaluation recommended?	Yes
Likelihood of showing better rating	Unlikely Possible Good chance
Likelihood of showing worse rating	Unlikely Possible Good chance
Evaluation needed to clarify the necessary retrofit scope?	Yes
Discussion of priority assignment	None

It is recommended to investigate the central long interior wall of the building, that aligns with the step in roof profile, if it is sheathed with plywood. Accordingly, the building should be revaluated to see if it needs a retrofit.

Peer review of rating

This seismic evaluation was discussed in a peer review meeting on 29 May 2020. Reviewers present were Bret Lizundia of R+C and Joe Maffei of Maffei Structural Engineering. Comments from the reviewers have been incorporated into this report. The reviewers agreed on the assigned rating.

Additional building data	Entry	Notes
Latitude	36.99773	
Longitude	-122.05171	
Are there other structures besides this one under the same CAAN#	No	
Number of stories above lowest perimeter grade	1	
Number of stories (basements) below lowest perimeter grade	0	
Building occupiable area (OGSF)	1,077 sq. ft	
Risk Category per 2016 CBC Table 1604.5	II	Residential House
Building structural height, h_n	12 ft (Avg)	Structural height defined per ASCE 7-16 Section 11.2
Coefficient for period, C_t	0.020	Estimated using ASCE 41-17 equation 4-4 and 7-18
Coefficient for period, β	0.75	Estimated using ASCE 41-17 equation 4-4 and 7-18
Estimated fundamental period	0.13 sec	Estimated using ASCE 41-17 equation 4-4 and 7-18

Site data		
975 yr hazard parameters S_s, S_1	1.289, 0.489	
Site class	D	
Site class basis	Geotech[4]	See footnote below.
Site parameters F_a, F_v[5]	1.00, 1.811	
Ground motion parameters S_{cs}, S_{c1}	1.289, 0.886	
S_a at building period	1.289	
Site V_{s30}	900 ft/s	
V_{s30} basis	Estimated	Estimated based on site classification of D.
Liquefaction potential	Low	
Liquefaction assessment basis	County map	See footnote below.
Landslide potential	Low	
Landslide assessment basis	County map	See footnote below.
Active fault rupture identified at site	No	
Fault rupture assessment basis	County map	See footnote below.
Site-specific ground motion study?	No	
Applicable code		
Applicable code or approx. date of original construction	Built: 1967 UBC 1964	Assumed
Applicable code for partial retrofit	None	No partial retrofit
Applicable code for full retrofit	None	No full retrofit
Model building data		
Model building type North-South	Wood,W1 - Wood Shear Walls	
Model building type East-West	Wood,W1 - Wood Shear Walls	
FEMA P-154 score	N/A	Not included here because we performed ASCE 41 Tier 1 evaluation.
Previous ratings		
Most recent rating	-	
Date of most recent rating	-	

[4] Determination of site class and assessment of geotechnical hazards are based on correspondence with Pacific Crest Geotechnical Engineers and Nolan, Zinn, and Associates Geologists. [*Revised Geology and Geologic Hazards, Santa Cruz Campus, University of California*, Job # 04003-SC 13 May 2005]. Site class is taken as D throughout the main campus of UC Santa Cruz. The following links provide hazard maps for liquefaction, landslide, and fault rupture:
https://gis.santacruzcounty.us/mapgallery/Emergency%20Management/Hazard%20Mitigation/LiquifactionMap2009.pdf
https://gis.santacruzcounty.us/mapgallery/Emergency%20Management/Hazard%20Mitigation/LandslideMap2009.pdf
https://gis.santacruzcounty.us/mapgallery/Emergency%20Management/Hazard%20Mitigation/FaultZoneMap2009.pdf

[5] F_V factor used does not include the requirements of Section 11.4.8-3 of ASCE 7-16 that are applicable to Site Class D, and which per Exception 2 would result in an effective F_V factor of 2.72 (1.5 times larger). At the Santa Cruz main campus this affects structures with T>0.69 seconds. The increase is not currently a requirement of ASCE 41-17.

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.

Appendix A
ASCE 41-17 Checklists

UC Campus:	Santa Cruz			Date:	5/7/20		
Building CAAN:	7174	Auxiliary CAAN:	-	By Firm:	Degenkolb Engineers		
Building Name:	Stevenson College Preceptor House			Initials:	*HK*	Checked:	
Building Address:	532 Stevenson Service Road, Santa Cruz, CA 95064			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:** There is a disruption in load path at the discontinuous shear walls at the floor cantilevers.
◉	○	○	○	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:** Shear walls at floor cantilevers are unsupported.

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

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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:**

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ASCE 41-17
Collapse Prevention Basic Configuration Checklist

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

FOUNDATION CONFIGURATION

	Description
C NC N/A U ● ○ ○ ○	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:** (28' / 22' = 1.27) > (0.6 x 1.289 = 0.77)
C NC N/A U ● ○ ○ ○	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:** Continuous Strip footings at all walls

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

LOW AND MODERATE SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

	Description
C NC N/A U ● ○ ○ ○	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:**
C NC N/A U ● ○ ○ ○	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:** 3/8” plywood structural panel sheathing
C NC N/A U ● ○ ○ ○	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:** Exterior walls have stucco finishes but do not rely on it for seismic-force-resisting system.
C NC N/A U ● ○ ○ ○	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:**
C NC N/A U ● ○ ○ ○	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:**
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:** Where walls are continuous to the crawl space, the plywood sheathing runs continuous to the bottom sill plate the foundations.
C NC N/A U ○ ○ ● ○	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:**

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

C	NC	N/A	U	
◉	○	○	○	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:** Cripple walls are sheathed with 3/8" plywood
○	◉	○	○	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:** Walls with large openings are not always braced with plywood sheathed panels with aspect ratio >1.5:1 and not have special detailing for transferring seismic forces.

CONNECTIONS

				Description
C	NC	N/A	U	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:**
C	NC	N/A	U	WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3) **Comments:**
C	NC	N/A	U	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:**

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

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

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

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:** Roof diaphragm is discontinuous and has a step in roof elevation not supported by a lateral member.
●	○	○	○	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:**
●	○	○	○	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:**
○	●	○	○	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:** 3x6 decking at Roof diaphragm
○	○	●	○	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:**

Appendix B
Quick Check Calculations

Subject:	Global Data	Job Number:	B9956006.00	Date:	05/11/20
Job:	UCSC Tier 1 Seismic Evaluations - CAAN 7173	By:		Section:	
		Checked By:		Page	

GLOBAL DATA

ASCE 41-17 SEISMIC EVALUATION & RETROFIT OF EXISTING BUILDINGS
CHAPTER 4 - TIER 1 EVALUATION
LINEAR STATIC PROCEDURE
COLLAPSE PREVENTION
BSE-2E HAZARD LEVEL

SITE DATA:

Latitude:		36.99684	°N	532 Stevenson Service Road	*USGS Seismic Design Map Application:*	
Longitude:		122.05139	°W	Santa Cruz, CA 95064	*http://geohazards.usgs.gov/hazardtool/application.php*	
Site Class:		D (determined)		(Stiff Soil)	Site Class	[ASCE 41-17, §2.4.1.6]
S_S	=	1.288	g	(USGS) (5% / 50 years)	USGS Mapped (T = 0.2 sec)	[ASCE 41-17, §2.4.1.3]
S_1	=	0.489	g	(USGS) (5% / 50 years)	USGS Mapped (T = 1.0 sec)	[ASCE 41-17, §2.4.1.3]
F_a	=	1.000		(Site Class D)	Site Coefficient (T = 0.2 sec)	[ASCE 7-16, Table 11.4-1]
F_v	=	1.811		(Site Class D)	Site Coefficient (T = 1.0 sec)	[ASCE 7-16, Table 11.4-2]
S_{XS}	=	1.288	g	$= F_a S_S$	Site-Adjusted Design (T = 0.2 sec)	[ASCE 41-17, Eq. 2-1]
S_{X1}	=	0.886	g	$= F_v S_1$	Site-Adjusted Design (T = 1.0 sec)	[ASCE 41-17, Eq. 2-2]

BUILDING DATA:

Building Type:	W1	(Wood Light Frames) [ASCE 41-17, Table 3-1]
Year Built:	1966	
Number of Stories:	1 story	
Parapet Height:	0.00 ft	
Roof Height:	12.00 ft	
Total Area:	985 sf	

Level	Height [ft]	Elevation [ft]	$Length_{N-S}$ [ft]	$Length_{E-W}$ [ft]	Area [sf]	Diaphragm Stiffness	Diaphragm Description
Roof Avg	12.0	12.0	30	33	985	Flexible	3x planks
1st	0.0	0.0	30	33	985	Flexible	Plywood sheathing

Subject:	Weight Take Off	**Job Number:**	B9956006.00	**Date:**	05/11/20
Job:	UCSC Tier 1 Seismic Evaluations - CAAN 7173	**By:**	0.00	**Section:**	
		Checked By:		**Page**	

WEIGHT TAKEOFF

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BSE-2E HAZARD LEVEL

ROOF TYPE: ROOF

		Shingles	(Asphalt)	@	2.0	psf	2.0 psf
		Roof Insulation		@	1.0	psf	1.0 psf
3	in	Wood Sheathing		@	3.0	psf per inch	9.0 psf
10	ft O.C.	Wood Girders (6x10's)		@	11.0	plf	1.1 psf
0.5	in	Gypsum Board Ceiling		@	4.4	psf per inch	2.2 psf
100%	floor area	Interior Partitions	(Below)	@	5.0	psf	5.0 psf
		M.E.P.		@	0.5	psf	0.5 psf
		Miscellaneous		@	0.5	psf	0.5 psf
						ROOF WEIGHT =	**21.3 psf**

WALL TYPE: WALL-R

1	in	Exterior Stucco		@	11.4	psf per inch.	11.4 psf
		Wall Insulation		@	1.0	psf	1.0 psf
0.375	in	Plywood		@	3.2	psf per inch	1.2 psf
16	in O.C.	Wood Studs	(2 x 4)	@	1.1	plf	0.9 psf
		Miscellaneous		@	1.5	psf	1.5 psf
						Solid Wall Weight =	16.0 psf
						WALL-R WEIGHT =	**16.0 psf**

SEISMIC MASS

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ROOF/FLOOR WEIGHT SUMMARY:

Level Type	Weight [psf]
ROOF	21.30

WALL WEIGHT SUMMARY:

Wall Type	Weight [psf]		
	Net	Solid	Openings
WALL-R	16	16	8

SEISMIC MASS SUMMARY:

Level	FLOOR			WALL ABOVE				WALL BELOW				TOTAL
	Level Type	Weight [psf]	Area [sf]	Wall Type	Weight [psf]	Length [ft]	Height [ft]	Wall Type	Weight [psf]	Length [ft]	Height [ft]	WEIGHT [kips]
Roof Avg	ROOF	21.30	985	WALL-R	16.0	0	0.00	WALL-R	16.0	126	6.00	33
											TOTAL	33

SEISMIC FORCES

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BUILDING TYPE: W1 (Wood Light Frames) [ASCE 41-17, Table 3-1]
SITE CLASS: D (determined) (Stiff Soil) [ASCE 41-17, §2.4.1.6]

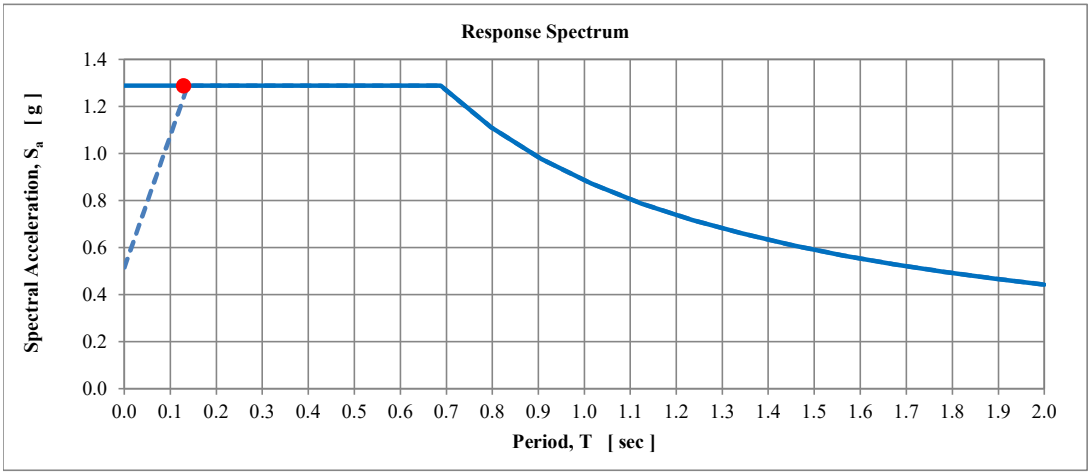
DESIGN SPECTRAL ACCELERATIONS:

S_{XS}	=	1.288 g	(BSE-2E)	Site-Adjusted Design (T = 0.2 sec)	[ASCE 41-17, Eq. 2-1]
S_{X1}	=	0.886 g	(BSE-2E)	Site-Adjusted Design (T = 1.0 sec)	[ASCE 41-17, Eq. 2-2]

BUILDING PERIOD:

h_n	=	12.0 ft	(Base to Roof)	Building Height	[ASCE 41-17, §4.4.2.4]
C_t	=	0.020	(Building Type W1)	Period Coefficient	[ASCE 41-17, §4.4.2.4]
β	=	0.750	(Building Type W1)	Period Exponent	[ASCE 41-17, §4.4.2.4]
T	=	0.129 sec	$= C_t h_n^{\beta}$	Fundamental Period	[ASCE 41-17, Eq. 4-4]

RESPONSE SPECTRUM:



PSEUDO LATERAL FORCE:

n	=	1	(n = 1)	Total Number of Stories	
C	=	1.3	(Building Type W1)	Modification Factor	[ASCE 41-17, Table 4-7]
S_a	=	1.288 g	$= MIN \{ S_{X1} / T , S_{XS} \}$	Spectral Acceleration	[ASCE 41-17, Eq. 4-3]
V	=	**1.674 W**	$= C S_a W$	Pseudo Lateral Force	[ASCE 41-17, Eq. 4-1]

VERTICAL DISTRIBUTION OF SEISMIC FORCES:

k = 1.00 (T ≤ 0.5 sec) Seismic Distribution Exponent [ASCE 41-17, §4.4.2.2]

Level	h_x [ft]	w_x [kips]	$w_x h_x^k$	C_{vx}	F_x [kips]	V_j [kips]
Roof Avg	12.0	33	397	1.00	55	55
TOTAL	-	33	397	1.00	55	-

$F_x = C_{vx} V = [w_x h_x^k / \Sigma (w_x h_x^k)] V$ [ASCE 41-17, Eq. 4-2a]
$V_j = \Sigma F_x$ [ASCE 41-17, Eq. 4-2b]

QUICK CHECKS

ASCE 41-17 SEISMIC EVALUATION & RETROFIT OF EXISTING BUILDINGS
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BSE-2E HAZARD LEVEL

BUILDING TYPE: W1A (Multi-Story, Multi-Unit Residential Wood Frames) [ASCE 41-17, Table 3-1]

AVERAGE SHEAR STRESS CHECK: [ASCE 41-17, §A.3.2.7.1]

ν_n	=	1,000 plf	(Structural Panel Sheathing)	Shear Wall Capacity	[ASCE 41-17, §A.3.2.7.1]
M_s	=	4.5	COLLAPSE PREVENTION	System Modification Factor	[ASCE 41-17, Table 4-8]
$\nu_{j,\,avg}$	=	$(1 / M_s) (V_j / L_w)$		Average Shear Wall Stress	[ASCE 41-17, Eq. 4-8]
L_w	=	$L_{w,\,total} - L_{w,\,openings}$		Net Wall Length	[ASCE 41-17, §4.4.3.3]

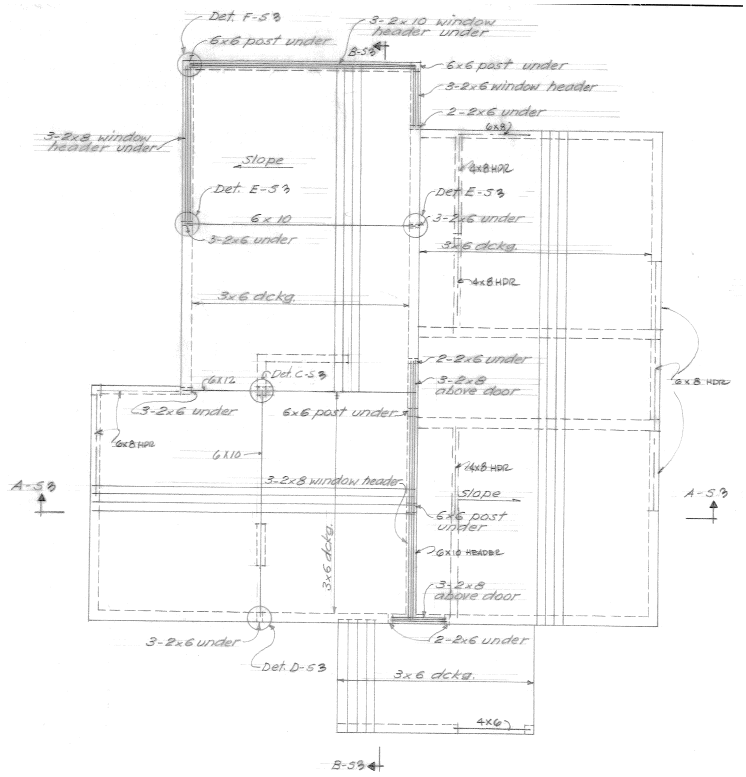
North-South Direction:

Level	V_j [kips]	$L_{w,\,total}$ [ft]	$L_{w,\,openings}$ [ft]	L_w [ft]	$\nu_{j,\,avg}$ [plf]	DCR	Quick Check
Roof Avg	55	68	0	29	424	0.42	OK

East-West Direction:

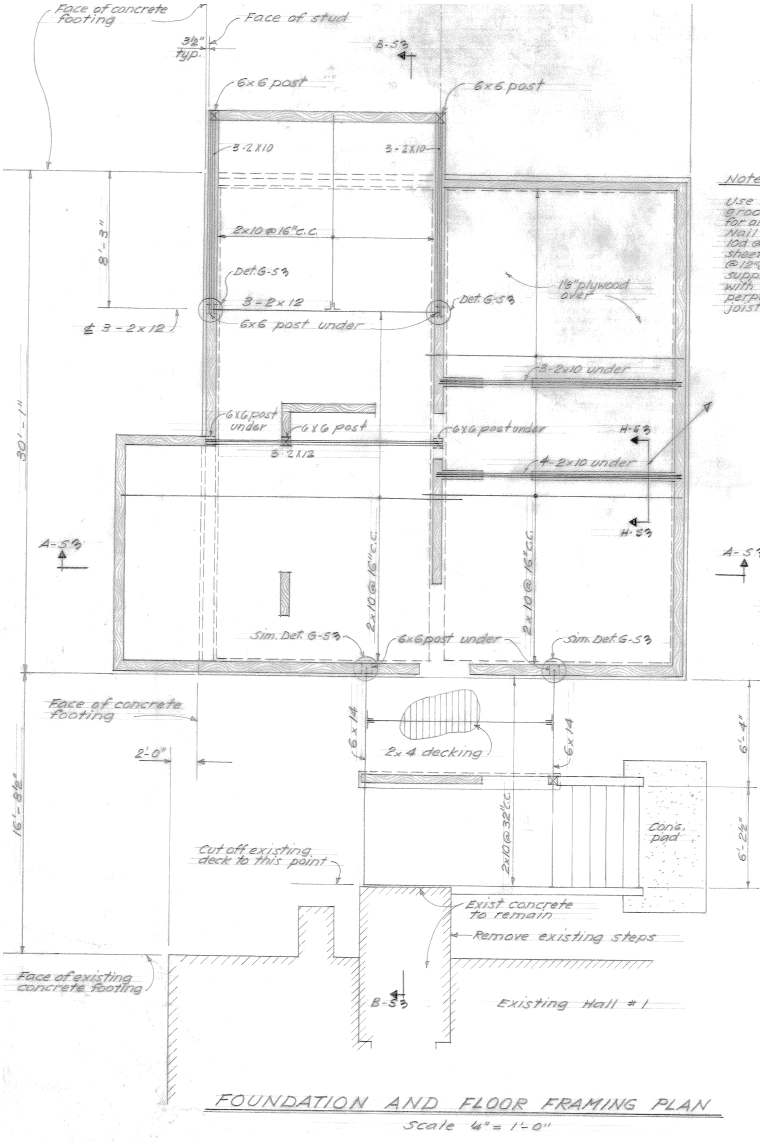
Level	V_j [kips]	9.5 [ft]	$L_{w,\,openings}$ [ft]	L_w [ft]	$\nu_{j,\,avg}$ [plf]	DCR	Quick Check
Roof Avg	55	125	0	41	300	0.30	OK

Appendix C
Figures



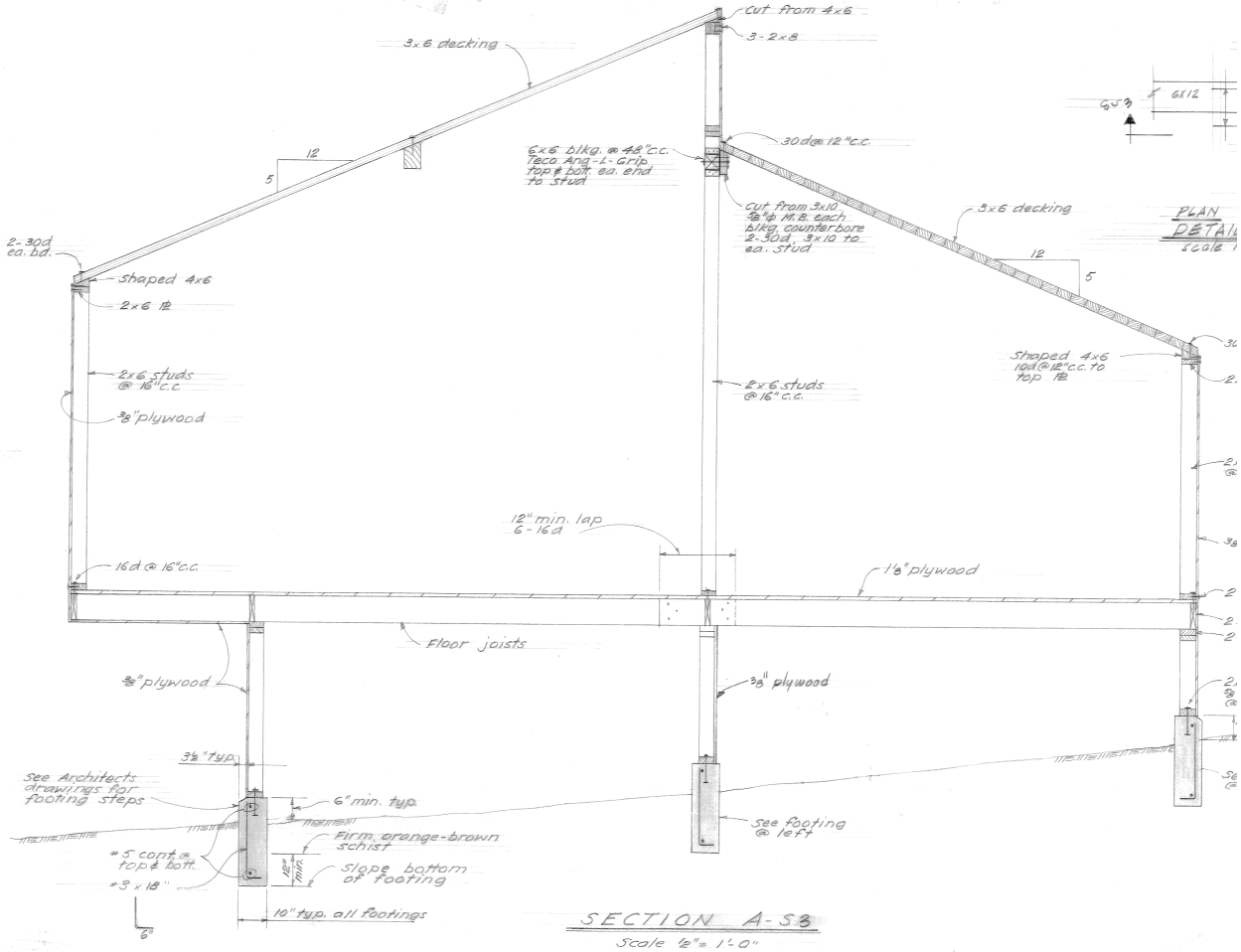
ROOF FRAMING PLAN

Scale 4"= 1'-0"



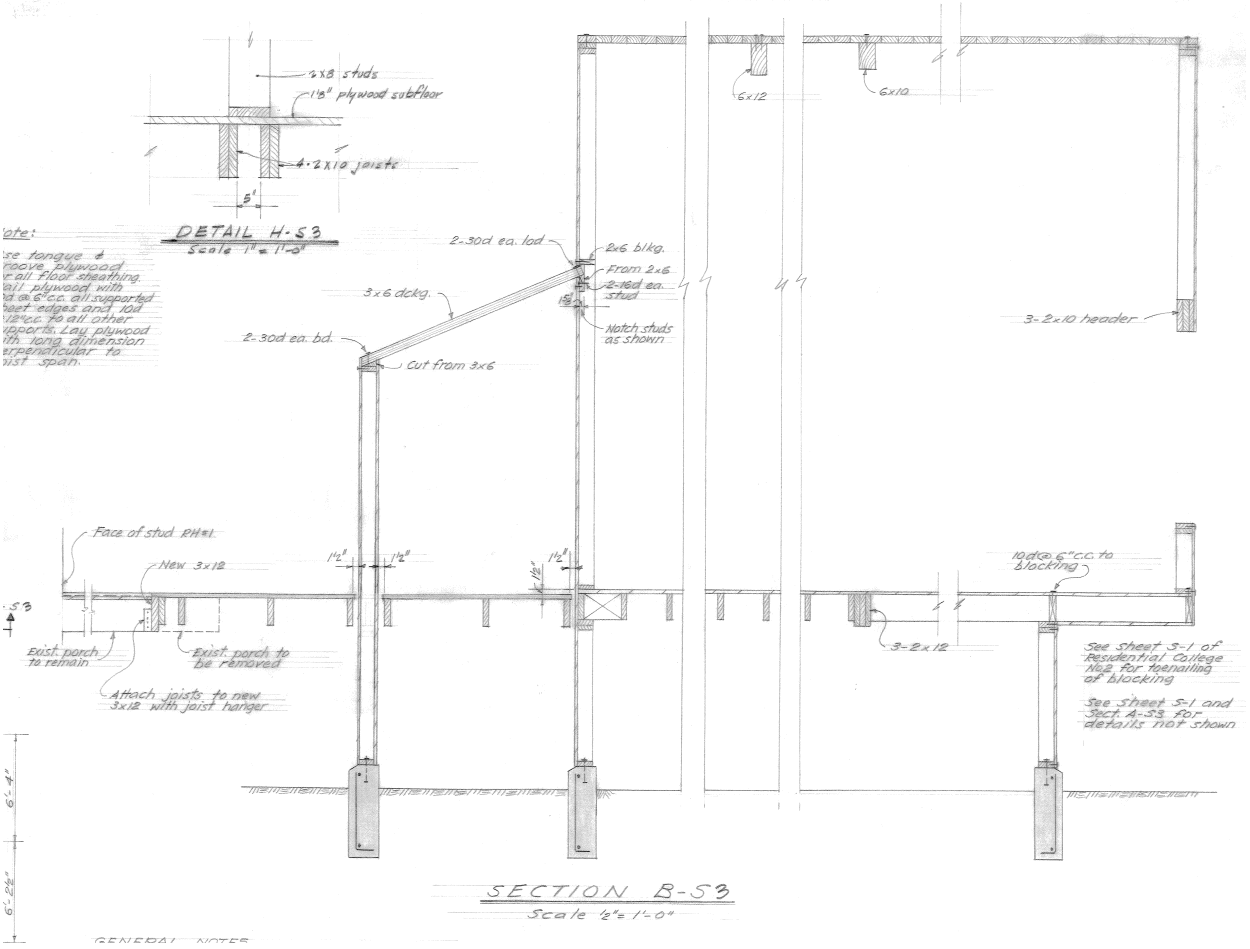
FOUNDATION AND FLOOR FRAMING PLAN

Scale 4"= 1'-0"



SECTION A-S3

Scale 1/2" = 1'-0"



DETAIL H-S3

Scale 1" = 1'-0"

ote:
se tongue & groove plywood r all floor sheathing. ll plywood with d @ 6" c.c. all supported heet edges and 10d 12" c.c. to all other upports. Lay plywood ith long dimension erpendicular to nist span.

SECTION B-S3

Scale 1/2" = 1'-0"

GENERAL NOTES