



Rating form completed by
Priscilla Nguyen, Jay Yin

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

DATE: 2019-06-30

UC Santa Cruz building seismic ratings
Cowell College Faculty Office Addition, Cowell College

CAAN #7566

521 Cowell Service Road, Santa Cruz, CA 95064

UCSC Campus: Main Campus



Rating summary	Entry	Notes
UC Seismic Performance Level (rating)	IV (Fair)	
Rating basis	Tier 1	ASCE 41-17 ¹
Date of rating	2019	
Recommended UC Santa Cruz priority category for retrofit	None	Priority A=Retrofit ASAP Priority B=Retrofit at next permit application
Ballpark total construction cost to retrofit to IV rating ²	None	
Is 2018-2019 rating required by UCOP?	Yes	Building was not previously rated
Further evaluation recommended?	No	

¹ We translate this Tier 1 evaluation to a Seismic Performance Level rating using professional judgment. Noncompliant 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 Policy and Method B of Section 321 of the 2016 California Existing Building Code.

² Per Section 3.A.4.i of the Seismic Program Guidebook, 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

- Architectural drawings by Herbert Kahn Architect, "Cowell College Faculty Office Building," original issue date 21 July, 1986.
- Structural drawings by Peter Boyce Associates Structural Engineers, "Cowell College Faculty Office Building," original issue date 21 July, 1986.
- Site visit observations.

Additional building information known to exist

- None

Scope for completing this form

Reviewed structural drawings for original construction and carried out ASCE 41-17 Tier 1 evaluation. We made a site visit on June 5th, 2019. We looked for potentially hazardous nonstructural components during the site visit. Only one piece of MEP equipment (boiler) at the basement seems to not be anchored at its base.

Brief description of structure

The Cowell College Faculty Office Addition (CAAN 7566) is a mostly, one-story building with MEP spaces below the offices. It was built in 1987. The lateral system consists of plywood shear walls at interior and exterior transverse walls and interior longitudinal walls and plywood diaphragms. The existing lateral system also uses stucco and gypsum wallboard shear walls at the exterior longitudinal walls in the north-south direction. The gravity system consists of wood framing: wood rafters to interior posts in stud walls and exterior stud walls at the pitched roof and floor joists to interior wood girders and exterior stud walls. The MEP spaces in the lower level are accessed through a door on the south side of the eastern elevation at the exterior of the building.

Identification of levels: Lower Level, Ground Floor

Foundation system: Shallow foundation of strip footings and grade beams at walls and precast pier blocks to concrete pads at the wooden posts.

Structural system for vertical (gravity) load: Plywood sheathing diaphragm supported on wood framing at the pitched roof. The wood roof rafters span between the perimeter stud walls and interior wood posts. At the ground level above the basement area, plywood sheathing diaphragm supported on floor joists that span to interior wood girders and exterior stud walls.

Structural system for lateral forces: Plywood diaphragms at the roof and ground floor levels to interior plywood shear walls and exterior plywood and stucco with gypsum wallboard shear walls. All shear walls to strip footings tied together with 6" SOG.

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

The Tier 1 checklists for the Collapse Prevention performance objective at BSE-2E seismic event did not trigger any seismic deficiencies.

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	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)	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	N		

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

Boiler at the basement level not apparently anchored at base. The boiler is near a door in one of the lower level rooms. Tall MEP equipment that is not anchored may topple over during a seismic event and block exits or doorways. However, this is a moderate falling hazard since the boiler is at a lower level and did not seem too heavy.

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	N	Unrestrained hazardous materials storage	N
Heavy masonry or stone veneer above exit ways and public access areas	N	Masonry chimneys	N
Unbraced masonry parapets, cornices or other ornamentation above exit ways and public access areas	N	Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.	Y

Discussion of rating

The Tier 1 checklists for the Collapse Prevention performance objective at BSE-2E seismic event did not trigger any seismic deficiencies. However, the rating of IV assumes that the shear wall materials (plywood, stucco, and gypsum wallboard) are not deteriorated. The state of deterioration, if any, of the existing shear walls could not be observed during the site visit since the walls were finished (painted and covered).

Recommendations for further evaluation or retrofit

The following are brief descriptions of possible seismic retrofit concepts:

1. Anchorage of tall MEP equipment such as the boiler encountered will ensure that exits remain clear for evacuating the building.

Peer review of rating

This seismic evaluation was discussed in a peer review meeting on June 19, 2019. Reviewers present were Bret Lizundia of R+C and Joe Maffei of Maffei Structural Engineering. Comments from the reviewers have been incorporated into and addressed in this report. The reviewers agreed with the rating.

Additional building data	Entry	Notes
Latitude	36.996714	
Longitude	-122.05348	
Are there other structures besides this one under the same CAAN#	No	

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 if and where non-structural hazards may occur.

Number of stories above lowest perimeter grade	1	Mostly a one-story building except where the MEP equipment areas are located below the offices.
Number of stories (basements) below lowest perimeter grade	0	
Building occupiable area (OGSF)	4,161 sq. ft.	
Risk Category per 2016 CBC Table 1604.5	II	Faculty office occupancy.
Building structural height, h_n	18.5 ft	Structural height defined per ASCE 7-16 Section 11.2
Coefficient for period, C_t	0.02	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	0.178 sec	Estimated using ASCE 41-17 equation 4-4 and 7-18
Site data		
975 yr hazard parameters S_s, S_1	1.287, 0.488	
Site class	D	
Site class basis	Geotech ⁴	See footnote below
Site parameters F_a, F_v	1.2, 1.812	
Ground motion parameters S_{cs}, S_{c1}	1.545, 0.885	
S_a at building period	1.699	
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: 1987 Code: 1985 UBC	Code inferred based on design year
Is this a benchmark building	No	
Is this a retrofit building?	No	
Applicable code for retrofit	N/A	
Model building data		
Model building type North-South	Wood, W1 - Wood Light Frame (Single or multi-family dwelling)	

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>

Model building type East-West	Wood,W1 - Wood Light Frame (Single or multi-family dwelling)	
FEMA P-154 score	N/A	Not included here because we performed ASCE 41 Tier 1 evaluation.
Previous ratings		
Most recent rating	Unknown	
Date of most recent rating	Unknown	
2 nd most recent rating	-	
Date of 2 nd most recent rating	-	
3 rd most recent rating	-	
Date of 3 rd most recent rating	-	
Appendices		
ASCE 41 Tier 1 checklist included here?	Yes	Refer to attached checklist file in Appendix A.



University of California, Santa Cruz
ASCE 41-17 Tier 1 Seismic Evaluation
7566 - Cowell College Faculty Office Addition

Appendix A
ASCE 41-17 Checklists

UC Campus:	Santa Cruz			Date:	6/20/19		
Building CAAN:	7566	Auxiliary CAAN:	-	By Firm:	Degenkolb Engineers		
Building Name:	Cowell College Faculty Office Addition			Initials:	PN	Checked:	
Building Address:	521 Cowell Service Road, Santa Cruz, CA 95064			Page:	1	of	3

ASCE 41-17 Collapse Prevention Basic Configuration Checklist

LOW SEISMICITY

BUILDING SYSTEMS - GENERAL

	Description
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	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:
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	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:
C NC N/A U <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	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

	Description
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	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. A.2.2.2. Tier 2: Sec. 5.4.2.1) Comments:
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	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:
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	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:

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 <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments:</p>
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments:</p>
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: Symmetric building.</p>

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

GEOLOGIC SITE HAZARD

	Description
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments:</p>
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments:</p>
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments:</p>

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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 <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: $30'/18.5' = 1.62$ $0.6 * 1.545 = 0.927 < 1.62$ (OK)</p>
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: Slab on grade tie spread footings together.</p>

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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 <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: There are 3 lines in the transverse (east-west) direction and two lines in the longitudinal (north-south) direction.</p>								
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Structural panel sheathing</td> <td>1,000 lb/ft (14.6 kN/m)</td> </tr> <tr> <td>Diagonal sheathing</td> <td>700 lb/ft (10.2 kN/m)</td> </tr> <tr> <td>Straight sheathing</td> <td>100 lb/ft (1.5 kN/m)</td> </tr> <tr> <td>All other conditions</td> <td>100 lb/ft (1.5 kN/m)</td> </tr> </table> <p>Comments: See Quick Checks Max DCR = 0.98 < 1 (OK) in the north-south direction Max DCR = 0.62 < 1 (OK) in the east-west direction</p>	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)
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)								
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: Stucco shear walls are used at the exterior north-south walls but building is mostly one story.</p>								
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: Gypsum wallboard shear walls are used at the exterior north-south walls but building is mostly one story.</p>								
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: Max Height / Min Length = 18.5 ft / 12.25 ft = 1.51 < 2 (OK)</p>								
C NC N/A U <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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)</p> <p>Comments: Yes, per detail 9/S6</p>								

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

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)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comments: Max Height / Min Length = 8.5 ft / 30 ft = 0.62 < 1 (OK) of single transverse wall on downhill side
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)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Comments:
C	NC	N/A	U	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)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Comments:

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)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comments: 5/8"Ø wood sill anchor bolts @ 4'-0" max (< 6 ft) per details 1 and 3-7/S6

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

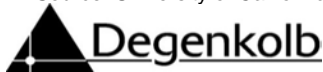
DIAPHRAGMS							
				Description			
C	NC	N/A	U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comments: No split level diaphragms			
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)			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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)			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Comments: Plywood sheathing			
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)			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comments: Plywood sheathing			
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)			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comments: Aspect ratio = $119' / 39' = 3.05 < 4$ (OK) L max = $41' - 1.5'' \sim 40'$ (OK)			
C	NC	N/A	U	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)			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comments:			

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



University of California, Santa Cruz
ASCE 41-17 Tier 1 Seismic Evaluation
7566 - Cowell College Faculty Office Addition

Appendix B
Quick Check Calculations



Subject: Global Data	Job Number: B9959006.00	Date: 06/19/19
Job: UCSC Tier 1 Seismic Evaluations	By: PN	Section:
CAAN 7566	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

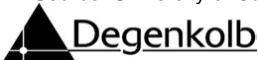
SITE DATA:

Latitude:	36.99672 °N	521 Cowell Service Road	USGS Seismic Design Map Application:
Longitude:	122.05346 °W	Santa Cruz, CA 95064	http://geohazards.usgs.gov/hazardtool/application.php
Site Class:	D (default)	(Stiff Soil)	Site Class [ASCE 41-17, §2.4.1.6]
S _s	= 1.287 g	(USGS) (5% / 50 years)	USGS Mapped (T = 0.2 sec) [ASCE 41-17, §2.4.1.3]
S ₁	= 0.488 g	(USGS) (5% / 50 years)	USGS Mapped (T = 1.0 sec) [ASCE 41-17, §2.4.1.3]
F _a	= 1.200	(Site Class D)	Site Coefficient (T = 0.2 sec) [ASCE 7-16, Table 11.4-1]
F _v	= 1.812	(Site Class D)	Site Coefficient (T = 1.0 sec) [ASCE 7-16, Table 11.4-2]
S _{XS}	= 1.545 g	= F _a S _s	Site-Adjusted Design (T = 0.2 sec) [ASCE 41-17, Eq. 2-1]
S _{X1}	= 0.885 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:	1987		
Number of Stories:	2 stories		
Parapet Height:	0.00 ft		
Roof Height:	18.50 ft		
Total Area:	1,071 sf		

Level	Height [ft]	Elevation [ft]	Length _{N-S} [ft]	Length _{E-W} [ft]	Area [sf]	Diaphragm Stiffness	Diaphragm Description
Roof	10.0	18.5	72	30	2,168	Flexible	Plywood Sheathing
2nd	8.5	8.5	18	30	536	Flexible	Plywood Sheathing
1st	0.0	0.0	18	30	536	-	-



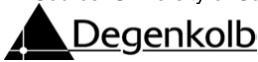
Subject: Weight Take Off	Job Number: B9959006.00	Date: 06/19/19
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WEIGHT TAKEOFF

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ROOF TYPE:		ROOF				
		Roofing / Re-roofing	@	5.0 psf	5.0 psf	y
0.5 in		Rock Ballast (Gravel)	@	8.0 psf per inch	0.0 psf	n
3 ply		Ready Roofing	@	0.3 psf per ply	0.0 psf	n
5 ply		Felt Roofing	@	0.5 psf per ply	0.0 psf	n
0.25 in		Slate	@	40.0 psf per inch	0.0 psf	n
		Shingles (Asbestos Cement)	@	4.0 psf	4.0 psf	y
		Copper or Tin	@	1.0 psf	0.0 psf	n
		Corrugated Asbestos-Cement	@	4.0 psf	0.0 psf	n
		Waterproofing Membranes (Smooth Bituminous)	@	1.5 psf	0.0 psf	n
		Cement Tiles	@	16.0 psf	0.0 psf	n
		Clay Tiles (Book Tile, 2 in)	@	12.0 psf	0.0 psf	n
		Mortar Bed for Clay Tiles	@	10.0 psf	0.0 psf	n
		Roof Insulation	@	1.0 psf	0.0 psf	n
1 in		Insulation (Rigid)	@	1.5 psf per inch	1.5 psf	y
1 in		Insulation Boards (Fibrous Glass)	@	1.1 psf per inch	0.0 psf	n
3 in		Vermiculite Concrete	@	2.5 psf per inch	0.0 psf	n
0.5 in		Fire Proofing	@	2.0 psf per inch	0.0 psf	n
		Diaphragm - core planks	@	35.0 psf	0.0 psf	n
2.5 in		Concrete Slab (Normal Weight)	@	12.5 psf per inch	0.0 psf	n
4.75 in		Concrete Fill (Light Weight)	@	9.2 psf per inch	0.0 psf	n
0.5 in		Concrete Overpour (Light Weight)	@	9.2 psf per inch	0.0 psf	n
18 ga		Bare Metal Deck	@	3.0 psf	0.0 psf	n
2 in		Wood Decking	@	2.5 psf per inch	0.0 psf	n
1 in		Wood Sheathing	@	3.0 psf per inch	3.0 psf	y
0.5 in		Plywood	@	3.2 psf per inch	1.6 psf	y
		Framing	@	20.0 psf	0.0 psf	n
6 ft O.C.		Steel Beams	@	22.0 plf	0.0 psf	n
36 ft O.C.		Steel Girders	@	76.0 plf	0.0 psf	n
2 ft O.C.		Wood Sub-Purlins	@	1.8 plf	0.0 psf	n
2.0 ft O.C.		Wood Purlins	@	5.1 plf	2.6 psf	y
15 ft O.C.		Wood Girders	@	5.1 plf	0.3 psf	y
12.75 ft O.C.		Concrete Beams	@	800.0 plf	0.0 psf	n
20 ft O.C.		Concrete Girders	@	300.0 plf	0.0 psf	n
5.00 ft trib. ht.		Typical Columns (A _{col} = 90 sf)	@	32.1 plf	0.0 psf	n
		Ceiling	@	5.0 psf	5.0 psf	y
0.625 in		Gypsum Board Ceiling	@	4.4 psf per inch	0.0 psf	n
		Acoustical Fiber Board	@	1.0 psf	0.0 psf	n
		Plaster Ceiling (On Tile)	@	5.0 psf	0.0 psf	n
		Suspended Metal Lath & Plaster (Gypsum Plaster)	@	10.0 psf	0.0 psf	n
		Suspended Steel Channel System	@	2.0 psf	0.0 psf	n
		Suspended Wood Furring System	@	2.5 psf	0.0 psf	n
		T-bar Ceiling System	@	3.0 psf	0.0 psf	n
70% floor area		Interior Partitions (Below)	@	5.0 psf	3.5 psf	y
		M.E.P.	@	5.0 psf	5.0 psf	y
		Miscellaneous	@	1.4 psf	1.4 psf	y
		4.5' wide 2x6 Facia	@	0.1 psf	0.1 psf	y
		Other	@	1.0 psf	0.0 psf	n
		Other	@	1.0 psf	0.0 psf	n
		Other	@	1.0 psf	0.0 psf	n
		Other	@	1.0 psf	0.0 psf	n
		Other	@	1.0 psf	0.0 psf	n

ROOF WEIGHT = 33.0 psf



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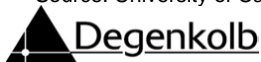
WEIGHT TAKEOFF

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 BSE-2E HAZARD LEVEL

FLOOR TYPE: FLR-2

	Flooring	@	15.0 psf	0.0 psf	n
1 in	Floor Tiles (Terrazzo)	@	13.0 psf per inch	0.0 psf	n
0.75 in	Wood Flooring (Hardwood)	@	4.6 psf per inch	3.4 psf	y
2 in	Wood Blocks	@	3.3 psf per inch	0.0 psf	n
2 in	Asphalt Blocks	@	12.0 psf per inch	0.0 psf	n
0.75 in	Mastic	@	12.0 psf per inch	0.0 psf	n
1 in	Cement Finish	@	12.0 psf per inch	0.0 psf	n
2 in	Mortar Bed	@	12.0 psf per inch	0.0 psf	n
2 in	Floor Fill (Stone Concrete)	@	12.0 psf per inch	0.0 psf	n
0.75 in	Subflooring	@	4.0 psf per inch	0.0 psf	n
	Marble & Mortar, Stone Concrete	@	33.0 psf	0.0 psf	n
	Solid Flat Tile, 1-in Mortar Base	@	23.0 psf	0.0 psf	n
	Floor Insulation	@	1.0 psf	0.0 psf	n
1 in	Insulation (Rigid)	@	1.5 psf per inch	1.5 psf	y
1 in	Insulation Boards (Fibrous Glass)	@	1.1 psf per inch	0.0 psf	n
3 in	Vermiculite Concrete	@	2.5 psf per inch	0.0 psf	n
0.5 in	Fire Proofing	@	2 psf per inch	0.0 psf	n
	Diaphragm	@	20.0 psf	0.0 psf	n
1.625 in	Concrete Slab (Normal Weight)	@	12.5 psf per inch	0.0 psf	n
1.50 in	Concrete Fill (Light Weight)	@	9.2 psf per inch	13.8 psf	y
0.5 in	Concrete Overpour (Light Weight)	@	9.2 psf per inch	0.0 psf	n
18 ga	Bare Metal Deck	@	3.0 psf	0.0 psf	n
1.5 in	Wood Decking	@	2.5 psf per inch	0.0 psf	n
2 in	Wood Sheathing	@	3.0 psf per inch	0.0 psf	n
0.75 in	Plywood	@	3.2 psf per inch	2.4 psf	y
	Framing	@	20.0 psf	0.0 psf	n
6 ft O.C.	Steel Beams	@	22.0 plf	0.0 psf	n
36 ft O.C.	Steel Girders	@	76.0 plf	0.0 psf	n
2 ft O.C.	Wood Sub-Purlins	@	1.8 plf	0.0 psf	n
1.33 ft O.C.	Wood Purlins	@	3.1 plf	2.3 psf	y
7.50 ft O.C.	Wood Girders	@	5.7 plf	0.8 psf	y
8 ft O.C.	Concrete Beams	@	200.0 plf	0.0 psf	n
20 ft O.C.	Concrete Girders	@	300.0 plf	0.0 psf	n
9.3 ft trib. ht.	Typical Columns (A _{trib} = 90 sf)	@	32.1 plf	0.0 psf	n
	Ceiling	@	5.0 psf	5.0 psf	y
0.625 in	Gypsum Board Ceiling	@	4.4 psf per inch	0.0 psf	n
	Acoustical Fiber Board	@	1.0 psf	0.0 psf	n
	Plaster Ceiling (On Tile)	@	5.0 psf	0.0 psf	n
	Suspended Metal Lath & Plaster (Gypsum Plaster)	@	10.0 psf	0.0 psf	n
	Suspended Steel Channel System	@	2.0 psf	0.0 psf	n
	Suspended Wood Furring System	@	2.5 psf	0.0 psf	n
	T-bar Ceiling System	@	3.0 psf	0.0 psf	n
70% floor area	Interior Partitions (Above & Below)	@	10.0 psf	7.0 psf	y
	M.E.P.	@	5.0 psf	5.0 psf	y
	Miscellaneous	@	1.8 psf	1.8 psf	y
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n

FLR-2 WEIGHT = 43.0 psf



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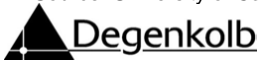
WEIGHT TAKEOFF

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 BSE-2E HAZARD LEVEL

WALL TYPE: WALL-P

	Wall Covering	@	4.0 psf	4.0 psf	y
0.875 in	Exterior Stucco	@	11.4 psf per inch.	10.0 psf	y
0.5 in	Wood Sheathing	@	3.0 psf per inch	0.0 psf	n
0.5 in	Gypsum Sheathing	@	4.0 psf per inch	0.0 psf	n
0.625 in	Gypsum Wallboard	@	4.4 psf per inch	2.8 psf	y
	Porcelain Enamel Panels	@	5.0 psf	0.0 psf	n
	Metal Lath & Plaster (Gypsum Plaster)	@	10.0 psf	0.0 psf	n
	Wall Insulation	@	1.0 psf	0.0 psf	n
1 in	Insulation (Rigid)	@	1.5 psf per inch	1.5 psf	y
1 in	Insulation Boards (Fiber Board)	@	1.5 psf per inch	0.0 psf	n
0.5 in	Fire Proofing	@	2 psf per inch	0.0 psf	n
	Wall Framing	@	20.0 psf	0.0 psf	n
8 in	Concrete Wall (Normal Weight)	@	12.5 psf per inch	0.0 psf	n
8 in	CMU Wall w/ Full Grouting (Normal Weight)	@	83.0 psf	0.0 psf	n
8 in	Solid CMU Wall (Normal Weight)	@	87.0 psf	0.0 psf	n
4 in	HCB Wall w/ Full Grouting	@	38.0 psf	0.0 psf	n
3.5 in	Solid Clay Brick Wall	@	11.1 psf per inch	0.0 psf	n
0.5 in	Plywood	@	3.2 psf per inch	1.6 psf	y
16 in O.C.	Wood Studs (2 x 6)	@	1.8 plf	1.3 psf	y
16 in O.C.	Metal Channel Studs	@	2.0 plf	0.0 psf	n
8 ft O.C.	Steel Girts	@	6.0 plf	0.0 psf	n
	Miscellaneous	@	1.8 psf	1.8 psf	y
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n

Solid Wall Weight = 23.0 psf
 Window & Door Weight = 8.0 psf
 % Solid Wall = 100%
WALL-P WEIGHT = 23.0 psf



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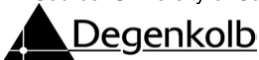
WEIGHT TAKEOFF

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 BSE-2E HAZARD LEVEL

WALL TYPE: **WALL-R**

	Wall Covering	@	4.0 psf	4.0 psf	y
0.875 in	Exterior Stucco	@	11.4 psf per inch.	10.0 psf	y
1 in	Wood Sheathing	@	3.0 psf per inch	0.0 psf	n
0.5 in	Gypsum Sheathing	@	4.0 psf per inch	0.0 psf	n
0.625 in	Gypsum Wallboard	@	4.4 psf per inch	2.8 psf	y
	Porcelain Enamel Panels	@	5.0 psf	0.0 psf	n
	Metal Lath & Plaster (Gypsum Plaster)	@	10.0 psf	0.0 psf	n
	Wall Insulation	@	1.0 psf	0.0 psf	n
1 in	Insulation (Rigid)	@	1.5 psf per inch	1.5 psf	y
1 in	Insulation Boards (Fiber Board)	@	1.5 psf per inch	0.0 psf	n
0.5 in	Fire Proofing	@	2 psf per inch	0.0 psf	n
	Wall Framing	@	20.0 psf	0.0 psf	n
8 in	Concrete Wall (Normal Weight)	@	12.5 psf per inch	0.0 psf	n
8 in	CMU Wall w/ Full Grouting (Normal Weight)	@	83.0 psf	0.0 psf	n
8 in	Solid CMU Wall (Normal Weight)	@	87.0 psf	0.0 psf	n
4 in	HCB Wall w/ Full Grouting	@	38.0 psf	0.0 psf	n
3.5 in	Solid Clay Brick Wall	@	11.1 psf per inch	0.0 psf	n
0.5 in	Plywood	@	3.2 psf per inch	1.6 psf	y
16 in O.C.	Wood Studs (2 x 6)	@	1.8 plf	1.3 psf	y
16 in O.C.	Metal Channel Studs	@	2.0 plf	0.0 psf	n
8 ft O.C.	Steel Girts	@	6.0 plf	0.0 psf	n
	Miscellaneous	@	1.8 psf	1.8 psf	y
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n

Solid Wall Weight = 23.0 psf
 Window & Door Weight = 8.0 psf
 % Solid Wall = 75%
WALL-R WEIGHT = 19.3 psf



Subject: Weight Take Off	Job Number: B9959006.00	Date: 06/19/19
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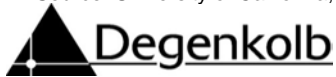
WEIGHT TAKEOFF

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 BSE-2E HAZARD LEVEL

WALL TYPE: WALL-2

	Wall Covering	@	4.0 psf	4.0 psf	y
0.875 in	Exterior Stucco	@	11.4 psf per inch.	10.0 psf	y
1 in	Wood Sheathing	@	3.0 psf per inch	0.0 psf	n
0.5 in	Gypsum Sheathing	@	4.0 psf per inch	0.0 psf	n
0.625 in	Gypsum Wallboard	@	4.4 psf per inch	2.8 psf	y
	Porcelain Enamel Panels	@	5.0 psf	0.0 psf	n
	Metal Lath & Plaster (Gypsum Plaster)	@	10.0 psf	0.0 psf	n
	Wall Insulation	@	1.0 psf	0.0 psf	n
1 in	Insulation (Rigid)	@	1.5 psf per inch	1.5 psf	y
1 in	Insulation Boards (Fiber Board)	@	1.5 psf per inch	0.0 psf	n
0.5 in	Fire Proofing	@	2 psf per inch	0.0 psf	n
	Wall Framing	@	20.0 psf	0.0 psf	n
8 in	Concrete Wall (Normal Weight)	@	12.5 psf per inch	0.0 psf	n
8 in	CMU Wall w/ Full Grouting (Normal Weight)	@	83.0 psf	0.0 psf	n
8 in	Solid CMU Wall (Normal Weight)	@	87.0 psf	0.0 psf	n
4 in	HCB Wall w/ Full Grouting	@	38.0 psf	0.0 psf	n
3.5 in	Clay Brick Wall	@	11.1 psf per inch	0.0 psf	n
0.5 in	Plywood	@	3.2 psf per inch	1.6 psf	y
16 in O.C.	Wood Studs (2 x 6)	@	1.8 plf	1.3 psf	y
16 in O.C.	Metal Channel Studs	@	2.0 plf	0.0 psf	n
8 ft O.C.	Steel Girts	@	6.0 plf	0.0 psf	n
	Miscellaneous	@	1.8 psf	1.8 psf	y
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n
	Other	@	1.0 psf	0.0 psf	n

Solid Wall Weight = 23.0 psf
 Window & Door Weight = 8.0 psf
 % Solid Wall = 75%
WALL-2 WEIGHT = 19.3 psf



Subject: Seismic Mass	Job Number: B9959006.00	Date: 06/19/19
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SEISMIC MASS

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ROOF/FLOOR WEIGHT SUMMARY:

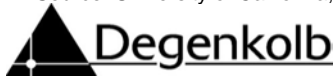
Level Type	Weight [psf]
ROOF	33
FLR-2	43

WALL WEIGHT SUMMARY:

Wall Type	Weight [psf]		
	Net	Solid	Openings
WALL-R	19.25	23	8
WALL-2	19.25	23	8

SEISMIC MASS SUMMARY:

Level	FLOOR			WALL ABOVE				WALL BELOW				TOTAL WEIGHT [kips]
	Level Type	Weight [psf]	Area [sf]	Wall Type	Weight [psf]	Length [ft]	Height [ft]	Wall Type	Weight [psf]	Length [ft]	Height [ft]	
Roof	ROOF	33	2,168	WALL-R	19.3	0	0.00	WALL-R	19.3	96	5.00	81
2nd	FLR-2	43	536	WALL-2	19.3	205	5.00	WALL-2	19.3	96	4.25	51
											TOTAL	131



Subject: Seismic Forces	Job Number: B9959006.00	Date: 06/19/19
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SEISMIC FORCES

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BUILDING TYPE: W1 (Wood Light Frames) [ASCE 41-17, Table 3-1]
SITE CLASS: D (default) #N/A [ASCE 41-17, §2.4.1.6]

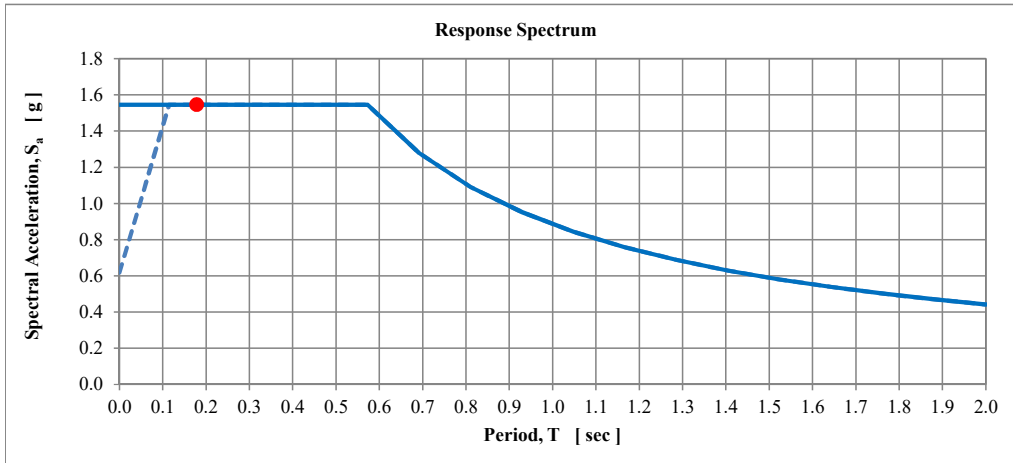
DESIGN SPECTRAL ACCELERATIONS:

S_{XS} = 1.545 g (BSE-2E) Site-Adjusted Design (T = 0.2 sec) [ASCE 41-17, Eq. 2-1]
 S_{X1} = 0.885 g (BSE-2E) Site-Adjusted Design (T = 1.0 sec) [ASCE 41-17, Eq. 2-2]

BUILDING PERIOD:

h_n = 18.5 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 = 0.178 sec = $C_t h_n^\beta$ Fundamental Period [ASCE 41-17, Eq. 4-4]

RESPONSE SPECTRUM:



PSEUDO LATERAL FORCE:

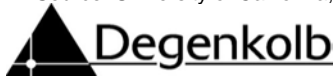
n = 2 (n = 2) Total Number of Stories
 C = 1.1 (Building Type W1) Modification Factor [ASCE 41-17, Table 4-7]
 S_a = 1.545 g = MIN { S_{X1} / T , S_{XS} } Spectral Acceleration [ASCE 41-17, Eq. 4-3]
 V = 1.699 W = $C S_a W$ Pseudo Lateral Force [ASCE 41-17, Eq. 4-1]

VERTICAL DISTRIBUTION OF SEISMIC FORCES:

k = 1.00 ($T \leq 0.5$ 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	18.5	81	1,494	0.78	173	173
2nd	8.5	51	430	0.22	50	223
TOTAL	-	131	1,923	1.00	223	-

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



Subject: Quick Checks	Job Number: B9959006.00	Date: 06/19/19
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QUICK CHECKS

ASCE 41-17 SEISMIC EVALUATION & RETROFIT OF EXISTING BUILDINGS

CHAPTER 4 - TIER 1 EVALUATION

LINEAR STATIC PROCEDURE

COLLAPSE PREVENTION

BSE-2E HAZARD LEVEL

BUILDING TYPE: W1 (Wood Light Frames) [ASCE 41-17, Table 3-1]

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

Plywood:

$V_{n, \text{plywd}}$	=	1,000 plf	(Structural Panel Sheathing)	Shear Wall Capacity	[ASCE 41-17, §A.3.2.7.1]
$M_{s, \text{plywd}}$	=	4.5	COLLAPSE PREVENTION	System Modification Factor	[ASCE 41-17, Table 4-8]
$L_{w, p}$	=	$L_{w, \text{total}, p} - L_{w, \text{openings}, p}$		Net Wall Length	[ASCE 41-17, §4.4.3.3]

Stucco on studs:

$V_{n, \text{stucco}}$	=	100 plf	Stucco on Studs	Shear Wall Capacity	[ASCE 41-17, §A.3.2.7.1]
$M_{s, \text{stucco}}$	=	4.5	COLLAPSE PREVENTION	System Modification Factor	[ASCE 41-17, Table 12-3]
$L_{w, s}$	=	$L_{w, \text{total}, s} - L_{w, \text{openings}, s}$		Net Wall Length	

Gypsum Wallboard:

$V_{n, \text{gyp}}$	=	100 plf	Gypsum Wallboard	Shear Wall Capacity	[ASCE 41-17, §A.3.2.7.1]
$M_{s, \text{gyp}}$	=	4.5	COLLAPSE PREVENTION	System Modification Factor	[ASCE 41-17, Table 12-3]
$L_{w, s}$	=	$L_{w, g}$		Wall length for gyp bd = Wall length for stucco	

North-South Direction:

Level	V_j [kips]	Plywood Shear Wall				Stucco & Gyp Board Shear Wall				DCR	Quick Check
		$L_{w, \text{total}}$ [ft]	$L_{w, \text{openings}}$ [ft]	L_w [ft]	$V_{n, \text{plywd}}$ [kips]	$L_{w, \text{total}}$ [ft]	$L_{w, \text{openings}}$ [ft]	$L_{w, s}$ [ft]	$V_{n, s \& g}$ [kips]		
Roof	173	62	18	44	196	145	50	95	85	0.62	OK
2nd	223	62	18	44	196	36	0	36	32	0.98	OK

Level	V_j [kips]	Plywood Shear Wall				Stucco & Gyp Board Shear Wall				DCR	Quick Check
		$L_{w, \text{total}}$ [ft]	$L_{w, \text{openings}}$ [ft]	L_w [ft]	$V_{n, \text{plywd}}$ [kips]	$L_{w, \text{total}}$ [ft]	$L_{w, \text{openings}}$ [ft]	$L_{w, s}$ [ft]	$V_{n, s \& g}$ [kips]		
Roof	173	85	8	77	503	0	0	0	0	0.50	OK
2nd	223	85	4	81	616	0	0	0	0	0.62	OK

$$V_{n, \text{plywd}} = L_{w, p} \times V_{n, \text{plywd}} \times M_{s, \text{plywd}}$$

$$V_{n, s \& g} = L_{w, s} \times (V_{n, \text{stucco}} \times M_{s, \text{stucco}} + V_{n, \text{gyp}} \times M_{s, \text{gyp}})$$

$$DCR = V_j / (V_{n, \text{plywd}} + V_{n, s \& g})$$



UC Santa Cruz Tier 1

Latitude, Longitude: 36.99752620, -122.05373821



Date	6/4/2019, 9:11:34 AM
Design Code Reference Document	ASCE41-17
Custom Probability	
Site Class	D - Default (See Section 11.4.3)

Type	Description	Value
Hazard Level		BSE-2N
S _s	spectral response (0.2 s)	1.638
S ₁	spectral response (1.0 s)	0.629
S _{XS}	site-modified spectral response (0.2 s)	1.965
S _{X1}	site-modified spectral response (1.0 s)	1.069
F _a	site amplification factor (0.2 s)	1.2
F _v	site amplification factor (1.0 s)	1.7
ssuh	max direction uniform hazard (0.2 s)	1.758
crs	coefficient of risk (0.2 s)	0.932
ssrt	risk-targeted hazard (0.2 s)	1.638
ssd	deterministic hazard (0.2 s)	3.026
s1uh	max direction uniform hazard (1.0 s)	0.69
cr1	coefficient of risk (1.0 s)	0.912
s1rt	risk-targeted hazard (1.0 s)	0.629
s1d	deterministic hazard (1.0 s)	1.032

Type	Description	Value
Hazard Level		BSE-1N
S _{XS}	site-modified spectral response (0.2 s)	1.31
S _{X1}	site-modified spectral response (1.0 s)	0.713

Type	Description	Value
Hazard Level		BSE-2E
S_S	spectral response (0.2 s)	1.287
S_1	spectral response (1.0 s)	0.488
S_{XS}	site-modified spectral response (0.2 s)	1.545
S_{X1}	site-modified spectral response (1.0 s)	0.885
f_a	site amplification factor (0.2 s)	1.2
f_v	site amplification factor (1.0 s)	1.812

Type	Description	Value
Hazard Level		BSE-1E
S_S	spectral response (0.2 s)	0.696
S_1	spectral response (1.0 s)	0.245
S_{XS}	site-modified spectral response (0.2 s)	0.865
S_{X1}	site-modified spectral response (1.0 s)	0.517
F_a	site amplification factor (0.2 s)	1.243
F_v	site amplification factor (1.0 s)	2.11

Type	Description	Value
Hazard Level		T-Sub-L Data
T-Sub-L	Long-period transition period in seconds	12

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University of California, Santa Cruz
ASCE 41-17 Tier 1 Seismic Evaluation
CAAN 7566 - Cowell College Faculty Office Addition

Appendix C
Photos and Details



University of California, Santa Cruz
ASCE 41-17 Tier 1 Seismic Evaluation
CAAN 7566 - Cowell College Faculty Office Addition



Figure 1 - View from southeast corner of the building



Figure 2 - MEP Equipment not anchored at base



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 ASCE 41-17 Tier 1 Seismic Evaluation
 CAAN 7566 - Cowell College Faculty Office Addition

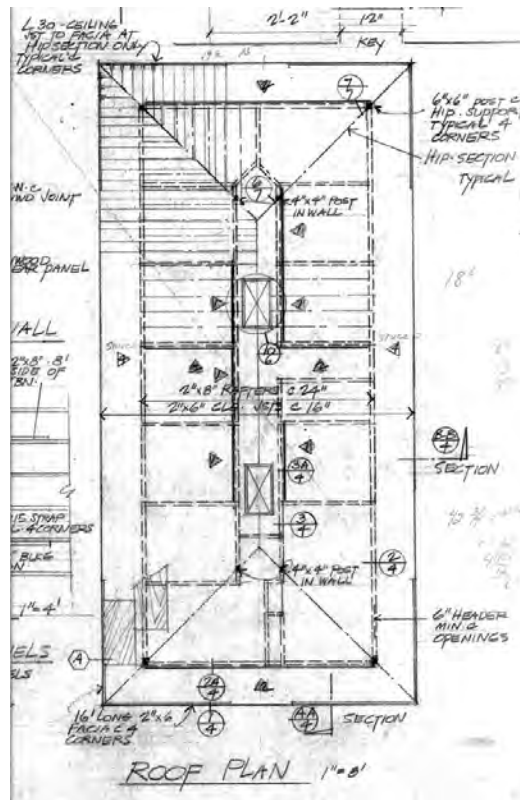
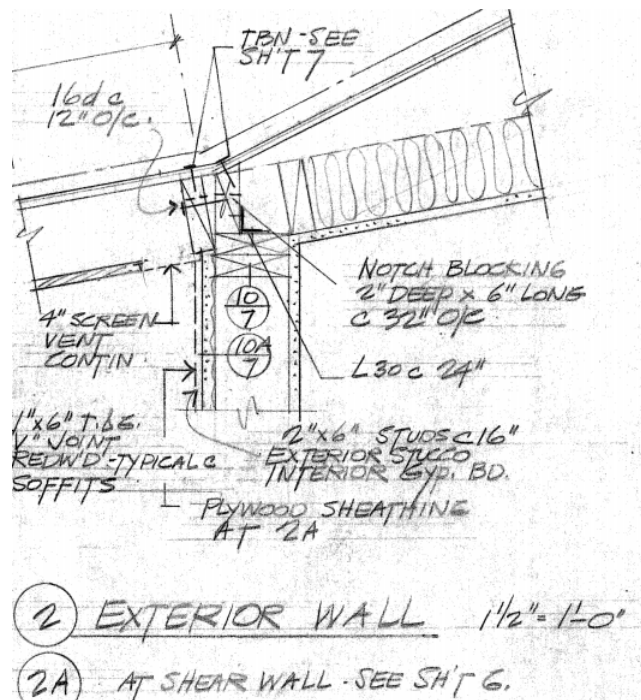


Figure 3 - Roof Framing Plan



- ② EXTERIOR WALL 1 1/2" = 1'-0"
- ②A) AT SHEAR WALL - SEE SH'T 6.

Figure 4 - Detail 2 & 2A/4 - Wall Section



University of California, Santa Cruz
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 CAAN 7566 - Cowell College Faculty Office Addition

VERTICAL SHEAR ASSEMB. SCHEDULE

NOTES:

1. T.E.N. DESIGNATES "TYPICAL EDGE NAILING" AT EDGES OF EACH PLYWOOD SHEET.
2. SPACE NAILS 12" O.C. ALONG ALL INTERMEDIATE MEMBERS.
3. ALL PLYWOOD SHEET EDGES SHALL BE BACKED WITH BLOCKING THE SAME WIDTH AS STUDS.
4. GYPSUM WALL BOARD INTERMEDIATE MEMBER NAILING SAME AS T.E.N.
5. JOIST/BLK. CONNECTION TO HAVE COMMON NAILS INTO TOP PLATE.

MARK	DESCRIPTION MATERIAL	NAILING T.E.N.	STUD THICK- NESS	CONNECTIONS (SEE DETS.)			REMARKS
				SILL NAILING	SILL BOLTING	JOIST/BLK CONNECTION	
①	1/2" CDX PLYWOOD	10d x 6"	2x				
②	1/2" CDX PLYWOOD	10d x 4"	2x	SEE DETAILS			
③	1/2" CDX PLYWOOD	10d x 6"	2x				BOTH SIDES
④	7/8" STUCCO	SEE REMARKS	2x				N# 11 GA., 1/2" LONG, 7/16" HEAD OR N# 16 GA. STAPLE, 7/8" LEGS
⑤							

⑤ SHEAR ASSEMBLIES

Figure 5 - Detail 5/7 - Shear Wall Schedule