



Rating form completed by:

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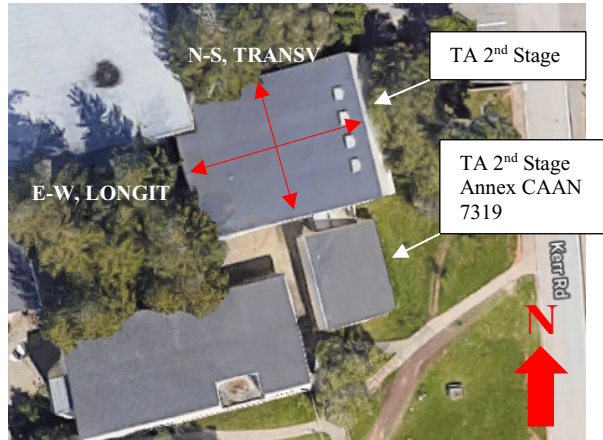
Text in green is to be part of UC Santa Cruz building database and may be part of UCOP database

UC Santa Cruz building seismic ratings
Theater Arts H 2nd Stage

CAAN #7318
 451 Kerr Road, Santa Cruz, CA 95064
 UCSC Campus: Main Campus



DATE: 2019-06-30



Rating summary	Entry	Notes
UC Seismic Performance Level (rating)	V (Poor)	
Rating basis	Tier 1	ASCE 41-17 ¹
Date of rating	2019	
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)	See recommendations on further evaluation and retrofit.
Is 2018-2019 rating required by UCOP?	Yes	Building was not previously rated
Further evaluation recommended?	Yes	Tier 2 - Focused on adequacy of transverse walls to resist overturning at Level 2

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 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 Ralph Rapson and Associates Inc., “Performing Arts Building, University of California Santa Cruz,” as-built dated 30 June 1969
- Structural drawings by Pregnoff and Matheu, “Performing Arts Building, University of California Santa Cruz,” as-built dated 30 June 1969
- Architectural drawings by Sara Kane/Associates, “Choral Room Alterations” dated 27 April 1984
- University of California Facilities Link building database information, “7318” provided by José Sanchez (UCSC) on 2019-05-30.

Additional building information known to exist

- None

Scope for completing this form

We reviewed the structural drawings for the original construction and carried out a site visit to verify that the existing drawings matched the existing structure to the best of our knowledge. An ASCE 41-17 Tier 1 evaluation was completed. We did not perform an ASCE 41 Tier 1 nonstructural evaluation, but we looked for potentially hazardous nonstructural components during our site visit.

Brief description of structure

Theater Arts H 2nd Stage is one of a cluster of eleven buildings that forms the Theater Arts complex. The complex was designed in 1969 by the architectural office of Ralph Rapson and Associates and the structural office of Pregnoff and Matheu.

The building is a theater and largely a 1-story structure, with a partial 2nd story which holds the stage control booth. The entrance is on the west side of the building, and the stage is on the east side of the building. The roof is sloped, and forms a deep overhang over the entrance. The east wall of the building (at the back of the stage) is sloped.

A corridor structure from the 2nd Stage Annex is attached to the exterior of the south wall of the building.

Identification of levels: Level 1 (elev. 694.0' at the building entrance), Level 2 (elev. 704'), Roof (highest elevation 732.0')

Foundation system: The superstructure is founded on shallow strip footings located under the exterior walls and the wood bearing wall that runs north-south just inside the entrance. Four interior steel columns which support the roof are supported on concrete footings bearing on drilled piers. The site is moderately sloping up from west to east. To accommodate the slope of the finished grade outside the building, a concrete foundation wall is provided at the north, east, and south perimeter walls to retain soil and support the perimeter walls. The Level 1 floor is slab on grade.

Structural system for vertical (gravity) load: The framing for Level 2 and the roof consists of wood joists spanning north-south, supported by the exterior wood bearing walls and 2 lines of steel girders supported by steel columns. Level 2 is a partial floor.

Structural system for lateral forces: Plywood sheathed floor and roof diaphragms transfer lateral inertial forces from floors and roof to plywood sheathed wood walls in-plane, which occur at the perimeter of the building. One line of interior walls is provided at the west end of the building, just inside the entrance. The walls on this line are shorter in length than the perimeter walls, and hold-downs are to be provided at the connection to the foundation. The wall at the east end of the building is sloped at an angle of approximately 18 degrees. The thrust from the sloping wall is resisted by the slab-on-grade, which is doweled into the strip footings all around its perimeter.

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

Identified seismic deficiencies of the building include the following:

- There appears to be no vertical connection of the walls through the floors. This is especially a concern at the short walls in the east-west direction at gridline V, which has hold-downs at the connection to the foundation but no tie-downs between floors.
- A corridor structure is attached to the south side of this building and provides access to the 2nd Stage Annex building (CAAN 7319). The corridor structure is one-story tall. Roof joists in the corridor structure span north-south, connected at one end to the wall of the 2nd Stage building and at the other end to the wall of the 2nd Stage Annex building, with no seismic separation joints at either end. The elevation of the corridor roof does not line up with the elevation of the floor of the adjoining buildings. Differential movement of the 2nd Stage and 2nd Stage Annex building in the north-south direction may result in pulling the roof joists away from their supports, creating a falling hazard.

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	Y	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

We walked through the building. We did not perform the Tier 1 nonstructural evaluation, but we looked for potentially hazardous nonstructural components during our site visit on 13 June 2019. As shown in the table below, no non-structural hazards were observed inside the building. The corridor structure outside the building is a potential life safety concern, because it is connected to both the 2nd Stage and the 2nd Stage Annex buildings, with no seismic separation joints.

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 ornamentation above exit ways and public access areas	None observed	Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.	None observed

Discussion of rating

The rating of V (Poor) is because of the potential life safety hazard posed by the corridor structure, as well as the lack of tie-downs at the wall on gridline V. A Tier 2 evaluation may find that the building itself could be rated IV (Fair) if the corridor is fixed.

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.

Recommendations for further evaluation or retrofit

We recommend that the Campus perform a more detailed review of the connection of the corridor structure and consider providing separation joints in the corridor roof between buildings. A Tier 2 evaluation for the building should focus on the adequacy of the roof diaphragm at the overhang over the entry at the east side of the building and whether hold-downs are required at the transverse (north-south) walls at gridlines U and V at Level 2.

Peer review of rating

This seismic evaluation was discussed in a peer review meeting on 17 June 2019. Reviewers present were Bret Lizundia of R+C and Robert Graf of Degenkolb. Comments from the reviewers have been incorporated into this report. The reviewers agreed with the assigned rating.

Additional building data	Entry	Notes
Latitude	36.99517	
Longitude	-122.06144	
Are there other structures besides this one under the same CAAN#	No	
Number of stories above lowest perimeter grade	2	Partial 2nd story
Number of stories (basements) below lowest perimeter grade	0	
Building occupiable area (OGSF)	5677 sq. ft.	
Risk Category per 2016 CBC Table 1604.5	II	Assembly occupancy (theater).
Building structural height, h_n	41 ft	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	0.32 sec	Estimated using ASCE 41-17 equation 4-4 and 7-18
Site data		
975 yr hazard parameters S_s, S_1	1.286, 0.488	
Site class	D	
Site class basis ⁴	Geotech	See footnote below
Site parameters F_a, F_v ⁵	1, 1.81	
Ground motion parameters S_{cs}, S_{c1}	1.286, 0.885	
S_a at building period	1.28	

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/mappallery/Emergency%20Management/Hazard%20Mitigation/LiquifactionMap2009.pdf>

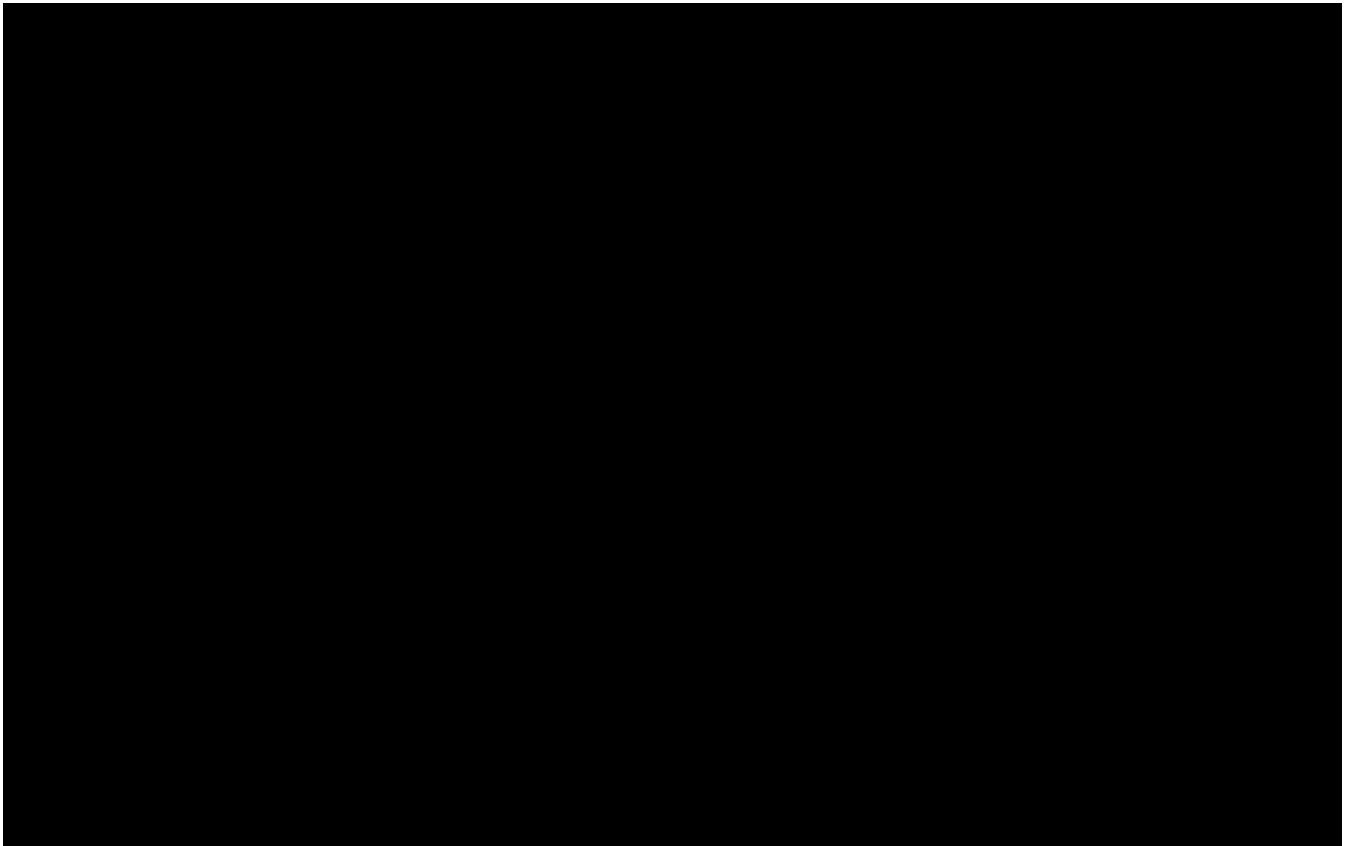
<https://gis.santacruzcounty.us/mappallery/Emergency%20Management/Hazard%20Mitigation/LandslideMap2009.pdf>

<https://gis.santacruzcounty.us/mappallery/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, which per Exception 2 would result in an effective F_v factor of 2.72 (1.5 times larger). We are doing this intentionally as we understand that the appropriateness of the requirements of Section 11.4.8 is under review by UCOP.

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	Designed: 1969 Code: 1967 UBC	Code inferred based on design year
Applicable code for partial retrofit	None	None
Applicable code for full retrofit	None	None
Model building data		
Model building type North-South	W2 – Wood frame	
Model building type East-West	W2 – Wood frame	
FEMA P-154 score	N/A	Not included here. Tier 1 evaluation.
Previous ratings		
Most recent rating	None	
Date of most recent rating	-	
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

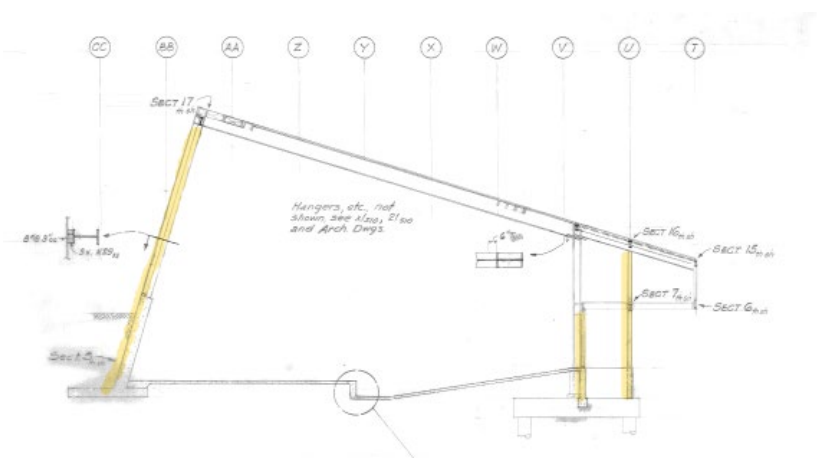
Annotated floor plan (2nd floor and roof shown)



Plan at Level 2

Plan at Roof

Section looking south



Entry looking south



Entry looking north



South elevation showing corridor



Back of building, looking north



UC Campus:	UC Santa Cruz		Date:	6/30/2019		
Building CAAN:	7318	Auxiliary CAAN:	By Firm:	Maffei Structural Engineering		
Building Name:	TA 2nd Stage		Initials:	NY	Checked:	JM
Building Address:	463 Kerr Road, Santa Cruz, CA 95064		Page:	1	of	3

ASCE 41-17 Collapse Prevention Basic Configuration Checklist

LOW SEISMICITY

BUILDING SYSTEMS - GENERAL

	Description
<input checked="" type="radio"/> C <input type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>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)</p> <p>Comments:</p>
<input type="radio"/> C <input checked="" type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>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)</p> <p>Comments: No seismic joints at corridor structure between buildings</p>
<input type="radio"/> C <input type="radio"/> NC <input checked="" type="radio"/> N/A <input type="radio"/> U <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>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)</p> <p>Comments: No mezzanine</p>

BUILDING SYSTEMS - BUILDING CONFIGURATION

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

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

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C <input checked="" type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/>		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:		
C <input checked="" type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/>		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:		
C <input checked="" type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/>		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				Description
C <input checked="" type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/>		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:				
C <input checked="" type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/>		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:				
C <input checked="" type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U <input type="radio"/>		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								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">NC</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">U</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> </table>	C	NC	N/A	U	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<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:</p>
C	NC	N/A	U						
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">NC</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">U</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> </table>	C	NC	N/A	U	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<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:</p>
C	NC	N/A	U						
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						

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 W2

LOW AND MODERATE SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

				Description								
<input checked="" type="radio"/> C	<input type="radio"/> NC	<input type="radio"/> N/A	<input type="radio"/> U	<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:</p>								
<input checked="" type="radio"/> C	<input type="radio"/> NC	<input type="radio"/> N/A	<input type="radio"/> U	<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</td> </tr> <tr> <td>Diagonal sheathing</td> <td>700 lb/ft</td> </tr> <tr> <td>Straight sheathing</td> <td>100 lb/ft</td> </tr> <tr> <td>All other conditions</td> <td>100 lb/ft</td> </tr> </table> <p>Comments:</p>	Structural panel sheathing	1,000 lb/ft	Diagonal sheathing	700 lb/ft	Straight sheathing	100 lb/ft	All other conditions	100 lb/ft
Structural panel sheathing	1,000 lb/ft											
Diagonal sheathing	700 lb/ft											
Straight sheathing	100 lb/ft											
All other conditions	100 lb/ft											
<input type="radio"/> C	<input type="radio"/> NC	<input checked="" type="radio"/> N/A	<input type="radio"/> U	<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:</p>								
<input type="radio"/> C	<input type="radio"/> NC	<input checked="" type="radio"/> N/A	<input type="radio"/> U	<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:</p>								
<input checked="" type="radio"/> C	<input type="radio"/> NC	<input type="radio"/> N/A	<input type="radio"/> U	<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:</p>								
<input type="radio"/> C	<input checked="" type="radio"/> NC	<input type="radio"/> N/A	<input type="radio"/> U	<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: No hold-downs provided at any wall at Level 2</p>								

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ASCE 41-17 Collapse Prevention Structural Checklist For Building Type W2

<input checked="" type="radio"/> C <input type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> 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: Not a hillside site	
<input type="radio"/> C <input type="radio"/> NC <input checked="" type="radio"/> N/A <input type="radio"/> 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:	
<input checked="" type="radio"/> C <input type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> 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)
Comments:	

CONNECTIONS

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

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ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W2

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

CONNECTIONS

					Description
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	WOOD SILL BOLTS: Sill bolts are spaced at 6 ft (1.8 m) or less with acceptable edge and end distance provided for wood and concrete. (Commentary: A.5.3.7. Tier 2: Sec. 5.7.3.3)
					Comments:

DIAPHRAGMS

					Description
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	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:
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	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:
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)
					Comments:
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	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: Wood structural panels at all diaphragms
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	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: Wood structural panels at all diaphragms

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

UC Campus:	UC Santa Cruz		Date:	6/30/2019		
Building CAAN:	7318	Auxiliary CAAN:	By Firm:	Maffei Structural Engineering		
Building Name:	TA 2 nd Stage		Initials:	NY	Checked:	JM
Building Address:	451 Kerr Road, Santa Cruz, CA 95064		Page:	4	of	4

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<input checked="" type="radio"/> C <input type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U	<p>DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft (12.2 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)</p> <p>Comments:</p>
<input checked="" type="radio"/> C <input type="radio"/> NC <input type="radio"/> N/A <input type="radio"/> U	<p>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)</p> <p>Comments:</p>

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



SEISMIC EVALUATION OF EXISTING BUILDINGS - TIER 1 SCREENING

ASCE 41-17 Chapter 4

General

Architect	Ralph Rapson and Associates Inc
Structural Engineer	Pregnoff & Matheu
Location	451 Kerr Road
Design date	1971
Latitude	36.9951722
Longitude	-122.06144
Stories above grade	2

Reference

(Google Earth)
"

Seismic parameters

Risk Category	II	2016 CBC Table 1604.5	
Site Class	D	https://earthquake.usgs.gov/hazards/urban/sfbay/soilt	(ASCE 41-17 2.4.1.6, ASCE 7-16 Chapter 20)
Liquefaction hazard	Low	http://data-sccgis.opendata.arcgis.com/datasets/77d380d355934b38a44894154377e28d_62	(ASCE 41-17 3.3.4)
Landslide hazard	Low	http://data-sccgis.opendata.arcgis.com/datasets/7984aabd55ec4a4794ae33d7919bd9c7_133	
S_{DS}	1.087	Based on ASCE 7-16 DE, used to determine "Level of Seismicity"	(ASCE 41-17 Eq 2-4)
S_{D1}	N/A	Based on ASCE 7-16 DE, used to determine "Level of Seismicity"	(ASCE 41-17 Eq 2-5)
S_{X5}	1.281	For BSE-2E hazard level	(ASCE 41-17 Table 2-2)
S_{X1}	0.88	For BSE-2E hazard level	(ASCE 41-17 Table 2-2)

Scope

Performance level	Collapse Prevention	(ASCE 41-17 Table 2-2)
Seismic hazard level	BSE-2E	(ASCE 41-17 Table 2-2)
Level of seismicity	High	(ASCE 41-17 Table 2-4)
Building type	W2: Wood Frames, Commerical and Industrial	(ASCE 41-17 Table 3-1)

Material properties

				Notes	
Concrete	f'_c	4000	psi	Specified on drawings, NWC	(ASCE 41-17 Table 10-4)
Reinf.	f_y	60	ksi	#6 and larger A432	(ASCE 41-17 Table 10-4)
	f_y	40	ksi	All other bars A-15 Intermediate	(ASCE 41-17 Table 10-4)
Steel	F_y	N/A	ksi	N/A	(ASCE 41-17 Table 9-1)

**Checklists**

Benchmark building	No	(ASCE 41-17 Table 3-2)
Checklist(s) req'd	17.1.2 Basic Configuration	(ASCE 41-17 Table 4-6)
	17.12 Structural Checklist for Building Types W2	(ASCE 41-17 Table 4-6)
	17.19 Nonstructural Checklist (not performed)	(ASCE 41-17 Table 4-6)

Seismic forces

V	557	kip	$V = C_s a W$	$= 1.41W$	(ASCE 41-17 Eq 4-1)
W	395	kip	building weight		(ASCE 41-17 4.4.2.1)
C	1.1		Convert linear elastic to inelastic disp.		(ASCE 41-17 Table 4-7)
S_a	1.28	g	$S_a = S_{x1} / T \leq S_{xs}$		(ASCE 41-17 Eq 4-3)
T	0.32	sec	$T = C_t h_n^\beta$		(ASCE 41-17 Eq 4-4)
C_t	0.020				(ASCE 41-17 Eq 4-4)
β	0.75				(ASCE 41-17 Eq 4-4)
h_n	41	ft	building height		(ASCE 41-17 Eq 4-4)

Story Forces

(ASCE 41-17 4-2a) (ASCE 41-17 4-2b)

Story	w kip	story ht ft	h ft	wh^k	F_{story}	F_{story} kip	V_{story} kip
Roof	395.04	20.25	20	8000	1.00	557	557
Total	395			8000	1.0	557	

k 1.00 $k = 1.0$ for $T < 0.5$, 2.0 for $T > 2.5$, linear interpolation between

$$F_{story} = V(wh^k) / (\sum wh^k) \quad (\text{ASCE 41-17 4-2a})$$

$$V_{story} = \sum_{above} F_{story} \quad (\text{ASCE 41-17 4-2b})$$



Project: _____

Subject: _____

By: _____

Date: _____

Shear stress in shear walls (ASCE 41-17 4-8) (ASCE 41-17 4-8)

Story	L_w N-S ft	L_w E-W ft	V_{NS}^{avg} p/ft	V_{EW}^{avg} p/ft	D/C_{NS}	D/C_{EW}
Roof	128.8359	142.16	960	870	1.0	0.9

Total

M_s 4.50 (ASCE 41-17 Table 4-8)

v_{limit} 1000 p/ft

$v^{avg} = (1/M_s)(V_{story}/L_w)$ (ASCE 41-17 Eq 4-8)

BUILDING H

AREA OF FLOOR

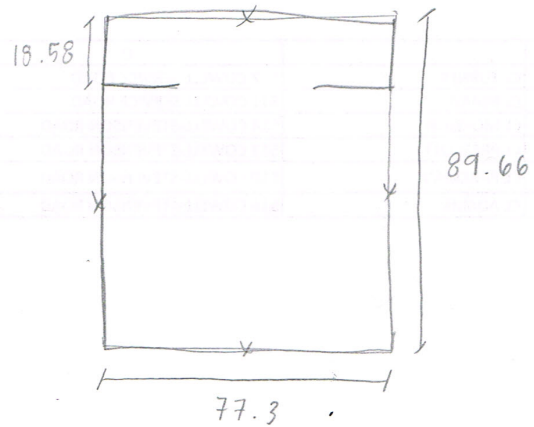
ROOF: 6930

LENGTH OF WALLS (N-S)

ROOF: $77.3 + 51.53 + .84 \cdot 77.3 = 190.7$

LENGTH OF WALLS (E-W)

ROOF: $2 (71.08) = 142.16$



SEISMIC WEIGHT TABLE

ROOF

→ SHINGLE	2	} = 45 psf
→ 1/2" PLY 2x8 @ 16"cc	1.5	
→ .25 (A2) + .75 (A6) + 2x12 @ 16"	8.8	
→ 5/8" GYP 2x12 @ 16"cc	2.75	
→ INSUL, MEP, STAGE LIGHTS + CURTAINS	30	

WALL WEIGHT

EYT

→ STUCCO 1"	1.1	} 17 psf
→ 3/8" PLY	1.2	
→ 2x6 @ 16" studs	1.7	
→ 5/8 GYP + INSUL	2.75	

TRIB HEIGHTS

