Rating form completed by:

RUTHERFORD + CHEKENE
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Evaluator: JY/WAL/BL
Date: 06/28/2019

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

REGISTERED PROFESSIONAL ENGINEER
BRET LIZUNDIA
No. S3950
Exp. 12-31-20
STRUCTURAL
STATE OF CALIFORNIA
06-28-19

DATE: 2019-06-28

UC Santa Cruz building seismic ratings

Visual Arts Facilities-Building H

CAAN #7784
427 Baskin Arts Service Road, Santa Cruz, CA 95064
UCSC Campus: Main Campus

Northwest Elevation (Looking Southeast)

Plan

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	B	Priority A=Retrofit ASAP Priority B=Retrofit at next permit application
Ballpark total construction cost to retrofit to IV rating[2]	None	See recommendations on further evaluation and retrofit.
Is 2018-2019 rating required by UCOP?	Yes	Building was not previously rated.
Further evaluation recommended?	Yes	Investigation Line C roof-to-wall connections at the time of re-roofing and possible improvement for north-south out-of-plane loading

[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 19 May 2017 *UC Seismic Safety Policy* and Method B of Section 321 of the 2016 *California Building Code*.

[2] Per Section III.A.4.i of the 26 March 2019 *UC Seismic Program Guidebook, Version 1.3*, 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 Gary Garmann Architects, "UCSC BASKIN VISUAL ARTS - Plaster Studio and Facility Office Additions," revisions dated 1 May 1989, stamped by State Fire Marshal on 8 February 1990, Sheets A1-A6.
- Structural drawings by Donald C. Urfer & Associates, Inc., "UCSC BASKIN VISUAL ARTS - Plaster Studio and Facility Office Additions," revisions dated 10 October 1989, Sheets S1-S3. S4 and S5 are plans for alternate foundation plans. For the purpose of this evaluation, we assume the building is built per the foundations shown on Sheets S1-S3.

Additional building information known to exist

None

Scope for completing this form

Reviewed structural drawings, made brief site on 23 May 2019, and carried out ASCE 41-17 Tier 1 evaluation.

Brief description of structure

Baskin Building H is a two-story building at the northeast region of the Department of Art's Baskin Visual Art studios complex. It houses approximately 3,000 square foot of program space, with 1,200 square feet of office area in the lower level and a 1,780 square feet plaster studio at the main level. The metal studio (Building P CAAN#7929) is to the west, and Building B (CAAN #7494) is to the south. A retaining wall supports the east edge of the north courtyard of the complex and runs south from Building H to Building B. The out-to-out dimensions for the rectangle are 44'-0" in the north-south direction and 40'-6" in the east-west direction. The building is on a sloped site which is low to the north and east side which corresponds to the lower level elevation and high on the south and west side which corresponds to the main level elevation. The main level is at the same elevation as the north courtyard. The elevation of the high edge and the valley of the roof are at 21'-6" and 9'-0" respectively above the main level floor elevation. The lower level floor is at 10'-0" below the main level. Architecturally, it is designed to be compatible with the sawtooth roofs of the original Baskin complex to the south. Structurally, at the main level, Building H has two lines of steel truss frames and one line of wood frame wall in the longitudinal direction (E-W direction) and regular wood frame stud wall in the transverse direction (N-S direction). The lower level has concrete retaining walls on the upslope sides and wood walls at the downslope side. The building was designed in 1989 by architect Gary Garmann Architects, and the structural engineer was Donald C. Urfer & Associates, Inc.

The roof is comprised of plywood over wood joists that span north-south between east-west steel trusses at the north and center and a wood stud wall at the south façade. The main floor system has plywood over wood joists that spans between glulam beams which are in turn supported by wood posts at 8' apart E-W and 11' apart N-S. Truss posts from above terminate at the main floor level and are supported either by concrete foundation walls where occurs along the perimeter or by 6x6 wood posts at the interior.

<u>Identification of levels:</u> The building site slopes to the northeast. The building is comprised of two levels above the lowest perimeter grade: a partial basement (lower level) on the east side and a full main level at the same elevation of the north courtyard.

<u>Foundation system:</u> The west perimeter wall bears on a 6" concrete curb on the west and south. The 6" concrete curbs are reinforced with #4 bars at 12" o.c. each way above grade. Below grade, the curb thickens to a 12" concrete wall to support the continuous 2x6 flat plate on top of which the 2x12 floor joists bear. The 12" concrete wall is reinforced with two layers of #4 bars at 16" o.c. each way. Where the glulam floor beams occur, a 16" wide by 20" pilaster, reinforced with four #5 bars and four #3 ties, is provided. The 12" concrete wall is in turn supported by a 1'-6" deep by 3'-0" wide continuous strip footing that is reinforced with three #5 bars top and bottom and then with #4 bars spaced at 9" on center. (See Detail 4/S3 for the concrete curb and wall connection on the west elevation.) Concrete piers, 24" or 36" diameter by 8'-0" minimum long, are provided to support the strip footings at 11'-0" on center. The concrete piers are typically reinforced with two #5 vertical bars on the downhill side (east side) and three #5 bars on the uphill side (west side) with #3 stirrups spaced at 12" o.c.

The east perimeter wall bears directly on top of an 18"x18" concrete strip footing reinforced with two #5 bars top and bottom with #3 ties at 24" o.c. per Detail 1/S3.

The north perimeter wall of the crawl space starts with a 6'-0" long concrete curb over strip footing level with the higher grade level, with the same dimension and reinforcement as the west perimeter foundation and with 24" diameter concrete piers below each end. Then the strip footing changes to an approximately 12'-6" long concrete grade beam that steps to follow the finish grade slope. These grade beams are 12" wide by 24" deep with three #5 bars top and bottom with possibly #3 stirrups at 16" o.c. As shown on foundation plan on Sheet S2 and per Detail 14/S3, the grade beam is supported by two 36" diameter concrete piers at 8'-0" from the grade beam ends and between. Then as grade flattens at the lower level, the wood wall bears directly on top of the basement slab at the lower grade level, same as the east perimeter wall per Detail 1/S3.

The south perimeter wall bears on a concrete curb over strip footing, same as the west wall, for approximately 20'-6" long from west end of the building to the end of the retaining wall location. The concrete strip footings are supported with three concrete piers at 8'-0" o.c. Then beyond the retaining wall, the exterior wood wall extends below main level and bears directly on a 1'6" by 1'6" strip footing at the lower grade level, same as the east perimeter wall per Detail 1/S3.

The interior retaining wall is the separation between the west crawl space and the east lower level and was extended continuously from Building B to support the elevated north courtyard. There does not appear to be a joint where the north-south exterior courtyard retaining wall meets the east-west building retaining wall. The 8" concrete retaining walls are typically reinforced with #4 bars at 16" o.c. each way and supported by a continuous 1'-6" deep by 2'-0" wide strip footing which is reinforced with two #5 bars top and bottom tied together with #3 stirrups at 24" o.c. (See Detail 6/S3 for this connection detail.) The basement slab is 6" thick with #5 bars at 10" o.c. in the N-S direction and #4 at 18" o.c. in the E-W direction. The slab is thickened around the perimeter when connecting into the perimeter footings.

The interior 6x6 wood posts are anchored into a 1'-6" diameter round concrete curb on top of the typical 24" diameter concrete piers with 6" above basement floor per Detail 7/S3.

<u>Structural system for vertical (gravity) load:</u> The roof bears on 2x12 joists spaced @ 16" o.c. spanning in the N-S direction to the steel trusses or wood bearing walls. At the roof valley, roof joints are supported by the lower horizontal truss chord by bearing onto a steel plate welded to the side of the tube per Detail 10/A5. At roof high points on Gridlines A and B, roof joists are supported by an upper horizontal chord by bearing directly on it per Detail 7/A5. At the south perimeter, the roof joists bearing on the top double plate over the wood bearing wall per Detail 4/A5. The trusses are typically comprised of structural steel tubes welded directly together without gusset plates. The trusses are supported by steel tube posts, and the posts bear on the concrete foundation (or into the 6x6 posts and the interior and into the foundation on the northeast location).

The main level floor is supported by 2x12 Douglas Fir #2 floor joists spaced at 16" o.c. spanning in the N-S direction to glulam floor beams. The glulam beams are typically single span 5 1/8" wide by 10 ½" deep members spanning between 6x6 wood posts and pilasters in the west perimeter concrete wall. 6x6 posts are spaced at 8'-0" E-W direction and 11'-0" N-S direction. The material type and grade of the glulam beams and the 6x6 posts are unknown due to the unavailability of the specifications. Typical perimeter walls are comprised of 2x6s spaced at 16" o.c. with ¾" plywood wall sheathing.

<u>Structural system for lateral forces:</u> In the N-S direction, the lateral forces at the roof are delivered from the ½" plywood roof diaphragm at each sloped sawtooth roof panel to the east and west plywood walls. The trusses span vertically for out-of-plane loads between the top and bottom of the roof panels. At the valley, per Detail 10/A5, north-south out-of-plane loads are resisted by a ¼" x 3" steel plate welded to the vertical chord of the truss at 8'-0" o.c. and then bolted to the roof framing with ¾" diameter bolts. At the two high roof eaves, per Detail 7/A5, north-south out-of-plane loads are resisted with an unusual detail with 2x6s nailed to the roof joists capturing the steel top chord in bearing, together likely with toe nails from the joists to a 2x6 top plate with welded studs to the steel top chord tube. At the roof low eave, per Detail 4/A5, north-south out-of-plane loads appear to likely only have toe nails from the joists to the wall top plate and partial resistance from the blocking, nailing and clips detailed for in-plane loads. At the north wall, per Detail 10/A5, north-south out-of-plane loads are transferred at the top of the wood wall to the bottom chord of the truss with a 4"x6-1/4" continuous nailer and 5/8" threaded welded studs at

32" o.c. The steel truss posts that continue down to the main floor are also bolted to the wood studs in the wall per Detail 13/S3.

North-south forces at the main level are delivered to the main level plywood floor diaphragm and then to the west retaining wall and east lower level stud wall and down to the foundation. Per Detail 2/S2, in-plane loads are transferred from the floor to the top of the lower story wall top plate through blocking and then nailing into a sill plate which is bolted to the top of the concrete. Out-of-plane straps are also provided from the top plate to blocking.

In the E-W direction, lateral loads in the roof diaphragm are delivered through the diaphragm to south and north plywood shear walls. Because of the sawtooth nature of the diaphragm, it is made up of the two sloped plywood panels and the vertical trusses on Lines B and C, and internal forces within the diaphragm must pass from the plywood portions through the truss members. In-plane east-west loads at the low roof eave at Line C, per Detail 4/A5, are transferred from blocking through L50 clips at each joist bay into the top plate. At Line B, east-west internal diaphragm shear loads are transferred per Detail 10/A5 at the low eave from blocking to L50 clips to a 2x6 nailer through threaded welded studs to a ½" plate welded to the truss bottom chord. At the high eave on Lines A and B, per Detail 7/A5, east-west internal diaphragm shear loads are transferred from blocking through L50 clips to a 2x6 nailer through welded threaded studs to the top of the truss top chord.

East-west loads at the main level are delivered to the main level plywood floor diaphragm and then to the north and south stepped retaining walls/wood stud walls and down to the foundation.

The typical exterior truss posts are anchored atop of the concrete curb with two 5/8" anchor bolts as per Detail 9/S3. The two interior truss posts at the north elevation and the exterior one at the east elevation are welded to a built-up '∏' shape steel bracket with two ¾" through bolts to the glulam floor beam, which in turn are anchored into the concrete curb below per Detail 8/S3. The truss post on the northeast corner is welded to a ½" thick plate anchored with two 5/8" anchor rods each side through the continuous double top plate atop 6x6 wood post in the wood frame wall per Detail 2/S3.

<u>Building condition:</u> During the site visit, the lower level was not observed. All exposed structural steel frame and connections appeared to be in relatively good condition. No stains from water leaks were seen inside the studio.

<u>Building code</u>: The building code used for design is not listed on the architectural or structural drawings. The earliest date on the drawings is 21 December 1988. A 2016 history of building codes in California is provided in "Abridged History of San Francisco's Bureau of Building Inspection: 1944 to 1992," by Lonnie Haughton of Richard Avelar & Associates and informs the following. In 1978, the State Building Standards Commission was given responsibility for state building codes. The 1985 State Building Code adopted the 1982 Uniform Building Code (UBC), with an effective date of 1 October 1985. In 1989, the first California Building Code was developed; it adopted the 1988 UBC, with an effective date of 1 July 1989 for State projects. Building H was permitted under the University of California, Santa Cruz jurisdiction, and it is assumed that the State Building Code/California Building Codes were used. It thus appears likely that the 1988 UBC was the building code used for Building H.

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

Potential seismic deficiencies of the building include the following:

- For east-west loads, the sawtooth configuration at the roof creates a type of vertical irregularity. It also combines sloped plywood panels and steel trusses and requires loads to pass through a fairly complicated set of details to span from shear walls at Line C to the shear wall below the truss and clerestory window on Line A. As the diaphragm deforms, there is no horizontal tie or chord at the bottom chord level in the west and east walls, so the diaphragm will have a tendency to unfold and deform farther than it would if were a single plane. The connection of the roof framing to the lower chord of the truss at roof valley may induce out-of-plane forces and torsion to the truss. The roof diaphragm also lacks cross ties except for the central truss.

- For north-south loads, out-of-plane transfer of loads from the top of the wall on Line C into the roof joists likely relies only on toe nails with limited capacity, but the joists run over the top plate.

Inelastic behavior will likely be distributed in the roof diaphragm and the wall and possibly at the Line C roof-to-wall connection. There could also be movement due to differential settlement and slope stability from the unbalanced load of the hillside site. Evaluation of slope stability is beyond the scope of the Tier 1 evaluation.

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)	Y	URM wall height-to-thickness ratio	N
Torsion	N	URM parapets or cornices	N
Mass – vertical irregularity	N	URM chimney	N
Cripple walls	N	Heavy partitions braced by ceilings	N
Wood sills (bolting)	N	Appendages	N
Diaphragm continuity	N		

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

No apparent falling hazard items were observed in the studio during our brief visit. Basement rooms were not observed during the site visit and are therefore excluded from the scope of the nonstructural review. It is not known if they contain any natural gas-fueled equipment.

UCOP nonstructural checklist item	**Life safety hazard?**	**UCOP nonstructural 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.	Unknown

Basis of rating

The building is assigned as a Seismic Performance Level rating of Level IV. Demands in the plywood shear walls are low. Although the sawtooth roof combination of plywood panels and steel trusses is unusual and will have increased flexibility due to a lack of a horizontal tie, the spans are relatively short, and loads in the trusses and plywood are relatively low. The building is generally well tied together, though there are various eccentricities in the load path. At the Line C roof-to-wall connection, there appears to be limited capacity, but the rafters span over the top of the wall, so loss of vertical support is unlikely. Slope stability considerations have not been considered in the rating.

[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.

Recommendations for further evaluation or retrofit

When the building is re-roofed, we recommend investigation of the Line C roof-to-wall connection and possible improvement for north-south out-of-plane loading if only toe nails are found between the joists and top plate.

Peer review of rating

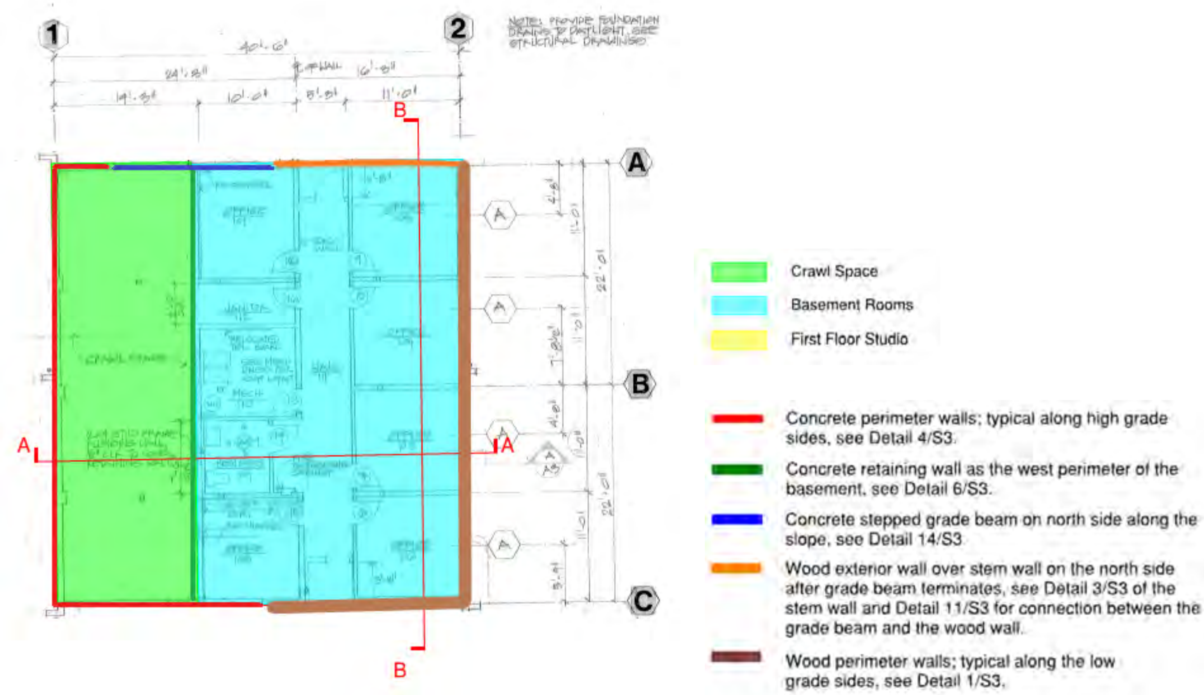
This seismic evaluation was discussed in a peer review meeting on 24 June 2019. Reviewers present were Joe Maffei of Maffei Structural Engineering and Jay Yin of Degenkolb Engineers. Comments from the reviewers have been incorporated into this report. The reviewers agreed with the assigned rating.

Additional building data	Entry	Notes
Latitude	36.995080	
Longitude	-122.061000	
Are there other structures besides this one under the same CAAN#	No	
Number of stories above lowest perimeter grade	2	The building is below grade on the west side more than ½ level
Number of stories (basements) below lowest perimeter grade	0	
Building occupiable area (OGSF)	3,074	From UCSC facilities database.
Risk Category per 2016 CBC Table 1604.5	II	
Estimated fundamental period	0.14 sec	Estimated using ASCE 41-17 equation 4-4 and 7-18
Building structural height, h_n	25 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
Site data		
975-year hazard parameters S_s, S_1	1.281, 0.485	From SEAOC/OSHPD website
Site class	D	
Site class basis	Geotech[4]	See footnote below
Site parameters F_a, F_v	1.0, 1.815	From SEAOC/OSHPD website
Ground motion parameters S_{cs}, S_{c1}	1.281, 0.881	From SEAOC/OSHPD website
S_a at building period	1.28	
Site V_{s30}	900 ft/s	

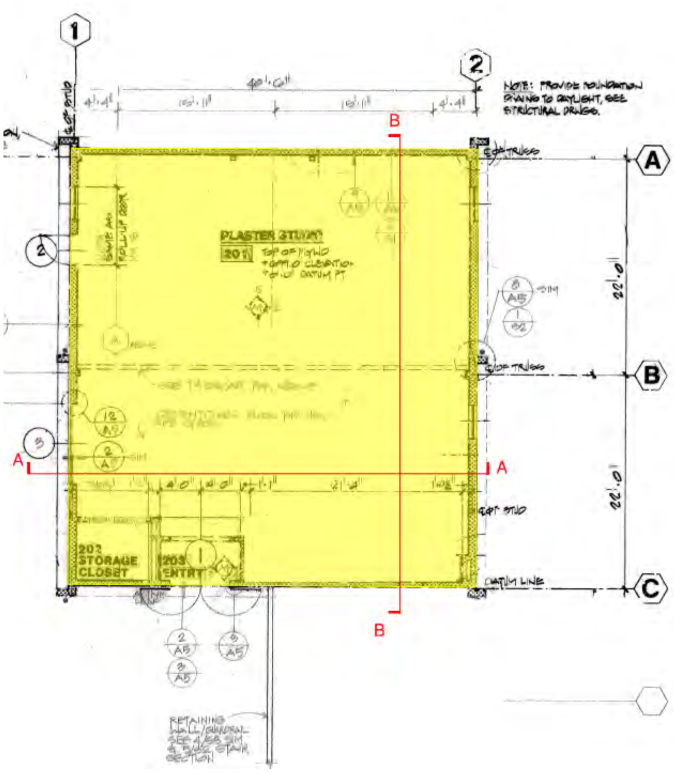
[4] Determination of site class and assessment of geotechnical hazards are based on correspondence with Pacific Crest Geotechnical Engineers and Nolan, Zinn, and Associates Geologists. [*Revised Geology and Geologic Hazards, Santa Cruz Campus, University of California*, Job # 04003-SC 13 May 2005]. Site 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

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	Original Built: 1990 (Estimated) Code: 1988 UBC	
Applicable code for partial retrofit	None	No partial retrofit.
Applicable code for full retrofit	None	No full retrofit
FEMA P-154 data		
Model building type North-South	W2 -Wood Frame	
Model building type East-West	Steel Truss Frame/W2-Wood Frame	S2 checklist in ASCE 41-17 is used to check truss elements.
FEMA P-154 score	N/A	Not included here because we performed ASCE 41 Tier 1 evaluation.
Previous ratings		
Most recent rating	-	Not evaluated before.
Date of most recent rating	-	
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.

Basement Level Plan

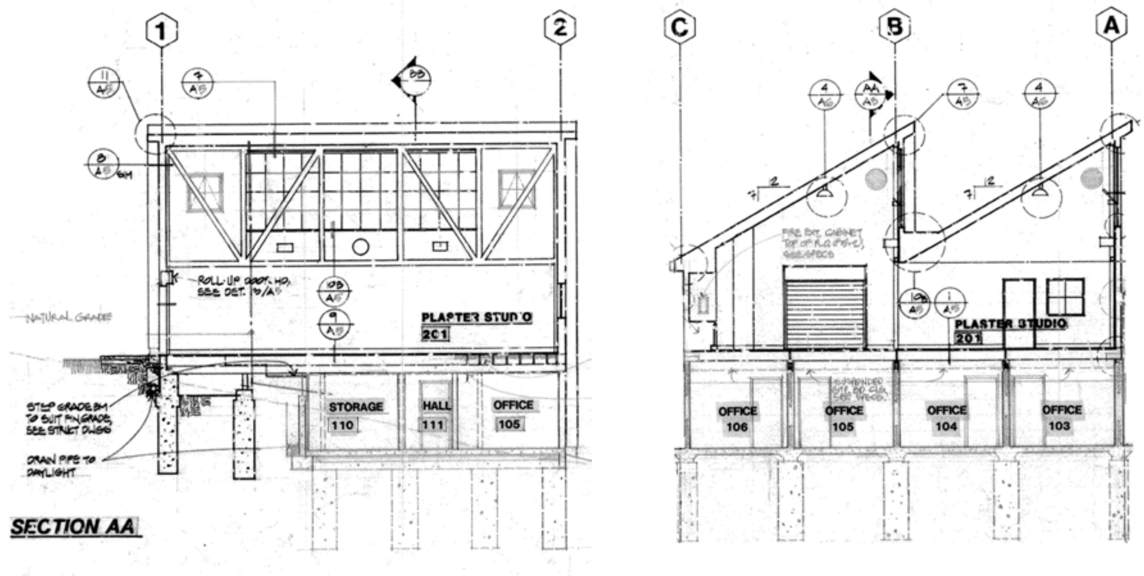


First Floor Plan

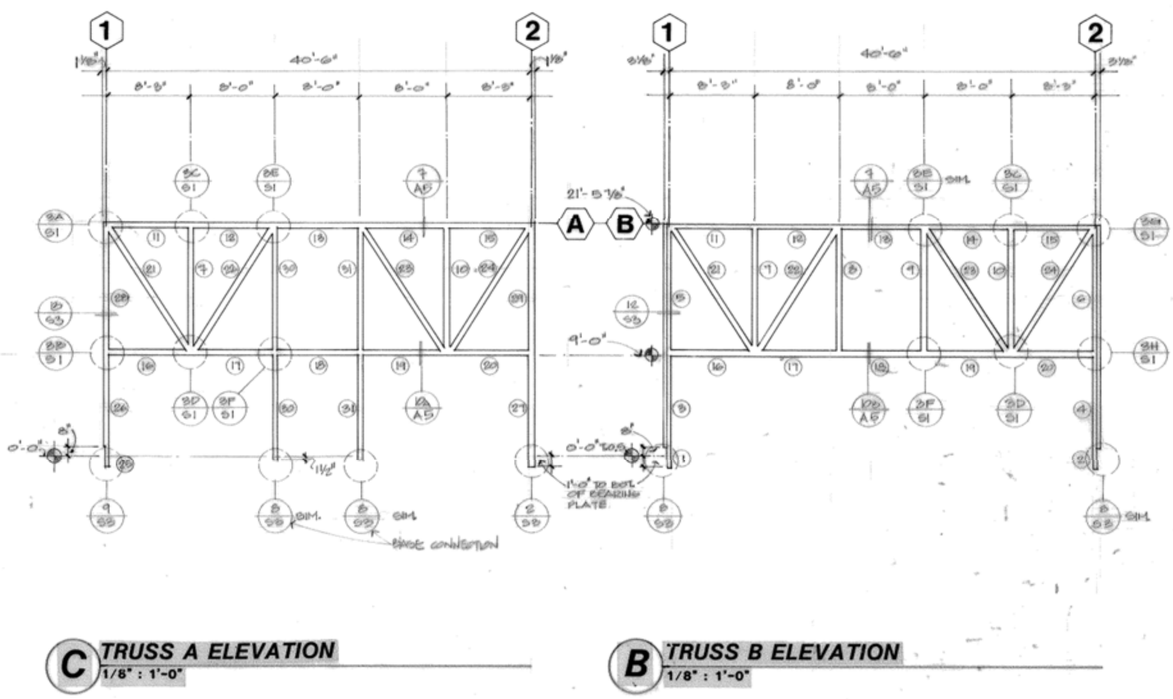


Section AA

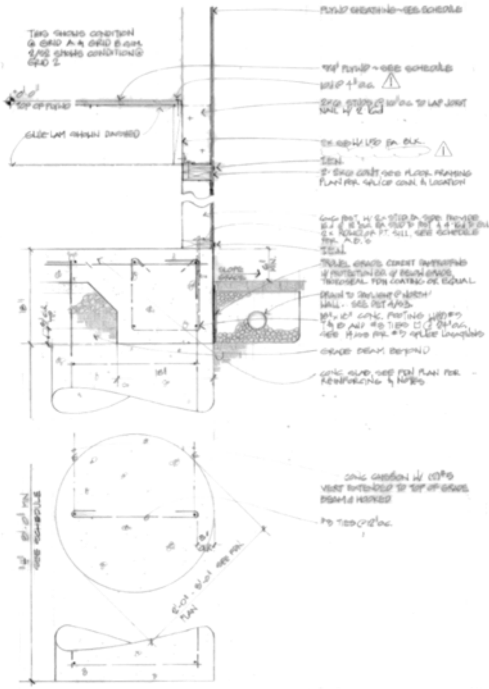
Section BB



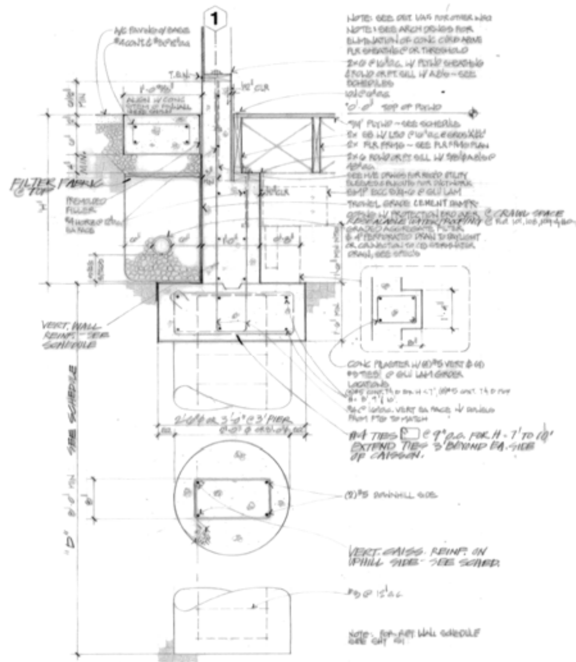
Truss Elevation



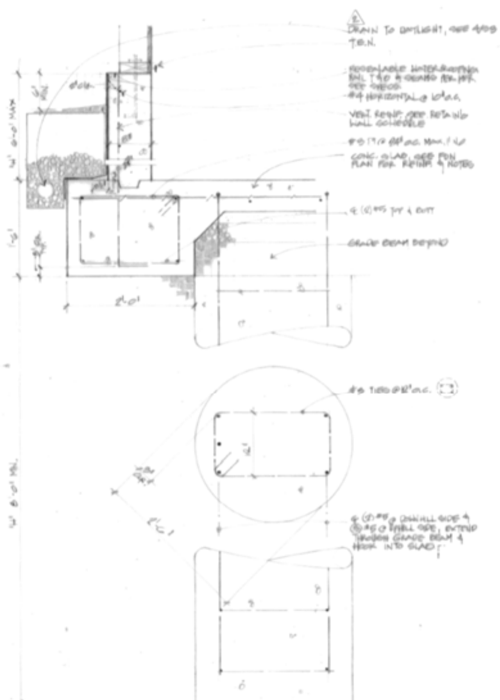
Connection Details on Sheet S3



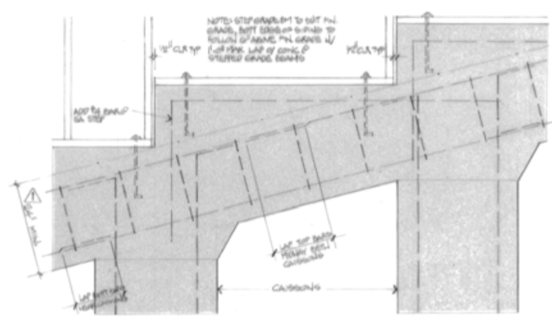
1 TYPICAL FOUNDATION AT CRIPPLE WALL
1":1'-0"
REFER TO S5 FOR ALTERNATE DETAILS



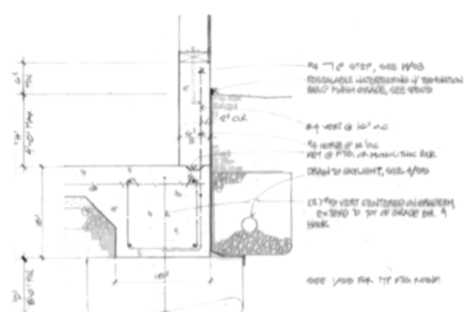
4 TYPICAL FOUNDATION AT CONCRETE CURB
1":1'-0"
? TYPICAL RETAINING WALL



6 RETAINING WALL & FOOTING AT CRAWL SPACE
1": 1'- 0"



14 TYPICAL GRADE BEAM STEP
NO SCALE



3 RETAINING WALL & FTNG AT LOWER LEVEL STOR
1":1'-0"

APPENDIX A

Additional Photos

Southeast Corner (Looking Northwest)

North Elevation (Looking South)

Southwest Corner (Looking East)

Northwest Corner (Looking Southeast)

Steel Truss at North Exterior Wall (Grid A, Looking North)

Steel Truss at Roof Intersection (Grid B, Looking North)

APPENDIX B

ASCE 41-17 Tier 1 Checklists (Structural)

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

LOW SEISMICITY

BUILDING SYSTEMS - *GENERAL*

C NC N/A U	Description
C: ☒ NC: ☐ N/A: ☐ U: ☐	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:** Roof diaphragms deliver loads to plywood shear walls over strip footings with concrete piers in the N-S direction and to steel trusses and plywood shear walls over strip footings with concrete piers in the E-W direction.
C: ☒ NC: ☐ N/A: ☐ U: ☐	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:** There are no adjacent structures.
C: ☒ NC: ☐ N/A: ☐ U: ☐	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:** There are no mezzanines.

BUILDING SYSTEMS - *BUILDING CONFIGURATION*

C NC N/A U	Description
C: ☒ NC: ☐ N/A: ☐ U: ☐	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:** Shear wall lengths are equal or larger at the lower story compared to the main story.
C: ☒ NC: ☐ N/A: ☐ U: ☐	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:** Shear wall lengths are equal or larger at the lower story compared to the main story. The lower story height is lower than the main story height.

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

UC Campus:	Santa Cruz		Date:	06/28/2019	
Building CAAN:	7784	Auxiliary CAAN:	By Firm:	Rutherford + Chekene	
Building Name:	Elena Baskin Visual Arts Building H		Initials:	JY	Checked: WAL/BL
Building Address:	427 Baskin Arts Service Road, Santa Cruz, CA 95064		Page:		of

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

C NC N/A U	
☒ ☐ ☐ ☐	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:** Steel posts support the ends of the streel trusses. At the northeast corner of the building, the truss post is connected into the 6x6 wood post inside exterior wood shear wall which is continuous to the foundation.
☒ ☐ ☐ ☐	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:** Shear wall lengths are equal or larger at the lower story compared to the main story.
☒ ☐ ☐ ☐	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:** The effective mass difference between the main floor and roof is less than 50%.
☒ ☐ ☐ ☐	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:** A flexible diaphragm is used.

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

GEOLOGIC SITE HAZARD

	Description
C NC N/A U ☒ ☐ ☐ ☐	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:** There is no mapped liquefaction on https://gis.santacruzcounty.us/mapgallery/Emergency%20Management/Hazard%20Mitigation/LiquifactionMap2009.pdf.
C NC N/A U ☒ ☐ ☐ ☐	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:** There are no mapped landslides on https://gis.santacruzcounty.us/mapgallery/Emergency%20Management/Hazard%20Mitigation/LandslideMap2009.pdf.

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Collapse Prevention Basic Configuration Checklist

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

GEOLOGIC SITE HAZARD

C NC N/A U	
◉ ○ ○ ○	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:** There are no faults at the project site per https://gis.santacruzcounty.us/mapgallery/Emergency%20Management/Hazard%20Mitigation/FaultZoneMap2009.pdf.

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:** Building width B = 40.5', Building average height is H = 25', B/H = 1.62 Sa = 1.28g per SEAOC at BSE-2E 0.6 x Sa = 0.77 B/H > 0.6 Sa
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:** Site Class D is assumed. There are no tie beams between the top of the piers as shown on the foundation plan and Detail 7/S2.

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Collapse Prevention Structural Checklist For Building Type W2

LOW AND MODERATE SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

C NC N/A U	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:** There are two lines of shear walls in the N-S direction and three lines of lateral force-resisting system in the E-W direction
☒ 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 Diagonal sheathing: 700 lb/ft Straight sheathing: 100 lb/ft All other conditions: 100 lb/ft **Comments:** 5/8-inch structural panel sheathing was provided at all perimeter shear walls. The average shear stress in N-S direction is 426 plf at the main story and 564 plf at lower story. The average shear stress in E-W direction is 210 plf at the main story and 613 plf at lower story if the capacity of the Line B braced frame line and its exterior columns are not included.
☒ 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:** There is no stucco.
☒ 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:** Gypsum wallboards or plaster walls are not used as shear walls.
☒ 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:** Narrow wall panels that exceed the 2V:1H ratio are not used to resist seismic forces.

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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:** Per Detail 2/S2, four ¾" diameter bolts are provided to connect the bottom plate of the main story wall panel to the double top plate of the lower story wall panel. Double top plate is continuous between glulam beams and butt tight to glulam at ends. Simpson L50s are provided at each side of the glulam to double top plates. Additionally, a Simpson ST2115 strap is provided at 4'-0" on center and bent over the double top plates to connect the floor diaphragm to the exterior wall diaphragm.
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:** Site slopes down to the north and east. Shear wall panels used to resist shear forces satisfy the intent of the 1-to-1 ratio limit.
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**: Plywood wall panels are continuous below the floor level to the concrete foundation.
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) **Comments:** No openings observed in wood shear walls are larger than 80%.
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:** Simpson CB-66s bolted to the column are embedded into concrete foundation per Detail 7 on Sheet S-3.
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:** Wood sills are bolted with 5/8" dia. anchor bolts on varies spacing ref 'Plywood Vert. & Horiz. Diaphragm Schedule' on Sheet S-2.
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:** Simpson CC51/4-6 Column Cap is used to connect the glulam beam to the 6x6 post below.

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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

C NC N/A U	Description
C (selected)	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:** Per 'Plywood Vert. & Horiz. Diaphragm Schedule' on Sheet S-2, maximum spacing between the 5/8" diameter anchor bolts is 4'-0".

DIAPHRAGMS

C NC N/A U	Description
C (selected)	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:** First floor is level, no expansion in the floor and roof diaphragm.
NC (selected)	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:** Chord discontinuity occurs at roof valley.
N/A (selected)	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:** No large opening observed in the roof diaphragm.
C (selected)	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:** Roof is plywood sheathed.
C (selected)	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:** Plywood sheathing diaphragm is used.

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C NC N/A U	
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 (12.2 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) **Comments:** Plywood sheathing at the roof is blocked. Plywood sheathing at the main level floor is unblocked, but spans are less than 40 feet and the aspect ratios are less than 4:1
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) **Comments:** Plywood sheathing is used.

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ASCE 41-17
Collapse Prevention Structural Checklist For Building Type S2-S2A

LOW SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

C NC N/A U	Description
☒ C ☐ NC ☐ N/A ☐ U	REDUNDANCY: The number of lines of braced frames in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.3.1.1. Tier 2: Sec. 5.5.1.1) **Comments:** **In the E-W direction, two lines of steel truss braced frames and a line of wood shear wall are provided.**
☒ C ☐ NC ☐ N/A ☐ U	COLUMN AXIAL STRESS CHECK: The axial stress caused by gravity loads in columns subjected to overturning forces is less than $0.10F_y$. Alternatively, the axial stress caused by overturning forces alone, calculated using the Quick Check procedure of Section 4.4.3.6, is less than $0.30F_y$. (Commentary: Sec. A.3.1.3.2. Tier 2: Sec. 5.5.2.1.3) **Comments:** **Axial stress in the truss posts due to gravity force is 0.6 ksi per Tier 1 quick check and is less than the 5 ksi limitation. Axial stress due to overturning is 1.1 ksi and is also less than the 0.3 x 46 ksi =13.8 ksi limitation.**
☒ C ☐ NC ☐ N/A ☐ U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$. (Commentary: Sec. A.3.3.1.2. Tier 2: Sec. 5.5.4.1) **Comments**: **Maximum axial stress in the diagonals of the steel trusses are estimated to be 3.1 ksi which is less than the 0.5 x 46 = 23 ksi limitation.**

CONNECTIONS

C NC N/A U	Description
☒ C ☐ NC ☐ N/A ☐ U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel frames. (Commentary: Sec. A.5.2.2. Tier 2: Sec. 5.7.2) **Comments:** **Shear stresses in the diaphragms are transferred to the truss chords by continuous wood blocking bolted to steel welded studs that connect to the truss elements.**
☐ C ☒ NC ☐ N/A ☐ U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation. (Commentary: Sec. A.5.3.1. Tier 2: Sec. 5.7.3.1) **Comments:** **Steel post on the northeast corner is bolted to the double top plates of the wood cripple wall below, and there is no substantial out-of-plane connection between the post and the foundation to prevent the column from sliding off.**

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

SEISMIC-FORCE-RESISTING SYSTEM

C NC N/A U	Description
◉ C ○ NC ○ N/A ○ U	REDUNDANCY: The number of braced bays in each line is greater than 2. (Commentary: Sec. A.3.3.1.1. Tier 2: Sec. 5.5.1.1) **Comments:** In the E-W direction, two lines of steel truss frames and a line of wood shear wall are provided.
◉ C ○ NC ○ N/A ○ U	CONNECTION STRENGTH: All the brace connections develop the buckling capacity of the diagonals. (Commentary: Sec. A.3.3.1.5. Tier 2: Sec. 5.5.4.4) **Comments:** The maximum welded size required at the connection between the post and the lower horizontal chord is less than the ¼” weld provided.
◉ C ○ NC ○ N/A ○ U	COMPACT MEMBERS: All brace elements meet compact section requirements in accordance with AISC 360, Table B4.1. (Commentary: Sec. A.3.3.1.7. Tier 2: Sec. 5.5.4) **Comments:** Maximum b/t ratio is 14 which is less than 33 limitation per Table B4.1a in the AISC steel construction manual.
◉ C ○ NC ○ N/A ○ U	K-BRACING: The bracing system does not include K-braced bays. (Commentary: Sec. A.3.3.2.1. Tier 2: Sec. 5.5.4.6) **Comments:** No K-bracing is used.

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

SEISMIC-FORCE-RESISTING SYSTEM

C NC N/A U	Description
○ C ○ NC ○ N/A ◉ U	COLUMN SPLICES: All column splice details located in braced frames develop 50% of the tensile strength of the column. (Commentary: Sec. A.3.3.1.3. Tier 2: Sec. 5.5.4.2) **Comments:** No column splices are shown in the drawings,

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C NC N/A U	
C (●) NC ( ) N/A ( ) U ( )	SLENDERNESS OF DIAGONALS: All diagonal elements required to carry compression have *Kl/r* ratios less than 200. (Commentary: Sec. A.3.3.1.4. Tier 2: Sec. 5.5.4.3) **Comments:** **All truss diagonal members satisfy this limit because they are relatively short elements.**
C (●) NC ( ) N/A ( ) U ( )	CONNECTION STRENGTH: All the brace connections develop the yield capacity of the diagonals. (Commentary: Sec. A.3.3.1.5. Tier 2: Sec. 5.5.4.4) **Comments:** **Complete penetration welds at the tube-to-tube connections are shown in Detail 3/S1.**
C ( ) NC (●) N/A ( ) U ( )	COMPACT MEMBERS: All brace elements meet section requirements in accordance with AISC 341, Table D1.1, for moderately ductile members. (Commentary: Sec. A.3.3.1.7. Tier 2: Sec.5.5.4) **Comments:** **The *b/t* ratio for moderately ductile HSS sections in AISC 341-16, Table D1.1 is 0.76$(E/R_yF_y)^{1/2}$ = 0.76 (29000/1.4x46)$^{1/2}$ = 16.1. The truss columns are TS7x5x1/4 (*b/t* =18.5), TS5x5x1/2 (*b/t* =7.75), and TS5x5x3/8 (*b/t* =11.3). The truss verticals are TS5x5x3/16 (*b/t* =25.7). The truss diagonals and verticals are TS5x5x3/16 (*b/t* =25.7). The truss top and bottom chords are TS5x5x1/4 (*b/t* =18.5). Thus, several members do not meet the moderately ductile requirement.**
C ( ) NC ( ) N/A (●) U ( )	CHEVRON BRACING: Beams in chevron, or V-braced, bays are capable of resisting the vertical load resulting from the simultaneous yielding and buckling of the brace pairs. (Commentary: Sec. A.3.3.2.3. Tier 2: Sec. 5.5.4.6) **Comments:** **No traditional chevron braces or "V"-braces are used.**
C ( ) NC ( ) N/A (●) U ( )	CONCENTRICALLY BRACED FRAME JOINTS: All the diagonal braces frame into the beam–column joints concentrically. (Commentary: Sec. A.3.3.2.4. Tier 2: Sec. 5.5.4.8) **Comments:** **No traditional concentric braced frames are used, but the truss members connections are concentric.**

DIAPHRAGMS (STIFF OR FLEXIBLE)

	Description
C (●) NC ( ) N/A ( ) U ( )	OPENINGS AT FRAMES: Diaphragm openings immediately adjacent to the braced frames extend less than 25% of the frame length. (Commentary: Sec. A.4.1.5. Tier 2: Sec. 5.6.1.3) **Comments:** **There are no openings in the floor adjacent to the frames.**

FLEXIBLE DIAPHRAGMS

	Description

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C NC N/A U	
○ ◉ ○ ○	CROSS TIES: There are continuous cross ties between diaphragm chords. (Commentary: Sec. A.4.1.2. Tier 2: Sec. 5.6.1.2) **Comments:** For the N-S direction at the roof, the joists run N-S and each serves as a cross tie for each sawtooth roof panel. For the N-S direction at the main level, the top plates of the interior walls can help serve as cross ties. For the E-W direction at the roof, there are no defined cross ties within each sawtooth roof panel. There is metal "X" bridging at third points. For the E-W direction at the mail level, glulam beams help serve as crossties.
○ ○ ◉ ○	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:** Plywood sheathing is used.
◉ ○ ○ ○	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:** Plywood sheathing is used.
◉ ○ ○ ○	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 aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2) **Comments:** Plywood sheathing is used, and it is blocked.
◉ ○ ○ ○	OTHER DIAPHRAGMS: 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:** Plywood sheathing is used.

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APPENDIX C

UCOP Seismic Safety Policy Falling Hazards Assessment Summary

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Falling Hazard Assessment Summary

	Description
P ☐ N/A ☒	**Heavy ceilings, features or ornamentation above large lecture halls, auditoriums, lobbies, or other areas where large numbers of people congregate (50 ppl or more)** **Comments:** There are no heavy ceilings, features or ornamentation above the studios.
P ☐ N/A ☒	**Heavy masonry or stone veneer above exit ways or public access areas** **Comments:** There is no heavy masonry or stone veneer at Building H.
P ☐ N/A ☒	**Unbraced masonry parapets, cornices, or other ornamentation above exit ways or public access areas** **Comments:** There are no unreinforced masonry parapets, cornices or ornamentation at Building H.
P ☐ N/A ☒	**Unrestrained hazardous material storage** **Comments:** No hazardous material storage was observed.
P ☐ N/A ☒	**Masonry chimneys** **Comments:** There are no masonry chimneys.
P ☐ N/A ☒	**Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.** **Comments:** Unknown.

Falling Hazards Risk: Low

Note: P= Present, N/A = Not Applicable

APPENDIX D

Quick Check Calculations

Unit Weights:

Floor Level	Seismic Weight Weight [psf]	Dead Load	Observations
Cementitous Topping	1.0	1.0	
Plywood Floor Sheathing	2.4	2.4	3/4" plywood
Floor Framing	7.0	7.0	2x12 @ 16" o.c.
Gulam Beam	1.1	1.1	5 1/8 x 10 1/2 x143.5' long tota
MEP	3.0	3.0	Assumed (the lower level not entered)
ceiling	2.0	2.0	typ. gypboard ceiling panels
misc+lighting	3.0	3.0	Assumption (the lower level not entered)
posts+partition+shear walls	18.4	37	wood&steel posts, int. partition, ext.wall
Total	37.8	56.2	

Roof Level	Seismic Weight Weight [psf]	Dead Load	Observations
roofing	5	5	Metal roof with insulation and 5/8" gyp
Plywood Roof Sheathing	2.1	2.1	5/8" plywood
Roof Framing	7.0	7.0	2x12 @ 16" o.c.
MEP	3.0	3.0	
ceiling	2.0	2.0	typ. gypboard ceiling panels
misc+lighting	3.0	3.0	
posts+partition+shear walls	21.5	0.0	wood&steel posts, truss chords, int. partition, ext.wall
Total	44	22	

Story	W (psf)
Roof	38
1st floor	44
TOTAL	81

Floor Trib						
wood posts in Basement	6x6 (plf)	triba(ft)	per post (#)	# of post	total weight	weight/floor (psf)
	7.35	5	36.76	12	441.15	0.25
exterior wall	2x6 @16" o.c. w/gyp. (psf)	trib area (ft^2)	plf	length	total weight	weight/floor (psf)
	12	1186			14232	8.00
interior partition walls	2x6 @16" o.c. w/ 3.5" fiberglass insulation (psf)	trib (ft)	plf	length	total weight	weight/floor (psf)
	8.85	9.5	84.075	209.5	17614	9.90
steel post of truss	6x4x1/2+5x5x1/2 (plf)	trib length (ft)	5x5s(plf)	trib length (ft)	total weight	weight/floor (psf)
	56.8	9	21	18	889.2	0.50
					total weight	weight/floor (psf)
					32734.9	18.4

Roof Trib						
exterior wall	2x6 @16" o.c. w/gyp. (psf)	trib area (ft^2)	glazing (psf)	trib area (ft^2)	total weight	weight/roof (psf)
	12	1773	10	550	26776	15.04
steel post of truss	6x4x1/2+5x5x1/2 (plf)	trib length (ft)	5x5s(plf)	trib length (ft)	total weight	weight/floor (psf)
	56.8	34	21	68	3359.2	1.89
steel chords & diagonals of	5x5 (plf)	trib length (ft)			total weight	weight/floor (psf)
	20	406			8120	4.56
					total weight	weight/floor (psf)
					38255.2	21.5

Story Weights

Level	Area (ft^2)	Unit Weight (psf)	Seismic Weight (kips)
2nd floor	1780	38	67
1st floor	1780	44	78
TOTAL			145

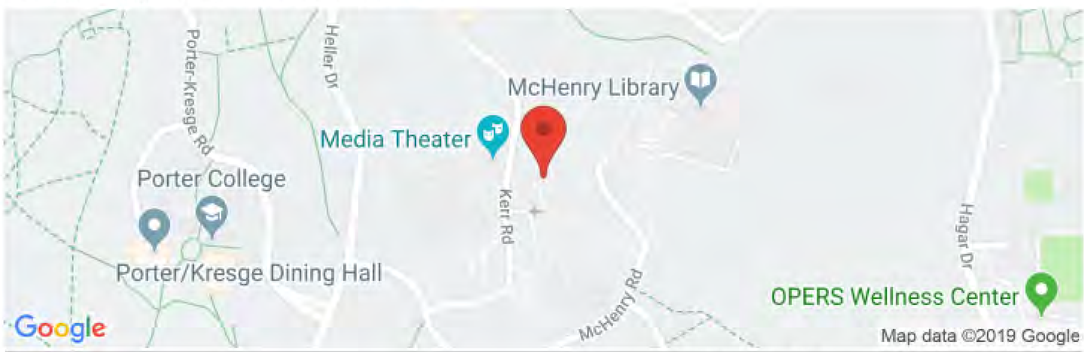
Period

C_t	0.02
h_n (ft)	25.25
β	0.75

T (sec)	0.23

BSE-2E Response Spectrum

Latitude, Longitude: 36.995080, -122.061000



Date	6/17/2019, 5:46:32 PM
Design Code Reference Document	ASCE41-17
Custom Probability	
Site Class	D - Stiff Soil

Type	Description	Value
Hazard Level		BSE-2E
S_S	spectral response (0.2 s)	1.281
S_1	spectral response (1.0 s)	0.485
S_{XS}	site-modified spectral response (0.2 s)	1.281
S_{X1}	site-modified spectral response (1.0 s)	0.881
f_a	site amplification factor (0.2 s)	1
f_v	site amplification factor (1.0 s)	1.815

Story Shears

Sa [g]	1.28	
W [kips]	145	
C [1]	1.2	1.1 for wood shear wall; 1.2 steel frame. Use 1.2 to be conservative.

V [kips]	223

k= 1.00

Floor Levels	h_i [ft]	h_x [ft]	W_i [kips]	$w_i*h_x^k$	coeff	F_x [kips]	V_j [kips]
2nd floor (roof)	15.25	25.25	67	1701	0.69	153	153
1st floor	10.00	10.00	78	776	0.31	70	223
Σ			145	2477		223	

Notes:
[1] Modification Factor, C, per ASCE 41-17, Table 4-7.

Average Stress:

E-W direction (Longitudinal)	Steel truss frame @ Grid B	
$M_{S,Frame}$	3.5	b/t=25.7 (TS5x5x3/16) > 90*(Fye)^1/2 = 11.9 per 4.4.3.4 and Table 4-9 (which has Ms =7)
N_{br}	4	b/t=25.7 (TS5x5x3/16) > 190*(Fye)^1/2 = 25.1 per 4.4.3.4 and Table 4-9 (which has Ms =3.5)
s	8.0	
L_{br}	14.8	
A_{br}	3.28	

E-W direction (Longitudinal)	Steel truss column @ Grid B	Steel truss column @ Grid A
$M_{S,Frame}$	2.5	2.5
L	40.5	16.0
n_c	1.0	2.0
h_n	17.5	17.5
A_{col}	15.76	5.24

E-W direction (Longitudinal)	Wood shear wall	
$M_{S,Shear\ walls}$	4.5	CP of wood shear wall

Level	Force (kips)	f_j^{avg}	Tier 1 Shear Stress Limit[2]	Units	Result
Main (steel truss col OT@truss B)[1]	77	0.6	13.8	ksi	OK!
Main (steel truss col OT@truss A)[1]	38	1.1	13.8	ksi	OK!

Level	Force (kips)	f_j^{avg}	Tier 1 Shear Stress Limit[4]	Units	Result
Main (steel truss braces@truss B)[3]	77	3.1	23	ksi	OK!
Main (steel truss braces@truss A)[3]	38	1.5	23	ksi	OK!

Level	Force (kips)	length of wall (ft)	Avg. Shear stress (plf)	Tier 1 Shear Stress Limit	Result
Main (Wood SW@Grid C)	38	40.5	210.4	1000	OK!
Basement (Wood SW)	223	81	613	1000	OK!

N-S direction (Transverse)	Shear Walls	
M_s	4.5	CP of wood shear wall

Level	Force (kips)	length of wall (ft)	Avg. Shear stress (plf)	Tier 1 Shear Stress Limit	Result
Main (Wood SW)	153	80.0	426.1	1000	OK!
Basement (Wood SW)	223	88	564.0	1000	OK!

Notes:
1. Check of steel truss columns at ends in overturning, using Equation 4-11 from Section 4.4.3.6
2. Tier 1 stress limits for axial overturning on columns is 0.3 x Fy per the S2 checklist.
3. Check of steel truss diagonals, using Equation 4-9 from Section 4.4.3.4
4. Tier 1 stress limits for diagonal bracing is 0.5 x Fy per the S2 checklist.