ASCE 41-17 Tier 1 Seismic Evaluation

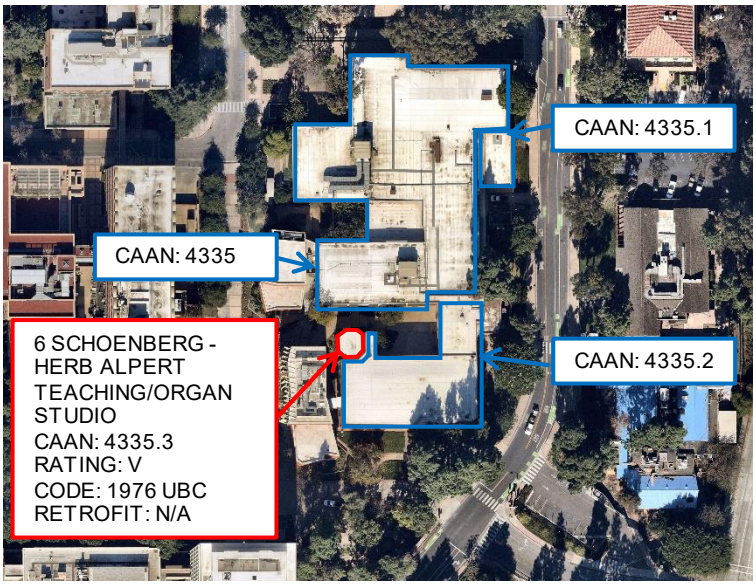
DATE: 5/18/2021
UC Campus: UCLA
Building Name: 6 Schoenberg – Herb Alpert Teaching/Organ Studio Building
CAAN ID: 4335.3
Auxiliary Building ID: 4335, 4335.1, 4335.2

SUMMARY OF INFORMATION PROVIDED BY EVALUATOR: THORNTON TOMASETTI

FURTHER EVALUATION RECOMMENDED: YES

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING") BASED ON TIER 1 EVALUATION FINDINGS: V

Plan Image or Aerial Photo



Exterior Elevation Photos
Left: West Elevation, Right: Seismic Joint

The seismic evaluation of this building is being undertaken at the request of UCLA. The ASCE 41-17 evaluation methodology and criteria, as well as the UC's evaluation criteria, are the procedures used to evaluate the seismic performance of the Teaching/Organ Building. This report represents the findings of the Tier 1 evaluation, which identifies potential deficiencies in the building based on the performance of similar buildings in past earthquakes. Any deficiencies found in the Tier 1 evaluation should be further investigated.

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1. BUILDING INFORMATION:

Site location coordinates:

-Latitude: 34.07038
-Longitude: -118.44034

ASCE 41-17 Model Building Type:

Above Grade:
-Longitudinal Direction: RM2, Reinforced Masonry Bearing Walls with Stiff Diaphragm at 1st floor and flexible diaphragm at roof
-Transverse Direction: RM2, Reinforced Masonry Bearing Walls with Stiff Diaphragm at 1st floor and flexible diaphragm at roof

Below Grade (Note lateral system checked above grade only in Tier 1):
-Longitudinal Direction: C2, Concrete Shear Walls with Stiff Diaphragms
-Transverse Direction: C2, Concrete Shear Walls with Stiff Diaphragms

Notes:
1. Only two sides of the building are below grade level.
2. The thickness of 12" concrete walls is reduced to approximately 8" where brick veneers occur. Brick veneers secured to concrete wall with masonry ties per architectural drawings.
3. Original building Architectural and Structural drawings were provided to us but not the "Project Detail Book". According to the drawings we have, "Project Detail Book" is a separate set of drawings which contains building sections and details. It appears that "Project Detail Book" was not available in current UCLA archives. Also provided was the 1999 Seismic Correction set of Architectural and Structural drawings, but it appears no strengthening work was done to the Teaching/Organ Studio Building.

Total Floor Area (sq. ft.): 1,640
Number of Stories:
-Above grade: 1 (2 story tall volume space)
-Below grade: 1
Year Original Building was Constructed: 1981 (Therefore not an ASCE 41-17 Benchmark Building)
Original Building Design Code and Year: 1976 UBC
Retrofit Building Design Code and Year: N/A

COST RANGE TO RETROFIT (if applicable): **Low (<$50/sf)**

2. GEOTECHNICAL INFORMATION:

Site Information:

Site Class (A-F): D (Basis: Inferred from Geotechnologies, Inc. (2011))
Geologic Hazards:
- Fault Rupture: No (Basis: Inferred from Geotechnologies, Inc. (2011) and CGS Maps)
- Liquefaction: No (Basis: Inferred from Geotechnologies, Inc. (2011) and CGS Maps)
- Landslide: No (Basis: Inferred from Geotechnologies, Inc. (2011) and CGS Maps)

CGS = California Geological Survey
Geotechnologies, Inc. = Los Angeles based soils engineering firm who prepared soils report for an adjacent building in 2011

Site-specific Ground Motion Study: No

ASCE 41 Evaluation Criteria (Using ATC Hazard by Location Maps):

Hazard Level BSE-2E, Collapse Prevention
Site-modified Spectral Response (0.2 s): Sds, BSE-2E = 1.554
Site-modified Spectral Response (1.0 s): Sd1, BSE-2E = 0.949
Estimated Fundamental Period (seconds):
- Longitudinal Direction: 0.282 (per ASCE 41-17, Eqn. 4-4, assume h = 40 ft)
- Transverse Direction: 0.282 (per ASCE 41-17, Eqn. 4-4, assume h = 40 ft)

(h = building height above first floor)

3. FALLING HAZARDS ASSESSMENT SUMMARY (applicable when box is checked):

☐ Heavy ceilings, features or ornamentation above large lecture halls, auditoriums, lobbies or other areas where large numbers of people congregate
☐ Heavy masonry or stone veneer above exit ways
☐ Unbraced masonry parapets, cornices or other ornamentation above exit ways
☐ Masonry chimneys
☐ Heavy Partitions Braced by Ceilings
☐ Appendages
☒ Anchorage of organ and its components needs to be assessed for potential falling hazard

UCLA staff to verify the following potential falling hazards due to limited interior access:
- Unrestrained hazardous materials storage.
- Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.

4. TIER 1 SEISMIC EVALUATION SUMMARY OF STRUCTURAL NON-STRUCTURAL/FINDINGS SIGNIFICANTLY AFFECTING RATING DETERMINATION (applicable when box is checked):

Non-Compliance items indicate potential significant structural deficiencies potentially affecting the seismic performance level designation (CP) of the building:

Building Basic Configuration Checklist – Collapse Prevention (CP)

Low Seismicity:

☒ Load Path *(Unknown – more information required)*
☒ Adjacent Buildings
☐ Mezzanines
☐ Weak Story
☐ Soft Story
☐ Vertical Irregularities (all elements continuous to foundation check)
☐ Geometry
☐ Mass – Vertical Irregularity
☐ Torsion

Moderate Seismicity:

☐ Liquefaction

☐ Slope Failure

☐ Surface Fault Rupture

High Seismicity:

☒ Overturning

☐ Ties between Foundation Elements

Structural Checklist for Building Type RM1-RM2

Low and Moderate Seismicity:

☐ Redundancy

☐ Shear Stress Check

☐ Reinforcing Steel

Stiff Diaphragms:

☐ Topping Slab – Precast

Connections:

☒ Wall Anchorage *(Unknown – more information required)*

☐ Wood Ledgers

☒ Transfer to Shear Walls *(Unknown – more information required)*

☐ Topping Slab to Walls or Frames

☒ Foundation Dowels *(Unknown – more information required)*

☐ Girder-Column Connection

High Seismicity:

Stiff Diaphragms:

☐ Openings at Shear Walls (concrete or masonry)

☐ Openings at Exterior Masonry Shear Walls

Flexible Diaphragms:

☒ Cross Ties

☐ Openings at Shear Walls (concrete or masonry)

☐ Openings at Exterior Masonry Shear Walls

☐ Straight Sheathing

☐ Spans

☐ Diagonally Sheathed and Unblocked Diaphragms

☐ Other Diaphragms

☐ Stiffness of Wall Anchors

NON-STRUCTURAL FALLING HAZARD NOTES: The organ studio houses a large organ with many component parts. The attachment of these organ components to their respective parts and to the building structure is unknown and could pose a falling hazard risk to room occupants, but the occupant load is low. The large organ bracing to the wall and floor needs to be reviewed to determine its adequacy to keep the organ secured in position during the earthquake. The masonry wall design should be reviewed for the imposed out-of-plane load of the organ's weight during an earthquake on the two story tall wall.

DEFECTS AND DETERIORATION: No structural defects or deterioration was noted while performing visual observations except at the roof where some roofing was falling away from the parapet walls.

5. BRIEF DESCRIPTION OF ANTICIPATED FAILURE MECHANISM:

Built in 1981, the Schoenberg Teaching and Organ Studio space is a reinforced brick masonry and cast-in-place reinforced concrete building under the provisions of the 1976 UBC. The building is separated from the Herb Alpert building by 3 inch seismic joints. The ground floor is partially below grade and the plan is generally an octagon shape. The ground floor has a floor-to-floor height of 12.5 feet while the organ studio has a tall space and floor-to-roof height of 27.5 feet.

At the ground level, the building has reinforced concrete and reinforced masonry walls, concrete slab and concrete beams. At the first floor, the building has reinforced masonry bearing walls, concrete acoustic floating slab over reinforced structural concrete slab and concrete beams. The roof structure is comprised of 4" insulation concrete over 1-5/16" metal deck supported by steel roof joists.

Connection and reinforcement details for bearing walls were not provided for review. In addition, the connection of the roof diaphragm to the bearing walls is unclear and needs further investigation and analysis to determine adequacy and diaphragm continuity.

6. COMMENTS AND ADDITIONAL DEFICIENCIES:

6.1. Seismic Separation between Buildings: During intense ground shaking by a seismic event the adjacent structures could collide causing localized damage. The damage would likely be limited to the cracking of mortar joints and joint separations, as well as tearing of the seismic joint cover over the top of the parapet walls. The vertical seismic joint cover on the west side of the building is starting to deteriorate and likely needs to be replaced to help prevent future rain water intrusion.

Seismic joint cover / flashing at roof south edge

Seismic joint cover and top of wall flashing

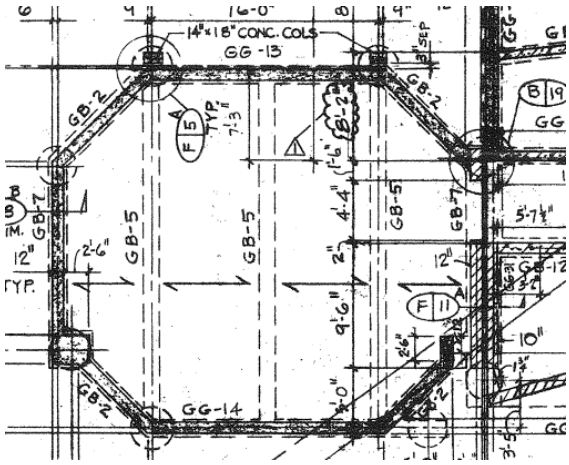
Seismic joint in wall at ground floor level (West side of building) in need of review and/or replacement cover.

Exposed west wall (ground floor to first floor) showing brick veneer over concrete wall.

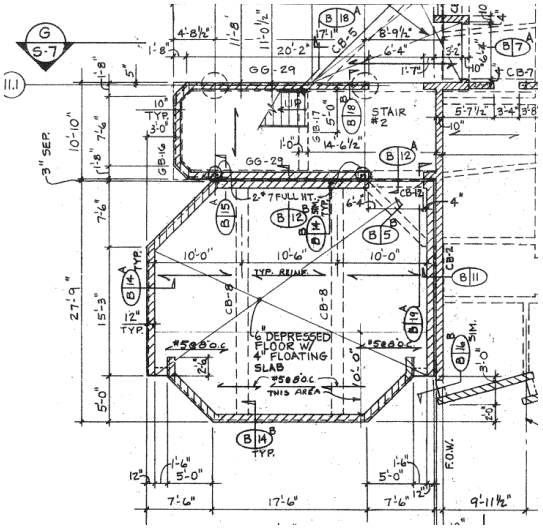
6.2. Roof Flexible Diaphragm: The roof 1 5/16 inch, 22 gauge, metal deck diaphragm is considered flexible as it has an insulating concrete topping and not a lightweight or normal weight concrete topping. The "Project Detail Book" is not available to review how the roof metal deck is anchored to the brick wall. The attachment is assumed a steel ledger angle and the anchor bolts spaced uniformly along the length of the masonry lintel.

Seismic Concern: During an earthquake, there is a concern that the roof diaphragm can detach from the wall and lead to damage of the roof structure.

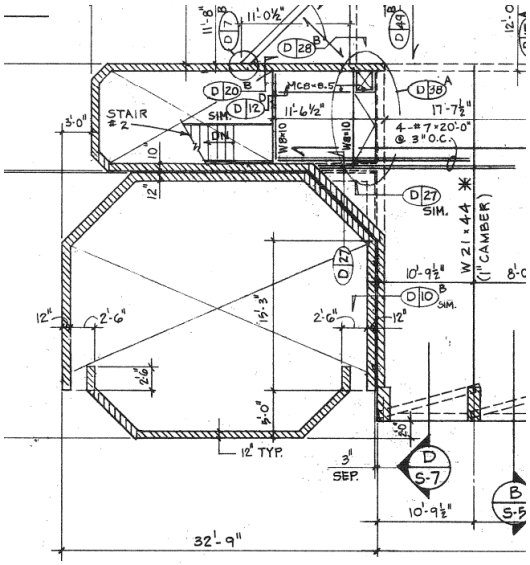
6.3. Silo Wall Structure: The organ chamber resembles a silo with some tall vertical slots in it for windows. The first floor-to-roof is a two-story tall high volume space.



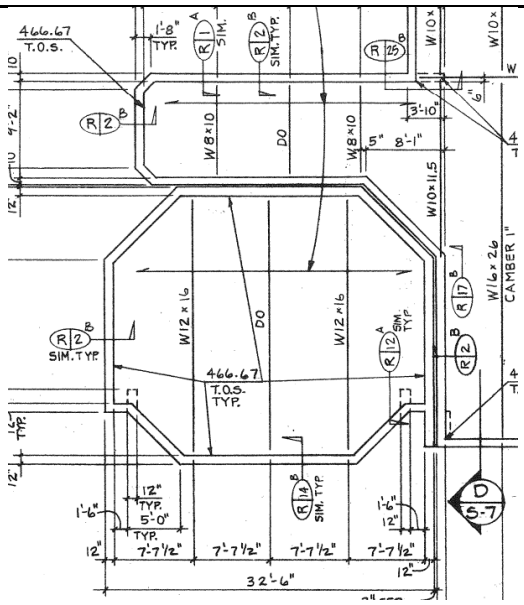
Ground floor framing plan



First floor framing plan



Second floor framing plan

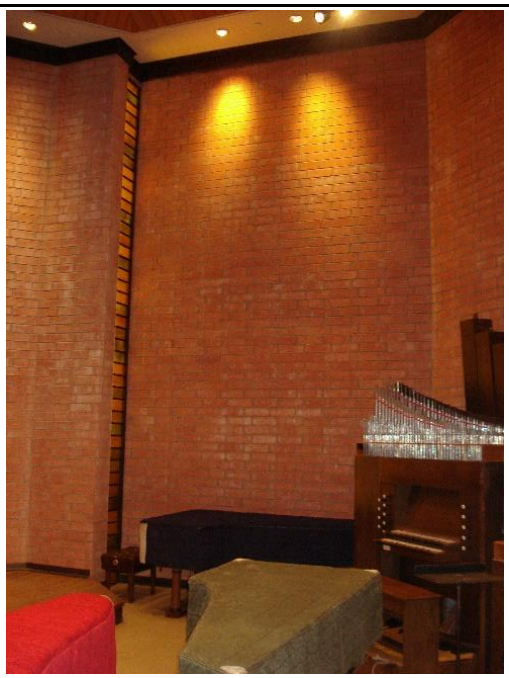


Roof Framing Plan

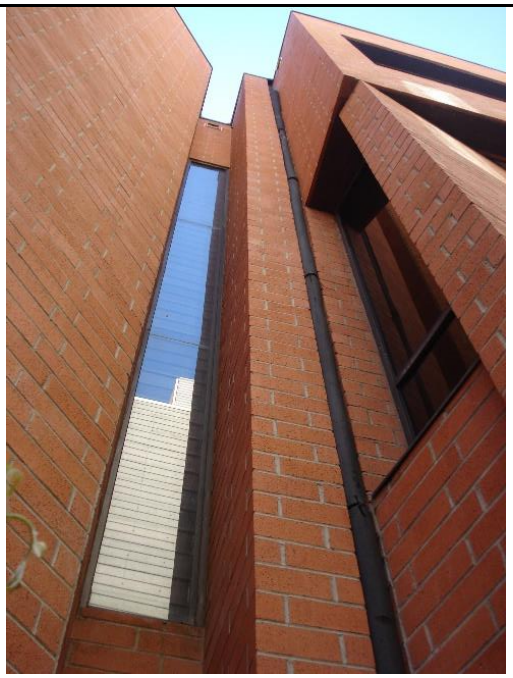
Seismic Concern: The brick wall reinforcing is #4 at 20" O.C. in each direction and the sum of the ratio of rebar in the vertical and horizontal planes is at least 0.002. The concern is the long vertical length of the windows in the organ room and possible breakage of the glass due to wall movement during an earthquake.

Organ Chamber & Stairwell – looking west

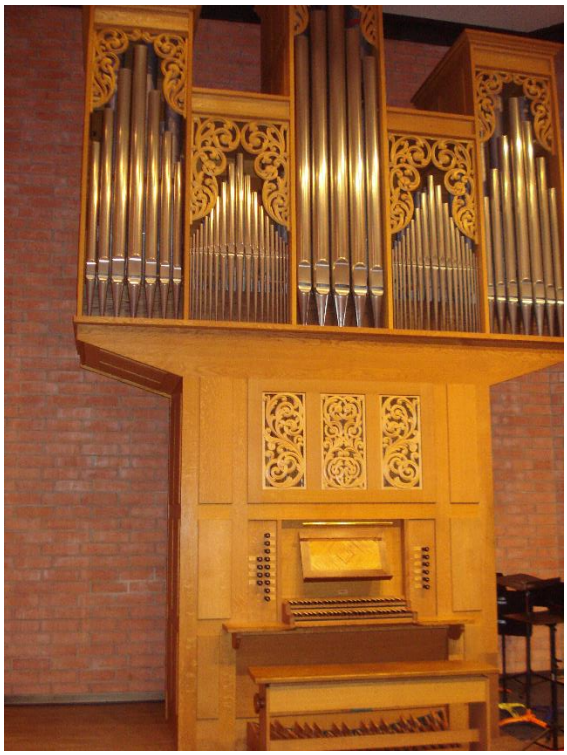
Organ Chamber Roof - some loose roofing at parapet



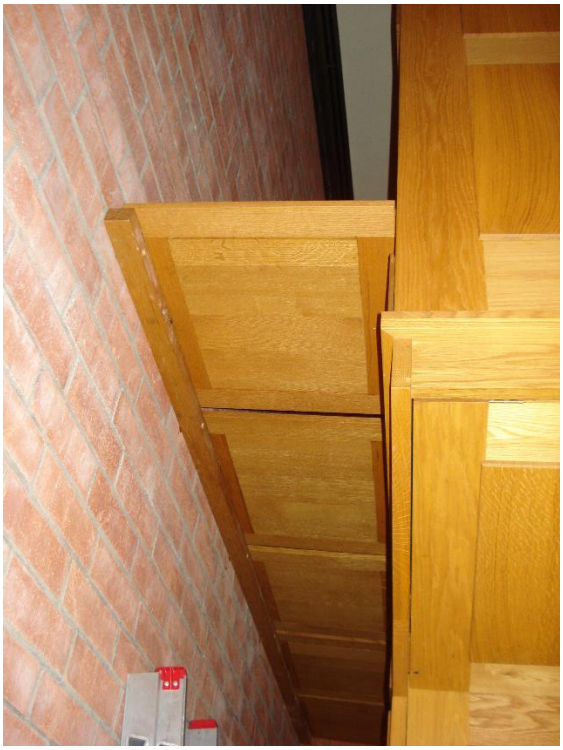
Organ Chamber – 2-story wall



Seismic Joint – West Side of Building with Window Slot



Picture of organ



Existing organ wall bracing

7. SEISMIC RETROFIT CONCEPT SKETCHES/DESCRIPTIONS (only required for buildings rated SPL V or worse):

Description:

Tier 1 Quick Checks show that the two existing 3 inch seismic separations between the Teaching/Organ Studio and Herb Alpert buildings is not adequate, but a more detailed analysis could rule out this potential deficiency.

Utilization of the existing lateral system is not a concern, however, a lack of information for the connections of the roof diaphragm to the masonry walls and the connection of the masonry walls to their foundations supports a SPL V rating. A more detailed analysis of the wall connections at the roof diaphragm and foundation could make this building a good candidate to have a SPL IV or better. However, if a more detailed analysis shows the roof connections to be inadequate a retrofit may require adding steel, welding and post-installed anchorage to provide more positive connections between elements.

8. LIMITATIONS

Thornton Tomasetti's professional services have been performed in accordance with the standards of skill and care generally exercised by other professional consultants acting under similar circumstances and conditions at the time the services were performed. Thornton Tomasetti's findings, conclusions and opinions are based on Thornton Tomasetti's visual observations, professional experience and evaluation of documentation provided. This report shall not be construed to warrant or guarantee the building and/or any of its components under any circumstances. No other warranty, expressed or implied, is made as to the professional advice presented in this report.

9. APPENDICES

A. ATC Hazards by Location Data
    a. Geotechnical Information
    b. CGS map
B. ASCE 41-17 Tier 1 Checklists (Structural Only)
    a. Building Basic Configuration
    b. Structural Checklist for Building Type RM1-RM2
C. Quick Check Calculations