UCLA University of California Los Angeles

Thornton Tomasetti

ASCE 41-17 Tier 1 Seismic Evaluation

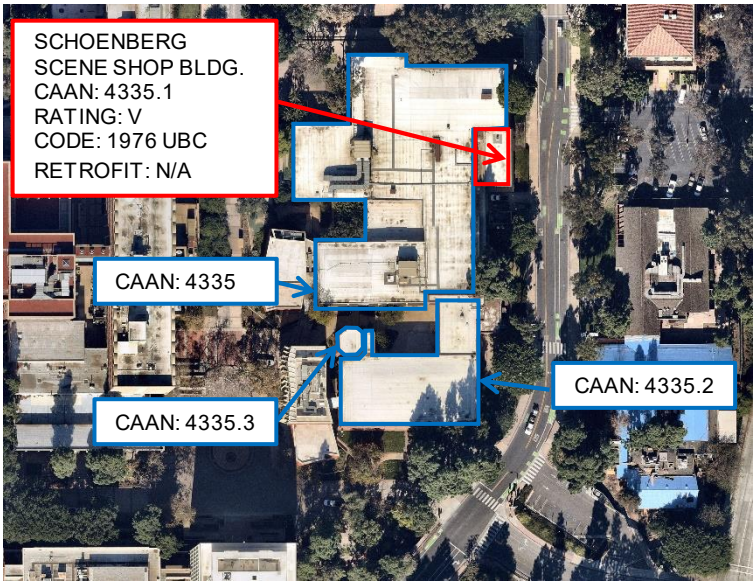
DATE: 5/18/2021
UC Campus: UCLA
Building Name: Schoenberg – Scene Shop Building
CAAN ID: 4335.1
Auxiliary Building ID: 4335, 4335.2, 4335.3

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 Photo – South and East sides

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 Scene Shop 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: 34.07094
-Longitude: -118.43983

ASCE 41-17 Model Building Type:

-Longitudinal Direction: RM1, Reinforced Masonry Bearing Walls with Flexible Diaphragms
-Transverse Direction: RM1, Reinforced Masonry Bearing Walls with Flexible Diaphragms

Note: 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 Scene Shop Building.

Total Floor Area (sq. ft.): 1,774
Number of Stories:
-Above grade: 1
-Below grade: 0
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: 0.182 (Per ASCE 41-17, Eqn. 4-4, assume h = 19 ft)
- Transverse Direction: 0.182 (Per ASCE 41-17, Eqn. 4-4, assume h = 19 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

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.
- Unrestrained tall stage props from falling over

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

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

<u>Building Basic Configuration Checklist – Collapse Prevention (CP)</u>

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
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 nature of this building is to store materials used in performance arts productions. These materials could vary in size and mass and will not be positively connected to the building creating a potential for falling hazards.

DEFECTS AND DETERIORATION: There were no signs of defects or deterioration noted during the visual observation. In general, the building appeared to be in good condition.

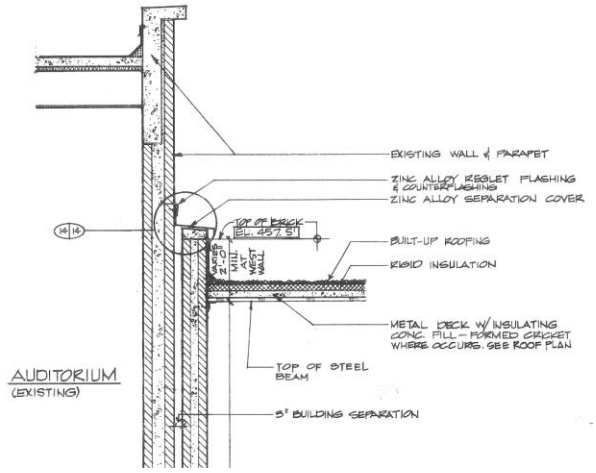
5. BRIEF DESCRIPTION OF ANTICIPATED FAILURE MECHANISM:

The Schoenberg Scene Shop building is a reinforced concrete masonry block building that was built in 1981 under the provisions of the 1976 UBC. A 3" seismic joint provided on the north side and a 2" seismic joint provided at the walkway canopy on the west side separate the Scene Shop building from the Schoenberg Building. The Scene Shop building houses storage space and is rectangular with the long side oriented in the north-south direction.

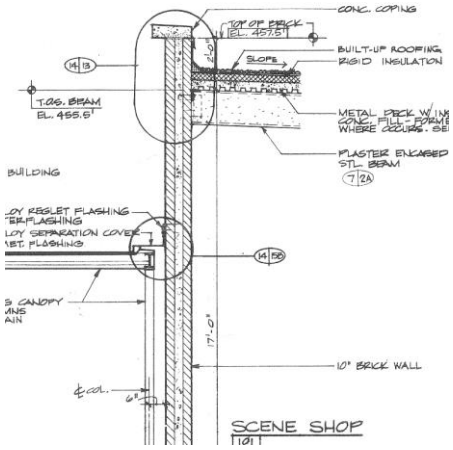
The building reinforced masonry bearing walls are supported at the top by a 4" minimum depth insulating concrete topping over a 1-5/16" non-composite 22 gauge metal deck roof diaphragm that is considered flexible. Roof beams typically occur every 7'-5" on center. Connection details of bearing walls lack information for transferring forces at the roof diaphragm and foundation. A more detailed analysis will be needed to determine if connection details are a local or global deficiency.

6. COMMENTS AND ADDITIONAL DEFICIENCIES:

6.1. Seismic Separation between Buildings: During intense ground shaking by a seismic event the two structures could collide causing localized damage due to the limited seismic joint widths of 2 and 3 inches. The damage would likely be limited to the cracking of the plaster finish of reinforced masonry walls or possibly damage to the walkway canopy on the west side of the building.



North Wall Separation Joint



West Wall Separation Joint

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. Out-of-Plane Wall Anchors: The anchorage of the north and south walls of the Scene Shop building to the roof metal deck appears to be deficient due to lack of sub-diaphragm struts and possibly insufficient welds of metal deck to ledger angle and insufficient ledger anchorages to the wall. Further analysis beyond Tier 1 is required.

The roof anchorages to the east and west walls of the Scene Shop building should further be investigated as no details were available to indicate type of connection in order to determine the adequacy of the existing beam embed in masonry wall capacity.

North wall opening to Schoenberg Auditorium

South wall opening to exterior

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

Description:

Tier 1 Quick Checks show that the existing 2 and 3 inch seismic separations are not adequate, but a more detailed analysis could rule out this potential deficiency. Additionally, the utilization of the existing lateral system is not a concern but the lack of detail information for connections of the roof diaphragm to masonry walls and connections of masonry walls to the foundation warrant an SPL V rating. A more detailed analysis of these connections could make this building a good candidate to have a SPL IV or better. However, if a more detailed analysis shows the connections to be inadequate a retrofit may require adding post-installed anchorage to provide more positive connections between elements. At the roof diaphragm additional framing members may be required to provide a sub-diaphragm connection between the existing metal deck and masonry walls.

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 maps
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