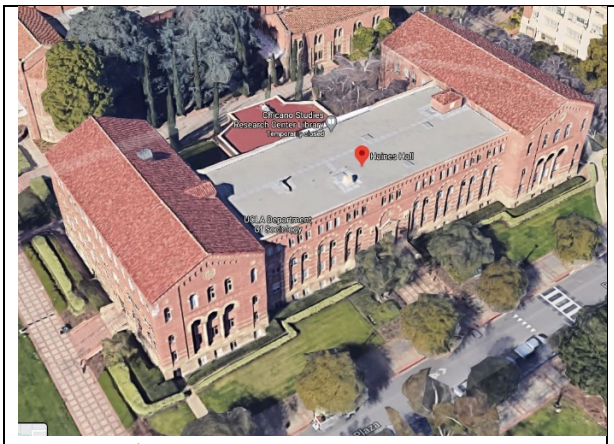
UNIVERSITY OF CALIFORNIA

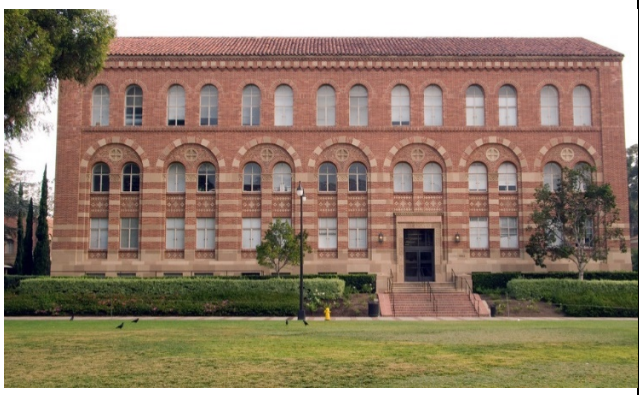
BUILDING REPORT

1) UC Campus: UCLA
2) Building Name: Charles Grove Haines Hall
3) Building CAAN ID: 4225
4) Auxiliary Building ID[1]: N/A
5) Date of Evaluation: April 23, 2021
6) Evaluation by (Firm, Evaluator Name, Signature, Stamp): John A. Martin & Associates, Inc., JJ, JL
7) Seismic Performance Rating[2] and Basis of Rating: V based on the University of California Seismic Safety Policy and ASCE 41-17 Tier 1 evaluation. Some shear wall segments exceeded the stress limits per the Tier 1 requirements for concrete and masonry walls. A limited Tier 3 analysis was performed to evaluate the concrete walls added in the 2001 retrofit and the majority of these walls satisfy the acceptance criteria for a Level V rating. Tier 3 is recommended to evaluate the masonry walls around the Auditorium.

REGISTERED PROFESSIONAL ENGINEER JAMES K. LEE No. S3493 STRUCTURAL STATE OF CALIFORNIA
4/23/2021



8) Plan Image or Aerial Photo



9) Exterior Elevation Photo

10) Site Location
    (a) Latitude Decimal Coordinates: 34.07
    (b) Longitude Decimal Coordinates: -118.44

11) ASCE 41-17 Model Building Type and Description[3]
    (a) Longitudinal Direction: Building Type C2 (Concrete Shear Walls with Stiff Diaphragms) for North and South Wings; Type URMA (Unreinforced Masonry Bearing Walls with Stiff Diaphragms) for Auditorium Wing.
    (b) Transverse Direction: Building Type C2 (Concrete Shear Walls with Stiff Diaphragms) for North and South Wings; Type URMA (Unreinforced Masonry Bearing Walls with Stiff Diaphragms) for Auditorium Wing.

[1] Applicable only for individual buildings that are structurally separate units within a building complex. Each auxiliary building shall be designated with the main building CAAN ID with a decimal number suffix (i.e. main building CAAN ID 5534; auxiliary building CAAN ID 5534.1). Auxiliary building ID is null for a single building or the main building in a building complex.
[2] The designated Seismic Performance Rating shall be a Roman numeral associated with the most applicable performance description from Table 1 of the UC Facilities Manual, UC Seismic Program Guidelines.
[3] If a building has multiple building types in one story, the model building type should be designated based on engineering judgement as the lateral system that would have the most predominantly negative effect on the seismic behavior of the building in that respective direction.

Haines Hall at UCLA is a four-story structure with plan dimensions of approximately 128 ft in the east-west direction and 280 ft in the north-south direction. The original building was built in two phases starting in 1927 with the North Wing and Auditorium, followed by the construction of the South Wing starting in 1934. The Auditorium wing is connected to the North Wing at the first elevated floor level. The South Wing is rigidly attached to the North Wing at all levels. Therefore, we consider Haines Hall to be a single structure since all three wings of the building are connected. The gravity system of the North and South Wings primarily consists of one-way concrete slabs supported over concrete beams and concrete columns. The gravity framing at the south end of the South Wing consists of one-way concrete slabs supported on steel beams. The steel beams are supported on concrete encased steel columns. The gravity framing system of the 1-story Auditorium includes one-way concrete slabs spanning between steel beams, which in turn are supported by steel framed trusses. The trusses are supported on steel columns. Therefore, the masonry walls of the Auditorium are considered non-bearing walls for gravity loading. Haines Hall underwent a seismic retrofit in 2001, adding reinforced concrete shear walls along the longitudinal and transverse directions throughout the North and South Wings of the building. These new walls along with the original reinforced concrete shear walls around stair cores constitute the primary lateral load resisting system of the main building. Unreinforced masonry walls are used as the primary lateral load resisting system of the Auditorium Wing. The unreinforced masonry walls around the perimeter of the North and South Wings are not considered as part of the lateral force resisting system as they contribute significantly less to the building's lateral resistance than the reinforced concrete shear walls. The seismic retrofit in the Auditorium consisted of adding structural steel tube strongbacks to brace the masonry walls for out-of-plane bending. The foundation system of the building consists of spread footing supporting the gravity columns, continuous wall footing supporting the concrete and masonry walls. New grade beams were also added under the new shear walls during the seismic retrofit.

12) Number of Stories
    (a) Above grade: 4
    (b) Below grade: 0

13) Original Building Design Code & Year: Building design preceded an official building code.

14) Retrofit Building Design Code & Year (if applicable): 1995 California Building Code

15) Cost Range to Retrofit (if applicable)[4] (Low, Medium, High, or Very High): Low

Please assume a "Low" cost-range corresponds to a complete retrofit cost less than $50 per square foot (sf), a "Medium" cost-range corresponds to a complete retrofit cost greater than $50 per sf and less than $200 per sf, a "High" cost-range corresponds to a complete retrofit cost greater than $200 per sf and less than $400 per sf, and a "Very High" cost-range corresponds to a complete retrofit cost greater than $400 per sf.

[4] Assume a complete retrofit conforming to the current UC Seismic Safety Policy. Note this range includes all construction costs, including code upgrades (e.g., accessibility, fire and life safety, mechanical, electrical, plumbing) triggered by the seismic retrofit. No specific estimate is required to be supplied at this time (i.e., provide an approximate cost to retrofit using Low, Medium, High or Very High cost-range categories). It is acknowledged that such a cost range is assumed to be based only on the engineer's rough estimate and is not intended to require input from a professional cost estimator. For estimation purposes, CSEs may judgmentally determine an approximate cost range for seismic retrofits based on recent relevant experience, and then apply a multiplier to approximate total construction costs.

BACKGROUND INFORMATION

Site Information

16) Site Class (A – F) and Basis of Assessment: Site Class D (default site class per code; no geotechnical reports available)

17) Geologic Hazards
   (a) Fault Rupture (Yes, No or Unknown) and Basis of Assessment: No, based on "Fault Activity Map of California" from California Geological Survey.
   (b) Liquefaction (Yes, No or Unknown) and Basis of Assessment: No, based on "Earthquake Zones of Required Investigation Beverly Hills Quadrangle" map published by the California Geological Survey, dated January 11, 2018.
   (c) Landslide (Yes, No or Unknown) and Basis of Assessment: No, based on "Earthquake Zones of Required Investigation Beverly Hills Quadrangle" map published by the California Geological Survey, dated January 11, 2018.

18) Site-specific Ground Motion Study? (Yes or No): No

Seismic design acceleration parameters of interest:	
For BSE-2E	S_{XS}: 1.863g S_{X1}: 0.949g
For BSE-1E	S_{XS}: 0.898g S_{X1}: 0.518g

19) Estimated Fundamental Period (seconds)
   (a) Longitudinal: 0.45sec
   (b) Transverse: 0.45sec

20) Falling Hazards Assessment Summary: A structural observation could not be conducted as the campus is currently closed due to the Covid-19 pandemic. Based on our review of the original construction drawings, the building façade which consists of terra cotta, ornamental brick and stone cladding may present a falling hazard if these components are not properly anchored to the primary structure. The attachment of the cladding to the structure could not be verified from the available drawings.

21) Structural Non-Compliances/Findings Significantly Affecting Rating Determination Summary
Significant Structural Deficiencies, Potentially Affecting *Seismic Performance Rating* Designation:

   (a) Shear Wall Stress Checks
   The average shear stress in some of the concrete and masonry shear walls in both orthogonal directions of the building exceed the shear stress limits per the Tier 1 checklist. Limited Tier 3 calculations were performed to evaluate the reinforced concrete walls in the North and South Wings and most of the walls were found to satisfy the acceptance criteria for a Level V rating.

22) Brief Description of Anticipated Failure Mechanism
   The masonry walls around the Auditorium wing may experience in-plane shear cracking during a seismic event.

23) Seismic Retrofit Concept Sketches/Description (only required for buildings rated V or worse): Strengthen deficient concrete shear walls with shotcrete or fiber reinforced polymer (FRP) wrap, add supplemental connections for cladding elements that are not properly attached to the primary structure. At the masonry walls around the Auditorium, infill the spaces between the steel tube strongbacks with reinforced shotcrete. Holes should be drilled through the steel tubes to allow the rebar to be continuous.

Building Report Appendices

A) ASCE 41-17 Tier 1 Checklists (Structural only)
B) Tier 1 Quick Check Calculations
C) Tier 3 Evaluation of Reinforced Concrete Shear Walls