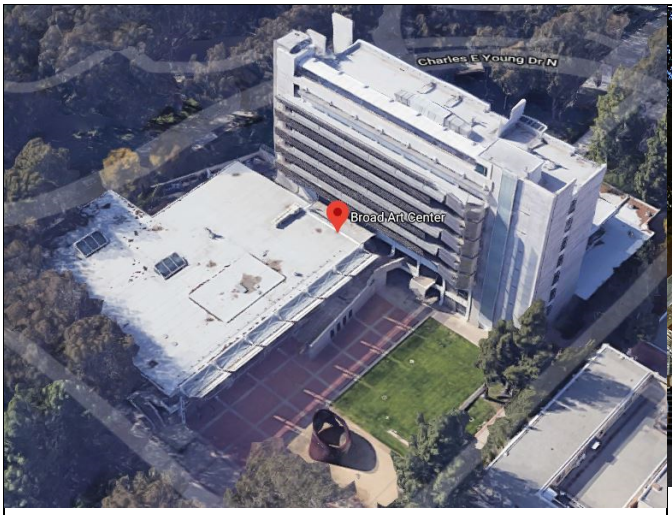
UNIVERSITY OF CALIFORNIA

BUILDING REPORT

1) UC Campus: UCLA
2) Building Name: Broad Art Center - Tower
3) Building CAAN ID: 4206
4) Auxiliary Building ID[1]: N/A
5) Date of Evaluation: March 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: IV based on the University of California Seismic Safety Policy and ASCE 41-17 Tier 1 evaluation. Some shear wall segments exceed the stress limits per the Tier 1 requirements for concrete and reinforced masonry walls. Some concrete gravity columns have insufficient column tie spacing to satisfy deflection compatibility requirements. A Tier 2 or Tier 3 analysis might eliminate these deficiencies.

REGISTERED PROFESSIONAL ENGINEER JAMES K. LEE No. S 5493 STRUCTURAL STATE OF CALIFORNIA

3/23/2021



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)
    (b) Transverse Direction: Building Type C2 (Concrete Shear Walls with Stiff Diaphragms)

Broad Art Center is comprised of two seismically separated structures – the Wight Wing and Dickson Tower. The buildings are separated with a 2" seismic joint. The Tower building is an 8-

[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.

story building with two, 2-story wings projecting from north face of the building. A partial basement exists below the building and is connected to the Wight Wing basement. The 8-story portion of the Tower utilizes reinforced concrete shear walls as its lateral force resisting system. At the 2-story wings on the north side of the Tower, a majority of the original brick masonry walls were removed or detached from the diaphragms during the 2006 retrofit. The 2-story wings utilize a combination of reinforced concrete and masonry shear walls, and two 2-story braced frames which were added during the 2006 retrofit. New concrete shear walls were installed throughout the interior and the perimeter of the 8-story Tower portion, including buttress shear walls at the west end for the longitudinal direction, and shotcrete walls to thicken the original east and west elevation shear walls in the transverse direction. Select gravity columns were reinforced with fiber-wrap during the 2006 retrofit to satisfy deflection compatibility. The reinforced columns are indicated on sheet S1.0.9 from the retrofit drawings.

12) Number of Stories
    (a) Above grade: 8
    (b) Below grade: 1

13) Original Building Design Code & Year: Uniform Building Code 1961

14) Retrofit Building Design Code & Year (if applicable): Seismic Design Force per the 1994 Uniform Building Code, detailing requirements per the 1998 California Building Code; retrofit completed 2006

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
   Wight Wing: 0.69sec

   (b) Transverse
   Wight Wing: 0.69sec

20) Falling Hazards Assessment Summary: A structural observation could not be conducted as the campus is currently closed due to the Covid-19 pandemic.

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

   (a) Adjacent Buildings
   The as-built drawings specify a 2-inch seismic separation between the Wight Wing and Dickson Tower at the second and third floors of the Tower, which is less than the required clear distance per the Tier 1 checklist. 3D analysis models were created for both the Wight Wing and the Tower. The BSE-2E level seismic drifts at the adjacent floors showed that the 2-inch separation is sufficient.

   (b) Geometry (vertical irregularities)

An in-plane shear wall vertical irregularity occurs at the brick masonry shear wall along gridline 3 between gridlines E and F from the first floor to second floor level. The discontinuous wall is supported on a concrete beam and spans between concrete columns.

(c) Torsion

The estimated distance between the center of mass and center of rigidity along the transverse direction of the building are greater than the permissible distance per the Tier 1 checklist and may create a torsional irregularity.

(d) Shear Wall Stress Checks

The average shear stress in some of the concrete shear walls in both orthogonal directions of the building exceeds the shear stress limit per the Tier 1 checklist. A Tier 3 evaluation may eliminate some of these deficiencies and show that the existing walls meet the required acceptance criteria.

(e) Diaphragm Openings at Shear Walls (concrete or masonry)

The combined length of the diaphragm openings adjacent to the shear wall along gridline 8, between gridlines B and D, is greater than 25% of the length of shear wall. Drag beams were installed during the 2006 retrofit to provide additional diaphragm length to transfer the seismic forces into the shear walls.

(f) Deflection Compatibility

There are some concrete gravity columns along gridlines 6, 7 and 8 that were not reinforced with fiber-wrap during the 2006 retrofit. These columns typically have #3 ties spaced at 18" on center, which does not provide sufficient shear strength to develop the moment capacity of the column. Most of these columns utilize #18 bars for the vertical reinforcement. A Tier 2 analysis based on the moments due to the actual displacements, rather than the moment capacities of the columns, may eliminate these deficiencies as minimal seismic drift is expected.

22) Brief Description of Anticipated Failure Mechanism

Limited shear capacity due to insufficient column tie spacing at the gravity columns that were not reinforced with fiber-wrap may result in column shear failure during a seismic event.

23) Seismic Retrofit Concept Sketches/Description (only required for buildings rated V or worse)

Building Report Appendices

A) ASCE 41-17 Tier 1 Checklists (Structural only)

B) Quick Check Calculations