NABIH YOUSSEF ASSOCIATES
STRUCTURAL ENGINEERS

UC Seismic Evaluation – LA Tennis Center

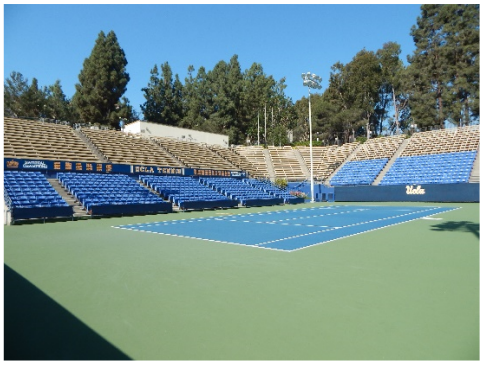
Date:	11/10/2020
UC Campus:	UCLA
Building Name:	LA Tennis Center
Building Address:	420 Charles E. Young Drive, Los Angeles, CA 90095
CAAN ID:	4217
Auxiliary Building ID[1]:	N/A

Summary of information provided by Evaluator:
Nabih Youssef Associates Structural Engineers

UCOP Seismic Performance Level[2] (or "Rating") based on ASCE 41-17 Tier 1/Tier 2 evaluation findings: VI

Plan Image or Aerial Photo

Exterior Elevation Photo



Site location coordinates (decimal):
Latitude: 34.070352
Longitude: -118.448412

Is this a "Partial" Building (i.e., a single structure in a complex building? (Y or N): N

ASCE 41-17 Model Building Type[3]:
Longitudinal Direction: C2 – Concrete Shear Walls w/ stiff diaphragms
Transverse Direction: C1 – Concrete Moment Frames
C2 – Concrete Shear Walls w/ stiff diaphragms

Number of stories:
Above grade: 2
Below grade: 0

[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.
[1] The designated Seismic Performance Level shall be a Roman numeral associated with the most applicable performance description from Table A.1 in Appendix A of the UC Seismic Safety Policy.
[1] 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.

Original Building Design Code and Year: Uniform Building Code 1979 Edition
Retrofit Building Design Code and Year: N/A

Cost Range to Retrofit (if applicable)[4]: To be determined
"Low" cost-range corresponds to a complete retrofit cost less than $50 per square foot (sf), "Medium" cost-range corresponds to a complete retrofit cost greater than $50 per sf and less than $200 per sf, "High" cost-range corresponds to a complete retrofit cost greater than $200 per sf and less than $400 per sf, and "Very High" cost-range corresponds to a complete retrofit cost greater than $400 per sf.

Building information used in this evaluation:
Structural drawings by Hillman, Biddison, and Loevenguth Structural Engineers, "Los Angeles Tennis Center", dated 11/8/1982

Scope for completing this form:
Reviewed structural drawings for original construction and performed ASCE 41-17 Tier 1 evaluation.

Brief description of structure:

The LA Tennis Center is a 2-story stadium structure of approximately 42,210 square feet and was constructed in 1982. The stadium seating is partially built into the hillside on the north and west sides of the tennis courts and extends two stories above grade on the south side. The structure is U-shape in plan and includes a 2" wide expansion joint at each corner of the "U".

Foundation System: The foundation system consists of shallow reinforced concrete spread footings supporting columns and strip footings supporting walls at the south portion of the stadium, and reinforced concrete belled caissons supporting both columns and walls at the north and west portions of the stadium. A 6" thick concrete slab on grade forms the first level at the south portion of the stadium.

Structural System for Vertical (gravity) loads: The seating level consists of reinforced concrete precast tread risers spanning to reinforced concrete girders. The second floor consists of a reinforced concrete slab spanning to reinforced concrete beams. The concrete beams and girders are supported by reinforced concrete columns and walls that are continuous to the foundation.

Structural System for Lateral (seismic/wind) loads: The precast tread risers and concrete slabs act as structural diaphragms. These diaphragms transfer seismic forces to the vertical lateral force resisting system elements consisting of long concrete shear walls in the longitudinal direction. Besides a couple of concrete shear walls, there is not a well-defined lateral force resisting system in the transverse direction. By default, the reinforced concrete girders at the seating level and columns will act as moment frames in that direction.

BACKGROUND INFORMATION

Site Information:
Site Class (A-F): D; Default

Geologic Hazards (Y or N):

- Fault Rupture: N; EZRIM Beverly Hills
- Liquefaction: N; USGS
- Landslide: N; EZRIM Beverly Hills

Site-specific Ground Motion Study? N

Site-modified Spectral Response (0.2s), Hazard Level BSE-2E, S_{XS}: 1.849

Site-modified Spectral Response (1.0s), Hazard Level BSE-2E, S_{X1}: 0.944

Estimated Fundamental Period (seconds):

- Longitudinal Direction: 0.27s
- Transverse Direction: 0.27s

Falling Hazards Assessment Summary: None observed.

Summary of Tier 1 Seismic Evaluation Structural Non-compliances/Findings Significantly Affecting Rating Determination:

Significant Structural Deficiencies, Potentially Affecting *Seismic Performance Level* Designation:

- ☒ Lateral System Stress Check (wall shear, column shear or flexure, or brace axial as applicable)
- ☐ Load Path
- ☐ Adjacent Buildings
- ☐ Weak Story
- ☐ Soft Story
- ☐ Geometry (vertical irregularities)
- ☐ Torsion
- ☐ Mass – Vertical Irregularity
- ☐ Cripple Walls
- ☐ Wood Sills (bolting)
- ☒ Diaphragm Continuity
- ☐ Openings at Shear Walls (concrete or masonry)
- ☐ Liquefaction
- ☐ Slope Failure
- ☐ Surface Fault Rupture
- ☐ Masonry or Concrete Wall Anchorage at Flexible Diaphragm
- ☐ URM wall height to thickness ratio
- ☐ URM Parapets or Cornices
- ☐ URM Chimney
- ☐ Heavy Partitions Braced by Ceilings
- ☐ Appendages

Brief Description of Anticipated Failure Mechanism: Moment frame columns in shear, development of moment frame beam reinforcement, and confinement of moment frame columns.

Comments and Additional Deficiencies:
LSP analysis and Tier 1 quick checks were performed. The results indicate that the concrete columns and girders in the transverse direction of the stadium seating are not properly detailed as moment frames and have insufficient development of beam reinforcement, lap splice length of column reinforcement and column confinement ties. The building also contains expansion joints that are too narrow to be a proper seismic joint.

Seismic Retrofit Concept Sketches/Description (only if above-listed rating is V or greater): Due to the complexity of this structure and lack of a well-defined lateral force resisting system in the transverse

direction, it is recommended that a full Tier 3 evaluation be performed in order to better understand the expected behavior of the building in a seismic event.

Appendices:

A. ASCE 41-17 Tier 1 Checklists
B. Quick Check Calculations