

UC RIVERSIDE
CAMPUS SEISMIC PLAN
2023 Update





UC Riverside's Campus Seismic Plan will be reviewed and updated annually, and coordinated with the development of the Capital Financial Plan.



Version Log:

Version 1: April 30, 2021

Version 2: September 23, 2022

Version 3: July 31, 2023



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2023 Executive Summary

The purpose of the UC Seismic Safety Policy is to ensure earthquake safety for students, employees, and the public who occupy University facilities located in California. The current policy requires that all campus buildings be evaluated and rated for seismic safety, and if determined to not meet Policy standards, then seismically corrected, or not used, by 2030. According to the Policy, buildings with a Seismic Performance Rating (SPR) of I, II, III, or IV are deemed compliant, and buildings rated a V, VI, or VII, are in need of seismic retrofit. *

UCR'S Campus Seismic Program began in the 1990s, and while several buildings have been retrofitted over the last 30 years, evolving codes require that buildings be continually evaluated. In June of 2019, UC Riverside initiated new seismic reviews of the entire campus building inventory, which includes all owned and leased structures on and off campus.

While these seismic evaluations are still underway, based on the information known, UC Riverside has developed this preliminary **Campus Seismic Plan** to establish priorities and estimated costs for the presumed required seismic retrofit projects, in accordance with the UC Seismic Safety Policy.

UC Riverside has prepared this 2023 update to our **Campus Seismic Plan** to summarize the overall seismic improvement need for campus, as well as the proposed schedule and funding plan that would be required to retrofit all of the buildings in need of remediation by December 31, 2030.

As of the date of this updated version of the UCR **Campus Seismic Plan**, approximately \$1.95 Billion is estimated to be needed to retrofit the 176 building/building wings requiring correction—however the draft 2023 Capital Financial Plan lists six priority seismic retrofit projects. UCR has no identified funding for these projects and at this time, and UCR is unable to commit that these can be completed by 2030.

*<https://policy.ucop.edu/doc/3100156/Seismic>



Top photo by Darren Bradley

Summary of Updates to The 2023 Campus Plan

- The total number of building wings needing retrofit decreased from 185 to 176. The decrease was a result of Tier 3 reviews since 2022 where the seismic rating for nine (9) buildings was changed from a rating of V to IV.
- Two seismic retrofits are underway for Auxiliaries managed apartment buildings.
- No seismic retrofits have been completed for state eligible buildings due to lack of funding, however, the 2023 Capital Financial Plan lists six (6) projects as Riverside's top capital project priorities for seismic retrofit.
- Campus is presently planning for the demolition of 3 buildings: Veitch (rated V), University Extension (rated V), and College Building South (rated VI).

Seismic Evaluation Process

The American Society of Civil Engineers (ASCE) provides a three-tier review methodology to assess an existing building's seismic vulnerability. ASCE-41-17 Tier 1 is an initial high-level screening to identify those buildings that appear to comply with designated seismic performance. Tier 2 and Tier 3 Reviews involve more detailed engineering analyses.

In accordance with the Seismic Safety Policy (SSP), UC Riverside considered an initial campus inventory of 700 campus buildings, and performed 479 Tier 1 seismic reviews. **Because individual wings of buildings may perform differently in seismic events, each wing is reviewed independently; consequently, there are more seismic reports than there are buildings. UCR's initial review effort resulted in 560 individual seismic reports.**

Buildings are assigned a Seismic Performance Rating (SPR) based on criteria defined in the SSP building rating system' higher ratings reflect increasing seismic risk.

- **Rating of I, II, III, or IV: meets or exceeds the requirements of CBC; no retrofit required**
- **Rating of V, VI, or VII: does not adequately meet the requirements of the CBC; retrofit required**

In some instances, the initial Tier 1 review yields only a provisional rating, requiring a subsequent more detailed Tier 2 or 3 review to finalize the seismic rating.



Spieth Hall is an example of one building with multiple wings, and thus multiple seismic reports; photo on left by Darren Bradley

Evaluation Challenges

- Quantity of buildings to review within the aggressive UCOP deadlines
- Lack of adequate university project management staff available to manage work
- Many buildings located off-campus, including remote Natural Reserve sites
- Challenges presented due to Covid-19 pandemic
- Because many UCR buildings date back to the early 1950's & 1960's, (and, in fact also to the 1930's, and 1916) a lack of adequate building documentation necessitates Tier 2/3 evaluation to determine rating, which is added cost

Tier 2 and 3 Evaluation Status

Tier 2 & 3 Status	Count
Number of evaluations in progress <i>(Will be Complete by August 2023)</i>	14
Number of evaluations in planning <i>(To be Completed After August 2023)</i>	128
Number of completed Tier 2 & 3 evaluations (Since 2021 Campus Seismic Plan)	42
Number of buildings converted to a compliant rating of IV or better	12
Number of buildings with confirmed rating of V	30
Number of buildings with confirmed rating of VI	0

1. These counts represent the status of the Tier 2 & 3 evaluations only.
2. The number of buildings shown with confirmed or converted ratings are for the completed evaluations only and do not represent the total number of UCR buildings in each rating category. See page 9 and 10 for total number of UCR buildings in each rating category.

Seismic Evaluation Results

Following the completion of the Tier 1 reviews, Riverside's campus building inventory falls into the following categories outlined by the UC Seismic Program Guidelines*:

1. Policy compliant, or exempt.
2. Seismic rating is confirmed, and seismic retrofit is required. Further planning for retrofits will be needed. Scope development will be planned and reported according to the following phases:
 - a. *Seismic need identified, but no plans for retrofit; campus to provide justification*
 - b. *Tier 2/3 evaluation needed to determine extent of seismic retrofit*
 - c. *Study phase to determine project executive strategy, and additional scope, such as deferred maintenance and code upgrades, in order to develop a conceptual budget*
 - d. *P-funding complete and the project is in planning phase*
 - e. *W-funding complete, and the project is in design phase*
 - f. *In construction*
 - g. *Planned demolition*
 - h. *Planned decommission*

*UC Seismic Program Guidelines for Campus Seismic Plans, version August 8, 2022

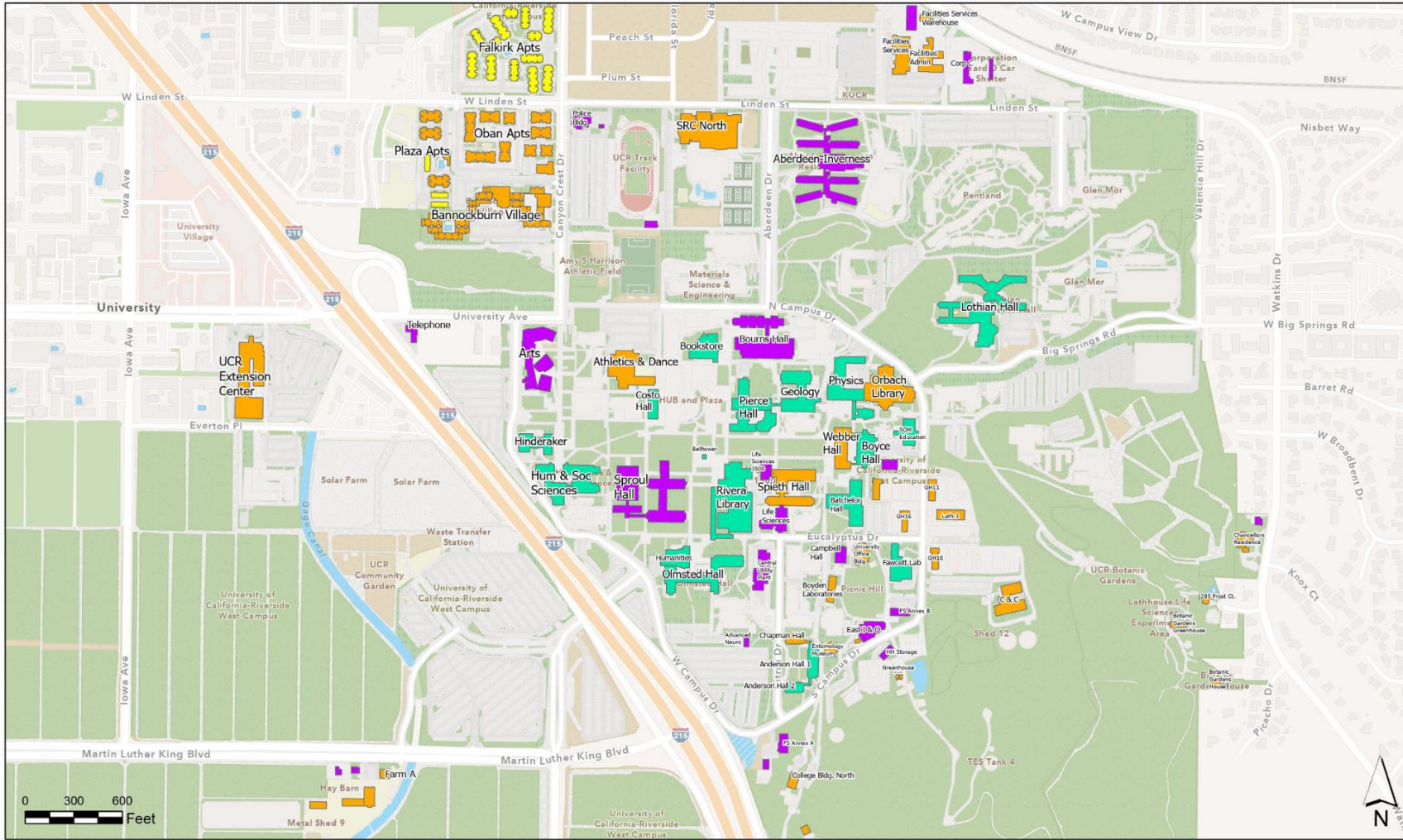
Seismic Evaluation Results

		Buildings Slated for Tier 2 or 3 Evaluation				
		Total No. of Bldgs	State Eligible	NonState / Aux.	Status Category	Comment
Buildings Rated VI		7	1	6		Planned Decomission for One. Retrofit in progress for Others,
Buildings Rated V	Seismic Retrofit Required. Tier 2 / 3 Analysis is not required to Confirm Building Rating or establish the need for Retrofit. However, Tier 2/3 Analysis is required to Support Project Planning & Design	67	14	53	2b (&2c)	
	Tier 2 / 3 Analysis Required to Confirm Building Rating and establish the scope of seismic retrofit, if required.	24	10	14	2b	
	Tier 2 / 3 Analysis performed already and they require Retrofit. Commence Study Phase to determine project execution strategy	30	19	11	2c	Tier 3 Analysis complete. Require Retrofit.
	Building rated as V , but a more detailed Tier 2 or 3 evaluation could result in Building being rated IV .	48	32	16	3	

Seismic Evaluation Results (Cont. from Previous Page)

		Buildings Slated for Tier 2 or 3 Evaluation		Status Category	Comment
	Total No. of Bldgs	State Eligible	NonState / Aux.		
Buildings Rated IV	Building rated as IV. No need for Tier 2 or 3 analysis to confirm rating.	114			
Buildings Rated III		86			
Bldgs Excluded from Tier 1 Evaluation		177			
Out-of-Inventory (Demolished, Lease Canceled, Not a Building)		31			
TOTAL =		584	76	100	
		176		Include the 4 Buildings Rated VI - 3 of which are being retrofitted and one slated for planned decommission.	

Seismic Evaluation Results



PREVIOUS SEISMIC RETROFITS

Costo Hall	1990
Bell Tower	1990
Anderson South	1991
Anderson Main	1993
Physics	1996
Boyce Hall	1998
Pierce Hall	1999
Rivera Library 2&3	1999
Humanities	2000
Humanities Theater	2000
Olmstead	2000
Fawcett	2000
Bachelor	2001
Hinderaker Hall	2004
Geology	2004
Physics	2004
Culver Rouse	2010
Lothian East	2014
Lothian West	2014
Lothian Dining	2014
Bookstore	2017

UCR Campus Seismic Report

Table 1 - Campus Priority Building Inventory

TABLE 1. BUILDING INVENTORY, BY RATING, AND BY PRIORITY GROUP ASSIGNMENT

	V	VI	VII	Group A	Group B	Group C
Building Count ¹	169	7	0	46	30	100
Building Area (OGSF100)	3,018,313	40,310	0	1,067,880	521,492	1,469,251

Figure 1 (Seismic Database Table) to be provided separately.

Table 2 – Percent Compliant Space

UC RIVERSIDE - PERCENT COMPLIANT SPACE

2022 Compliance Status	Building/Project Count		Building Area (OGSF100)	
	Count	% of Total	Area	% of Total
Not Compliant (i.e., rated V, VI or VII)	176	32%	3,058,623	37%
Compliant (i.e., rated I, II, III, IV, or exception to rating requirement)	377	68%	5,206,781	63%
TOTAL =	553	100%	8,265,404	100%



Retrofit Planning

Planning Principles:

- Prioritize retrofits by priority, focusing on planning for the highest risk buildings first, as funding is identified
- Incrementally improve as many buildings as possible, when funding is identified
- Provide essential life safety across all buildings needing improvement
- Implement ADA and building code improvements as required
- Evaluate critical deferred maintenance needs and where possible include with seismic retrofit scope
- Improve efficiency and flexibility of programmatic space to the greatest extent possible
- Ensure long-term functionality and incorporate pandemic lessons-learned

Retrofit Implementation Strategies:

- Full retrofit, addressing highest priority needs
- Incremental retrofits addressing highest hazards
- Full retrofits over multiple bid packages over multiple summers
- Decommission/Demolish

IMPLEMENTATION CONTINGENT ON AVAILABLE FUNDING



Retrofit Prioritization

All buildings requiring retrofit have been initially allocated into Priority Groups A, B, or C, based on the following specific seismic considerations which evaluate building occupancy and use:

- Seismic rating resulting from the Tier 1 review
- Results of the UC Seismic Risk Model (SRM), which is a tool that assesses seismic risk of University Facilities
- Collapse Risk Index, (CRI): the risk of earthquake-induced collapse
- Occupancy Risk Index (ORI): the risk associated with the type of occupancy

Campus will continue to review and adjust the priority groups based on the following parameters:

- Availability of funds
- Seismic rating
- Mission criticality
- Business continuity
- Availability of relocation space
- Continued consultation with UCOP, consulting engineers, and the Seismic Advisory Board (SAB)

IMPLEMENTATION CONTINGENT ON AVAILABLE FUNDING

Retrofit Prioritization

Group A: 46 buildings

UCR's highest priority buildings needing retrofit.

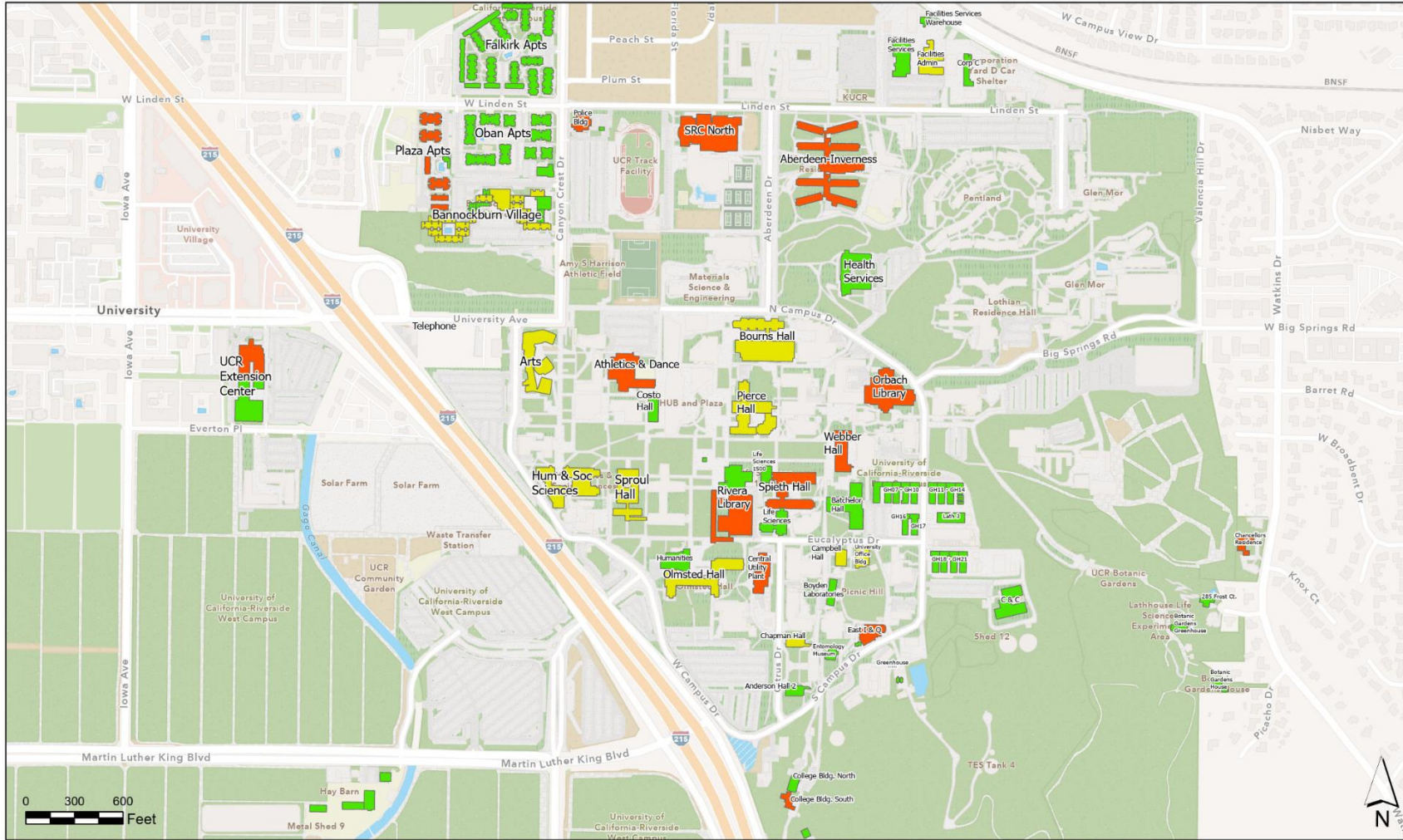
6 buildings identified for priority retrofit:

- Tier 2 Reviews (*Phase 2b, per Seismic Guidelines*) were completed for Spieth, Rivera, Webber and Physical Education to support for the G.O. Bond and AB94 funds in 2020.
- The G.O. Bond did not pass and AB94 funds were not provided, so these projects have not advanced into further planning and design (*Phase 2c, per Seismic Guidelines*), but remain as the highest campus priority for retrofit
- Per SRM results, Orbach Library and Central Plant are new priorities for 2022
- These high priority projects (Spieth, Rivera, Webber and Physical Education, Orbach Library and Central Plant) continue to be listed as high priority renovation projects in the 2023 CFP.



IMPLEMENTATION CONTINGENT ON AVAILABLE FUNDING

Retrofit Prioritization



UCR Campus Seismic Report

Challenges

- Seismic Plan Guidelines require campus to represent the total costs required to implement all of the required retrofits by 2030 without sufficient understanding of the full extent of the required seismic scope, nor the necessary code and related repairs that would be triggered by the retrofits.
- Prioritization of the retrofits will necessarily make it more challenging to address other equally important needs:
 - Mitigation of UC Riverside's \$600 Million + deferred maintenance backlog
 - Necessary improvements to campus' aging infrastructure
 - Needed improvements to existing instructional facilities to support current student enrollment
 - Potential enrollment growth
- UC Riverside campus funding is challenged with extraordinary construction cost escalation over the past 12-24 months.
- In addition to Seismic Safety Policy requirements, the Riverside campus is also charged with complying with additional mandates without compromise to the instructional and research mission of the university:
 - UC Sustainability Policy
 - UC Carbon Neutrality Policy
 - Buy Clean California Act
 - SB-721 Balcony Bill

While all worthy, they compete for same scant funding sources.

**MEETING THE
2030
CHALLENGE**



Challenges

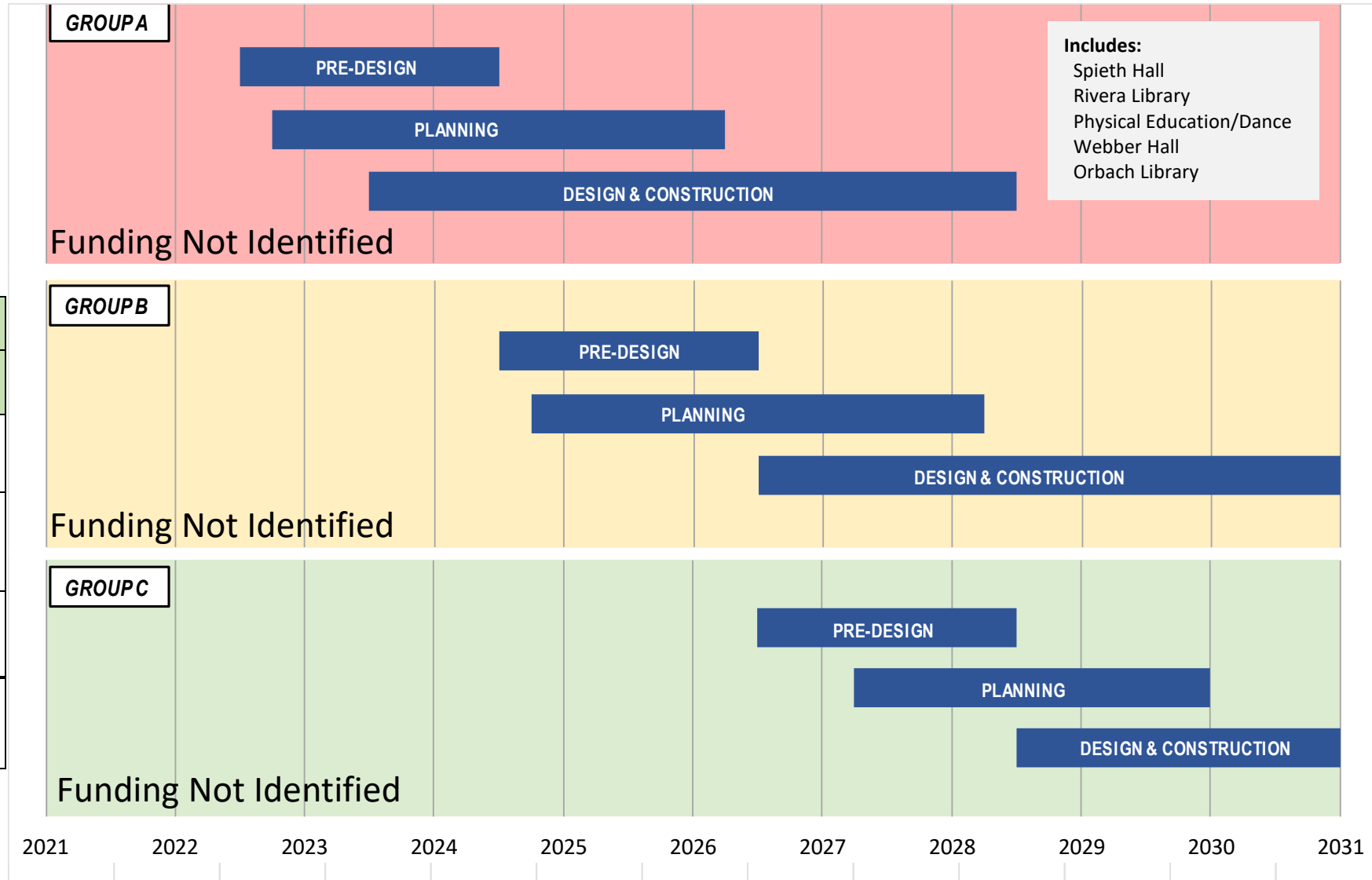
Meeting the 2030 Seismic Safety Policy requirement to retrofit all buildings by 2030 will necessarily mean that construction will dominate the campus core for many years, along with those other projects that would be - of necessity - also underway. This will make mitigating these following challenges much more difficult.

- Lack of swing space for relocation of research and instruction
- Coordinating retrofit work in occupied buildings
- Contingency costs for mitigation measures and unforeseen conditions in existing buildings
- Mitigating disruption to research and instruction
- Limited regional contractor pool for so many complex projects
- Construction cost volatility
- Multiple concurrent projects and associated staging and parking will compete with limited available campus open space and will displace campus parking, outdoor events, and wayfinding
- Added costs of dust, sound and vibration containment
- Multiple utility shutdowns and interruptions to research/teaching mission
- Lack of available project management staff to oversee the quantity of projects

**MEETING THE
2030
CHALLENGE**

Retrofit Schedule

Priority Group	UCR Proposed		
	State	Non-State	Total
Group A	12	34	46
Group B	10	20	30
Group C	54	46	100
TOTAL	76	100	176



*21 non-state buildings currently undergoing incremental seismic improvement; rating to be re-established pending tier 2/3 evaluation

Table 3 – Seismic Capital Need

UC RIVERSIDE - SEISMIC CAPITAL NEED

Priority Group	Seismic Only	Total Capital Need	Funded Total Capital Need		Funding Not Identified (FNI) Total Capital Need		State Eligible Total Capital Need		Non-State Total Capital Need	
	\$ millions	\$ millions	\$ millions	%	\$ millions	%	\$ millions	%	\$ millions	%
A	\$313	\$851	\$0	0%	\$851	100%	\$425	50%	\$426	50%
B	\$102	\$348	\$0	0%	\$348	100%	\$167	48%	\$180	52%
C	\$157	\$751	\$0	0%	\$751	100%	\$406	54%	\$345	46%
Total (A,B & C)	\$573	\$1,950	\$0	0%	\$1,950	100%	\$998	51%	\$952	49%

NOTES:

1. Capital Need includes escalation rate of 5.58% from 2nd quarter of 2022 to 1st quarter of 2023.
2. Cost estimates will be continually refined as UCR continues to develop a greater understanding of individual building needs.

UC Riverside Capital Need Summary

Priority Group	UCR Proposed		
	State	Non-State	Total
Group A	\$424,992,315	\$426,390,134	\$851,382,449
Group B	\$167,115,191	\$180,389,799	\$347,504,990
Group C	\$405,509,214	\$345,405,771	\$750,914,986
TOTAL	\$997,616,720	\$952,185,704	\$1,949,802,425

1. Capital Need includes escalation rate of 5.58% from 2nd quarter of 2022 to 1st quarter of 2023.
2. Cost estimates will continually be refined as UCR develop a greater understanding of individual building needs.

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Building Count ¹	169	7	0	46	30	100
Building Area (OGSF100)	3,018,313	40,310	0	1,067,880	521,492	1,469,251

TABLE 2A. SEISMIC CAPITAL NEED - PRIORITY GROUP A

Priority Group A - Capital Need ⁵							
Funded				Funding Not Identified			
Seismic Only ²	DM ³	Other Capital Need ⁴	Total ⁵	Seismic Only ²	DM ³	Other Capital Need ⁴	Total ⁵
\$0	\$0	\$0	\$0	\$313,358,363	\$421,290,003	\$116,734,083	\$851,382,449

TABLE 2A. SEISMIC CAPITAL NEED - PRIORITY GROUP A

Priority Group B - Capital Need ⁵							
Funded				Funding Not Identified			
Seismic Only ²	DM ³	Other Capital Need ⁴	Total ⁵	Seismic Only ²	DM ³	Other Capital Need ⁴	Total ⁵
\$0	\$0	\$0	\$0	\$102,445,839	\$245,059,151	N/A	\$347,504,990

TABLE 2A. SEISMIC CAPITAL NEED - PRIORITY GROUP A

Priority Group C - Capital Need ⁵							
Funded				Funding Not Identified			
Seismic Only ²	DM ³	Other Capital Need ⁴	Total ⁵	Seismic Only ²	DM ³	Other Capital Need ⁴	Total ⁵
\$0	\$0	\$0	\$0	\$156,733,625	\$594,181,360	N/A	\$750,914,986

NOTES:

1. "Building Count" refers to seismically distinct structures.
2. "Seismic Only" refers to seismic improvement scope and building code updates triggered by the seismic improvement scope, plus associated soft costs.
3. Deferred maintenance (DM) refers to DM scope, plus associated soft costs.
4. For Priority Group A, "Other Capital Need" refers to energy efficiency upgrades, program upgrades and other building code updates not triggered by seismic improvement scope, plus associated soft costs.
5. For Priority Group A, "Total" refers to the combined costs of "Seismic Only", "DM" and "Other Capital Need." For Priority Groups B & C, "Total" refers to the combined cost of "Seismic Only" and "DM."
6. Campuses should track capital need per distinct components to support future reporting purposes, and potential funding opportunities.

IMPLEMENTATION CONTINGENT ON AVAILABLE FUNDING

end