



# Seismic Safety Policy

**Responsible Officer:** Executive Vice President – Business Operations

**Responsible Office:** Capital Resources Management

**Original Issuance Date:** 1/16/1975

**Date of Last Revision:** August 25, 2011

**Effective Date:** August 25, 2011

**Scope:** All locations of the University of California within the United States

<b>Contact</b>	<b>Associate Vice President, Capital Resources Management</b>
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## I. POLICY SUMMARY

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The purpose of this policy is to the maximum extent feasible by present earthquake engineering practice to provide an acceptable level of earthquake safety for students, employees, and the public who occupy University buildings and other facilities, at all locations of University operations and activities.

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## II. DEFINITIONS

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**Campus Building Official:** designated campus administrator who ensures code compliance for all campus projects by appropriate reviews and inspection in accordance with CBC.

**CBC:** California Building Code, Title 24 portion of the CCR.

**CCR:** California Code of Regulations.

**Consulting Structural Engineer (CSE):** a structural engineer duly licensed by the State of California (or by the state where the building is located), with demonstrated experience in field investigation and analysis of earthquake damage, site-specific seismic forces, and design of structural systems to resist seismic forces, A University of California employee may not perform this function (except that a licensed faculty member otherwise qualified may serve in this capacity).

**EOR:** Engineer-of-Record, a registered structural engineer responsible for the structural design of the structure.

**Existing Building:** A building that is already erected.

**Independent Seismic Peer Review:** an objective technical review by an independent reviewer to provide independent, knowledgeable review of potential buildings or other facilities prior to University lease, licensing, or acquisition by purchase or other title transfer (Section G) also provides a measure of additional assurance regarding performance and safety of new construction, and repair or renovation of existing buildings. The reviewer shall not be an employee of the University (except that a licensed faculty member otherwise qualified may serve in this capacity).

**Responsible Official:** As used in this Policy, the Chancellors, the Executive Vice President-Business Operations, the Vice President-Agriculture and Natural Resources, and the Director-Lawrence Berkeley National Laboratory. This responsibility may not be delegated, except for responsibilities specifically delegated in this Policy.

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### III. POLICY TEXT

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The University shall lease, license, acquire, build, maintain, repair and rehabilitate buildings and other facilities to provide an acceptable level of earthquake safety for students, employees, and the public who occupy those buildings and other facilities, to the maximum extent feasible by present earthquake engineering practice and University resources, at all locations where University operations and activities occur within the United States. Feasibility shall be determined by weighing practicality and the cost of protective measures against severity and probability of injury resulting from seismic occurrences.

This Policy addresses

- A. Survey of Existing Buildings and Other Facilities;
- B. Interim Use Plans;
- C. Program for Abatement of Seismic Hazards of Existing Buildings and Other Facilities;
- D. Seismic Rehabilitation Standards;
- E. Post Earthquake Response;

- F. Standards for New Construction and Renovation;
- G. Independent Seismic Peer Review;
- H. Special Considerations; and
- I. Standards for Lease, License, Acquisition by Purchase or other Title Transfer.

For facilities located outside the United States, the Responsible Official should coordinate with the UC Office of President for appropriate actions.

#### **A. Survey of Existing Buildings and Other Facilities**

Each Responsible Official is charged to engage a consulting structural engineer (CSE) who shall examine existing buildings and other facilities and report on the adequacy of the resistance of such existing campus buildings and other facilities to seismic forces based on:

1. conformance to current seismic provisions of California Code of Regulations (CCR), Title 24, Part 2, CBC for existing buildings;
2. the CSE's professional evaluation of existing buildings' anticipated seismic performance, based on Performance Levels I through VII<sup>1</sup> as defined in Tables A.1 and A.2, with respect to the degree of risk to life or safety of persons but not necessarily in strict conformance with the above specific seismic provisions;
3. identification of potential falling hazards<sup>2</sup> that pose a significant life or safety hazard to occupants; and,
4. a written technical discussion of the basis for the building's performance level rating (as defined in Appendix A).

The CSE's report shall include recommendations for resolving any noted deficiencies, priorities for abatement of seismic hazards, and estimates of costs for correcting seismic deficiencies and associated life safety work in accordance with this policy.

#### **B. Interim Use Plans**

For each building or other facility identified in the CSE's report as meeting Performance Levels V, VI, or VII<sup>3</sup> the Responsible Official shall develop and implement an Interim Use Plan, for the period until the building or facility is vacated and the seismic hazards are abated. Such plan shall clearly indicate the proposed interim use, specific dates for evacuation, and any temporary emergency measures to reduce the risk to life and safety during the interim use period. The Plan shall:

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<sup>1</sup> Formerly expressed as *Good, Fair, Poor, or Very Poor*; see [Appendix A](#)

<sup>2</sup> For purposes of seismic performance ratings, *falling hazards* are interior and exterior building elements that may fall or slide during an earthquake, including parapets, ornamentation, chimneys, walls, and partitions, but excluding equipment, fixtures, ceilings, furniture, furnishings, and other contents. The excluded elements should not be considered in the determination of the seismic performance rating of a building or structure but any associated risk should be abated as soon as possible.

<sup>3</sup> Formerly expressed as *Poor* or *Very Poor*; see [Appendix A](#),

1. Consider alternatives to undiminished continued use and occupancy of the building or facility, including partial evacuation, temporary emergency measures, reduction in use, rehabilitation, or combinations of these alternatives;
2. Develop and implement an Interim Use Plan for each building or other facility as detailed in Section B, below;
3. Incorporate such buildings and other facilities in the Program for Abatement of Seismic Hazards as detailed in Section C, below; and
4. Take appropriate action as soon as practicable.

The Responsible Official shall incorporate any related capital costs into the campus Ten-Year Capital Financial Plan, including a financial feasibility analysis and funding plan, and shall submit annual updates to UCOP Capital Resources Management. Interim Use Plans shall be updated if they are revised, or if new information regarding the level of seismic safety is determined by additional studies or information, and then submitted to the UCOP Office of General Counsel.

### **C. Program for Abatement of Seismic Hazards**

Each Responsible Official shall develop a *Program for Abatement of Seismic Hazards* in existing buildings and other facilities within their respective jurisdictions and shall establish priorities for seismic rehabilitation projects in accordance with this policy. The program will take into account:

1. proposed fire protection work as required by fire protection regulations in the CBC;
2. other proposed work involving environmental health and safety considerations; and
3. reasonable and prudent rehabilitation for functional and programmatic improvements.

The *Program for Abatement of Seismic Hazards* shall include identification, temporary and permanent correction of potential earthquake falling, sliding, or rupturing hazards such as, but not limited to, interior and exterior building elements, utilities, equipment, fixtures, furnishings, and other contents that could be dislodged, fall, overturn, slide, or rupture during a seismic disturbance. Temporary measures to reduce the risks of injury pending permanent corrective action shall be considered and implemented as possible. The Responsible Official shall consider and implement temporary measures to reduce the risks of injury pending permanent corrective action when feasible, as noted under Section B, *Interim Use Plans*.

When funds for seismic rehabilitation are limited, the program developed by the Responsible Official may include a phased rehabilitation program for selected buildings. The first phase goal shall be reducing the greatest life and safety hazards of the structure, such as reducing the potential of partial building collapse and/or reducing falling hazards at building entrances and along adjacent walkways. Later phases, performed when funds are available, would complete the seismic rehabilitation program of the structure. A CSE shall assist the Responsible Official in establishing scope of work in each phase of a rehabilitation program.

The Responsible Official shall incorporate any related capital costs into the campus Ten-Year Capital Financial Plan, including a financial feasibility analysis and funding plan, and shall submit annual updates to the President. The Program shall also include plans for abatement and rehabilitation as needed for projects below the threshold for the Capital Financial Plan.

**D. Seismic Rehabilitation Standards**

In conducting seismic rehabilitation projects, the University shall seek to provide, at a minimum, an acceptable level of earthquake safety based on the protection of life and prevention of personal injury, insofar as predictable, at a level of safety equivalent to that which would be established by compliance with current CBC seismic provisions for existing buildings. The University will address ground motions at the site and other geologic hazards considered in accordance with one or more of the methodologies specified in CBC. The seismic rehabilitation shall reconstruct buildings and other structures to a Performance Level ranking of I, or III<sup>4</sup> (per Table A.1, Appendix I) depending on occupancy, and based on current practice of earthquake engineering. All Seismic Rehabilitation projects shall follow the requirements for Independent Seismic Peer Review (Section III G).

**E. Post Earthquake Response**

Each campus or University location shall maintain an emergency response plan for use in the event of a damaging earthquake. The plan shall consider structural condition; hazardous materials; fire and life safety of all facilities; health and safety issues applicable to each site; coordination/communication with emergency operations centers; procedures for inspection; and a prioritized list of university buildings including all essential services facilities, critical utilities, and high risk or high occupancy buildings . Campus units that may be involved in the emergency response include facilities planning, design, and construction; plant operations; environmental health and safety; fire marshal; public safety; campus health services; and housing. The Campus Building Official shall verify that various persons or firms performing structural inspections have appropriate qualifications and/or certifications required for such work.

After a damaging earthquake, the emergency response plan is activated as established by the campus. Preliminary rapid damage assessment protocols should be completed as quickly as possible, and trained evaluators shall post placards or ‘tag’ each building based on ATC 20-2, or other currently acceptable standards, in the following manner:

Green	INSPECTED - Lawful occupancy permitted
Yellow	RESTRICTED USE - Entry, occupancy, and lawful use are restricted as indicated below
Red	UNSAFE - Do not enter or occupy.
White	(optional) Building has NOT been inspected

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<sup>4</sup> Formerly expressed as *Good*; see [Appendix A](#).

When so notified, the University police will restrict occupancy of or entry to all buildings so identified to persons authorized by the Campus Building Official. University buildings and facilities damaged by earthquakes shall be repaired and occupied in compliance with the CBC for existing buildings, and consistent with university policies..

**F. Standards for New Construction and Renovation**

The design and construction of buildings on University premises shall comply, at a minimum, with the current seismic provisions of CBC for new or existing buildings as appropriate. All aspects of the structural design for each individual building of a UC project shall be under the responsible charge of one licensed, registered Professional Engineer or Structural Engineer that serves as the EOR for the structural design of the project through completion of construction. The structural design includes the design of the structural frame; lateral force-resisting system; foundations; structural aspects of the building, skin/façade; and support and anchorage of equipment, building systems and architectural features. The EOR has the responsibility for the structural aspects of the entire project and must sign and stamp all final documents, including deferred submittals, for which he/she is in responsible charge.

An independent seismic peer review (Section III.G) shall be conducted on all capital projects, whether new construction or renovation, that involve structural design and that are intended for human occupancy or which affect life or safety of the occupants. The Campus Building Official shall provide for the selection of the reviewer, and plan for the review.

Independent seismic peer review is optional and at the discretion of the Responsible Official, for:

1. one and two-story wood-framed buildings of less than 3,000 square feet
2. buildings not intended for human occupancy
3. University hospitals (under the jurisdiction of the Office of Statewide Health Planning and Development); K-12 schools (under the jurisdiction of the Division of the State Architect)
4. Community Colleges on University land that are plan checked, permitted, and inspected by the Division of the State Architect.
5. Small projects that the Campus Building Official determines do not involve structural work requiring design by a consulting engineer and do not alter lateral structural systems.

**G. Independent Seismic Peer Review**

When seismic peer review is required, the review shall be conducted by a CSE, who shall be contracted for and paid directly by the University. The Responsible Campus Building Official shall select the CSE.

The purpose of a peer review is to assure quality and provide a measure of additional assurance regarding performance and safety of the completed project. It is an objective

technical review by an independent, knowledgeable reviewer(s) experienced in structural, analysis, and seismic performance issues. The purpose is to verify that seismic response characteristics of the structural design are well considered, appropriate, and acceptable. The review provides the EOR with a qualified technical opinion on the structural engineering approaches used and the resulting design.

#### **H. *Special Considerations***

1. Private buildings constructed on UC Land: When a private developer constructs a building on land owned or controlled by the UC or any of its foundations or entities, then the project shall be peer reviewed in accordance with this Policy.
2. Geotechnical Investigations: Any geotechnical investigation conducted for a project shall include consideration of the seismically induced site failure hazards, including liquefaction, differential settlement, lateral spreading, land sliding, and surface faulting.
3. Deferred Approvals or Multiple Design Packages: Some projects include deferred submittals. This occurs on projects with non-traditional delivery, such as Design-Build, Construction Manager at Risk, or Integrated Project Delivery (IPD); or with deferred submittals of specific elements (e.g. manufactured steel or wood framing elements, stairs, MEP supports or bracing), or a portion of the project may be designed by design-build subcontractors (e.g. foundation, metal stud framing, fire suppression systems, or precast subcontractors). The structural design for such components or portions of a structure shall be under the responsible charge of a component Engineer of Record (CEOR), who shall be a California registered engineer, and must be signed or stamped by that individual. In order to establish responsibility for the overall design and component design, the project EOR and the CEOR shall have responsibility as follows:
  - a. The EOR shall establish written criteria and other requirements necessary for coordination of the components and their incorporation into the overall structural system and design before the project is released for design of the system or components. The EOR shall review the design of these elements for conformance with the established criteria prior to construction.
  - b. The design for each submittal shall include calculations indicating design criteria, applicable loads, properties, and deformation analysis as required by the EOR; plans and details indicating all structural elements of the component; assemblage of elements including, as appropriate, profiles, connections, welding, bracing, and attachments to elements designed by others. The construction documents (plans, calculations, and details) shall bear the signature of the CEOR.
  - c. Special inspection requirements specific to the deferred work must be prepared and submitted with the design documents for each deferred item.

4. **Pre-Engineered Structures:** Pre-engineered structures often provide certificates from various agencies in lieu of specific engineering and seismic calculations, and may include requirements for installation necessary to achieve the certificated performance. These structures may include 'Butler' style buildings, awnings and bridges. All such structures must have design documents signed and stamped by a registered California Structural Engineer. When a proposed structure is freestanding with an acceptance certificate applicable to the site's seismic coefficients, the structure may be accepted without independent seismic peer review, provided there will be no applied loads to the structure other than the self-loads. Piping, lighting and similar elements may be attached to the structure insofar as the manufacturer's specifications allow. Structures may be attached to existing buildings when the element has a certificate applicable to the site's seismic coefficients without seismic peer review provided the structure to which it is attached is verified for gravity, wind, and seismic loads. If the structure's certificate of approval does not include foundation requirements, then the foundation design shall be peer reviewed. When a trailer is placed on the ground, and the wheels are removed or are not in contact with the ground, then UC seismic requirements apply. Seismic peer review shall focus on the lateral bracing of the installation and not of the unit itself, except to verify the capacity of anchor points to transfer applied lateral loads.

***I. Standards for Lease, License, Acquisition by Purchase or other Title Transfer***

For leases or licenses and subsequent University occupancy, buildings and other facilities shall be rated, at a minimum, at Performance Level II or IV<sup>5</sup>, depending on occupancy. For acquisitions by purchase or other title transfer, and subsequent University occupancy, buildings and other facilities shall be rated at Performance Level I or III<sup>6</sup>, depending on occupancy.

1. The University may acquire, by purchase or other title transfer, and occupy a building rated at Performance Level II or IV<sup>7</sup>, depending on occupancy provided the Regents' action item for approval of the transaction includes:
  - a. An analysis of the economic risk to the University based on a Probable Maximum Loss Report (PML)<sup>8</sup>, including an estimate of the total project cost to repair the building after the seismic event in the PML Report,

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<sup>5</sup> Formerly expressed as Fair, see [Appendix A](#)

<sup>6</sup> Formerly expressed as Good, see [Appendix A](#)

<sup>7</sup> Formerly expressed as Fair, see [Appendix A](#)

<sup>8</sup> PML reports shall be completed following the requirements of ASTM E 2026 as Level 1 investigation for Site Stability, Building Stability, and Building Damageability where PML is defined as the scenario expected loss (SEL) in the design basis earthquake ground motion (DBE).

- b. An estimate of the total project cost to retrofit the building to achieve a Performance Level rating of I or III,
  - c. Plan to retrofit within a timeframe/plan deemed acceptable by the Regents, and
  - d. Actual compliance with that timeframe/plan.
2. The following building types are deemed adequate, and therefore do not require further evaluation:
- a. one and two-story wood-framed single-family residences less than 3,000 square feet
  - b. relocatable structures (e.g., trailers or other portable buildings), if the building does not have a gas connection.

Prior to lease, license, or acquisition, the Campus Building Official must evaluate a building's compliance with this Policy by means of an Independent Review, or by review of a completed Certificate of Applicable Code, as described below, and report to the Responsible Official on such compliance.

### 3. Independent Review

A CSE shall be engaged by the Responsible Official to examine the building or other facilities and to submit a report on the adequacy of the resistance of the entire building/other facility(ies) to seismic forces under the following conditions:

- a. if the building is located outside of the State of California; or,
- b. if the building is to be acquired by purchase or other title transfer; or,
- c. if the building is to be leased or licensed, and the use is as an acute care hospital, an essential services building, or K-12 school; or,
- d. if the premises to be leased or licensed are contained in a building not constructed or fully seismically retrofitted pursuant to 1976 or later edition of the Uniform Building Code; or,
- e. if the building contains any of the following conditions:
  - i. unreinforced masonry walls;
  - ii. welded steel moment frames (WSMF) constituting the primary structural system of the building which WSMFs have been subjected to a strong ground motion (approximately 0.20g or greater) since construction<sup>9</sup>, or may have low or limited redundancy, or discontinuity, or offsets of the moment frames;

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<sup>9</sup> Currently applies to WSMF buildings built before 1989 in the Santa Cruz/San Francisco Bay Area (Loma Prieta) and built before 1994 in the Los Angeles area (Northridge). It also applies to WSMF buildings in other geographic areas whose design and construction was approved by the local jurisdiction prior to the effective date of the 1998 Edition, CCR, Title 24, California Building Code that may have been subjected to this level of ground motion in any subsequent earthquakes.

- iii. flexible diaphragm-rigid walls;
- iv. apparent additions, or modifications, or repairs to the seismic resisting systems made without a permit;
- v. hillside construction on a slope steeper than 1-vertical to 3-horizontal;
- vi. multi-story structures with construction over soft-story construction on lower levels.

The independent review shall use the most current structural engineering evaluation techniques and data appropriate for the structure type, use, and age. Ground motions at the site and other geologic hazards considered shall be determined in accordance with any of the methodologies in the CBC (including site-specific studies, time-history studies, etc.). At a minimum, the review shall include a review of plans, specifications, and calculations (when available); a report on the adequacy of the resistance of such buildings and other facilities to seismic forces based on:

- f. conformance to the current seismic provisions of the CBC for existing buildings;
- g. the reviewer's professional evaluation of their anticipated seismic performance, expressed in terms of Performance Levels I through VII<sup>10</sup> with respect to degree of risk to life and safety of persons but not necessarily in strict conformance with the above specific seismic provisions;
- h. identification of potential falling hazards that pose a significant life or safety hazard to occupants; and,
- i. a written technical discussion of the basis for the building's performance level rating (as defined in [Appendix A](#)).

#### 4. Certificate of Applicable Code

An architect, civil engineer, or structural engineer (a University of California employee may not perform this function except that a licensed faculty member otherwise qualified may serve in this capacity) shall complete the University's Certificate of Applicable Code form (see [Appendix B](#)) prior to lease or license if the space to be leased or licensed is contained within a building where:

- a. design and construction was approved by the local jurisdiction pursuant to the 1998 or later edition of the CCR, Title 24, Part 2, California Building Standards Code, or
- b. design and construction was approved by the local jurisdiction pursuant to the 1976 edition of the Uniform Building Code and *does not* contain any of the construction conditions listed in paragraph III.I.3.e, above, or

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<sup>10</sup> Formerly expressed as *Good, Fair, Poor, or Very Poor*; see [Appendix A](#))

- c. a complete seismic structural retrofit was completed and approved by the local jurisdiction pursuant to the 1976 or later edition of the UBC and does *not* contain any of the construction conditions listed in III.I.3.e, above.

If the building contains any of the conditions described in Section III.I.3.e and none of the circumstances above are applicable, the Certificate of Applicable Code form may not be used. In such circumstances, the University shall contract and pay for an independent review as described above. Alternatively, the University may accept, at its sole discretion, a Landlord's independent review report that has been verified by the University's technical advisors.

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## **IV. COMPLIANCE / RESPONSIBILITIES**

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The Associate Vice President, Capital Resources Management is responsible for overall administration of this policy, including:

- 1) interpretation or clarification of this policy;
- 2) development of seismic safety criteria, standards, and guidelines;
- 3) evaluation of seismic safety programs and review of proposals for abatement of seismic hazards; and
- 4) determination of University-wide priorities among seismic rehabilitation projects and other projects proposed for inclusion in the Capital Improvement Program.

Designated Responsible Officials are tasked with taking reasonable steps to assure protection of persons under their respective jurisdictions against the effects of earthquakes, which could result in the loss of life or injury. Each such Responsible Official shall assign specific duties and authority to individuals within the respective jurisdiction to discharge this responsibility.

The Executive Vice President—Business Operations is responsible for coordination of seismic safety programs and may issue appropriate administrative guidelines as necessary.

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## **V. PROCEDURES**

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See the University Facilities Manual.

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## **VI. RELATED INFORMATION**

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Appendix A: Earthquake Performance Levels for Existing Buildings

Appendix B: University of California Certificate of Applicable Code for University Properties

California Code of Regulations, Title 24, Part 2, California Building Standards Code  
Section 15001 of the California Health and Safety Code  
California Uniform Building Code

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## **VII. FREQUENTLY ASKED QUESTIONS**

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N/A

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## **VIII. REVISION HISTORY**

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1/16/1975: Seismic Safety Policy reviewed and accepted by the Regents' Grounds and Buildings Committee, and formally transmitted to campuses by Vice President McCorkle on 1/20/1975

5/17/1988, 1/17/1995 and 4/20/2005: (minor editorial changes)

10/16/1996: Seismic Safety Policy for Leased and Purchased Facilities (issued by Assistant Vice President Bocchicchio, and revised by President Dynes in his 6/29/2007 letter to Chancellors

9/30/1985: Policy for Independent Seismic Review of Capital Projects, revised on 6/29/2007

8/25/2011: The Seismic Safety Policy incorporates and consolidates the three policies listed above to provide consistency with newer ratings systems for seismic safety adopted by Department of General Services (DGS) Division of the State Architect (DSA) and the California State University, and to reflect current practices with regard to engineering and process. This Policy supersedes all previous versions.

## APPENDIX A

### Earthquake Performance Levels For Existing Buildings

This series of definitions was developed by the California State University, the University of California, the California Department of General Services, and the Administrative Office of the Courts from 1995 through 2009.

**Table A.1. Determination of Expected Seismic Performance Based on Structural Compliance with the 2010 Edition, California Code of Regulations, Part 2, California Building Code (CBC)**

Definitions based upon California Building Code (CBC) requirements for seismic evaluation of buildings using Occupancy Categories of CBC Table 1604A.5, depending on which applies, and performance criteria in CBC Table 3417.5 <sup>2</sup>	Rating Level <sup>1</sup>	
	No Peer Review <sup>5</sup>	Peer Review <sup>5</sup>
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category IV performance criteria with BSE-1 and BSE-2 hazard levels replacing BSE-R and BSE-C as given in Chapter 34.	<b>I</b>	<b>I</b>
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category IV performance criteria.	<b>II</b>	<b>II</b>
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category I-III performance criteria with BSE-1 and BSE-2 hazard levels replacing BSE-R and BSE-C respectively as given in Chapter 34; alternatively, a building meeting CBC requirements for a new building.	<b>III</b>	<b>II<sup>5</sup></b>
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category I-III performance criteria.	<b>IV</b>	<b>III<sup>5</sup></b>
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category I-III performance criteria only if the BSE-R and BSE-C values are reduced to 2/3 of those specified for the site.	<b>V</b>	<b>IV<sup>5</sup></b>
A building evaluated as not meeting the minimum requirements for Level V designation and not requiring a Level VII designation.	<b>VI</b>	<b>VI</b>
A building evaluated as posing an immediate life-safety hazard to its occupants under gravity loads. The building should be evacuated and posted as dangerous until remedial actions are taken to assure the building can support CBC prescribed dead and live loads.	<b>VII</b>	<b>VII</b>

For Notes, see page 14

**Table A.2. Indications of Implied Risk to Life and Implied Seismic Damageability**

Rating Level <sup>1,5</sup>	Historic Risk Ratings of <sup>6,7</sup>		Implied Risk to Life <sup>3</sup>	Implied Seismic Damageability <sup>4</sup>
	DSA/SSC <sup>7</sup>	UC <sup>6</sup>		
I	I		Negligible	0% to 10%
II	II		Insignificant	0% to 15%
III	III	Good	Slight	5% to 20%
IV	IV	Fair	Small	10% to 30%
V	V	Poor	Serious	20% to 50%
VI	VI	Very Poor	Severe	40% to 100%
VII	VII	Very Poor	Dangerous	100%

Notes:

1. Earthquake damageability levels are indicated by Roman numerals I through VII. Assignments are to be made following a professional assessment of the building's expected seismic performance as measured by the referenced technical standard and earthquake ground motions. Equivalent Arabic numerals, fractional values, or plus or minus values are not to be used. These assignments were prepared by a task force of state agency technical personnel, including the California State University, the University of California, the California Department of General Services, the Division of the State Architect, and the Administrative Office of the Courts. The ratings apply to structural and non-structural elements of the building as contained in Chapter 34, CBC requirements. These definitions replace those previously used by these agencies.

2. Chapter 34 of the California Building Code, current edition, regulates existing buildings. It uses and references the American Society of Civil Engineers Standard *Seismic Rehabilitation of Existing Buildings, ASCE-41*. All earthquake ground motion criteria are specific to the site of the evaluated building. The CBC definitions for earthquake ground motions to be assessed are paraphrased below for convenience:

BSE-2, the 2,475-year return period earthquake ground motion, or 150% of the Maximum Considered Earthquake ground motion for the site.

BSE-C, the 975-year return period earthquake ground motion.

BSE-1, two-thirds of the BSE-2, nominally, the 475-year return period earthquake ground motion.

BSE-R, the 225-year return period earthquake ground motion.

*Occupancy Category* is defined in the CBC Table 1604A.5. The occupancy category sets the level of required seismic building performance under the CBC. Occupancy Category IV includes acute care hospitals, fire, rescue and police stations and emergency vehicle garages, designated emergency shelters, emergency operations centers, and structures containing highly toxic materials where the quantities exceed the maximum allowed quantities, among others. Occupancy categories I-III includes all other building uses that include most state owned buildings.

3. Implied Risk to Life is a subjective measure of the threat of a life threatening injury or death that is expected to occur in an average building in each rank following the indicated technical requirements. The terms negligible through dangerous are not specifically defined, but are linguistic indications of the relative degree of hazard posed to an individual occupant.

4. Implied Damageability is the level of damage expected to the average building in each rank following the indicated technical requirements when a BSE-1 level earthquake occurs. The damage includes both the structural and non-structural systems, but does not consider furnishing and tenant contents. Damage is measured as the ratio of the cost to repair the building divided by the current cost to reconstruct the building from scratch. Such assessments are to be completed to the requirements of ASTM E-2026 at ASTM Level 1 or higher in order to be considered appropriate, where the damage ratio is the Scenario Expected Loss (SEL) in the BSE-1 earthquake ground motion evaluated. ASTM E2026 is the standard for evaluating the seismic damageability of buildings for financial transactions.

5. In those cases where the engineer making the assessment using the requirements for a given Rating Level concludes that the expected seismic performance is consistent with a one-level higher or lower rating, this alternative Rating Level may be assigned if and only if an independent technical peer reviewer concurs in the evaluation. The peer review must be completed consistent with the requirements of Chapter 34 of the CBC. It is

anticipated that most projects that are independently peer reviewed from the initiation of the evaluation and/or design process will qualify for a higher Rating than those buildings, which have not been so reviewed at all. The second column under Peer Review the Ratings have been assigned when this occurs. Note that peer review is unlikely to improve buildings rated as VI or VII because they have fundamental seismic system flaws. The ratings for I and II are not changed because the performance increment between levels is so large.

6. Historically the University of California has used the terms good, fair, poor and very poor to distinguish the relative seismic performance of buildings. The concordance of values in the table above is approximate. The former rating procedures did not provide specific performance levels as is done herein, but were sentence fragments for qualitative performance and are recalled below for historical purposes only:

A *Good* seismic performance rating would apply to buildings and other structures whose performance during a major seismic disturbance is anticipated to result in some structural and/or nonstructural damage and/or falling hazards that would not /significantly/ jeopardize life. Buildings and other structures with a *Good* rating would have a level of seismic resistance such that funds need not be spent to improve their seismic resistance to gain greater life safety, and would represent an acceptable level of earthquake safety.

A *Fair* seismic performance rating would apply to buildings and other structures whose performance during a major seismic disturbance is anticipated to result in structural and nonstructural damage and/or falling hazards that would represent /low/ life hazards. Buildings and other structures with a *Fair* seismic performance rating would be given a low priority for expenditures to improve their seismic resistance and/or to reduce falling hazards so that the building could be reclassified *Good*.

A *Poor* seismic performance rating would apply to buildings and other structures whose performance during a major seismic disturbance is anticipated to result in significant structural and nonstructural damage and/or falling hazards that would represent appreciable life hazards. Such buildings or structures either would be given a high priority for expenditures to improve their seismic resistance and/or to reduce falling hazards so that the building could be reclassified as *Good*, or would be considered for other abatement programs, such as reduction of occupancy.

A *Very Poor* seismic performance rating would apply to buildings and other structures whose performance during a major seismic disturbance is anticipated to result in /extensive/ structural and nonstructural damage, potential structural collapse, and/or falling hazards that would represent /high/ life hazards. Such buildings or structures either would be given the highest priority for expenditures to improve their seismic resistance and/or to reduce falling hazards so that the building could be reclassified *Good*, or would be considered for other abatement programs such as reduction of occupancy.

7. For reference, the historically used Division of the State Architect and Seismic Safety Commission levels corresponds approximately to the new Performance Level numerical values in this table.

APPENDIX B

UNIVERSITY OF CALIFORNIA
CERTIFICATE OF APPLICABLE CODE FOR CALIFORNIA PROPERTIES

Building Address: \_\_\_\_\_, California ("Building")

I, \_\_\_\_\_ an architect, civil engineer, or structural engineer, duly licensed by the State of California, have completed a walk-through of the Building on \_\_\_\_\_ and reviewed the available documentation of the Building described above. I hereby certify<sup>1</sup> that the design and construction of the entire Building was either:

[ ] approved by the local jurisdiction pursuant to the 1998 or later edition of the California Code of Regulations, Title 24, Part 2, California Building Code (CBC)

-- OR --

[ ] approved by the local jurisdiction pursuant to the 1976 or later edition of the Uniform Building Code (UBC), including all additions, modifications or repairs to the seismic resisting systems. This building was originally constructed in \_\_\_\_\_ [year]. A complete seismic structural retrofit approved pursuant to the 1976 or later edition of the UBC took place in \_\_\_\_\_ [years(s), if applicable].

I further certify that the Building is not and does not contain any of the following:

- (i) unreinforced masonry walls;
(ii) welded steel moment frames (WSMF) constituting the primary structural system of the building which WSMFs (a) have been subjected to a previous strong ground motion (approximately 0.20g or greater) since construction<sup>2</sup>, or (b) may have low or limited redundancy, or discontinuity, or offsets of the moment frames;
(iii) flexible diaphragm-rigid walls;
(iv) apparent additions, or modifications, or repairs to the seismic resisting systems done without a permit;
(v) hillside construction on a slope steeper than 1-vertical to 3-horizontal; or,
(vi) multi-story structure with construction over soft first-story structure.

I have attached a copy of the certificate of occupancy.

Print Name \_\_\_\_\_ License No. \_\_\_\_\_

AFFIX SEAL HERE

Title \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

Firm Name and Address \_\_\_\_\_

1 As used herein, the use of the word 'certify' by an architect, civil engineer, or structural engineer constitutes an expression of professional opinion regarding those facts or findings, which are the subject of the certification, and does not constitute a warranty or guarantee, either expressed or implied.

2 Currently applies to WSMF buildings built before 1989 in the Santa Cruz/San Francisco Bay Area (Loma Prieta) and built before 1994 in the Los Angeles area (Northridge). It also applies to SMF buildings in other geographic areas whose design and construction was approved prior to the effective date of the 1998 Edition, California Code of Regulations, Title 24, California Building Code, that may have been subjected to this level of ground motion in any subsequent earthquakes.