CSU The California State University

CSU SEISMIC REQUIREMENTS

Rev. August 2024

CSU Seismic Requirements Quick Start Guide

Scope: The California State University (CSU) Seismic Requirements were established to implement the Seismic Policy approved by the Board of Trustees. The CSU Seismic Policy applies to all structures within the bounds of a CSU physical master plan. To accomplish its seismic purpose, it requires considerations of gravity loadings and response.

Applicability: If a University seeks to conduct operations at an off-campus location, the facility must be evaluated according to the "Standards for Acquiring Buildings and Space" (Lease/Acquisition Policy). Project funding source has no effect on peer review needs. CSU use is the determining factor. (Sec. 3.2, 3.4, 9.0)

Planning for All Capital Projects: Planning for all projects shall address the options considered to improve seismic performance beyond minimally required code conformance. The basis for determination of the selected option shall be documented to Capital Planning, Design and Construction (CPDC). (Sec. 8.0)

What Needs Seismic Peer Review: All major capital building projects require seismic peer review. All minor capital building projects shall be seismically assessed; however, a Campus Deputy Building Official (CDBO) may issue a written waiver for individual minor capital infrastructure and capital projects that do not have material seismic issues. If there is any doubt, contact the campus Seismic Peer Reviewer to assess a project's peer review need. (Sec. 3.7, 4.0, 5.5)

Early Notice to Design Team of Seismic Design Coefficients and Risk Category: The CSU has established campus-specific 'seismic ground motion parameters' that supersede California Building Code (CBC) values and implements a conservative evaluation on CBC Structural Risk Category assignments. As these can have a substantial effect on project costs, it is imperative that Universities inform the contractor and design team proposer of the CSU Seismic Requirements at the solicitation stage of a project. (Sec. 3.1, 3.3)

Peer Review: Peer review starts at project inception and continues until construction completion. Peer review concurrence letters are issued at the completion of the Schematic Preliminary Design and Construction Documents Phases, and during the course of construction on deferred submittals that have a seismic component. (Sec. 4.0) All Seismic Review Board (SRB) peer review comments require resolution. SRB construction phase submittals must be resolved prior to an occupancy permit being issued. Engage the SRB peer review of the Owner Program Requirements (OPR) and/or Feasibility Study (FS) concurrent with Project Request for Proposal (RFP) development for Design-Build (DB) or Collaborative Design-Build (CDB) Deliveries. Secure Seismic Peer Reviewer's concurrence letters for the OPRs and/or FSs in advance of advertisement for DB or CDB proposals and deliveries. (Sec. 3.8, 4.4, 5.18)

Purchase, Lease: The CSU Seismic Requirements have standards for the purchase, lease, license, and another form of acquisition or occupancy of buildings or portions thereof. Compliance is required before actual occupancy begins. (Sec. 1.0, 9.0)

Special Conditions: The CSU Seismic Requirements address many special conditions including geotechnical investigations, modular buildings, pre-engineered structures, temporary use of buildings, voluntary retrofits, use of engineered wood products, and designated seismic systems. (Sec. 5.0)

Phased Retrofit: If the CSU Building Official approved retrofit completion date is not met, then at their discretion, the CSU Building Official can direct the building to be vacated until such work is completed and a certificate of occupancy issued. (Sec 5. 16)

Change of Use: Temporary use changes (<14 days) require a Special Event Permit which should be coordinated with the CDBO. Renovations that alter an existing CBC Use and Occupancy require CDBO and SRB review. Early concept review by SRB can readily provide an informal advisory assessment. (Sec. 4.0)

CSU Seismic Priority Lists: Buildings on the CSU Priority Lists require seismic assessments to be included as a part of the project scope of any renovation work. (Sec. 7.0)

CSU Seismic Emergency Response: In the event of a seismic or structural emergency, contact any Seismic Peer Reviewer to assess the need for a mobilization response. If a mobilization response is warranted, the CDBO functions will be temporarily assumed by the SRB to rapidly assess which buildings are safe for use. (Sec. 6.0)

Responsibility of Design Professionals During Construction: Design professionals are expected to directly notify the CSU construction manager and Seismic Peer Reviewer of potential construction changes or modifications to the approved design documents that can substantively impact expected structural performance and, where appropriate, directly contact the Seismic Peer Reviewer for consideration of and concurrence with the changes as specific conditions warrant. (Sec. 3.10)

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CSU Seismic Requirements

Originally Adopted December 8, 2000; revised July 1, 2023

1. CSU SEISMIC REQUIREMENTS

The California State University (CSU) Board of Trustees (BOT) adopted the following policy to apply to all CSU construction projects:

> *RESOLVED, by the Trustees of the California State University, that the following policy is adopted:*
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> *It is the policy of the Trustees of the California State University that to the maximum extent feasible by present earthquake engineering practice to acquire, build, maintain, and rehabilitate buildings and other facilities that provide an acceptable level of earthquake safety for students, employees, and the public who occupy these buildings and other facilities at all locations where University operations and activities occur. The standard for new construction is that it meets the life safety and damageability objectives of Title 24 provisions; the standard for existing construction is that it provides reasonable life safety protection, consistent with that for typical new buildings. The California State University shall cause to be performed independent technical peer reviews of the seismic aspects of all construction projects from their design initiation, including both new construction and remodeling, for conformance to good seismic resistant practices consistent with this policy. The feasibility of all construction projects shall include seismic safety implications and shall be determined by weighing the practicality and cost of protective measures against the severity and probability of injury resulting from seismic occurrences.*
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> *[Approved by the Trustees of California State University at its May 18-19, 1993 meeting (RTCPBG 05-93-13).]*

The CSU requirements are the basis for CSU seismic actions. CSU undertook the assessment of the seismic hazard posed by the University's building stock at the direction of Governor Deukmejian in 1992 with resources provided by the Legislature in 1993. Since then, CSU has had a vigorous program of reducing the unacceptable seismic risk of its owned, constructed, acquired, and leased buildings based on these CSU requirements' enforcement to acceptable levels. Assessment of seismic issues also entails gravity and other environmental loads as necessary companions, which are included in the assessment.

The CSU Seismic Requirements describe the CSU framework used to implement the Trustees' Seismic Requirements. Key objectives and requirements are excerpted below. Additional background information and direction to the related policy requirements are provided for each.

1. The goal is, to the maximum extent feasible by present earthquake engineering practice, to provide an acceptable level of earthquake safety when acquiring, building, maintaining, and rehabilitating buildings and other facilities.

Discussion: Actions necessary to accomplish this goal were initiated in 1992 for existing buildings and will continue until all existing CSU buildings meet the seismic safety objective of the Trustees and all new construction meets this goal. Each year capital expenditures are recommended until the buildings with unacceptable safety hazards are seismically retrofitted or removed from service. The Seismic Review Board (SRB) is responsible to the Chancellor for review of expected seismic performance characteristics of all CSU buildings and advises the Chancellor of actions necessary to achieve an acceptable level of seismic risk for CSU buildings. The SRB is addressed in Section 2. Safe use of buildings subjected to possible earthquake damage is addressed in Section 6. Other special issues are addressed in Section 5. Standards for the acquisition and lease of buildings are provided in Section 9.

2. The standard for:
   - New construction is that it meets the life safety and damageability objectives of Title 24 applicable provisions.
   - Renovation and maintenance construction is that it provides reasonable life safety protection consistent with that for typical new buildings.

   Discussion: The California Building Code (CBC) and the California Existing Building Code (CEBC) provide construction standards for new construction and renovation of existing buildings, respectively. (The implementation of these standards is addressed in Section 3.)

3. Independent technical peer reviews shall be conducted to consider the seismic aspects of all construction projects from their design initiation, including new construction, maintenance, and remodeling, for conformance to good seismic-resistant practices consistent with these CSU requirements.

   Discussion: The SRB is delegated responsibility to conduct independent technical peer reviews of all CSU construction projects. The conduct of seismic peer reviews is addressed in Section 4.

4. The feasibility of all construction projects shall include seismic safety implications and shall be determined by weighing the practicality and cost of protective measures against the severity and probability of injury resulting from seismic occurrences.

   Discussion: The CBC establishes minimum standards for building safety. The CSU Standard may require more demanding considerations than what current CBC and referenced technical standards require where the SRB review indicates it is necessary to achieve the Trustees' standard of seismic performance. Section 9 of the CSU Seismic Requirements addresses the incorporation of seismic design and review into facilities planning and campus development.

2. SEISMIC REVIEW BOARD

The SRB was established in 1992. It is charged with implementing the independent peer review requirements of the Trustees' Seismic Requirements later adopted. The Board of Trustees also advises the CSU on structural engineering issues for specific projects. Membership is comprised of professionals not otherwise affiliated with the University system. The Board's current membership is listed in Attachment A.

3. CODES AND STANDARDS APPLICABLE TO CSU CONSTRUCTION ACTIVITY

By law, California State University is required to enforce the current edition of the adopted applicable elements of the California Code of Regulations, Title 24 in its entirety as adopted by the California Building Standards Commission (CBSC), henceforth known as the CBSC unless specifically noted otherwise. To facilitate this legal requirement, the CSU has adopted, as policy, selected additional sections of Chapter 1 Scope and Administration of the CBC related to code administration, code enforcement, and code interpretation, see California State University Policy "PolicyStat" for listing of sections adopted as policy. The Seismic Requirements supplement the requirements of the Code (Parts 1 through 12). Where requirements differ, the more restrictive shall apply.

The CBSC applies to all construction activity undertaken by CSU and applies to both seismic and non-seismic requirements for construction. The two sections address the seismic design of structures: the requirements for new buildings are found in Chapter 16 of Part 2, Volume 2 of the California Code of Regulations, known as the California Building Code; and the requirements for existing retrofit/renovation and repair to campus buildings are found in Part 10 of the California Code of Regulations, termed the California Existing Building Code.

The CSU Building Official (known hereafter as the Building Official) is based in the Chancellor's Office and is responsible for the enforcement of the Code and the CSU Seismic Requirements. A Campus Deputy Building Official is designated on each campus and has the delegated responsibility under the direction of the Building Official to enforce the code at the associated campus and additional sites under campus jurisdiction. When an emergency occurs at the campus resulting in earthquake damage, an SRB member serves as Emergency Designated Building Official (EDBO) to assure the independence of judgment on safety-related issues.

Designated historic structures may be subject to the State Historic Building Code which are in addition to the life safety objectives as provided in CBC and CEBC.

3.1 Minimum Requirements

The current edition of the CBC provides the minimum requirements for the regulation of all California State University construction activity. It has 12 sections, including those for new (Part 2), existing (Part 10), and historic buildings (Part 8). By common practice, the CBSC Code refers to the entirety of the 12 Parts. It applies to all construction, whether it is new, or an addition, modification, or alteration of an existing structure, including both permitted and non-permit-requiring actions.

The seismic requirements of CEBC for existing buildings are less stringent than CBC requirements for new buildings. The intent of CEBC is to retrofit and repair existing structures that will yield an essential life-safety level of performance. Essential life safety seeks to provide design performance that will allow building occupants in a seismic event to exit the structure safely. CBC Part 2, Chapter 16 may be used for modifications of the International Building Code (IBC) existing building, if so desired. Essential life safety does not necessarily mean that the occupants will be uninjured or not need medical attention. A structure is presumed to achieve this level of performance where: although significant damage to the structure may have occurred, some margin against total collapse remains, even though damage may not be economical to repair; major structural elements have not become dislodged or fallen to pose a life-safety threat; and, non-structural systems or elements, which are heavy enough to cause severe injuries either within or outside the building, have not become dislodged so as to pose a life-safety threat. Window glass, roofing tile, and elements of non-structural cladding systems are not generally considered to be a falling hazard to be included within this category of concern, except over primary entrances and exits. Very heavy cladding, such as precast concrete or prefabricated scrim panels, should be considered a falling hazard.

The CBC-required seismic provisions can be modified by the University to provide a higher level of seismic performance and shall be in compliance with the intent and purpose of this code but may not be modified to provide a lower level of seismic performance. Part 2 Division I Chapter 1 allows the Building Official to enforce other provisions as long as they do not diminish the safety of the facility. At any time when the Building Official chooses to exercise the authority of Section 104.10 Modifications, the basis for the modification must be reviewed and approved by the SRB prior to the approval of the construction plans. If any such modifications are considered, they should be provided to the design team as soon as possible, preferably before the design begins.

Consistent with CEBC, the retrofit or repair of a structure to essential life safety as a level of expected structural performance intends that occupants will be able to exit the structure safely following an earthquake.

Special Note: CBC Section 1604.5 requires the [Structural] Risk Category to be determined for every building. Table 1604.5 characterizes the nature of the Risk Category for various occupancies and uses. Occupant load is typically calculated per CBC Chapter 10 occupancy values based on use and square footage. Once the occupant load is determined, Table 1604.5 is applied to assign the Risk Category for structural design purposes.

Note that the occupant load determined by the design team (architect) is based on fire-related considerations and confirmed by the CDBO.

CBC Table 1604.5 refers to “buildings and other structures containing educational occupancies above 12th grade with occupancy load greater than 500.”
These requirements broadly apply to all CSU buildings with educational occupancies and/or instructional facilities, including non-state-funded buildings, dormitories (with educational occupancies above 12th grade and occupancy load greater than 500), dining centers, student unions, student recreation centers, student health centers, office buildings, stadia, aquatic facilities, etc. When a building exceeds this threshold, it shall be classified as Risk Category III, unless other designations trigger a more restrictive designation.

Certain CSU operations, including emergency operations centers, public safety buildings, water storage facilities, and pump structures required to maintain water pressure for fire suppression will trigger a Category IV use classification.

Exception: Parking Structures: The occupancy threshold trigger for Risk Category III applied to parking structures is 5,000 occupants as calculated by CBC Chapter 10. Requiring a Category III inclusion at 500 occupants for the inherently short-term, transient occupancy of a parking structure use is inconsistent with the CBC intent to provide supplemental, concentrated occupancy protection otherwise broadly afforded to college and university adult education facilities.

Parking structures may be designed for Risk Category II provided there is no sub-occupancy of Risk Category IV and not more than 10 percent of any other non-parking occupancy of Risk Category III, see Section 3.1, Exception.

3.2 Application to New Buildings

These policy requirements apply to all construction, whether new or modification of an existing building. Additions to an existing building that are seismically separated from that existing building shall meet the requirements for a new building. An addition may be considered seismically separated if the response of its structural elements will not be directly impacted by those of the existing building, either because they are not physically connected, or the physical separation is sufficient to avoid contact during an earthquake response. The addition's foundation systems may be in contact if they are at or below grade and both existing and new foundations have been evaluated to avoid surcharging each other.

3.3 Campus Seismic Coefficients

CBC Chapter 16 and CEBC Part 10 require seismic coefficients for structural calculations. CSU has adopted specific seismic parameters (Attachment B) to be used at all sites within the contiguous portions of a given campus that supersede those provided in the CBC unless justified by the project geotechnical engineer and approved by the SRB.

For new buildings, the Risk-Targeted Maximum Considered Earthquake (MCE_R) Ground Motion Response Acceleration parameters (S_{MS} and S_{M1}) and the Design Earthquake (DE) Ground Motion Response Acceleration parameters (S_{DS} and S_{D1}) shall not be less than the respective BSE-2N (MCE_R) and BSE-1N (DE) values given in Table 1 of Attachment B for the Site Class corresponding to the site-specific subsurface conditions of the building location. Corresponding Peak Ground Acceleration parameter values (PGA_M and PGA_D) to be used for the evaluation of potential geologic/seismic hazards are also given in Table 1 of Attachment B.

Similarly, the ground motion response acceleration parameters used for evaluation and/or retrofit of existing buildings shall not be less than the respective BSE-C (S_{CS} and S_{C1}) and BSE-R (S_{RS} and S_{R1}) values given in Table 1 of Attachment B for the Site Class corresponding to the site-specific subsurface conditions of the building location. As specified in the CBC, the BSE-C and BSE-R parameters are related to the hazard levels of 5% and 20% probabilities of exceedance (P_E) in 50 years, respectively, and are not constrained by BSE-2N (MCE_R) and BSE-1N (DE) values. Corresponding Peak Ground Acceleration parameter values (PGA_C and PGA_R) to be used for the evaluation of potential geologic/seismic hazards at the respective hazard level are also given in Table 1 of Attachment B.

The campus seismic ground motion parameters given in Table 1 of Attachment B correspond to reference rock Site Class BC (V_{S30} = 760 m/s) as utilized by the United States Geological Survey (USGS) in developing the U.S. Seismic Design Maps, as well as Site Classes C and D, with adjustments made using site coefficients F_a and F_v per ASCE/SEI 7-16 Tables 11.4-1 and 11.4-2, respectively, and F_{PGA}, per ASCE/SEI 7-16 Table 11.8-1. The SMS and SM1 values given in Table 1 of Attachment B for Site Class BC represent the mapped spectral response acceleration parameters at short periods (SS) and at a period of 1 second (S1), respectively.

The site-specific subsurface conditions are to be determined for the building/facility site by the geotechnical engineer as part of the project's development. Site Class at a given building/facility site location shall be determined based on site-specific soil and/or rock properties data following the Site Class definitions given in ASCE/SEI 7 Chapter 20. If soil and/or rock properties information is not available in adequate detail to designate the Site Class per ASCE/SEI 7 Chapter 20, the Default D Site Class shall be used unless geologic/geotechnical information indicates that Site Class E or F ground conditions may be present at the site that could trigger the need for site-specific hazard analyses.

For locations not covered in Attachment B, the University shall request and the CSU Seismic Review Board shall provide such values for design.

Use of the seismic ground motion parameters given in Table 1 of Attachment B satisfies the provisions of ASCE/SEI 7 Chapter 11, Section 11.4.8, requiring site-specific ground motion hazard and/or site response analyses for structure locations at CSU campuses for any Site Class except as provided below. Site-specific ground motion hazard and/or site response analyses are required for Site Classes E and F ground conditions. Site-specific ground motion hazard and/or site response analyses are permitted for any Site Class if warranted by the nature or special characteristics of a project; however, the need for such site-specific analyses, as well as the methodology for these analyses and analysis results, shall be subject to peer review by the geotechnical member of the CSU Seismic Review Board.

3.4 Applications to Existing Buildings

The California Code of Regulations, the California Existing Building Code (CEBC), Sections 317 through 323, governs work on CSU existing buildings and provides a level of life safety generally consistent with that of new buildings, but not particularly to achieve any other function, maintenance, or damage limitation objectives. These CEBC sections reference sections of ASCE 41-17, but they supersede the application of ASCE 41 as the basis of the design directly unless SRB approves.

Whenever a construction project on an existing building is planned, CEBC requires, if any of the triggers defined in Section 317.3.1 are exceeded, a two-level structural assessment of the seismic performance of the building, and possibly its modification, to assure adequate seismic performance of the modified building.

For projects that include new construction that is not structurally connected to above-grade existing elements, that is adequately separated from the existing elements to avoid possible contact, and that share only below-grade basement and/or foundation elements, CBC Part 2, Chapter 16 applies to the new construction.

Seismic improvements are not required for the adjacent above-grade existing elements unless required for another reason. It must be verified by rational analysis that loads imposed on the existing below-grade structural elements by the new structure do not compromise the gravity load supporting and lateral load resisting performance of the existing structure as determined using the provisions of CEBC.

Even when no structural modifications are planned, CEBC may require evaluation and modification of the structural system as a part of the construction project. The SRB has determined for some specifically identified seismic priority buildings that the triggers for CEBC are predetermined to require its application. The lists of such buildings are discussed in Section 7.

Through this regularized assessment procedure, the University seeks to ensure, over time, that its building stock will align with the current code-defined standard of performance desired.

When the planned construction project incorporates existing structural elements into the lateral force-resisting system of the modified structure, CEBC allows the use of the resistance capacity of all existing structural elements that participate in the building's seismic response, even when those elements do not meet CBC requirements for new construction. The provisions of CEBC apply to the entire structure.

The resistance capacity of the existing structural elements may be included in the lateral force-resisting system using CEBC. New and existing elements may be jointly considered to be part of the lateral force-resisting system only when the load-deformation characteristics of each of the elements are considered and the forces are apportioned in accordance with their relative rigidities. The rigidities assumed should be representative of the conditions, including deterioration, and expected to exist at the maximum seismically-induced cyclic deformations expected to occur at the seismic performance level being assessed.

Building renovation cost levels defined in CEBC Section 317.3.1, Item 1, are cumulative for alterations occurring after the effective date of the 1995 CBC. Any building alteration whose cost exceeds the threshold requirement of Item 1 must be reviewed to determine if structural modifications are required to meet CEBC seismic performance requirements. This requires an evaluation to assess that the building's anticipated seismic performance is adequate and may require a retrofit of the building. Seismic retrofit is required only when the evaluation determines the building lacks sufficient seismic force resistance to achieve the specified performance levels.

Determination if a Seismic Assessment is Required for Existing Building Modification:

The assessment of whether a proposed modification of an existing building requires seismic assessment and potential seismic retrofit depends on whether any of the five triggers for the project in Section 317.3.1 are exceeded:

1. Total construction cost for the building, not including the cost of furnishings, fixtures, equipment, or normal maintenance, exceeds 25 percent of the construction cost for the replacement of the existing building. The changes are cumulative for past modifications to the building that occurred after the adoption of the 1995 California Building Code and did not require seismic retrofit.
2. There are changes in the risk category.

3. The modification to the structural components increases the seismic forces in, or strength requirements of, any structural component of the existing structure by more than 10 percent cumulative since the original construction unless the component has the capacity to resist the increased forces determined following Section 319. If the building's seismic base shear capacity has been increased since the original construction, the percent change in base shear may be calculated relative to the increased value.
4. Structural elements need repair where the damage has reduced the lateral-load-resisting capacity of the structural system by more than 10 percent.
5. Changes in live or dead load increase story shear by more than 10 percent.

If any of the five triggers are exceeded or applicable, then an assessment is required that could lead to a seismic retrofit being required for the proposed work to be allowed. Whether Items 2 through 5 apply is determined by the design team. Item 1 requires an assessment of all building construction-related activity since the effective date of the 1995 CBC (January 1, 1998). The key metric is whether the cumulative work done is 25% or more of the cost of construction for the replacement of the building.

Item 1 shall be evaluated as follows:

a. Determine the current replacement cost of the building in its current condition, not as improved.

   The term "construction cost for the replacement of the building" is taken to mean the cost of construction in current dollars replacement costs plus the costs for demolition of the building under consideration at the application for permit date. This may be determined by escalation of the original construction cost from that of the original construction using construction cost index as appropriate to the construction type and location. If the original cost is not available, then current replacement costs for recent new buildings of comparable like and similar program, use and construction may be used with the concurrence of the CSU Senior Building Official.

b. Determine the cost of qualifying work for all projects since completion of the building or January 1, 1998, whichever is later, including the total cost of the proposed project. Prior project costs are not inflated to the present day. If the ratio of the qualifying costs plus the proposed project to the replacement cost is less than 15%, then the trigger is deemed not to have been exceeded. This approach simplifies the trigger evaluation by eliminating the need to inflate past costs to current costs.

c. Alternatively, determine the regional Engineering News Record (ENR) construction cost index applicable to each qualifying project to inflate it to the present cost basis. From these values for each project, compute the equivalent present-day cost estimate, including the proposed project. If the ratio of qualifying costs to the replacement cost is less than 25%, then the trigger has not been exceeded.

The cost basis for Section 317.3.1, Item 1, does not include normal maintenance work: ordinary upkeep and repair work such as replacement in kind, repainting, re-plastering, and re-roofing. However, any work caused by an earthquake is not considered as normal maintenance.

a. "Equipment" means mechanical, electrical, and plumbing equipment that is replaced in kind with no betterment that could offer the original level of performance is available in the marketplace. The term "Normal Maintenance" includes work such as painting, replacement of roof membranes, damaged ducting, leaking piping, and frayed wiring, but does not include repair or replacement of physical elements of the building that are part of the building architectural and structural elements that would not be identified as having a service life far less than the expected useful life of the building.

For either b or c above, if the building has been retrofitted to then-current CEBC requirements, then the date for assessing qualifying costs begins when this work was completed.

If at any time, the construction cost of the project exceeds that used in either b or c and the ratio is more than 15% or 25%, as applicable, the Building Official shall determine if this is because of cost escalation or increase of the project scope; if the latter, then the project must be reassessed to determine if the revised seismic retrofit cost ratio requires evaluation and modification of the design. If it does, then the building shall be immediately evaluated in accordance with the requirements of Section 7, and placed the buildings on List 1, List 2, or No List.

When a seismic retrofit satisfying the requirements of Table 317.5 is completed, then the cumulative total cost ratio is reset to zero and the effective date in Section 317.3.1, Item 1, is advanced to the completion date of the seismic retrofit.

3.5 Code Enforcement

California State University is responsible for the enforcement of the CBSC. By delegation, one person is designated as the Deputy Building Official (DBO) for that campus and its other administrative locations. While the SRB is principally concerned with structural issues related to design and modifications of new and existing buildings, design teams must consider all 12 Parts.

When deemed necessary, the Building Official shall appoint a member of the SRB during an emergency as an Emergency Designated Building Official (EDBO), see Section 6. The EDBO is responsible for enforcing the requirements of CBSC to make the final determination as it relates to structural and seismic safety when buildings or portions of buildings at the campus can continue to be used or re-occupied. Another member of the SRB may provide the technical review of the seismic aspects of projects and reports findings to the EDBO, see Section 4.

CEBC Section 319.12 for existing state buildings states that, notwithstanding other requirements of the code, voluntary modifications to the lateral force resisting system are permitted under certain conditions. Among these is that:

5. A dangerous condition is not created.

CEBC Section 3.16.6 states that:

> "… buildings in existence … may have the existing use or occupancy continued if such occupancy was legal …, provided such continued use is not dangerous to life."

The term dangerous is not defined as used in these sections within the CEBC. The 2022 CBC defines dangerous as any building structure or portion thereof that meets any of the conditions described below:

1. The building or structure has collapsed, has partially collapsed, has moved off its foundation, or lacks the necessary support from the ground.
2. There exists a significant risk of collapsed detachment or dislodgment of any portion, member, appurtenance, or ornamentation of the building or structure under permanent, routine, or frequent loads; under actual loads already in effect; or under snow, wind, rain, flood, earthquake, or another environmental load when such loads are imminent. (2022 edition, CBC Section 202)

CSU has determined that for its buildings undergoing seismic upgrades, this term is defined as:

> A building is deemed dangerous if it does not satisfy the ASCE 41 S-5 performance criterion based on BSE-R.

Such a dangerous building determination must be peer-reviewed for accuracy based on Method B of CEBC Section 321. Method A may be used for the design of the voluntary seismic upgrade.

3.6 Active Faults

Faults capable of rupture can traverse campuses where construction is planned. It is recognized that the locations of future fault ruptures are not specifically known, but locations of past ruptures are good indicators of where the fault rupture may occur. The California Geological Survey (CGS) delineates earthquake study zones along known active faults in California. An active earthquake fault is defined as one that has exhibited surface displacement within Holocene time (about 11,000 years) as determined by the CGS under the Seismic Hazards Mapping Act of 1990, previously called the Alquist-Priolo Earthquake Fault Zoning Act, or another authoritative source, federal, state, or local governmental agency. The purpose of this Act is to prohibit the location of new structures for human occupancy across the traces of active faults and to mitigate thereby the hazards associated with fault rupture. Zone boundaries are generally drawn about 500 feet from major faults and 200 to 300 feet away from well-defined minor faults.

State agencies, including CSU, with jurisdiction over sites within an earthquake fault zone regulate the development of projects within these zones, and the Trustees will withhold development permits for sites within these zones until geologic investigations demonstrate those sites are not threatened by surface displacement from future faulting. These maps are available online from the CGS web address given in Attachment F. In the case of a fault not zoned by the CGS, CSU will determine whether an individual fault is active when there is sufficient evidence of an active fault traversing a campus, and it will apply the requirements for investigations pending evaluation by CGS of its status. The SRB determines the sufficient level of evidence regarding possible fault zones and maintains maps of zones determined to warrant treatment as a fault hazard zone. Currently enforced additional seismic hazard zones are identified in Table 1 of Attachment B under the heading Active Fault Zone.

When an active fault traverses a campus within a defined seismic zone as determined by CGS or by the SRB for the subject fault:

> All planned construction within the Earthquake Fault Zone shall have detailed geologic studies of the building site to determine if a fault trace passes through, or is within 50 feet of, the building perimeter. Such studies shall be completed under the peer review requirements of Section 4.

The distance from a building to a fault is measured from the closest point of the building, including its foundation, to the fault along a line normal to the plane of the fault. No new building shall be constructed, or the existing building's envelope extended, where the closest portion of the building, including foundations, is less than 50 feet from an active fault. Where the geological assessment is determined to support a smaller value than 50 feet, the SRB may approve the value on a case-by-case basis.

Campuses within a known active fault zone are identified in Table 1 of Attachment B. The Building Official and SRB must approve the selection of the engineer for a site study within a seismic zone before the initiation of the investigation. Once a geological study is completed and the Seismic Peer Reviewer accepts the results, this study will provide a basis for the design of the subject building for no more than five years after acceptance of the report by the Seismic Peer Reviewer, or a new study must be completed to determine findings for the site consistent with current scientific and field investigations.

Within an Earthquake Fault Zone, CEBC applies wherever the structure is to be modified without regard to its extent or purpose, notwithstanding the allowances of CEBC Section 317.3. Normal building maintenance and repairs of mechanical systems do not themselves trigger retrofit requirements unless the replacement unit outweighs the original unit by more than 10% and/or the supporting structural elements are altered.

For new determinations or relocations of fault locations at a campus, the SRB shall evaluate the incremental hazard posed to all existing buildings within an Earthquake Fault Zone and include this hazard in their overall evaluation of the seismic risk of the building.

Where a portion of the building is removed as a part of the building modifications, then the new perimeter of the modified building shall be used to determine if these conditions are met. Such actions will trigger CEBC consideration without consideration of the allowances for the triggers of CEBC Section 317.5.1.

These procedures apply only to buildings that are occupied, and not to storage buildings that are not occupied by staff except for placement or removal of stored materials; buildings where maintenance functions or other work are performed do not qualify for this exemption. Under no circumstances should such buildings house chemical or hazardous substances that, if released, could pose a toxic threat to the area around the building.

3.7 Peer Review for Small Projects

For projects with a total project cost of $3,000,000 or less, and for any amount of building element replacements-in-kind, or repairs and maintenance projects, the CDBO is obligated to evaluate the nature of the contemplated work, and they may self-certify compliance with these requirements (see also Section 5.5 Projects Not Warranting Peer Review). The CDBO will notify the Building Official in writing of this determination. If the proposed work involves increases in weight from that in place or modifies the structural system as stated by the designer-of-record, then peer review is not optional. This topic is discussed in more detail in Section 4.

3.8 Peer Review Verification

Verification that the construction documents comply with the CSU Seismic requirements, including an acceptable plan check for compliance with the CBC and/or CEBC, is a prerequisite to construction initiation. Seismic peer review verification shall be documented by a letter of concurrence signed by the Peer Review. The letter shall include specific references to the document set reviewed (i.e., date, revision number, sheets, identification of the Engineer-of-Record (EOR), etc.) sufficient to identify the project and the specific document set considered in the peer review. As construction continues, the Seismic Peer Reviewer shall review as appropriate any changes that occur to the design to assure that they are consistent with the approved plans and with CSU Policy.

3.9 Engineer-of-Record

All aspects of the structural design of a CSU project shall be under the responsible charge of one licensed California Architect, Civil Engineer, or Structural Engineer that serves as the EOR for the project through the completion of construction. The EOR shall be determined at the beginning of the design process and shall not be changed in the course of construction without approval by CSU. 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 responsibility for the structural aspects of the entire project and must sign and stamp all final documents, including deferred submittals, see also Section 5.13.

3.10 Responsibility of Design Professionals during Construction

The CSU recognizes that regardless of the project delivery method employed, the approved plans for each project may be modified or supplemented during the construction process. The University expects each licensed design professional engaged in the design to review and approve all such modifications proposed within their area of responsibility as a professional obligation before its execution. CSU project management team members do not have the authority to approve substantive changes during construction without the approval of the design professional and, where necessary, the Seismic Peer Reviewer. The CSU project manager will document these approvals in writing if the design team has not done so.

To assure the structural seismic performance of its buildings is consistent with the approved plans, CSU looks to the design professionals (including Structural-, Component-, Mechanical-, and Geotechnical-Engineers of Record and Architect-of-Record) to directly notify the CSU of potential construction changes or modifications to the approved design documents that can substantively impact expected seismic or gravity load response performance.

CSU requires the responsible EOR, or equivalent person (e.g. Component Engineers of Records), to make the structural/seismic assessments and to directly contact the Seismic Peer Reviewer for consideration of and concurrence in the changes as specific conditions warrant. This is similar to the process described for Delegated Design and/or Deferred Approvals in Section 5.13. CSU has determined that all substantive changes to the foundation system, vertical load-bearing system, and/or lateral load-resisting system require such notification. This responsibility is a non-delegable professional duty of the EOR regardless of the project delivery contract employed.

In some cases, the EOR, and/or contractor may advise the CSU that the original Plan Check Agency review documents that have altered plans for compliance with the approved design and the CBSC; delegated and/or deferred items from the original approved plans are in this category. This is consistent with the delegated and/or deferred approval procedures unless the change involves the seismic force-resisting system in which case the Seismic Peer Reviewer must be involved. CSU shall cause these reviews to be performed when it deems them necessary, which is any modification that could be questioned on its technical impact on the structural performance of the building. Each member of the project team, including the contractor, design team members, and CSU project manager, will have various schedule imperatives. It is important that where review or further plan check review is deemed necessary, that it be initiated promptly, and that sufficient time is allocated to complete the review.

3.11 Special Inspections

Chapter 17 of the CBSC requires the design professional to prepare special inspection and testing requirements for a proposed project, the Owner to confirm responsibility for their completion, and the Building Official to approve the proposed plan. CBSC requires these to be listed on the permit drawings. The materials sections of the CBSC and many referenced standards therein contain requirements for inspection that must also be considered in the development of the testing and inspection program for construction. The Chancellor's Office maintains model forms that can be used as the basis for preparing the required Special Inspections Program. Where there are deferred approvals items, the special inspection requirements specific to the deferred work must be prepared and submitted with the design documents for each deferred item. Special inspections do not constitute Structural Observation.

3.12 Structural Observations

Structures requiring structural observation are identified in CBC Chapter 17 and as required by the Building Official in consultation with the Seismic Peer Reviewer. As discussed in Seismic Requirements Section 3.1, many CSU projects will trigger this requirement because they are Risk Category III structures. Some projects will involve structural observation of nonstructural components and systems. With the concurrence of the Seismic Peer Reviewer, the approved structural design shall specify structural observations required by the CBC and those recommended by the design team and required by the Building Official. Component engineers of record shall specify structural observations applicable to their designs on their drawings. This concurrence shall be obtained prior to initiating structural observations. Unless otherwise agreed to by the Building Official, the structural observation shall be performed by the design professional specifying the structural observation. Documentation of the structural observations and a statement regarding the resolution of observed deficiencies shall be submitted to the Building Official.

4. PEER REVIEW

Peer review is a mandatory part of the construction process of the California State University system. The seismic peer review is independent of the plan check requirement of the CBSC whose principal focus is conformance with the CBSC requirements, not necessarily the total building seismic performance and its reliability. CSU performs both independent peer reviews for fire and panic safety, Mechanical, Electrical, and Plumbing (MEP) aspects of the design, as well as other plan checks for Code compliance.

Peer review is to be performed for all building projects and all engineered structures, such as trailers and bridges. Other construction activities may be referred for seismic peer review at the discretion of the Building Official or CDBO. If the Seismic Peer Reviewer concludes that a seismic peer review is not required, then a letter to this effect will be issued. This letter is an adequate record of peer review of the project, provided the scope of the project does not change.

The purpose of peer review is to assure project quality, to provide a measure of additional assurance regarding the performance and safety of the completed project, to provide advice on methods and means, and to provide relevant specific campus information. When the peer review of the design has been completed but aspects of the design are not complete because of deferred submittals, discovered conditions, etc., then these should be identified in the reviewed permit documentation and reviewed during the construction period when identified by the EOR's evaluation or the Seismic Peer Reviewer's observations as having implications for the seismic performance.

Peer review is not intended to and does not replace the design responsibilities of the EOR. Peer review is not a plan check for detailed determination of the compliance of the developed plans to the requirements of applicable codes and standards.

Peer review is an objective technical review by an independent, knowledgeable reviewer(s) experienced in structural design, analysis, and performance issues. The reviewer(s) shall examine the available information on the condition of the building, the basic engineering concepts employed, and the recommendations for action. This may include any structural issues, seismic and non-seismic, necessary to achieve adequate building structural performance.

The SRB has assigned individual Seismic Peer Reviewers for each campus (Attachment C) and will assign Seismic Peer Reviewers for locations not listed as needed.

The principal Seismic Peer reviewer may assign one or more qualified individuals to provide independent review under their direction. The SRB will periodically review such assignments.

A Seismic Peer Reviewer performs a different service than an organization's internal technical review, a Building Official's plan review, or a third-party plan check review. The peer review provides the EOR with a qualified technical opinion on the adequacy of the structural engineering approaches used and the resulting design. The peer review is not intended to check the project for code compliance or to validate computations or conduct a detailed examination of the retrofit design. Any such actions by the Seismic Peer Reviewer will be limited to those deemed required to complete her/his responsibilities. A peer review is not the same as value engineering but may include elements of value engineering. The purpose of value engineering is to suggest alternative systems, materials, and methods for a project to reduce its cost or improve its seismic performance. The purpose of the peer review is to assure that the seismic response characteristics of the building are well-considered, appropriate, and acceptable.

Because the Seismic Peer Reviewer is responsible to review the expected seismic performance characteristics of the buildings, in light of the Trustees' Seismic Requirements and specific CSU policies adopted to achieve this purpose, the review may exceed minimum building code requirements in assessing the performance of the overall structural system(s).

The Seismic Peer Reviewer is responsible and accountable solely to the SRB and CSU Trustees for their actions. Although the Seismic Peer Reviewer may advise the CSU Deputy Building Official and CDBO on seismic-related code compliance issues, it is the Building Official who retains the responsibility and authority for code compliance determination.

4.1 Scope of Review

Documents submitted for review shall include available construction documents, geotechnical reports, observations of the condition of the structure, all inspection and testing reports (including methods of sampling), analyses prepared by the EOR and consultants, and the retrofit or repair design. Peer review is both site- and building-specific and considers proximity to faults, and soils/geologic conditions. The expected seismic performance characteristics for each building include the geometry of the building, the structural system(s) proposed, lateral and gravity load paths, and whether these are supported by design, calculations, and detailing in the project documents. The review shall include consideration of the proposed design approach, methods, materials, and details.

Peer review tasks include any or all of the following:

1. Assess appropriateness of analysis and provide additional assurance of a highly reliable design performance under applicable environmental loads and conditions,
2. Suggest additional design options, analysis perspectives, and provide knowledge of experience in materials performance considerations,
3. Provide constructive comments on work-in-progress,
4. Assist in achieving consistency of design and design approach among different CSU projects and in expected retrofit project seismic performance,
5. Aid in communication regarding local conditions,
6. Provide technical assistance for the resolution of technical problems encountered in the design and construction,
7. Communicate with SRB on technical issues and concerns with system-wide implications,
8. Offer positive engineering input where new and/or innovative design or analysis procedures are proposed,
9. Confirm that the design of seismic protection of nonstructural components in or on the building is appropriately addressed and consistent with CSU's desire to limit earthquake damage,
10. During the construction phase, review additions and modifications to approved drawings that may impact the seismic performance of the building.

The EOR for the project and University project manager shall provide the Seismic Peer Reviewer with all available information determined by the Seismic Peer Reviewer to be necessary for the completion of the peer review.

The effort undertaken in peer review is commensurate with the size and complexity, or lack thereof, of the project, but shall not be limited so as to compromise the technical reliability of the process.

4.2 Timing of Peer Review

The Seismic Peer Reviewer should be engaged for the entire project, from concept to final construction, and should participate during early structural design to ensure concurrence with systems proposed for the specific project. The peer review is completed when the construction is completed and an occupancy permit is issued.

Where the delivery method is Design-Build, including collaborative Design-Build, the Seismic Peer Reviewer's effort begins when the RFP is prepared, see Section 5.

4.3 Reports

The peer reviewer(s) shall prepare written reports to the CSU Project Administrator and CDBO describing all aspects of the review performed to date, including conclusions reached by the reviewer. Reports shall be issued, as appropriate, after conceptual design, schematic design, during design development, and at the completion of construction documents, but before their issuance for a permit. On phased projects, a report shall be issued after the completion of each phase. Such reports should include in aggregate, as relevant, statements of the following issues:

1. Scope of engineering design peer review with limitations defined.
2. Status of the project documents at each review stage.
3. Design, performance, and loading criteria.
4. The ability of selected materials and framing systems to meet performance criteria with given loads and the configuration.
5. Degree of structural system redundancy and the deformation compatibility among structural and nonstructural elements.
6. Basic constructability of the retrofit or repair system.
7. Other recommendations as appropriate to the specific project.
8. Presentation of the reviewer's conclusions identifying any areas needing further review, investigation and/or clarification.
9. Recommendations for actions.

The final report shall be prepared when all the peer review comments are resolved. It shall indicate that in the Seismic Peer Reviewer's opinion the design is appropriate for construction. From time to time the design team may propose significant alterations to the design during construction; the Seismic Peer Reviewer will assess their merits and issue a letter reporting the recommended acceptance or rejection of the proposed alterations. In those cases where they are accepted as is, a written acceptance note to this effect should be sent.

4.4 Responses and Corrective Actions

The EOR shall develop corrective actions and other responses as appropriate, based on the report submitted by the Seismic Peer Reviewer. Construction changes that affect the seismic force-resisting system shall be reported to the reviewer in writing for review and recommendations.

4.5 Distribution of Reports

Copies of reports, responses, and notices of corrective actions shall be submitted to the University Project Manager for use and distribution, and the Building Official.

4.6 Design Professional Responsibility

Although the Seismic Peer Reviewer will exercise usual and customary professional care in performing the seismic peer review, the responsibility for structural design is fully and solely the responsibility of the design professional of record as outlined in the California Business and Professional Code. The seismic peer review is undertaken to enhance the quality of the design and to provide additional assurance regarding the performance of the completed project consistent with the Board of Trustees' direction of Section 1.

4.7 Resolution of Differences

If the EOR does not agree with the recommendation of the Seismic Peer Reviewer, then the SRB shall resolve such differences. Peer review should be a cooperative process between the structural EOR and project Seismic Peer Reviewer, both having the objective to produce a quality project. Direct and free communication between the EOR and the project's Seismic Peer Reviewer is vital to avoid misunderstanding. Despite this, honest differences may arise between the EOR and the project Seismic Peer Reviewer. In such cases, the EOR and project Seismic Peer Reviewer may determine the issue under consideration and the solution adopted may be controversial and would benefit from examination by the full SRB. Such cases will be presented to the SRB for consideration, evaluation, and resolution. All interested parties will have the opportunity to present their technical arguments to the SRB for its consideration. The project's Seismic Peer Reviewer will not participate in these proceedings as a member of the SRB. The decision of the SRB will be submitted to the Building Official with a recommendation of disposition.

4.8 Peer Review Contract and Cost

The Chancellor's Office maintains a fully executed, system-wide master enabling seismic peer review agreement with each Seismic Peer Reviewer. Terms and conditions, including specific services and fees, have been fixed in these agreements. Peer review fees normally are based on total project construction costs and shall not be amended without both University's and Seismic Peer Reviewer's concurrence. Copies of the agreements and amendments are provided for reference on the CPDC website. To authorize services under these Agreements, the University need only execute a Service Order to the reviewer assigned to its University and specify the fee and other relevant particulars.

5. SPECIAL CONSIDERATION

5.1 Private Buildings Constructed on CSU Land

When a private developer constructs a building on land owned or controlled by the California State University or any of its foundations or entities, or the building is expected to come under CSU control at a future date, the project shall be peer-reviewed in accordance with the requirements of this document as recommendations made to the design team as required for their considerations but not an expansion of CBSC requirements for the project.

5.2 Geotechnical Investigations

Determination of the seismic loading conditions requires that the building site's soils be classified. Any geotechnical investigation conducted for a project shall include consideration of all seismically induced site failure hazards, including liquefaction, differential settlement, lateral spreading, land-sliding, and surface faulting.

Note that CSU has determined campus-specific seismic design ground motion parameters to be used for new and modification of existing buildings that supersede those in the CBC. These are given in Attachment B. The engineer preparing geotechnical reports for projects at locations where the CSU values are prescribed need not do additional site exposure work for determining CBC seismic design requirements unless unique conditions are believed to exist.

5.3 EOR References to Geotechnical Investigation

Construction document directions to "see soils report" are not permitted on CSU projects. The Engineer of Record, not the contractor, is the responsible party to take from the geotechnical report the relevant information and then conveying it as a part of the construction documents; the geotechnical engineer shall remain responsible for its contents of the geotechnical report and recommendations.

The geotechnical report itself shall not be portrayed as a part of the construction documents. The construction documents may reference the geotechnical report as a 'supporting document' (providing name, title, author, date, etc.) for the contractor's reference and if desired, state that the geotechnical report was relied upon in the development of the construction documents. The Seismic Peer Reviewer will request a review by the geotechnical engineer to confirm that the design reflects the geotechnical recommendations of the geotechnical report.

5.4 Changes and Additions to Published SRB Requirements

The SRB may establish additional requirements relating to the design and construction of new buildings, and the retrofit or modification of existing buildings that have yet to be incorporated into these CSU Seismic Requirements. The assigned Seismic Peer Reviewer is responsible for informing the project manager and design team of these additional requirements as appropriate at the initiation of a project.

5.5 Projects Not Warranting Peer Review

By Trustee policy, all construction, whether above or below grade, requires a seismic review determination. Where the CDBO determines that there are no structural issues warranting a seismic peer review, the University shall submit project documentation to the Seismic Peer Reviewer for an initial determination. If the Seismic Peer Reviewer concurs, the Seismic Peer Reviewer will provide a letter documenting this to the University. This letter shall satisfy the requirements of peer review for this project. There is no charge to the University for an initial determination.

The CDBO is authorized to make an initial determination for projects with a total project cost of $3,000,000 or less, non-structural tenant improvements of any amount if they do not impact the structural system, building element replacements-in-kind, or repairs and maintenance projects. Should a peer review be deemed warranted, the University shall issue a Service Order Authorization for a seismic review of the project.

- Special non-building capital project types that typically require peer review include bridges, tanks, cellular towers, and field lighting that illuminates a surface 30 feet or greater below the light fixture.
- Special project types not required to be submitted for peer review generally include under 30-foot-tall streetlight and traffic components installed consistent with Green Book (or equivalent) standards, public utility elements installed by a public utility, storm drainage elements, and tree/palm installations not supported by above-grade structural elements.
- Student structures that are designed, constructed, and possibly used after construction, whether by student labor or contractors, shall be peer-reviewed. There is no charge for this peer review.

5.6 Demolition Projects

Demolition of existing facilities up to 45 feet total height from the lowest adjacent ground plane generally does not require peer review. Taller structures and all planned implosions require review. Even when not required, the SRB and campus Seismic Peer Reviewer is available to the University to provide technical advice and counsel on such.

5.7 Material Properties of Existing Buildings

Material properties (i.e., strength, stiffness, damping, mass) must be established on all projects involving existing buildings where structural modifications are involved or structural evaluations are required to determine load carrying capacity of structural elements.

This may be established based on existing documentation (e.g., record drawings) acceptable to the Engineer-of-Record and the Seismic Peer Reviewer or by a materials testing program.

ASCE/SEI 41-16 prescribes the methodology for the degree of destructive and non-destructive examination and testing to establish material properties and knowledge factor (k) to be used in the analysis and design. Where testing is to be performed, the Engineer-of-Record must define the destructive and non-destructive testing program using the guidelines of ASCE/SEI 41. ASCE/SEI 41 Commentary states “Where a destructive and non-destructive testing program is necessary to obtain as-built information, it is prudent to perform preliminary calculations on key selected locations or parameters before establishing a detailed testing program.” The ASCE standard for this notes the importance of obtaining this “knowledge at a reasonable cost and with as little disruption as possible of construction features and material properties at concealed locations”.

CSU encourages the EOR to use engineering judgment and experience and a preliminary evaluation to establish a cost-effective testing program. In developing a testing program, the following shall be considered:

- Fewer tests may be justified based on the confidence conference level of available information, uniformity of test results, and seismic or other loading demands on the existing structural elements.
- Phasing the testing program and using the results of the initial phase to qualify the number of locations in a subsequent phase.

- Focus the tests on critical structural elements.
- Utilize different appropriate testing procedures (i.e., cores, Schmidt Hammer tests, etc.).

The methods used to determine the material values must be approved by the Seismic Peer Reviewer.

5.8 Design-Build and CM at Risk Projects

Collaborative Design-Build, Design-Build, Construction Manager at Risk, and other project delivery systems (collectively called Design-Build) projects pose a special set of issues for the application of the CSU Seismic Requirements.

As noted in Section 4.2, seismic peer review of a project shall be initiated by the University when the project requirements and goals are in development, that is, well before the request for proposals or qualifications is issued to potential performers.

CPDC maintains model procurement and contract language for use in Design-Build procurement to assure that CSU seismic requirements are incorporated in the procurement and implementation process. The intent is to ensure an adequate review of the seismic requirements for the project when the specifications are written. The specifications shall clearly define the code requirements and seismic performance requirements for the project, thus reducing the potential for additional charges in the event of disputes regarding code interpretation and peer review.

The requirements for Design-Build projects include provisions that peer review, plan check, and testing and inspection services are paid for and under the direction of CSU. The contract may contain a provision that the contractor shall reimburse the University under the contract for these services. In such case, it is agreed that their duties for the project are to the University as representative of the Trustees, and not to the contractor.

5.9 Moment Frame Structural Systems

The following requirements apply when special moment frame structural systems are used. They apply to all moment frame structures, including concrete, masonry, and steel:

1. Where rigid elements, such as ramps, exist in the structure, a detailed assessment of the interaction of the ductile frame and rigid element shall be completed to assure adequate post-yielding behavior of the structural system at the maximum expected deformation.
2. Columns with variable, unsupported height shall be detailed to be ductile. As an alternate, double-column support systems can be used to accommodate sections at breaks in elevation, with seismic separations between the columns and slabs.
3. For parking structures, all concrete columns shall include confinement reinforcing, even if they are not part of the designated moment frame lateral load-resisting system of the structure. Ramps are to be included in the structural model used for analysis, and the interaction effects and deformation compatibility requirements must be included in the design of the structural system.

5.10 Post-tensioned Structural Elements

CSU Guidelines for post-tensioned concrete structures are found in Attachment E. The Guidelines are not intended as direction to the design team, but as alerts to important technical performance issues in the design that are likely to be of concern during the peer review.

5.11 Alternate Methods of Construction

Construction assemblies not specified in the CBSC may be used provided that:

1. They have been accepted for use by the International Code Council (ICC) Evaluation Service (ICCES), International Association of Plumbing & Mechanical Officials (IAPMO), the State Architect (DSA), or the Department of Health Care Access and Information (DHCAI) and are used in accordance with the referenced research report or approved memorandum for application.
2. The Building Official approves the application for alternate materials, alternate design, and methods of construction under Part I, Chapter 1.2.3. The Building Official may engage the responsible Seismic Peer Reviewer to examine technical materials submitted in support of requests for alternate methods of construction that have implications on the seismic performance of the resulting construction.

5.12 Use of Engineered Wood Products

1. The use of equivalently rated oriented strand board (OSB) as an alternative to plywood in shear walls and diaphragms is prohibited.
   Exception: The use of OSB may be used in areas where exposure to moisture is prevented during construction and use. Examples of where OSB shall not be used include roof sheathing, exterior wall sheathing, and floor sheathing under bathrooms and kitchens. Examples of where OSB may be acceptable include interior wall sheathing and floor sheathing except beneath kitchens and bathrooms.
2. Plywood used as a part of the seismic load-resisting systems shall be at least 15/32 inches thick.
3. Construction documents shall require the Contractor to protect OSB and plywood during construction from exposure to water during construction and use. If OSB or plywood deteriorates due to exposure to moisture, the material shall be replaced unless it can be demonstrated to the satisfaction of the Engineer-of-Record and Seismic Peer Reviewer that no loss of strength has occurred.
4. CSU supports the consideration of mass timber and variations of heavy timber construction on an alternate means basis.

5.13 Delegated Design and/or Deferred Approvals

The CSU permits delegated design. The Architect and/or Engineer-of-Record (AOR or EOR) shall identify the delegated scope of work on the drawings. Delegated design is typically confined to specialty items such as pre-engineered metal buildings, proprietary structural components or foundation systems, precast concrete, exterior cladding, skylights, steel stairs, and mechanical, electrical, and sprinkler and plumbing anchorage and bracing.

If a delegated design or other portion of the design is not submitted at the time of permit application, it becomes a deferred approval. Deferred approvals are discouraged by the CSU, and advance permission to defer approval must be obtained from the CDBO or the Building Official.

To establish responsibility for the overall design and component design, the EOR has the following responsibilities:

1. The EOR's drawings shall list all delegated designs and/or deferred approvals that require EOR review. This list shall be reviewed by the Seismic Peer Reviewer.
2. The EOR shall establish component design criteria. These criteria shall be reviewed by the Seismic Peer Reviewer before approval of the project. The criteria shall be placed on the EOR's drawings. If criteria are detailed in the specifications, the drawings shall reference the relevant specification section.
3. The Component Engineer of Record (CEOR) shall provide, at a minimum, the following:
    A. Calculations indicating design criteria, applicable loads, properties, and deformation analysis as required by the construction documents.
    B. Plans and details indicating all structural elements of the component, including appropriate profiles, connections, welding, bracing, and attachments to elements designed by others.
    C. Statement of required testing, special inspection, and structural observation of each component design shall be listed on the component drawings. Note that the Building Official and CDBO reserve the right to require additional testing, inspection, and structural observation.
4. The EOR shall review all delegated designs and/or deferred submittals listed on the EOR's drawings and consider all structural modifications to the approved plans that are proposed during construction. At the beginning of the construction phase, the Peer Reviewer and EOR will determine the conditions that warrant Peer Review. The EOR review shall confirm conformance with the component design criteria and coordination with the overall structural design including the ability of the structure to support all component loads. The Peer Reviewer shall review all structural modifications presented by the EOR that warrant review to confirm that the modifications are appropriate. The Peer Review in conjunction with the responsible CSU Project Manager shall determine if and when the modifications warrant independent plan review or not.
5. The EOR shall issue a signed and stamped letter confirming that the design satisfies the component design criteria, building code requirements, and applicable design standards. It shall confirm that the component design has been coordinated with the overall structural design and that structure is capable of supporting all component loads. A shop drawing stamp is not an acceptable alternative to this letter.

The following is a typical stamp for this purpose:

> *The EOR has reviewed the components engineered by others for conformance with the component design criteria and has verified that the structure can support the components as detailed. The EOR established the component design criteria but was not in responsible charge of the component design.*

6. The EOR shall annotate the component drawings to clarify work done under their responsible charge, if this is the case.
7. Responsibilities of the EOR and CEOR during construction shall be as described in Section 3.10.

5.14 Pre-engineered Structures

Pre-engineered structures used without alteration may have certificates from ICCES or other certification authorities. These are provided in place of project-specific engineering calculations demonstrating adequate seismic performance for the project for a specific level of seismic demand. These and the vendor's technical documents usually contain requirements for installation that must be followed for the certificated performance to be achieved. Other pre-engineered structures have project-specific designs.

The following requirements apply to such pre-engineered structures, which may include "Butler"-style buildings, awnings, bridges, and antennas. All such structures must have design documents signed and stamped by a California professional engineer.

When the pre-engineered structure is free-standing, with an acceptance certificate applicable to the site's seismic coefficients, then the structure may be accepted for CSU use without peer review of the seismic characteristics of the structure itself.
The structure shall be consistent with the size and framing depicted on the certificate, and there shall be no applied loads to the structure other than its self-weight and resulting environmental loads. This precludes adding floors or mezzanines to such structures or replacing storage racks or equipment that are braced to, or supported by, the structure. Piping, lighting, and similar elements may be attached to the structure only insofar as the manufacturer's specifications allow. Where the proposed structure has mezzanines, added floors above grade, or there is a basement below the structure, then the structure shall be peer-reviewed.

When the pre-engineered structure is not free-standing, such as an environmental cover on a roof, an awning, a cellular antenna, or similar addition to an existing building, and the element has a certificate applicable to the site's seismic coefficients, then the element may be used without peer review of its seismic performance provided the design limitations of the certificate are met and the structure to which it is attached is verified to be able to accommodate the applied gravity, wind, and seismic loads. If the pre-engineered structure's certificate of approval does not specify for foundations or anchorage to other structures, such as for a cellular antenna, the foundation design shall be peer-reviewed. Submittals shall include the acceptance certificate for the structure appropriate to the seismic environment of the site and structural calculations and design documents from a licensed California Professional Engineer. The calculations shall confirm the ability of the structure to support loads imposed by the pre-engineered structure.

Trailers or other transportable structures subject to Caltrans, not Title 24, regulations are considered to be pre-engineered structures and peer review is not required. When a trailer is placed and either the wheels are removed and/or are not in contact with the ground, then CSU seismic requirements apply. The peer review shall focus on the lateral bracing of the installation and not the unit itself, except as required to verify the capacity of the anchor points to transfer applied lateral loads.

If the structure's certificate of approval does not specify foundation requirements, such as for a cellular antenna, the foundation design shall be peer-reviewed. Submittals shall provide the ICCES or equivalent certificate for the structure appropriate to the seismic environment of the site and a report from a licensed California Professional Engineer that the foundations are capable of performing acceptably under the applied seismic loads, and these documents shall be peer-reviewed.

Structures with attachment requirements to other structural elements of existing or new construction, such as an entrance cover, or for a portable classroom (trailer), shall have the attached documents peer reviewed. The construction documents shall provide information applicable to the site's seismic coefficients, and a report from a California licensed architect or a civil or a structural engineer that the structure to which attachment is made is capable of performing acceptably under the applied seismic loads and these shall be peer-reviewed.

Pre-engineered metal buildings (PEMB) without acceptance certificates shall be peer-reviewed. Foundations for this type of building are nearly always designed by another professional engineer using loads provided by the PEMB engineer.
The foundations shall be peer-reviewed. Submittals for both peer reviews shall include structural calculations and design documents from a California Professional Engineer. The PEMB engineer shall also submit a letter confirming that the correct loads have been used in the foundation design.

PEMB design drawings shall be complete, shall present the structural information required by CBC Section 1603.1 and AISC 341 Section A4, and shall represent the structure independent of shop drawings or piece drawings. Foundation loads are to be shown on the PEMB drawings and foundation drawings. Details, elevations, and sections shall be properly referenced, and symbols used on the drawings shall be clearly defined in the design drawings. All distributed and point loads shall be shown on the drawings and be included in the design, including suspended lights, ceilings, MEP units, storage areas, as well as any other loads the structure is to support. Components of these buildings must be acceptable per the CBC (e.g., materials and connectors must have American Society for Testing Materials (ASTM) or American Welding Society (AWS) designations and/or ICC approvals), or test results prepared by an independent testing laboratory must be submitted to justify values used in the structural design.

A PEMB designed by the manufacturer that does not comply with the first four paragraphs of this section is to be reviewed by the Seismic Peer Reviewer.
Foundations for this type of building are often designed by an independent structural engineer. As there can only be one structural engineer of record for the building per Section 3.9, the Structural Engineer of Record (either the independent structural engineer or the engineer responsible for designing the PEMB) must take responsibility for the overall design and must review and sign all the design drawings.
This responsibility is normally, but not necessarily, taken on by the structural engineer responsible for the design of the foundations.

5.15 Designated Seismic Systems

Most CSU projects do not include Designated Seismic Systems (DSS), as defined in CBC Chapter 2 and ASCE 7 Chapter 13, e.g., emergency generators, critical switchgear, etc. For those that do, and for all buildings designated Risk Category IV, the DSS shall be identified within the construction documents by the Mechanical/Electrical/Plumbing Engineer with concurrence by the EOR. The DSS seismic qualification requirements of ASCE 7 Chapter 13 apply. Qualifications must be at or above the BSE-1 ground motion level of ASCE 7 for mechanical and electrical elements.

In addition to project-specific qualification, the CSU will permit the use of a DSS if it satisfies the requirements of Section 5.11.1, and the intended use of the equipment is consistent with the DSS certificate of compliance.

5.16 Phased and Voluntary Retrofit

Voluntary lateral-force-resisting system modifications allow seismic enhancements to buildings to be implemented when CBC 317.3 and CSU Seismic Requirements do not require a seismic retrofit. Projects on Priority List 1 and List 2 buildings may have partial or phased retrofit corresponding to the requirements of the CEBC with the restriction that a date (Section 317.6) approved by the Building Official is given for the completion of the total retrofit. Notwithstanding the allowances for seismic retrofit actions, other CBC requirements for the specific project, e.g., accessibility, fire, and life safety issues, must be completed before the seismically modified building may be lawfully occupied. If the approved date is not met, then at their discretion, the CSU Building Official can direct the building to be vacated until such work is completed and a certificate of occupancy issued.

Buildings not on List 1 or List 2 may have voluntary seismic retrofits consistent with the requirements of CEBC Section 319.12. All phased retrofits require written concurrence from CPDC. The request shall be signed by the University Vice President for Administration. A confirming letter from the CPDC Assistant Vice Chancellor and co-signed by the Building Official shall be required for such a plan to be considered approved. The construction documents shall indicate how the work shown thereon corresponds to the approved phased retrofit.

5.17 Final Approval

Acceptance and completion of a construction project is contingent, in part, upon the written representation by the Architect/Engineer that the permitted plan has been implemented and that changes or deferred approvals for the project were completed with her/his written approval. A written statement will be provided by the Seismic Peer Reviewer that the reviews have been performed and that issues raised during construction and brought to the Seismic Peer Reviewer’s attention were satisfactorily resolved. A written statement will be provided by the CSU project manager that issues raised during construction were satisfactorily resolved.

5.18 Earthquake Soil Pressures

Lateral pressures on the basement or retaining walls, as well as other below-grade structures or elements, shall be designed and reviewed for loadings due to earthquake ground motion based on established procedures. The following shall be considered:

a. The horizontal pseudo-static acceleration shall be taken as ½ (one-half) of the Site-Class adjusted BSE-2N (MCE_R) peak ground acceleration value (PGA_M) for new buildings and ½ (one-half) of the Site-Class adjusted BSE-C peak ground acceleration value for existing buildings from Table 1 of Attachment B of the CSU Seismic Requirements. The vertical pseudo-static acceleration shall be taken as zero.

b. The applicable lateral soil pressure is the active total earth pressure, including the static active earth pressure and seismic increment. These earth pressure components should include consideration of sloping ground conditions adjacent to the wall or below-grade structure, as well as long-term surcharge loads present within the active earth pressure zone of influence. The lateral load, H, is a result of this total active earth pressure.

Soil pressure applied to structures or elements of structures due to differential ground deformations shall also be considered in the design if the geotechnical evaluations of site conditions suggest that there is the potential for seismically-induced geo-hazards (e.g., settlement, lateral spreading, etc.) to be experienced at the site during earthquake ground shaking. Such consideration may include the loss or increase of lateral or vertical support due to ground movements.

Passive lateral resistance provided by below-grade soils against elements of the foundation (e.g., footings, grade beams, piles and pile caps, walls, etc.) or subsurface utility pipes, tunnels, or appendages structurally connected to the structure in analyses of a structure shall be evaluated based on deformation compatibility of the foundation elements.

5.19 Temporary Use of Buildings and Structures

The CBC defines temporary in relationship to buildings as follows:

> TEMPORARY: Buildings and facilities intended for use at one location for not more than one year and seats intended for use at one location for not more than 90 days.

For seismic evaluation purposes, CSU defines temporary use for a period of not more than 14 days. The CDBO may choose to define temporary as less than 14 days for other environmental loads.

When a building has been designed based upon a specific [structural] Risk Category, I, II, III, or IV, this limits occupancy of a building to its approved occupancy type and numbers until other Code-based actions are taken to change it (i.e., A Special Event permit). From time to time, a University may temporarily wish to use a building space in a way non-conforming to its approved normal occupancy. When such is proposed, then the CBDO shall make a determination that the hazard and risk posed by this use are acceptable and consistent with the direction of CBC Section 108.2. For the temporary use to be allowed, the CDBO must approve in writing the planned use, which shall specify the occupancy type and occupancy load compared to the approved use and propose, where appropriate, the specific mitigation steps to be taken to manage the risk; such steps may include fire watches during occupancy, pre-notification or positioning of emergency responders, etc. For terms exceeding seven days, a specific evaluation by a registered structural engineer must be made to determine the extent of the risk posed by this use for review by the CDBO in deciding to authorize such use.

When the temporary structure is a membrane structure, including tents of all types, to be used for a specific temporary purpose, there are special requirements that must be met. The California Fire Code (CFC) has prescriptive requirements in Sections 3104 and 3105 that govern the use of tents that extend beyond just fire hazards. They characterize temporary as 180 days or less use. The CFC references the CBC for structural issues, but they are the principal focus of regulations of temporary structures such as tents and stages, covered or not.

It is CSU Policy that whenever a tent or stage, whether covered or not, is to be used as a temporary use structure, then the use of that tent is regulated by CFC Section 3104 (tents) and 3105 (temporary stage canopies) and that to receive a temporary use permit for 45 or fewer days requires submission of the documentation requirements of Section 3105.5 to the Fire Marshal and the responsible CDBO for review and approval. Note that the Fire Code applies these sections to 3105 structures only, but that CSU requires the same reporting requirements for Section 3104 structures.

For CSU applications, the design documents and design calculations are to include structural and inspection requirements, including the reliability of the building for gravity and wind loadings. CSU requires that documentation be provided to verify these performance issues for both Sections 3104 and 3105 applications. Where hold-down devices are used to stabilize the structure, then special inspection of the installation is consistent with CBC code requirements for such elements.

5.20 Suspended Ceilings

CSU adopts CBC Section 1617.11.16, Item 3, requirements for (metal) lay-in panels, and Item 4 requiring lateral force bracing for suspended ceilings 144 square feet (SF) in area or larger.

5.21 Electrical Conduits

CSU Guidelines for the placement of Electrical Conduits in Reinforced Concrete slab structures are found in Attachment E Section 2. This is particularly in parking structures for solar photovoltaic systems and electric vehicles, in conjunction with other conduit intensive systems. The Guidelines are not intended as direction to the design team, but as alerts to important technical performance issues in the design that are likely to be of concern during the peer review.

6. POST-EARTHQUAKE REVIEWS

When an earthquake occurs near a CSU campus or facility, there is need for evaluation of the safety of buildings and facilities at the campus. Under Section 3.5, an assigned EDBO is responsible for the University's safety reviews. After any significant seismic event, the EDBO will contact the University to determine if damage occurred at the campus. From authority from the Building Official and the Chancellor's Office, the EDBO has been authorized to evaluate the safety of buildings on campus and make recommendations for additional engineering investigations to determine the condition and appropriate actions to repair individual buildings.

When so notified, the University Police will restrict occupancy or entry of all buildings on campus to those authorized by the EDBO to enter buildings to determine their structural safety.

Following evaluation, all campus buildings will be posted as:

- Safe for lawful occupancy (Green);
- Restricted entry (Yellow), with the limitations on entry explicitly stated on the placard; or
- Unsafe for entry (Red). If warranted, the assessor shall give notice to the University Police to enforce compliance with no-entry if the building may pose a collapse hazard under gravity loads or in aftershocks.

These designations shall be enforced to limit the risk to occupants until such time as the placard is modified or removed. In some cases, the reason for a red tag may be that the building is not to be entered or used until an inspection is completed to assess the appropriate tagging. The safety designation of any building may only be altered by the EDBO who posted the building or by the Building Official. From time to time, it is expected that re-postings may increase or decrease the rating of the building, depending on new information or possibly additional damage occurring.

The restoration of the University and campus facilities shall be completed to the requirements of CEBC and these CSU Seismic Requirements. Plans for all repairs shall be approved for implementation by the EDBO or the Building Official. The plans shall be peer-reviewed as determined by the EDBO. With suitable record keeping, the reviews and plans may be developed and implemented rapidly with appropriate approvals. Where emergency shoring is required to stabilize a building to prevent its further deterioration, the scheme and plans for shoring shall be peer-reviewed. Upon peer review acceptance, under such situations, such designs are approved for construction. After a suitable period, as determined by the Chancellor's Office, the CDBO will reassume the responsibility for review and approval of the repair of damaged buildings.

The SRB has determined that welded steel moment frame (WSMF) buildings constructed to engineering procedures used prior to 1995 may be subject to significant damage that is not readily apparent without detailed investigation. When an earthquake occurs, all CSU WSMF buildings permitted before 1995 in the region of strong motion exceeding 0.20g peak horizontal acceleration or a WSMF that has been reported damaged nearby shall be inspected to determine the conditions of their welded connections, even if the building shows no outward signs of damage. At the direction of the EDBO, such investigations shall be completed for all WSMF buildings assessed to have been subjected to ground motions sufficient to have potentially caused WSMF connection damage.

During the post-earthquake period, it may be necessary for a building to be condemned because its structural system is deemed in such a condition that repair is not practical or that the building poses an unacceptably high seismic threat to other buildings. The EDBO has the authority to condemn buildings subject to concurrence by the Building Official. Condemned buildings shall be demolished as soon as practical; in the interim period, the University shall take reasonable actions necessary to limit the possibility of injury to the public.

7. CSU SEISMIC BUILDING ASSESSMENT PROCEDURES

Seismic risk management decisions depend on risk assessments based on professional judgments. Some judgments are predictive and can be verified when the outcome becomes known in a short to medium time period. However, many judgments are unverifiable in part because of the period over which they apply. Determining the acceptable seismic performance of a building falls in this latter category. The quality of such judgments can be assessed only by the quality of the thought process and information that produced them.

The seismic risk management program for the CSU building stock has been underway since 1993 and was modified in 2022, to formalize the procedures and to institute a program to systematically assess and reassess buildings regularly. The objective is to provide prudent, legally defensible, and transparent risk management decisions. The goal is to distinguish seismically Good from Bad buildings quickly, with limited information and great uncertainty, and then determine how limited resources should be used to the greatest advantage by distinguishing really bad buildings from those that are so-so Bad. The procedure is based on modified FEMA P-154 as discussed in Attachment G. When a building is evaluated, the results can be several: based on the evaluation results and its reliability rating of the assessment as evaluated by the SRB, a building can be assigned to one of three dispositions representing the priority assessed for dealing with the seismic hazard posed:

CSU has used for over 20 years a system of identifying building hazards as follows:

List 1: A building posing a significant risk that warrants detailed seismic assessment and retrofit to be implemented as soon as funds are available to do so.

List 2: A building posing a sufficient risk to warrant detailed seismic assessment when any work requiring a permit is undertaken at the owner's initiative, whether the applicable Building Code requires it or not.

No List assignment for a building that has a seismic vulnerability that does not warrant assignment to Lists 1 or 2. When any work requires a permit where a trigger limit applies for evaluation and retrofit.

The new procedure allows the assignment to these lists the following Decision Rule:

Decision Rule: The decision on List assignment for an assessed building is to be made based on allowing an R(t, τ, S_{L2}) acceptable upper bound limit as follows:

1. If the reliability of the building's quality assessment is less than 0.30, then the SL2 assessment is provisionally not prudent for decisions, and a more reliable assessment needs to be performed. This can be done by improving the methods or information available to the assessor to achieve at least a 0.30 rating and/or by performing a more reliable engineering assessment procedure (e.g., detailed building investigation and engineering analyses).
2. If the building's Risk Class is I, II, or III (if not housing CEBC-restricted quantities of hazardous materials) and the quality of the assessment's performance is 0.30 or better, then provisionally:
   - Assign to List 1 if SL2 ≤0.3. This is equivalent to establishing a priority that the building is seismically assessed and retrofitted to meet CEBC Section 3.17 requirements as soon as practical, notwithstanding whether any other work is to be done.
   - Assign the building to List 2 if 0.3≤ SL2< 0.7. This means that the CEBC Section 3.17 trigger limits do not apply. If work requiring a permit is proposed, then it is required to seismically assess and retrofit the building to meet CEBC requirements.
   - Do not assign to a list if SL2 ≥ 0.7; This is equivalent to letting CEBC Section 3.17 control seismic improvement based on permit applications and whether any of the threshold's triggers requiring seismic assessment and related retrofit have been exceeded.

3. If the building's Risk Class is III and the reliability of the building's quality assessment performance is 0.30 or better, then the following score limits apply only for those buildings having Risk Category III hazardous materials storage:
    - Assign the building to List 1 if SL2 ≤0.7. This is equivalent to establishing a priority that the building is seismically assessed and retrofitted to meet CEBC Section 3.17 requirements as soon as practical, notwithstanding whether any other work is to be done.
    - Assign the building to List 2 if 0.7≤ SL2< 1.0. This means that CEBC Section 3.17 does not allow any option other than to seismically assess and retrofit the building to meet CEBC requirements.
    - Do not assign the building to a list if SL2 ≥ 1.0; This is equivalent to letting CEBC Section 3.17 control seismic improvement based on permit applications and whether any of the threshold triggers have been exceeded, which requires assessment.
4. If the building's Risk Class is IV and SL2 ≤2.0 and the reliability of the building's quality assessment performance is 0.30 or better, then provisionally assign the building to List 1, unless 1.5<SL2<2.0, then assign it to List 2.
5. The Building Official will consider the results of this assessment process and its basis and consider whether the provisional dispositions are appropriate or not. According to its professional judgment, the CB will assign the final score and recommend the appropriate Priority List to the Chancellor's Office.

The full text of the Assessment Procedure and its application can be found in papers by Thiel and Zsutty (https://juniperpublishers.com/cerj/pdf/CERJ.MS.ID.555857.pdf) of how the assessments are done, and the technical basis of how the methods were developed. It is important to note that the FEMA 154 approach has been significantly modified and that the CSU has included a formal method of evaluating whether the assessment procedure used is technically adequate and appropriately applied. The application of the method results in one of three assignments: List 1, List 2, or No List. Experience suggests that since there is no mandate for the steps that need to be taken to make the hazard incurred more obvious. The following actions become necessary:

1. When a building is newly assigned to List 1, then the Chancellor's Office shall sponsor a detailed engineering evaluation of the building's expected performance when funds become available. The intent is to determine the type and extent of retrofit work required to meet the CEBC seismic requirements. In essence, this proposed additional requirement is to serve to develop a provisional approach to retrofit such that the University can have a clear understanding of the amount of work necessary to make the building seismically safe. Such a study should be conducted under the review of the SRB and be completed within no more than two years of the date the building is assigned to List 1. Although desirable for planning, no such additional evaluation work would be required for buildings on List 1 that predate the approval of this assessment process, or for those buildings placed on List 2.
2. When a building has been on List 2 for 20 years since its assignment, it shall be moved to List 1. This suggests that the probability of collapse is less than or equal to 2% and more than 0.8% in the prior 20 years and in 30 years if nothing is done less than or equal to 4.9% and more than 2%. A 2.0% minimum probability is deemed unacceptable.

In the intervening time, there may have been a CEBC evaluation completed as CEBC requires, then one of two conclusions could have been reached: the building is not hazardous, in which the SRB would have removed it from List 2, or, the University has chosen not to implement the planned permit modifications. Promotion of the building to List 1 does not require assessment and retrofit; it means that a permit is required for a modification if the CEBC requires it.
By placement on List 2, the building has been identified as one that needs seismic performance attention as a priority. Action should not be delayed until there are other programmatic needs to modify the building.

3. We understand that the Chancellor's Office has recently initiated the incorporation of the List 1 and List 2 status of campus buildings into its annual capital allocation including consideration of seismic safety as one of several considerations for making allocations. The SRB endorses this and urges that University Planners use their SRB seismic reviewer as a resource in understanding the consequences of how allocations are made.

The Seismic Review Board regularly evaluates the buildings on each campus and off-campus facilities to determine if changes in the understanding of seismic hazards and/or structural performance warrant specific actions to moderate the seismic risk of specific buildings.

It should be noted that prior lists of buildings on which the current lists were based were determined by different procedures in the past from those now used. In time all CSU buildings will be assessed using the new procedures.

8. PROJECT PLANNING

8.1 Priority Lists

The Chancellor's Office maintains a seismic three-priority list of buildings identified by the Seismic Review Board for which there are additional seismic retrofit requirements above and beyond the seismic requirements of the CBC. These are:

List 1: These buildings are a priority for seismic retrofit and should be retrofitted as soon as resources are available without regard to other modifications of the building. The list is in two parts, those that are occupied and those that are not:

Part A (CSU – Seismic Priority List 1A) are buildings that are in use and regularly occupied. For these buildings, CSU has administratively determined that whenever any work which is betterment, that is, not maintenance or repair, is performed to the building that a CEBC seismic evaluation shall be performed and the building retrofitted to CBC seismic performance requirements notwithstanding the CEBC triggers of Section 3.17, which may allow nonmandatory seismic evaluation. Seismic Priority List 1A designation does not necessarily require that the building be placed in limited or restricted use; however, the final determination will be made by the Building Official based on recommendations from the SRB.

In addition to the CBC requirements, CSU has administratively determined that whenever any work, excluding routine maintenance or minor repair exempt from a permit as listed in the California Building Code (CBC), is performed on a Seismic Priority List 1A building, a seismic evaluation shall be performed and the building retrofitted to satisfy California Existing Building Code (CEBC) seismic performance requirements and CSU Policy.

Part B (CSU – Seismic Priority List 1B) are buildings whose seismic risk has been mitigated by not allowing permanent occupancy by any staff in the building and by limiting their use to storage and where the building's failure would not cause potential injuries to those outside the building. Occupancy is limited to the occasional entrance to place or retrieve stored items, with no office functions performed. (This may be achieved by fences and other means.) Seismic Priority List 1B designation indicates a building that can be used for storage, not including any toxic materials that could pose a threat to people outside the building. A CEBC seismic compliant retrofit consistent with the CSU Seismic Requirements must be completed prior to any additional type of use of the building. Whenever any work, including routine maintenance or minor repair, and/or including work exempt from a permit as listed in the CBC, is performed on a Seismic Priority List 1B building, a seismic evaluation shall be performed, and the building retrofitted to satisfy CEBC seismic performance requirements and CSU Policy.

Once designated, the building cannot be used by occupants as a normal building without demonstrating that the building has been modified to the safety requirements of these CSU requirements to allow occupancy.

List 2: (CSU – Seismic Priority List 2) are those buildings that must be evaluated and retrofitted if non-compliant with CEBC requirements when a major capital project is allocated to the building, notwithstanding an allowance from CEBC to not do so. For these buildings, CSU has administratively determined that the seismic evaluation of Section 317.5 is required, notwithstanding whether the Section 3417.3 triggers are exceeded. Seismic Priority List 2 designation indicates a building that, when a major capital project is allocated to the building, must be seismically evaluated for compliance with CEBC seismic performance requirements if its detailed engineering analysis indicates such is required, regardless of whether or not the project exceeds the code triggers. If the evaluation indicates the building does not satisfy the code requirements, then the necessary seismic improvements must be included in the project.

These lists are regularly updated and maintained on the CPDC website.
Seismic evaluations and retrofit for buildings not on these lists may be required by the CEBC.

The Chancellor’s Office has recently initiated incorporating the Lists 1 and 2 buildings in its annual capital allocation inclusion process for consideration of seismic safety as one of several considerations of making allocations.

Changes in the use of an existing building trigger the seismic evaluation by CEBC of an existing building. Where a portion or all of a List 1 or 2 building’s use is proposed to be changed and there are no structural modifications of the building, then the following information shall be required for consideration in the approval of the altered use plan:

1. Determination by the Building Official whether the proposed change triggers under the CEBC whether a seismic evaluation is required by Section 3.7A of these CSU requirements. If it does, have it completed as part of the review.
2. The total number of rooms and their total square footage are affected by the changes, in relation to the building's total SF.

3. A detailed listing of the proposed changes, including items to be removed and the nature of the subsequent repairs and patching.
4. Confirmation that the proposed change of use (such as conversion from lab use to lecture/classroom use) will not result in an increase in the building's assignable square footage or occupant load, or individual room occupant loading exceeding the existing occupancy or 50, whichever is greater.
5. Confirmation that the proposed changes and/or change of use do not trigger associated fire protection or accessibility requirements or improvements.

The CDBO shall consult with and receive concurrence from the Building Official before approval.

8.2 Project Considerations

All planned projects shall meet the specific technical requirements of the CBC and/or where applicable, CBEC, as detailed in previous sections of this document. A building meets the CSU requirements for seismic performance if it provides essential life safety to its occupants as required by these CSU requirements.

The requirements of the CBC, including Chapter 16 for new buildings, and CEBC Part 10 for modification of existing buildings, provide the minimum standards for construction. In many cases, modification of an existing building may not trigger seismic improvements to meet the requirements of CEBC or other structural provisions of Title 24.

Some occupancies for buildings under the CBC required higher than standard seismic performance (e.g., educational facilities having over 5,000 occupants, emergency operations centers, buildings with significant quantities of highly hazardous materials, etc.) and must be designed and constructed to achieve the required performance levels consistent with the assigned CBC Risk Category.

The Trustees' Seismic Requirements require that all projects shall include consideration of the projects' seismic safety implications and shall evaluate the practicality and cost of protective measures against the severity and probability of injury resulting from seismic occurrences. This applies to all projects, including those that do not trigger CEBC-mandated evaluations of the structural system.

Planning for all capital projects, regardless of size, shall address potential options considered to improve seismic performance beyond minimally required code conformance. The University shall document in writing the basis for the determination of the option selected for implementation.

It is important to note that meeting the seismic design and construction practices described herein does not provide protection of property or equipment from earthquake destruction or provide for the rapid restoration or maintenance of the building's functions or use after an earthquake.

9. SEISMIC SAFETY STANDARDS FOR ACQUIRING BUILDING AND SPACE

It is the Standard of California State University to acquire buildings and/or spaces in buildings owned by others that provide adequate seismic life safety to their occupants. "Acquire building and/or space in a building" as used in this Standard refers to a right to occupy buildings or space resulting from a purchase, lease, license, transfer title, or other means. The requirements for meeting this Standard are set forth below.

All evaluations performed under this Standard are to consider the whole building and all its structural sections. Where a seismic hazard to the subject building clearly is posed by adjacent buildings, e.g., an elevated unreinforced masonry wall that may collapse onto the subject building, these hazards are to be included in the assessment required below. It is not the intent of this standard to require detailed analyses of adjacent buildings. (See also Section 5.1 Private Buildings Constructed on CSU Land).

9.1 Types of Acquisitions

A. Acquire by Lease or License

Newly leased or licensed space may be occupied only if it satisfies the seismic safety requirements of this Standard at the time the lease or license is executed, which can be established by one of the following:

1. A Waiver Letter that justifies the determination that it is safe consistent with CSU Seismic Requirements, see Section 9.2.B; or
2. A FEMA Evaluation Report that indicates the building is not expected to pose a seismic safety risk, see Section 9.2.B; or
3. A Certificate of Applicable Code indicates the building was designed to modern Code requirements and does not have characteristics known to be hazardous, see Section 9.2.C; or
4. An Independent Review Report states that the building has an earthquake damageability Level of IV or better, as defined in the table Earthquake Performance Levels for Existing Buildings, see Attachment D.

The documents establishing any one of these may be produced by the University, the building owner, or the building owner's technical agent, and will be accepted subject to the review of the CSU as detailed in Section 9.2. The documents resulting from the requirements of items 2, 3, or 4, above, remain valid for 12 months from the date of their original issuance. This term can be extended for up to two years provided that a letter, signed and, where applicable, stamped by the author of the report or certificate, certifies that there have been: (i) no material changes in the structural system, either as part of building modifications, or as the result of accidents, and (ii) no changes in the standards of evaluating buildings that would change the report's or certificate's conclusions, and (iii) no seismic or wind events that could change the report's or certificate's conclusions.

B. Acquire by Purchase or Title Transfer

Whenever a building is acquired by purchase or other title transfer (e.g., exchange, gift), the due diligence examination of the property shall include a signed and stamped independent review report from a structural engineer licensed in the State of California or the state in which the property is located that meets the requirements of Section 9.2.D, Independent Review Report, below.

It is advisable that the campus Seismic Peer Reviewer review these documents to determine if they meet the CSU Seismic Requirements. As an alternative in lieu of Section 9.2.D requirements, the campus Seismic Peer Reviewer with agreement from the SRB Chair and Vice Chair may elect that the property meet the requirements of Section 9.2.B if the building was compliant with the 1998 or subsequent editions of the CBC (1997 Uniform Building Code, as amended).

See also Earthquake Performance Levels for Existing Buildings in Attachment D.

Before the acquisition of a building(s), CSU shall evaluate the building(s) and report on its seismic damageability. By Standard, a newly acquired building that has an evaluation of Level IV or better seismic performance may be occupied or continue to be occupied. A building with a Level V rating may be occupied or continue to be occupied only if the comprehensive and feasible budget and retrofit plan are in place at acquisition to retrofit it to achieve a Level IV within five years. A building with Level VI or poorer ratings must be seismically retrofitted to achieve a Level IV or better rating before it may be occupied. If the hazard classification depends on the seismic performance of adjacent structures, then mitigation can be achieved either by modification of the adjacent building hazard or by protecting the subject building from the consequences of the adjacent building's seismic performance. Any retrofit work undertaken as part of a purchase to meet an assigned Level must be independently peer-reviewed by the campus Seismic Peer Reviewer.

The peer review shall be of the retrofit or modification design prior to construction and continue through the completion of construction for conformance with the asserted Level. See also Earthquake Performance Levels for Existing Buildings given in Attachment D.

The requirements of this section may be waived if the building is unoccupied, will remain unoccupied after purchase, is to be demolished, will be sold without occupancy, or is a one or two-story, wood-framed single-family residence on a level site.

9.2 Acceptable Evaluation Documents

A. Waiver Letter

The requirements for seismic evaluation under the Seismic Requirements may be waived under the following limited conditions:

1. The space will be occupied for less than two years, and CSU does not currently occupy space in the building, or
2. The area of the space to be occupied by CSU is 3,000 SF or less, and the space is not to house pre-school age children, or
3. The building is a one-story, wood-framed building, or a one- or two-story, wood-framed single-family residence on level site, or
4. The building is subject to the regulatory authority of the Health Care Access and Information (HCAI) or is a schoolhouse regulated by the Division of the State Architect, or
5. The space to be occupied is within a structure currently occupied by and previously evaluated and accepted under this method by any of the named entities, or
6. The space must be occupied because of administrative requirements beyond the control of CSU as certified by a policy-level person. Each CSU organizational unit shall designate the person(s) authorized to make such waivers.

Any Waiver Letter issued under one or more of the above allowances must be in writing by the person making such determination and reviewed and approved by the campus Seismic Peer Reviewer to be acceptable.

For any building not qualifying for a Waiver Letter, proceed to Section 9.2.C below, FEMA Evaluation report.

B. Certificate of Applicable Code

A Certificate of Applicable Code (Certificate) may be provided if the entire building was constructed under a permit approved by the local jurisdiction and was designed to meet one of the following requirements:

1. Not located in a designated active seismic fault zone by CGS or CSU, in a CGS or designated seismic hazard zone (faulting, liquefaction, and other seismically induced hazard zones), or a FEMA high-risk flood zone.
2. Compliant with 1998 or subsequent editions of the CBC (1997 Uniform Building Code, as amended) or the indicated trigger lower-bound editions of the Code years indicated in ASCE 41's most current edition Benchmark Buildings List for the applicable structural types used in the building. Where several types of structural systems were used, then the most restrictive trigger date applies.

C. FEMA P-154 Evaluation Report

Seismic compliance may be met by an evaluation using the FEMA P-154 methodology (Rapid Visual Screening) that results in a score higher than the Basic Hazard Score provided in the FEMA handbook, see Section III for references. The FEMA P-154 benchmark years for building types in Table 2-2 are replaced by Table QX Benchmark Buildings List for different building types. All campuses are to be in areas of seismicity consistent with P-154 definitions based on the ground motions of the building site, which determines the form to be used. The P-154 Level 1 and 2 evaluations must be completed by a licensed structural engineer. A building with SL2 ≥ 2.0 is potentially acceptable if the SRB campus assessor approves the conclusion.

For any building not qualifying for a favorable FEMA P-154 report, proceed to Section 9.2.D below.

D. Independent Review Report

An Independent Review Report of the entire building and its critical nonstructural components shall be prepared by a structural engineer licensed by the State of California or the state in which the property is located, who has had no prior involvement in the building's design or evaluation and has no ownership interest in the property.

As a matter of policy, all acquisitions by Purchase or other Title Transfer (see Section 9.1.A. above) require an Independent Review Report. The CSU will not approve for occupancy a newly leased building having a seismic performance level of V or poorer. See the attached table titled Earthquake Performance Levels for Existing Buildings given in Attachment D.

The Independent Review Report and its preparation, at a minimum, shall include the following:

1. A visit to the building to observe its condition and characteristics;
2. A review of available design drawings and soil reports for the original construction and subsequent modifications;

3. An assessment shall be given based on an ASCE 41 Tier 1 or higher-level assessment, or some other procedure approved by the SRB. In addition, a qualitative (and quantitative, if needed) evaluation of the building's gravity systems shall be completed;
4. A qualitative (and quantitative, if needed) evaluation of the likelihood of earthquake-induced site failure that could cause damage to the facility, that is, the building is in the vicinity of earthquake faults listed in the State of California Earthquake Zones Act of 1990 (previously Alquist-Priolo) or liquefaction susceptibility zone as identified by the local jurisdiction, or the building site is subject to failure due to earthquake-induced landslide risk;
5. Identification of any potential falling hazards in areas that will be occupied or common areas within the building that poses a life-safety threat to the building occupants during an earthquake;
6. An evaluation of the earthquake damageability Level of the building using the definitions of the attached table, Seismic Earthquake Performance Levels for Existing Buildings, given in Attachment D;
7. A list of the documents, plans, and other materials examined.

If the assessment is done by an SRB member and the procedures of Section 7 are followed, then the Section 7-style report shall be reviewed by the SRB and the building leased if it meets them.

For leases, if a landlord intends to complete modifications to bring a building into compliance with the required Level (minimum), the landlord shall certify that the work to be completed will meet the requirements of this section, and (ii) describe the work in sufficient detail to allow CSU's technical review and approval. In either case, confirmation that the completed modifications meet the requirements of this section shall be done by the landlord's structural engineer.

The Independent Review Report must be signed and stamped by the professional who certifies that the evaluation was Level IV or better before occupancy occurs, then the landlord's structural engineer must state that the work was done by this person or under this person's direct supervision, that they have no prior involvement in the building's design or evaluation, and the firm or individuals of the firm have no ownership interest in the property. CSU may have the Independent Review Report prepared to meet Section 8.2 requirements peer-reviewed to confirm its technical reliability prior to acceptance of the report's conclusions and reliance upon it in the execution of the real estate transaction.

Table 1. *Trigger code dates for assignment of CSU Building seismic safety determinations. Table notes are in parentheses and below. This table was modified from materials from ACSE 41 and the University of California seismic policy of 2022.*

SCE 41 Building Type (a, b)	Building Seismic Design Provisions	
	UBC (2)	CBSC (3)
Wood frame, wood shear panels (Types W1 and W2)	1976	2000
Wood frame, wood shear panels (Type W1a)	1976	2000
Steel moment-resisting frame (Types S1 and S1a)	1997	2000
Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1997 (c)	2000
Buckling-restrained braced frame (Types S2 and S2a)	—	2006
Metal building frames (Type S3)	—	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	(b)	2000
Steel plate shear wall (Type S6)	—	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997 (d)	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	1987	2003
Reinforced concrete moment-resisting frame (Type C1) (e)	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	(b)	(f)
Tilt-up concrete (Types PC1 and PC1a) (a)	1987	2000
Precast concrete frame (Types PC2 and PC2a)	—	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	(b)	(b)
Unreinforced masonry (Type URMa)	(b)	(b)
Seismic isolation or passive dissipation	1991	2000

Notes:

(1) This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-C.
(2) UBC = Uniform Building Code unless noted by alphabetic note number
(3) California Building Standard Codes
  (a) CBSC = Building type refers to one of the common building types defined in Table 3-1 of ASCE 41-17.
  (b) Buildings must be evaluated in accordance with the CSU Seismic Requirements.
  (c) Steel eccentrically braced frames with links adjacent to columns must comply with the 1994 UBC Emergency Provisions, published September/October 1994, may be considered eligible for a Certificate of Applicable Code.
  (d) Cold-formed steel shear walls with wood structural panels only.
  (e) Flat slab concrete moment frames are not considered Benchmark Buildings.

ATTACHMENT A – California State University Seismic Review Board

The following persons are members of the CSU SRB:

- Thomas Sabol, Ph.D., S.E., Chair, Principal, Englekirk Institutional, Inc.
- K. Dirk Bondy, S.E., President, Seneca Structural Engineers, Inc.
- Debra Murphy, C.E., Consulting Civil Engineer - Geotechnical
- Barry Schindler, S.E., Partner, John A. Martin and Associates, Inc.
- Richard Niewiarowski, S.E., Consulting Structural Engineer
- Maryann Phipps, S.E., President, Estructure, Inc.
- Charles C. Thiel Jr., Ph.D., (Emeritus); President, Telesis
- John A. Martin Jr., S.E. (Emeritus); retired, President, John A. Martin and Associates, Inc.

ATTACHMENT B – CSU Seismic Requirements values for use on all projects subject to the 2022 edition of the California Building Code

Table 1 - CSU Campus Seismic Ground Motion Horizontal Response Spectral Acceleration Parameters (Table revision date: March 5, 2020)

Campus	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
Bakersfield	No	White Wolf ≈ 34 km & San Andreas ≈ 52 km	--	BC	0.41	0.38	0.95	0.35	0.27	0.25	0.63	0.23	0.31	0.29	0.72	0.26	0.16	0.15	0.37	0.13
				C	0.49	0.45	1.13	0.52	0.33	0.30	0.76	0.35	0.37	0.35	0.88	0.40	0.20	0.19	0.48	0.20
				D	0.49	0.42	1.06	0.68	0.33	0.28	0.71	0.45	0.40	0.35	0.88	0.55	0.24	0.22	0.55	0.31
				Default D	0.49	0.45	1.13	0.68	0.33	0.30	0.76	0.45	0.40	0.35	0.88	0.55	0.24	0.22	0.55	0.31
Bakersfield Antelope Valley	No	San Andreas ≈ 10 km	No	BC	0.67	0.61	1.52	0.62	0.44	0.40	1.01	0.42	0.56	0.57	1.43	0.58	0.25	0.24	0.60	0.22
				C	0.80	0.73	1.82	0.87	0.53	0.49	1.21	0.58	0.67	0.68	1.71	0.82	0.30	0.30	0.76	0.33
				D	0.73	0.61	1.52	1.06	0.49	0.40	1.01	0.71	0.62	0.57	1.43	1.00	0.34	0.32	0.79	0.48
				Default D	0.73	0.73	1.82	1.06	0.49	0.49	1.21	0.71	0.62	0.68	1.71	1.00	0.34	0.32	0.79	0.48
Cal Maritime Academy	No	Franklin ≈ 1¼ km, West Napa ≈ 11 km, Green Valley ≈ 11 km, & Hayward ≈ 14 km	--	BC	0.50	0.60	1.50	0.60	0.33	0.40	1.00	0.40	0.65	0.68	1.69	0.60	0.35	0.35	0.88	0.30
				C	0.60	0.72	1.80	0.84	0.40	0.48	1.20	0.56	0.78	0.81	2.03	0.84	0.43	0.42	1.05	0.45
				D	0.55	0.60	1.50	1.02	0.37	0.40	1.00	0.68	0.72	0.68	1.69	1.03	0.44	0.40	1.01	0.60
				Default D	0.55	0.72	1.80	1.02	0.37	0.48	1.20	0.68	0.72	0.81	2.03	1.03	0.44	0.42	1.05	0.60
Chancellor's Office	No	Compton ≈ 1½ km, Newport-Inglewood ≈ 5 km, & Palos Verdes ≈ 5¼ km	Yes	BC	0.72	0.65	1.63	0.59	0.48	0.43	1.09	0.40	0.49	0.48	1.19	0.42	0.23	0.21	0.54	0.18
				C	0.87	0.78	1.96	0.84	0.58	0.52	1.30	0.56	0.59	0.57	1.43	0.63	0.28	0.28	0.69	0.27
				D	0.80	0.65	1.63	1.01	0.53	0.43	1.09	0.68	0.54	0.49	1.22	0.79	0.32	0.29	0.74	0.41
				Default D	0.80	0.78	1.96	1.01	0.53	0.52	1.30	0.68	0.54	0.57	1.43	0.79	0.32	0.29	0.74	0.41

Campus continued	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
Channel Islands	No	Simi-Santa Rosa ≈ 8 km, & Oak Ridge ≈ 15 km	Yes	BC	0.64	0.59	1.49	0.54	0.43	0.40	0.99	0.36	0.45	0.45	1.13	0.40	0.23	0.22	0.54	0.19
				C	0.77	0.71	1.78	0.79	0.51	0.48	1.19	0.53	0.54	0.54	1.35	0.60	0.28	0.28	0.70	0.28
				D	0.70	0.59	1.49	0.95	0.47	0.40	0.99	0.64	0.52	0.47	1.18	0.76	0.32	0.30	0.74	0.42
				Default D	0.70	0.71	1.78	0.95	0.47	0.48	1.19	0.64	0.52	0.54	1.35	0.76	0.32	0.30	0.74	0.42
Chico	No	Cascadia Subduction Zone ≈ 125 km	--	BC	0.34	0.31	0.77	0.32	0.23	0.21	0.51	0.21	0.25	0.23	0.57	0.23	0.12	0.11	0.26	0.11
				C	0.41	0.37	0.92	0.47	0.27	0.25	0.62	0.32	0.30	0.29	0.72	0.35	0.15	0.14	0.34	0.16
				D	0.43	0.37	0.92	0.63	0.29	0.24	0.61	0.42	0.34	0.30	0.76	0.49	0.18	0.17	0.42	0.25
				Default D	0.43	0.37	0.92	0.63	0.29	0.25	0.62	0.42	0.34	0.30	0.76	0.49	0.18	0.17	0.42	0.25
Dominguez Hills	No	Newport-Inglewood < 1 km, Compton ≈ 8¾ km, & Palos Verdes ≈ 11 km	No	BC	0.75	0.70	1.74	0.62	0.50	0.46	1.16	0.41	0.52	0.51	1.29	0.45	0.26	0.24	0.60	0.20
				C	0.90	0.83	2.09	0.87	0.60	0.56	1.39	0.58	0.62	0.62	1.54	0.67	0.31	0.30	0.76	0.30
				D	0.83	0.70	1.74	1.06	0.55	0.46	1.16	0.70	0.57	0.51	1.29	0.83	0.34	0.32	0.79	0.44
				Default D	0.83	0.83	2.09	1.06	0.55	0.56	1.39	0.70	0.57	0.62	1.54	0.83	0.34	0.32	0.79	0.44
East Bay Concord	No	Concord/Green Valley ≈ 3 km	--	BC	0.94	0.93	2.33	0.69	0.62	0.62	1.56	0.46	0.75	0.77	1.92	0.65	0.39	0.38	0.95	0.31
				C	1.12	1.12	2.80	0.97	0.75	0.75	1.87	0.65	0.90	0.92	2.31	0.91	0.47	0.46	1.14	0.47
				D	1.03	0.93	2.33	1.18	0.69	0.62	1.56	0.78	0.83	0.77	1.92	1.11	0.47	0.43	1.06	0.62
				Default D	1.03	1.12	2.80	1.18	0.69	0.75	1.87	0.78	0.83	0.92	2.31	1.11	0.47	0.46	1.14	0.62

Campus continued	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
East Bay Hayward	Yes, Hayward	Hayward < 1 km	Yes, & Landslide Zone	BC	0.97	0.92	2.30	0.88	0.64	0.61	1.54	0.59	0.95	0.98	2.45	0.89	0.49	0.49	1.22	0.42
				C	1.16	1.11	2.76	1.23	0.77	0.74	1.84	0.82	1.14	1.17	2.94	1.25	0.59	0.58	1.46	0.63
				D	1.06	0.92	2.30	1.50	0.71	0.61	1.54	1.00	1.05	0.98	2.45	1.51	0.55	0.49	1.23	0.79
				Default D	1.06	1.11	2.76	1.50	0.71	0.74	1.84	1.00	1.05	1.17	2.94	1.51	0.55	0.58	1.46	0.79
Fresno	No	Great Valley ≈ 72 km & San Andreas ≈ 115 km	--	BC	0.24	0.22	0.56	0.22	0.16	0.15	0.37	0.15	0.18	0.16	0.40	0.16	0.09	0.08	0.20	0.09
				C	0.29	0.28	0.71	0.33	0.19	0.19	0.47	0.22	0.21	0.21	0.52	0.25	0.12	0.11	0.27	0.14
				D	0.33	0.30	0.75	0.48	0.22	0.20	0.50	0.32	0.25	0.24	0.59	0.37	0.15	0.13	0.33	0.22
				Default D	0.33	0.30	0.75	0.48	0.22	0.20	0.50	0.32	0.25	0.24	0.59	0.37	0.15	0.13	0.33	0.22
Fullerton	No	Puente Hills Blind Thrust < 1 km & Whittier ≈ 6 km	Yes	BC	0.72	0.67	1.69	0.59	0.48	0.45	1.12	0.40	0.51	0.50	1.26	0.43	0.26	0.24	0.61	0.21
				C	0.87	0.81	2.02	0.83	0.58	0.54	1.35	0.56	0.62	0.60	1.51	0.65	0.31	0.31	0.77	0.31
				D	0.80	0.67	1.69	1.01	0.53	0.45	1.12	0.67	0.56	0.50	1.26	0.81	0.35	0.32	0.80	0.45
				Default D	0.80	0.81	2.02	1.01	0.53	0.54	1.35	0.67	0.56	0.60	1.51	0.81	0.35	0.32	0.80	0.45
Humboldt	Yes, Fickle Hill	Fickle Hill < 1 km, Little Salmon ≈ 9 km, & Cascadia Subduction Zone ≈ 18 km	--	BC	0.99	0.98	2.44	1.07	0.66	0.65	1.63	0.72	0.99	0.91	2.27	0.91	0.43	0.37	0.92	0.34
				C	1.19	1.17	2.93	1.50	0.80	0.78	1.95	1.00	1.18	1.09	2.72	1.28	0.52	0.44	1.11	0.51
				D	1.09	0.98	2.44	1.82	0.73	0.65	1.63	1.22	1.08	0.91	2.27	1.55	0.50	0.42	1.04	0.66
				Default D	1.09	1.17	2.93	1.82	0.73	0.78	1.95	1.22	1.08	1.09	2.72	1.55	0.50	0.44	1.11	0.66
Humboldt Marine Lab Trinidad	No	Trinidad ≈ 1¼ km, Mad River ≈ 4 km, & Cascadia Subduction Zone ≈ 16 km	--	BC	1.21	1.08	2.71	1.10	0.81	0.72	1.81	0.73	0.92	0.80	2.01	0.85	0.36	0.31	0.78	0.29
				C	1.46	1.30	3.25	1.54	0.97	0.87	2.17	1.02	1.10	0.97	2.41	1.19	0.43	0.37	0.93	0.43
				D	1.34	1.08	2.71	1.86	0.89	0.72	1.81	1.24	1.01	0.80	2.01	1.45	0.45	0.37	0.92	0.58
				Default D	1.34	1.30	3.25	1.86	0.89	0.87	2.17	1.24	1.01	0.97	2.41	1.45	0.45	0.37	0.93	0.58

Campus continued	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
Long Beach	No	Newport-Inglewood ≈ 1½ km & Compton ≈ 6½ km	Yes	BC	0.67	0.62	1.55	0.56	0.45	0.41	1.03	0.37	0.46	0.45	1.12	0.39	0.22	0.21	0.53	0.18
				C	0.81	0.74	1.86	0.80	0.54	0.50	1.24	0.54	0.55	0.54	1.35	0.59	0.27	0.27	0.68	0.27
				D	0.74	0.62	1.55	0.97	0.49	0.41	1.03	0.65	0.52	0.47	1.18	0.75	0.31	0.29	0.73	0.40
				Default D	0.74	0.74	1.86	0.97	0.49	0.50	1.24	0.65	0.52	0.54	1.35	0.75	0.31	0.29	0.73	0.40
Los Angeles	No	Upper Elysian Park < 1 km	No	BC	0.87	0.80	2.01	0.72	0.58	0.54	1.34	0.48	0.61	0.61	1.53	0.53	0.29	0.28	0.69	0.23
				C	1.04	0.96	2.41	1.01	0.69	0.64	1.61	0.67	0.73	0.73	1.83	0.78	0.35	0.34	0.85	0.35
				D	0.95	0.80	2.01	1.23	0.64	0.54	1.34	0.82	0.67	0.61	1.53	0.94	0.38	0.34	0.86	0.50
				Default D	0.95	0.96	2.41	1.23	0.64	0.64	1.61	0.82	0.67	0.73	1.83	0.94	0.38	0.34	0.86	0.50
Monterey Bay East	No	Reliz ≈ 1¼ km&San Andreas ≈ 28 km	--	BC	0.60	0.59	1.47	0.53	0.40	0.39	0.98	0.35	0.45	0.45	1.12	0.40	0.26	0.26	0.64	0.22
				C	0.72	0.71	1.77	0.78	0.48	0.47	1.18	0.52	0.54	0.54	1.35	0.60	0.32	0.32	0.80	0.32
				D	0.66	0.59	1.47	0.93	0.44	0.39	0.98	0.62	0.52	0.47	1.18	0.76	0.35	0.33	0.83	0.47
				Default D	0.66	0.71	1.77	0.93	0.44	0.47	1.18	0.62	0.52	0.54	1.35	0.76	0.35	0.33	0.83	0.47
Monterey Bay West	No	Reliz ≈ 3 km & San Andreas ≈ 31 km	--	BC	0.58	0.57	1.41	0.51	0.39	0.38	0.94	0.34	0.43	0.43	1.07	0.39	0.25	0.24	0.60	0.21
				C	0.70	0.68	1.70	0.76	0.47	0.45	1.13	0.51	0.51	0.52	1.29	0.58	0.30	0.30	0.76	0.31
				D	0.64	0.57	1.41	0.91	0.43	0.38	0.94	0.61	0.50	0.46	1.15	0.74	0.33	0.32	0.79	0.45
				Default D	0.64	0.68	1.70	0.91	0.43	0.45	1.13	0.61	0.50	0.52	1.29	0.74	0.33	0.32	0.79	0.45
Moss Landing Marine Laboratories	No	San Andreas ≈ 19 km	--	BC	0.68	0.67	1.69	0.61	0.46	0.45	1.12	0.41	0.53	0.53	1.31	0.47	0.32	0.31	0.77	0.26
				C	0.82	0.81	2.02	0.85	0.55	0.54	1.35	0.57	0.63	0.63	1.58	0.71	0.38	0.37	0.92	0.38
				D	0.75	0.67	1.69	1.04	0.50	0.45	1.12	0.69	0.58	0.53	1.31	0.86	0.41	0.37	0.91	0.53
				Default D	0.75	0.81	2.02	1.04	0.50	0.54	1.35	0.69	0.58	0.63	1.58	0.86	0.41	0.37	0.92	0.53

Campus continued	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
Northridge	No	Santa Susana ≈ 7 km, Northridge Hills ≈ 1 km, & Mission Hills ≈ 3¾ km	No	BC	0.80	0.78	1.96	0.68	0.54	0.52	1.31	0.45	0.69	0.70	1.75	0.60	0.37	0.35	0.88	0.28
				C	0.96	0.94	2.35	0.95	0.64	0.63	1.57	0.64	0.83	0.84	2.10	0.84	0.45	0.42	1.06	0.42
				D	0.88	0.78	1.96	1.16	0.59	0.52	1.31	0.77	0.76	0.70	1.75	1.02	0.46	0.41	1.01	0.57
				Default D	0.88	0.94	2.35	1.16	0.59	0.63	1.57	0.77	0.76	0.84	2.10	1.02	0.46	0.42	1.06	0.57
Pomona	Yes, San Jose	San Jose < 1 km, Chino ≈ 7½ km, & Sierra Madre ≈ 8 km	Yes	BC	0.73	0.69	1.72	0.62	0.49	0.46	1.14	0.41	0.52	0.52	1.31	0.47	0.27	0.26	0.65	0.23
				C	0.88	0.82	2.06	0.87	0.58	0.55	1.37	0.58	0.62	0.63	1.57	0.70	0.33	0.32	0.81	0.34
				D	0.80	0.69	1.72	1.05	0.54	0.46	1.14	0.70	0.57	0.52	1.31	0.85	0.36	0.33	0.84	0.48
				Default D	0.80	0.82	2.06	1.05	0.54	0.55	1.37	0.70	0.57	0.63	1.57	0.85	0.36	0.33	0.84	0.48
Pomona Campus South (Lanterman)	No	San Jose ≈ 2½ km, Chino ≈ 6 km, & Sierra Madre ≈ 10 km	Yes	BC	0.75	0.70	1.75	0.63	0.50	0.47	1.17	0.42	0.53	0.53	1.34	0.47	0.28	0.27	0.66	0.23
				C	0.90	0.84	2.10	0.88	0.60	0.56	1.40	0.58	0.64	0.64	1.60	0.71	0.33	0.33	0.82	0.34
				D	0.82	0.70	1.75	1.06	0.55	0.47	1.17	0.71	0.59	0.53	1.34	0.86	0.37	0.34	0.84	0.49
				Default D	0.82	0.84	2.10	1.06	0.55	0.56	1.40	0.71	0.59	0.64	1.60	0.86	0.37	0.34	0.84	0.49
Sacramento	No	Great Valley (Midland) ≈ 38 km & San Andreas ≈ 130 km	--	BC	0.22	0.21	0.53	0.24	0.15	0.14	0.35	0.16	0.17	0.16	0.39	0.19	0.10	0.09	0.22	0.10
				C	0.27	0.27	0.68	0.36	0.18	0.18	0.45	0.24	0.21	0.20	0.51	0.28	0.12	0.11	0.28	0.15
				D	0.30	0.29	0.73	0.51	0.20	0.19	0.48	0.34	0.25	0.23	0.58	0.41	0.15	0.14	0.35	0.24
				Default D	0.30	0.29	0.73	0.51	0.20	0.19	0.48	0.34	0.25	0.23	0.58	0.41	0.15	0.14	0.35	0.24
San Bernardino	No	San Andreas ≈ 1½ km & San Jacinto ≈ 4½ km	--	BC	1.03	0.96	2.39	1.02	0.69	0.64	1.60	0.68	0.96	0.97	2.42	0.96	0.48	0.46	1.15	0.40
				C	1.24	1.15	2.87	1.43	0.82	0.77	1.92	0.95	1.15	1.16	2.90	1.35	0.58	0.55	1.38	0.60
				D	1.13	0.96	2.39	1.73	0.76	0.64	1.60	1.15	1.05	0.97	2.42	1.63	0.54	0.48	1.20	0.76
				Default D	1.13	1.15	2.87	1.73	0.76	0.77	1.92	1.15	1.05	1.16	2.90	1.63	0.54	0.55	1.38	0.76

Campus continued	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
San Bernardino Palm Desert	No	San Andreas ≈ 6 km	--	BC	0.77	0.72	1.81	0.74	0.52	0.48	1.20	0.49	0.65	0.66	1.64	0.63	0.32	0.31	0.77	0.26
				C	0.93	0.87	2.17	1.04	0.62	0.58	1.45	0.69	0.78	0.79	1.97	0.88	0.39	0.37	0.92	0.39
				D	0.85	0.72	1.81	1.26	0.57	0.48	1.20	0.84	0.71	0.66	1.64	1.06	0.41	0.37	0.92	0.54
				Default D	0.85	0.87	2.17	1.26	0.57	0.58	1.45	0.84	0.71	0.79	1.97	1.06	0.41	0.37	0.92	0.54
San Diego	No	Rose Canyon/Newport-Inglewood ≈ 10 km	--	BC	0.40	0.37	0.91	0.32	0.27	0.24	0.61	0.22	0.28	0.27	0.69	0.24	0.13	0.12	0.31	0.12
				C	0.48	0.44	1.10	0.48	0.32	0.29	0.73	0.32	0.33	0.34	0.84	0.36	0.17	0.16	0.40	0.17
				D	0.48	0.41	1.04	0.64	0.32	0.28	0.69	0.43	0.37	0.34	0.86	0.51	0.20	0.19	0.48	0.27
				Default D	0.48	0.44	1.10	0.64	0.32	0.29	0.73	0.43	0.37	0.34	0.86	0.51	0.20	0.19	0.48	0.27
San Diego Imperial Valley Brawley	*No*	*Brawley Seismic Zone <1 km & Imperial ≈8 km*	--	BC	0.55	0.60	1.50	0.60	0.37	0.40	1.00	0.40	0.808	0.84	2.11	0.74	0.48	0.48	1.20	0.38
				C	0.66	0.72	1.80	0.84	0.44	0.48	1.20	0.56	0.937	1.01	2.53	1.03	0.56	0.58	1.44	0.58
				D	0.61	0.60	1.50	1.02	0.40	0.40	1.00	0.68	0.873	0.84	2.11	1.25	0.54	0.49	1.22	0.74
				Default D	0.61	0.72	1.80	1.02	0.40	0.40	1.20	0.68	0.873	0.84	2.11	1.25	0.54	0.49	1.44	0.74
San Diego Imperial	No	Cerro Prieto ≈ 9½ km & Imperial ≈ 10 km	--	BC	0.54	0.60	1.50	0.60	0.36	0.40	1.00	0.40	0.67	0.70	1.76	0.64	0.39	0.40	0.99	0.33
				C	0.65	0.72	1.80	0.84	0.43	0.48	1.20	0.56	0.80	0.84	2.11	0.90	0.47	0.47	1.19	0.50
				D	0.59	0.60	1.50	1.02	0.40	0.40	1.00	0.68	0.73	0.70	1.76	1.09	0.47	0.44	1.09	0.66
				Default D	0.59	0.72	1.80	1.02	0.40	0.48	1.20	0.68	0.73	0.84	2.11	1.09	0.47	0.47	1.19	0.66
San Diego Mission Valley	No	Rose Canyon/Newport-Inglewood ≈ 7¼ km	--	BC	0.48	0.43	1.07	0.37	0.32	0.29	0.71	0.25	0.31	0.31	0.78	0.27	0.14	0.13	0.32	0.12
				C	0.57	0.51	1.29	0.56	0.38	0.34	0.86	0.37	0.38	0.38	0.94	0.40	0.17	0.17	0.42	0.18
				D	0.54	0.46	1.15	0.72	0.36	0.31	0.77	0.48	0.40	0.37	0.93	0.55	0.21	0.20	0.50	0.28
				Default D	0.54	0.51	1.29	0.72	0.36	0.34	0.86	0.48	0.40	0.38	0.94	0.55	0.21	0.20	0.50	0.28

Campus continued	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
San Francisco	No	San Andreas ≈ 4¼ km	Yes	BC	0.87	0.81	2.03	0.84	0.58	0.54	1.35	0.56	0.72	0.74	1.86	0.75	0.33	0.32	0.81	0.29
				C	1.05	0.97	2.44	1.17	0.70	0.65	1.62	0.78	0.87	0.89	2.23	1.05	0.40	0.39	0.97	0.44
				D	0.96	0.81	2.03	1.43	0.64	0.54	1.35	0.95	0.80	0.74	1.86	1.28	0.42	0.38	0.95	0.59
				Default D	0.96	0.97	2.44	1.43	0.64	0.65	1.62	0.95	0.80	0.89	2.23	1.28	0.42	0.39	0.97	0.59
San Francisco Tiburon	No	San Andreas ≈ 16 km & Hayward ≈ 13 km	--	BC	0.50	0.60	1.50	0.60	0.33	0.40	1.00	0.40	0.53	0.54	1.35	0.52	0.30	0.29	0.73	0.26
				C	0.60	0.72	1.80	0.84	0.40	0.48	1.20	0.56	0.64	0.65	1.62	0.77	0.36	0.35	0.88	0.39
				D	0.55	0.60	1.50	1.02	0.37	0.40	1.00	0.68	0.58	0.54	1.35	0.93	0.39	0.35	0.89	0.54
				Default D	0.55	0.72	1.80	1.02	0.37	0.48	1.20	0.68	0.58	0.65	1.62	0.93	0.39	0.35	0.89	0.54
San José	No	Hayward ≈ 9 km, Calaveras ≈ 11 km, & San Andreas ≈ 20 km	Yes	BC	0.58	0.60	1.50	0.60	0.38	0.40	1.00	0.40	0.66	0.71	1.77	0.65	0.40	0.41	1.02	0.35
				C	0.69	0.72	1.80	0.84	0.46	0.48	1.20	0.56	0.80	0.85	2.13	0.91	0.48	0.49	1.22	0.52
				D	0.63	0.60	1.50	1.02	0.42	0.40	1.00	0.68	0.73	0.71	1.77	1.10	0.48	0.44	1.11	0.68
				Default D	0.63	0.72	1.80	1.02	0.42	0.48	1.20	0.68	0.73	0.85	2.13	1.10	0.48	0.49	1.22	0.68
San José South	No	Hayward ≈ 8½ km, Calaveras ≈ 11 km, & San Andreas ≈ 20 km	Yes	BC	0.56	0.60	1.50	0.60	0.37	0.40	1.00	0.40	0.66	0.71	1.77	0.64	0.40	0.41	1.02	0.35
				C	0.67	0.72	1.80	0.84	0.45	0.48	1.20	0.56	0.80	0.85	2.12	0.90	0.48	0.49	1.22	0.52
				D	0.62	0.60	1.50	1.02	0.41	0.40	1.00	0.68	0.73	0.71	1.77	1.09	0.48	0.45	1.11	0.67
				Default D	0.62	0.72	1.80	1.02	0.41	0.48	1.20	0.68	0.73	0.85	2.12	1.09	0.48	0.49	1.22	0.67
San Luis Obispo	No	Oceanic-West Huasna ≈ 3½ km&Hosgri ≈ 25 km	--	BC	0.48	0.43	1.08	0.40	0.32	0.29	0.72	0.26	0.32	0.31	0.77	0.28	0.15	0.14	0.35	0.13
				C	0.57	0.52	1.29	0.59	0.38	0.34	0.86	0.40	0.38	0.37	0.92	0.43	0.19	0.18	0.45	0.19
				D	0.54	0.46	1.15	0.75	0.36	0.31	0.77	0.50	0.41	0.37	0.92	0.58	0.23	0.21	0.53	0.30
				Default D	0.54	0.52	1.29	0.75	0.36	0.34	0.86	0.50	0.41	0.37	0.92	0.58	0.23	0.21	0.53	0.30

Campus continued	Active Fault Zone[1]	Closest UCERF3[2] Faults for Deterministic Ground Shaking Considerations	Located in a Mapped Liquefaction Zone[3]	Site Class[4]	BSE-2N [MCE_R] (g)[4]				BSE-1N [Design] (g)[4]				BSE-C (g)[4]				BSE-R (g)[4]			
					PGA_M	S_{M0}	S_{MS}	S_{M1}	PGA_D	S_{D0}	S_{DS}	S_{D1}	PGA_C	S_{C0}	S_{CS}	S_{C1}	PGA_R	S_{R0}	S_{RS}	S_{R1}
San Marcos	No	Rose Canyon/Newport-Inglewood ≈ 20 km	--	BC	0.39	0.36	0.89	0.33	0.26	0.24	0.59	0.22	0.28	0.27	0.68	0.25	0.15	0.14	0.35	0.13
				C	0.46	0.43	1.07	0.49	0.31	0.29	0.71	0.33	0.34	0.33	0.83	0.37	0.19	0.18	0.45	0.19
				D	0.47	0.41	1.02	0.65	0.31	0.27	0.68	0.43	0.37	0.34	0.85	0.52	0.22	0.21	0.53	0.30
				Default D	0.47	0.43	1.07	0.65	0.31	0.29	0.71	0.43	0.37	0.34	0.85	0.52	0.22	0.21	0.53	0.30
Sonoma	No	Rodgers Creek-Healdsburg ≈ 3½ km	--	BC	0.87	0.82	2.06	0.79	0.58	0.55	1.37	0.53	0.69	0.71	1.77	0.66	0.33	0.32	0.80	0.29
				C	1.04	0.99	2.47	1.11	0.69	0.66	1.65	0.74	0.83	0.85	2.12	0.92	0.40	0.39	0.96	0.43
				D	0.95	0.82	2.06	1.35	0.64	0.55	1.37	0.90	0.76	0.71	1.77	1.12	0.42	0.38	0.95	0.58
				Default D	0.95	0.99	2.47	1.35	0.64	0.66	1.65	0.90	0.76	0.85	2.12	1.12	0.42	0.39	0.96	0.58
Sonoma Los Guilicos Preserve	No	Rodgers Creek-Healdsburg ≈ 9 km & West Napa ≈ 11 km	--	BC	0.66	0.63	1.56	0.60	0.44	0.42	1.04	0.40	0.61	0.64	1.60	0.58	0.32	0.32	0.80	0.28
				C	0.79	0.75	1.88	0.84	0.53	0.50	1.25	0.56	0.73	0.77	1.92	0.83	0.39	0.38	0.96	0.42
				D	0.72	0.63	1.56	1.02	0.48	0.42	1.04	0.68	0.67	0.64	1.60	1.00	0.41	0.38	0.94	0.57
				Default D	0.72	0.75	1.88	1.02	0.48	0.50	1.25	0.68	0.67	0.77	1.92	1.00	0.41	0.38	0.96	0.57
Stanislaus	No	Great Valley (Orestimba) ≈ 32 km	--	BC	0.28	0.26	0.66	0.26	0.18	0.18	0.44	0.18	0.21	0.20	0.49	0.20	0.12	0.11	0.27	0.11
				C	0.33	0.33	0.82	0.39	0.22	0.22	0.54	0.26	0.25	0.26	0.64	0.30	0.15	0.14	0.35	0.17
				D	0.36	0.34	0.84	0.55	0.24	0.22	0.56	0.36	0.29	0.28	0.69	0.44	0.18	0.17	0.43	0.27
				Default D	0.36	0.34	0.84	0.55	0.24	0.22	0.56	0.36	0.29	0.28	0.69	0.44	0.18	0.17	0.43	0.27
Stanislaus Stockton	No	Great Valley (Midland) ≈ 29 km	--	BC	0.30	0.29	0.72	0.28	0.20	0.19	0.48	0.19	0.22	0.21	0.54	0.22	0.13	0.12	0.30	0.12
				C	0.36	0.35	0.87	0.42	0.24	0.23	0.58	0.28	0.27	0.28	0.69	0.32	0.16	0.15	0.38	0.18
				D	0.39	0.35	0.88	0.57	0.26	0.23	0.59	0.38	0.31	0.29	0.73	0.47	0.20	0.18	0.46	0.29

Notes:	
1	The active fault zones are indicated by the appropriate fault zone special studies map issued by the California Geological Survey (CGS). The earthquake fault zone for the San José fault is indicated on the map prepared for and issued by the CSU Seismic Review Board. These are also available on the Web at the site https://maps.conservation.ca.gov/cgs/EQZApp/App/, where liquefaction, landslide and flood plain requirements are determinable by site address.
2	Field, E.H., Biasi, G.P., Bird, P., Dawson, T.E., Felzer, K.R., Jackson, D.D., Johnson, K.M., Jordan, T.H., Madden, C., Michael, A.J., Milner, K.R., Page, M.T., Parsons, T., Powers, P.M., Shaw, B.E., Thatcher, W.R., Weldon, R.J., II, and Zeng, Y., 2013, Uniform California earthquake rupture forecast, version 3 (UCERF3)—The time-independent model: U.S. Geological Survey Open-File Report 2013–1165, 97 p., California Geological Survey Special Report 228, and Southern California Earthquake Center Publication 1792, http://pubs.usgs.gov/of/2013/1165/.
3	Liquefaction Zonation is based on CGS maps from 1998 to 2005. Locations where a map was not available are indicated by "--".
4	As defined per ASCE/SEI 7-16, ASCE/SEI 41-17, 2019 California Building Code (CBC).
5	For sites underlain by Site Class E or F ground conditions, site-specific ground motion hazard and/or site response analyses shall be performed to determine appropriate horizontal response spectral acceleration parameters, unless the exceptions of ASCE/SEI 7-16 Supplement 3 (adopted by the CBC) are met.

ATTACHMENT C – California State University Campus Assignments of Seismic Peer Reviewers

The following Seismic Peer Reviewers are assigned for the respective campuses of the California State University and associated locations. All seismic peer reviews for the indicated campuses or their off-campus locations are to be performed by the named individuals or their designees. For other locations, the *CSU* Seismic Review Board will assign the Seismic Peer Reviewer. *In addition, for investigations that are undertaken specifically to investigate the occurrence of geologic and geotechnical seismic hazards (e.g., faulting, liquefaction, land sliding), Debra Murphy shall be the Seismic Peer Reviewer for all locations within the CSU system*. *For the updated and current list, see the link: Seismic Peer Reviewers are assigned to individual campuses of the CSU*.

Campus **Principal Seismic Peer Reviewer**	**Name**
Bakersfield	Dirk Bondy
Bakersfield – Antelope Valley	Dirk Bondy
California Maritime Academy	Maryann Phipps
Chancellor's Office	Barry Schindler
Channel Islands	Barry Schindler
Chico	Maryann Phipps
Dominguez Hills	Thomas Sabol
East Bay – Concord	Richard Niewiarowski
East Bay – Main Campus	Richard Niewiarowski
Fresno	Maryann Phipps
Fullerton	Barry Schindler
Humboldt	Maryann Phipps
Humboldt – Trinidad	Maryann Phipps
Long Beach	Dirk Bondy
Los Angeles	Thomas Sabol
Monterey Bay – East Campus	Richard Niewiarowski
Monterey Bay – West Campus	Richard Niewiarowski
Northridge	Thomas Sabol
Pomona	Barry Schindler
Pomona – South	Barry Schindler
Sacramento	Maryann Phipps
San Bernardino	Dirk Bondy
San Bernardino – Palm Desert	Dirk Bondy
San Diego	Barry Schindler
San Diego – Brawley	Barry Schindler
San Diego – Imperial	Barry Schindler
San Diego – Mission Valley	Barry Schindler
San Francisco	Charles Thiel
San Francisco – Tiburon	Charles Thiel
San José	Richard Niewiarowski
San José South Campus	Richard Niewiarowski
SJSU – Moss Landing	Richard Niewiarowski
SJSU – Marine Laboratory	Richard Niewiarowski
San Luis Obispo	Thomas Sabol
San Marcos	Dirk Bondy
Sonoma	Maryann Phipps
Sonoma – Los Guilicos Preserve	Maryann Phipps
Sonoma – Fairfield Osborn Preserve	Maryann Phipps
Sonoma – Galbreath Wildland Preserve	Maryann Phipps
Stanislaus	Richard Niewiarowski
Stanislaus – Stockton	Richard Niewiarowski

ATTACHMENT D – Seismic Performance Levels for Existing Buildings

(Table revision date: July 1, 2023)

Determination of expected seismic performance based on level of current CEBC Structural compliance, Part 10 of the California Code of Regulations:

Definitions based upon California Existing Building Code (CEBC) requirements for seismic evaluation of buildings using performance criteria in CEBC Table 317.5 [2].	Rating Level [1]
A building evaluated as meeting or exceeding the requirements of CEBC for Risk Category IV performance criteria with BSE-1 and BSE-2 hazard levels without MCE_R capping replacing BSE-R and BSE-C respectively as given in CEBC. Alternatively, a building meeting the CBC requirements for a new building[7] of this Category.	**I**
A building evaluated as meeting or exceeding the requirements of CEBC for Risk Category IV performance criteria. Alternatively, a building meeting the CBC requirements for a new building[7] of this Category.	**II**
A building evaluated as meeting or exceeding the requirements of CEBC for Risk Category I-III performance criteria with BSE-1 and BSE-2 hazard levels without MCE_R capping replacing BSE-R and BSE-C respectively as given in CEBC. Alternatively, a building meeting the CBC requirements for a new building[7].	**III**[5]
A building evaluated as meeting or exceeding the requirements of CEBC for Risk Category I-III performance criteria.	**IV**[5]
A building evaluated as meeting or exceeding the requirements of CEBC for Risk 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.	**V**[5]
A building evaluated as not meeting the minimum requirements for Level V designation and not requiring a Level VII designation.	**VI**
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.	**VII**

Indications of Implied Risk to Life and Implied Seismic Damageability

Rating Level [1,5]	Historic Risk Ratings of [6]		Implied Risk to Life [3]	Implied Seismic Damageability [4] (In a BSE-1 Event)
	DSA/SSC	UC		
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*		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 California State University, University of California, Department of General Services, Division of the State Architect, and Administrative Office of the Courts. The ratings apply to structural and non-structural elements of the building as contained in CEBC requirements. These definitions replace those previously used by these agencies.
2. The current edition of the CEBC, 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 CEBC and 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 the 84th percentile of the Maximum Considered Earthquake ground motion for the site, whichever is lower.
- 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. Risk Category is defined in the CBC Table 1604.5.
- The Risk Category sets the level of required seismic building performance under the CBC. Risk Category IV includes acute care hospitals, fire, rescue and police stations and emergency vehicle garages, designated emergency shelters, emergency operations centers, structures containing highly toxic materials where the quantities exceed the maximum allowed quantities, among others. Risk categories I-III include 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 Rating Level 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 Rating Level following the indicated technical requirements when a BSE-1 level earthquake occurs. Damage is measured as the ratio of the cost to repair the structure divided by the current cost to reconstruct the structure from scratch. Such assessments are to be completed to the requirements of ASTM E-2557, where the damage ratio is the Scenario Expected Loss (SEL) in the BSE-1 earthquake ground motion evaluated at Level 1 or higher in order to be considered appropriate.

5. The Engineer assessing the Earthquake Performance Level using the noted requirements may conclude that the expected seismic performance is consistent with a rating one-level higher or lower than the one assigned by the Table for Levels III, IV or V. An alternative rating may only be assigned if an independent technical peer reviewer concurs in the evaluation that it is a better representation of the seismic risk of the building than that determined by these definitions. The peer review must be completed consistent with the requirements of CEBC. 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 unchanged because the performance increment between levels is so large, and it is highly unlikely that revision could be justified.

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 is approximate; the former rating procedures did not specify specific performance levels as is done herein but were sentence fragments for qualitative performance. For reference the historically used Division of the State Architect and Seismic Safety Commission levels correspond approximately to the new numerical values.

7. For the alternative of meeting the CBC requirements for Level 3 to apply, the building must meet all of the requirements of the CBC; this includes all requirements, including ground motions, analysis procedures, and detailing limitations.

ATTACHMENT E – Technical Guidelines

The CSU Seismic Requirements details requirements for CSU construction projects in addition to those that are contained within the CBC and CEBC. The CSU Seismic Review Board (SRB) maintains guidelines on selected topics that provide the design team additional technical details on issues that are important to the execution of projects and represent areas of concern to the SRB. These are intended to inform the EOR so that when the situation is encountered, the EOR can know what the SRB expects. These are not directions, but express issues that in the experience of the SRB need to be resolved for the project to meet CSU's objectives. They are not intended as direction, but as alerts to important technical performance issues in the design that are likely to be of concern in the peer review. These are intended for use for California State University construction but may also be used by others.

1. Requirements and Recommendations for Post-Tensioned Concrete Structures

In addition to satisfying all of the requirements listed in the CSU Seismic Requirements and the applicable sections of the California Building Standards Code, the design and construction of all post-tensioned concrete structures shall conform to all requirements of:

- American Concrete Institute ACI 318-14 for post-tensioned concrete design,
- Post-Tensioning Institute – 6th Edition's recommendations for post-tensioned structures,
- Additional standard of care and practice for post-tensioned structures described in this document.

A post-tensioned concrete designer shall discuss with the Seismic Peer Reviewer, at a minimum, the recommendations in this document and comply with the intent of these requirements, unless there are good technical reasons for not doing so.

A. American Concrete Institute 318 Requirements

1. All post-tensioning tendons shall be encapsulated in compliance with ACI 318-14 Section 20.6.3.1 through 20.6.3.3. Specifications or details that show or indicate exposed strand are not permitted. Closure strip/pour strip details shall not show tendon tails extending into the delay strip.
2. Integrity tendons at the columns shall be clearly indicated on the structural drawings in compliance with ACI 318-14 Section 8.7.5.6.1.
3. Minimum average of 125 psi for one- and two-way slabs and plates shall be provided in compliance with ACI 318-14 Section 8.6.2.1.
4. Pre-compression from unbonded prestressing reinforcement, as described in ACI 318-14 Section 12.5.1.4, shall be utilized where possible to resist seismic diaphragm forces to minimize congestion from mild reinforcement in chords and collector elements.
5. In podium structures and post-tensioned mat foundation structures where the balanced load exceeds 100% of the concrete weight, the calculations shall clearly demonstrate that the transfer stresses in ACI 318-14 Table 24.5.3.2 are not exceeded using a concrete compressive strength f'_{ci} not greater than 75% of the 28-day compressive strength.

B. Post-Tensioning Institute Recommendations

1. Lateral curvature in banded groups of tendons should be minimized and should satisfy Section 6.3.1.3.4 and Figure 6.14 of the Post-Tensioning Manual - 6th Edition, except that the minimum extension of straight tendon layout past an opening shall be 4'-0". The maximum lateral curvature for banded tendon groups of 20 tendons or less shall be 1:6, with hairpin reinforcement required for curvatures exceeding 1:12. The maximum lateral curvature for banded tendon groups in excess of 20 tendons shall be 1:12, with hairpin reinforcement required for curvatures exceeding 1:20.

Lateral curvature of banded groups of tendons is prohibited in areas of the slab where the concrete top or bottom cover over the tendons is less than 2".

In general, uniformly spaced tendons should be placed orthogonally to the banded tendons. Lateral curvature of uniform tendons should be minimized and shall satisfy Section 6.3.1.3.4 and Figure 6.14 of the Post-Tensioning Manual - 6th Edition. When curving uniform tendons around openings and other obstructions, tendon layout shall not exceed the maximum tendon spacing of 5'-0" or 8 times the slab thickness, whichever is smaller.

2. The seismic system layout shall adhere to the "favorable" arrangement depicted in Figure 6.2 of the Post-Tensioning Manual – 6th Edition. The schematic layout of the seismic system shall be provided to the Seismic Peer Reviewer at the onset of the project for a compliance review.
3. Closure strips/pour strips shall be provided in structures where significant restraint-to-shortening exists. A minimum pour delay of 30 days from the time of the 2nd pour shall be specified for structures with plan dimensions less than or equal to 250', and 60 days for structures with a larger plan dimension. In structures where the plan dimensions exceed 350', a permanent expansion joint is required.
4. Closure strips/pour strips should be limited to 30"-36" in width as stated in the Post-Tensioning Institute document "Restraint Cracks and Their Mitigation in Unbonded Post-Tensioned Building Structures".
5. Slab and beam thicknesses should meet or exceed the recommendations of Table 9.3 of the Post-Tensioning Manual – 6th Edition.

C. California Building Standards Code

1. Comply with minimum fire cover as required in Table 721.1(1)4. Interior bays may be considered restrained as described in Note k. Exterior bays shall be considered unrestrained.

D. Recommended Standards of Care & Practice

1. Unless specifically designated otherwise, when closure strips/pour strips are used, it shall be made clear to the contractor through notes and details that the open pour strip bay is incapable of supporting any load, including its own. Unless a greater number of bays is required by calculation, shores shall be provided and designed such that for every open pour strip bay, a minimum of four closed and cured bays are required for support below if the shoring does not continue to the ground. It is recommended that all re-shores in closure/pour strip bays extend to the foundation level.
2. When closure strips/pour strips and construction joints are used, they should be located to minimize uneven floors, column deformations, and related construction costs. The Seismic Peer Reviewer will want to review the basis for their locations to assure good technical performance of the resulting structure.
3. The average compression in flat plates and flat slabs should be limited to a maximum of 250 psi, with 150-175 psi considered optimum. Stresses may be higher in localized areas.
4. Calculations shall demonstrate the amount of dead load balanced by the post-tensioning system. A minimum of 65% of the concrete weight shall be balanced. Balanced loads shall not exceed 125% of the concrete weight for uniformly loaded members not carrying additional floors.
5. Tendons less than 125' in length may be stressed from one end only. Tendons greater than 125' in length shall have a "lift-off" performed at the 2nd stressing end. The maximum length of a two-way pull is 250 feet.

6. Every tendon shall be stressed to their full extent (one occurrence) and never partially stressed and then restressed. This requirement is not intended to prohibit staged stressing.
7. Requiring de-tensioning of tendons should be avoided. This is a very dangerous operation for the contractor, and alternate solutions should be thoroughly explored before de-tensioning is proposed.
8. Care should be taken to minimize the amount and diameter of conduit placed in the decks. Congested runs of conduit should be surface mounted below the decks. All conduits shall be independently chaired and not supported by the post-tensioning tendons.
9. Care should be taken to minimize penetrations near column supports and tendon anchorages. Penetrations within a 45-degree angle compression zone of post-tensioning anchors, and within 4'-0" of an anchor shall require Schedule 40 steel sleeves. PVC sleeves are not permitted in this zone.
10. Shear stud reinforcement should be used at two-way slab banded tendon anchorages in lieu of hairpin reinforcement to minimize congestion near anchorages.
11. In flat plates and two-way slabs, provide a minimum of #4 continuous (lapped) bottom reinforcement, spaced not more than 30" apart each way.
12. Shot pin embedment shall be limited to 1/8” less than the cover of the concrete over the tendons.
13. Drilling into the post-tensioned slab is prohibited unless tendon locations are marked in advance, the slab has been x-rayed, or the post-tensioning has been recorded through drone or other photography methods. Cast-in-place non-prestressed reinforcement, bolts, plates, etc. shall be specified in lieu of post-installed items.
14. For structures utilizing moment frames, a thorough analysis of punching shear using the story drifts occurring during the maximum considered earthquake story drifts shall be completed.
15. Slabs 10” thick or greater should utilize column caps in lieu of shear studs for punching shear reinforcement.
16. Floor systems shall be required to be stressed within 3-5 days of the concrete pour to minimize shrinkage cracking.
17. Deck forms shall remain in place until the deck is poured and stressed completely. Re-shores shall be used in non-pour strip bays to distribute the weight of the wet concrete floor to cured and stressed floors below (3 floors minimum) such that the design live load at any floor is not exceeded. Details reflecting these requirements shall be provided on the structural design drawings.
18. Where significant modifications over the life of the structure are anticipated, the designer should specify a method for locating tendons, such as permanent marking on the slab, digitized photography, etc.

2. Requirements and Recommendations for Limitations on Electrical Conduits in Reinforced Concrete Slabs

Current California electrical requirements in all buildings but particularly in parking structures for solar photovoltaic systems and electric vehicles, in conjunction with lighting, data, Wi-Fi, power outlets, ventilation and fans, security video, carbon monoxide sensors, methane sensors, gate sensors, telephones and other electrical systems are now resulting in substantial conduit in most concrete slabs. When left unchecked by the Structural Engineer of Record (SEOR) this conduit may compromise the vertical (gravity) and lateral (diaphragm) load carrying systems.

It is preferred that electrical wires, except for the basic lighting of the structure, be placed in conduit or in a system that is exterior to the slab, particularly the wiring necessary for the photovoltaic systems and electric vehicles in parking structures.

The SEOR shall require on the structural drawings that a conduit placement plan be generated by the electrical engineer and verified by the electrical contractor for all conduit placed in the slab. This plan may not be a deferred submittal. If this plan is not provided to the SEOR during the plan check and review process, no conduit shall be allowed to be placed in the structural slab, and this must be stated on the structural plans.

The conduit plan shall comply with the following and this should be stated on the structural plans:

1. *Each individual conduit must be drawn with the outside diameter specified, and its complete path of travel. It is not acceptable to draw a single line and call out multiple conduits.*
2. *In two-way slabs, prestressed or non-prestressed, conduits shall not be placed within three feet of any column face or within any Studrails protruding from a column.*
3. *In post-tensioned slabs, conduit shall not exist within 24 inches of the bearing face of an anchor.*
4. *Maximum outside diameter of conduit shall be 1.0 inch for slabs 6 inches and thinner; 1.25” for slabs between 6 inches and 10 inches; 1.5” for slabs greater than 10 inches.*
5. *Conduit must exist within the middle 1/3 of the slab.*
6. *All conduits must be chaired independently of the slab reinforcing (bonded reinforcement or post-tensioning).*
7. *Crossing of conduit should be avoided or minimized. Where it cannot be avoided all conduit must exist within the middle 1/3 of the slab.*
8. *The spacing of the conduit in the slab must be shown and shall not be less than 3 times the conduit diameter.*
9. *Added bonded reinforcement (top and bottom) should be used at congested locations of conduit to minimize cracking.*
10. *Conduits should be constructed of plastic or steel. Aluminum conduit is not allowed.*

The seismic peer reviewer shall examine the electrical conduit plan and structural drawings to confirm that there are not excessive conduits in any proposed design.

Document history: First issued: November 16, 2017

ATTACHMENT F – References

ASCE 7. *Minimum Design Loads for Buildings and Other Structures*, American Society of Civil Engineers, Reston, Virginia, ASCE/SEI Standard 7-16, 2016.

ASCE-41. *Seismic Rehabilitation of Existing Buildings*, American Society of Civil Engineers, Reston, Virginia, ASCE/SEI Standard 41-17, 2016.

ASTM E2557-16a. "Standard Practice for Probable Maximum Loss Evaluations for Earthquake Due Diligence Assessments," ASTM International, Conshohocken, PA, June 2007.

California Building Standards Code, California Code Regulations, Title 24, California Building Standards Commission, Sacramento, California. Current Edition.

California Geological Survey, Seismic Hazard Regulatory Maps (faults, landslides, liquefaction) http://www.conservation.ca.gov/cgs/shp.

Code of California Regulations, Chapter 7.5 California Resources Code.

FEMA 352. Recommended Post-earthquake Evaluation and Repair Criteria for *Welded Steel Moment Frame Buildings*, Federal Emergency Management Agency, Washington D.C., July 2000.

FEMAP-154. *Rapid Visual Screening of Building for Potential Seismic Hazards: A Handbook*, Third Edition, Federal Emergency Management Agency, Washington D.C., 2013.

DOCUMENT HISTORY

8/15/2024	Added text to Section 3.4, Page 8, Paragraph "a" - The term "construction cost for the replacement of the building"…. And Pages 8 & 9, Paragraph "a" - "Equipment" means mechanical electrical… Added Section 5.21: Electrical Conduits in Reinforced Concrete Slabs. Added new Section in Attachment E: Technical Guidelines on Electrical Conduits. All added and/or revised Sections are indicated by ***blue italicized text***.
8/15/2024	Removed blue color text from the blue italicized text from revisions published 7/15/23 and 1/15/24.
1/15/2024	Revised Section 4.1, (10) for Scope of Review Revised Section 5.13, (4) for Delegated Design and/or Deferred Approvals Both Sections are indicated by ***blue italicized text***.
7/15/2023	The CSU Seismic Requirements document has been updated in its entirety including but not limited to the following: Clarification of specific compliance requirements for the Seismic Priory Lists; the addition of a new section for the New Seismic Assessment process; clarifies 25% Exception in the California Existing Building Code, Section 317.3.1; clarified sections - structural observation, pre-engineering, metal buildings & delegated design; updated References based on new reference editions; standardizes terms and acronyms; corrected punctuation, grammar, and spelling. All substantial revisions are indicated with ***blue italicized text***.
7/1/2023	All references to Seismic Policy were renamed Seismic Requirements for consistency. The requirements were entirely edited to revise and modify many prior requirements. It is advised that the familiar carefully reread these requirements to assure they detect the now requirements fully. Section 5.16 on Parking structures was moved to Section 3.1. Sections 3.12 (Structural Observation was added), 5.14 (Pre-Engineered Buildings had major additions), Section 7 (CSU Seismic Building Assessment was reorganized and the newly adopted assessment program is discussed), Section 7 (CSU Seismic Building Assessment Procedures) is new, Section 9 (Seismic Safety Standard for Acquired Buildings and Space) has been modified, and Section 9.1.A changes the method of evaluation of a proposed building to be leased.
4/30/2020	Revised Attachment C Campus Assignments for Seismic Peer Reviewers.
3/5/2020	Selected editorial change Revised Section 3.0 with clarification of California Code of Regulations Part 2 and Part 10. Revised Section 3.3 for Campus Seismic Coefficients. Revised Section 3.4 with clarification of California Code of Regulations Part 10. Revised Section 5.19 for Earthquake Soil Pressures. Omitted Section 5.21 for Use of ASCE 7 Site Modification Factors Fa and Fv. Revised Section 7.2 with clarification of CEBC. Revised Attachment B and Seismic Design Table, Table 1. Revised Attachment C Campus Assignments for Seismic Peer Reviewers. Revised Attachment F References (to ASCE 7 & 41).
6/25/2019	Requirements for temporary structures modified to specifically apply to tents and other temporary use structure, modification of requirements for peer review, and other items.
10/15/2018	Attachment D Table modified; added Attachment E on Post-tensioning; other minor editing; clarification of use changes in List 1 and 2 buildings.
11/1/2016	Revises selected items and references to the new CEBC applying to existing building that was formerly included in Part 2 Sections 3417-23.
9/10/2015	Corrected editorial items and provided accidentally deleted text.
8/11/2014	Section 5-8 First line of 3rd Paragraph change Design-Building to Design-Build; Section 5-17 Change all CBC 3417 references to CEBC 3419
7/14/2014	December 21, 2011 Document Edit - 7/14/2014 Revision Issued
	There are versions of the CSU Seismic Requirements that pre-date 2014.

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