The California State University
OFFICE OF THE CHANCELLOR

CSU SEISMIC REQUIREMENTS

March 5, 2020

http://www.calstate.edu/cpdc/ae

CSU Seismic Policy Quick Start Guide

Read this if you don't read anything else

Scope: These CSU Seismic Requirements were established to implement the Seismic Policy set by the Board of Trustees. The CSU Seismic Policy applies to all structures within the bounds of a CSU campus master plan. If a campus 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 need. CSU *use* is the determining factor. (Sec. 3.2, 3.4, 8.0)

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 selected for shall be documented. (Sec. 7.0)

What Needs Seismic Peer Review: All *major* capital building projects require peer review. All *minor* capital building projects shall be seismically assessed; however, a Campus Deputy Building Official may issue a written waiver for individual *minor capital infrastructure and capital* projects that do not have material seismic issues. In doubt, contact the campus 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 (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 campuses inform Contractor and Design team proposer of these 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 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 SRB peer review comments is required before start of construction, resolution of SRB construction phase submittals must be required prior to occupancy. (Sec. 3.8, 4.4, 5.18)

When Required: Engage peer review concurrent with Project RFP development. Secure peer review concurrence letters in advance of advertisement for proposals, CPDC schematic presentation and before construction begins. (Sec. 3.8, 4.2)

Purchase, Lease: The CSU Seismic Requirements have standards for the purchase, lease, license and other form of acquisition or occupancy of buildings, or portions thereof. Compliance is required before actual occupancy begins. (Sec. 1.0, 8.0)

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)

Change of Use: Temporary use changes (<7 days) require a Special Event Permit. Coordinate with 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. 5.20)

CSU Seismic Priority Lists: Buildings on the CSU Priority Lists require seismic improvements 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 SRB peer reviewer to assess the need for a mobilization response. If a mobilization response is warranted Campus Deputy Building Official 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 modification 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 March 5, 2020

1. CSU SEISMIC POLICY

The California State University (CSU) Board of Trustees 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.*
>
> *[Approved by the Trustees of California State University at its May 18-19, 1993 meeting (RTCPBG 05-93-13).]*

This policy is 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 to acceptable levels.

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

1. *To the maximum extent feasible by present earthquake engineering practice the goal is to acquire, build, maintain, and rehabilitate buildings and other facilities that provide an acceptable level of earthquake safety.*

   Discussion: Actions necessary to accomplish this goal were initiated in 1992 for existing buildings and will continue until all CSU existing buildings meet the seismic safety objective of the Trustees and all new construction meets this goal. Each year capital expenditures are recommended until the unacceptable safety hazard buildings 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 damaged is addressed in Section 6. Other special issues are addressed in Section 5. Standards for the acquisition and lease of buildings are given in Section 8.

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

   Discussion: The California Building Code (CBC) provides construction standards for both new construction and renovation of existing buildings. The code has added provisions for existing buildings since the Trustees' policy was established. (The implementation of these standards is addressed in Section 3)

3. *Independent technical peer reviews shall be conducted concerning the seismic aspects of all construction projects from their design initiation, including both new construction and remodeling, for conformance to good seismic resistant practice consistent with this policy.*

   Discussion: The SRB is delegated responsibility to conduct independent peer reviews of all CSU construction projects. 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 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. Section 7 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 policy. The Board also advises CSU on structural engineering issues for specific projects. Membership is comprised of professionals not otherwise affiliated with the University system. Board members are appointed by, and serve at the discretion of the Chancellor. The Board membership is listed in Attachment A.

3. CODES AND STANDARDS APPLICABLE TO CSU CONSTRUCTION ACTIVITY

By law, the California State University is required to enforce the current edition of the CBC as adopted by the California Building Standards Commission. 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 State University Administrative Manual (SUAM) Section XI for listing of

sections adopted as policy. This Seismic Policy supplements the requirements of the CBC. Where requirements differ the more restrictive shall apply.

The Building Code 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 (CBC); and the requirements for existing retrofit/renovation and repair to campus buildings are found Part 10 of the California Code of Regulations, Part 10, termed the California Existing Building Code (CEBC).

The CSU Building Official is responsible for enforcement of this code. A Deputy Building Official (CDBO) 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 those additional sites under campus jurisdiction.

Designated historic structures may be subject to the State Historic Building Code; these requirements are in addition to the same 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 applies to all construction, whether it is new, or an addition, modification or alteration of an existing structure.

The seismic requirements of CEBC for existing buildings are less stringent than CBC part 2, Chapter 16 for new buildings. The intent of CEBC is retrofit and repair of existing structures that will yield an essential life safety level of performance. Essential life safety seeks to provide design performance that will allow occupants in a seismic event to exit the structure safely. CBC Part 2, Chapter 16 may be used for modifications of an IEBEC existing building if so desired.

The required seismic provisions can be modified by the campus to provide a higher level of seismic performance, but may not be modified to provide a lower level of seismic performance. Chapter A1 allows the Building Official to enforce other provisions as long as they do not diminish the safety of the facility. At any time where the responsible CSU 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 approval of the plans for construction.

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. It 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 and significant partial structural collapse remains, even though damage may not be economical to repair; major structural elements have not become dislodged or fallen so as to pose a life- safety threat; and, nonstructural 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 entrance.

Special Note: CBC Section 1604.5 requires the *[Structural] Risk Category* be determined for every building. Table 1604.5 characterizes the nature of the Risk Category for various occupancies and uses. Occupancy load is typically calculated per Table 1004.1.2. Once the occupancy load is determined, Table 1604.5 is applied to assign the Risk Category for structural design purposes. These requirements broadly apply to all CSU buildings, including non-classroom buildings and non-state funded buildings such as dormitories, dining centers, student unions, student recreation centers, student health centers, office buildings, stadia, aquatic facilities etc. Among the designations of Table 1604.5 is

- *Buildings and other structures containing adult education facilities, such as colleges and universities, with occupancy load greater than 500.*

When a building exceeds this triggering threshold, it shall be classified as Category III use, unless other designations trigger a more restrictive designation. Note that the occupancy determined by the design team (architect) is based on fire rated occupancies and confirmed by the Building Official.

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

Exception: Parking Structures: The occupancy threshold trigger for Category III inclusion of parking structures is 5,000 occupants as calculated by CBC Table 1004.1.2. 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.*

3.2 Application to New Buildings

The 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 the other.

3.3 Campus Seismic Coefficients

CBC Part 2, 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.

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 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 associated directly to 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 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 U.S. 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 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 in accordance with 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 CSU Seismic Review Board shall provide such values for design.

Use of the seismic ground motion parameters given in Table 1 of Attachment B supersedes 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 with Site Class D ground conditions. Site-specific ground motion hazard and/or site response analyses may still be 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.

The 2016 Edition of the CBC changed the basis of design for many CSU campuses and that change is carried forward to the current version of the CBC. The CBC references ASCE/SEI 7 for the requirements of new buildings. ASCE/SEI 7 Section 11.6 requires that whenever the mapped spectral response acceleration parameter value at a 1-second period, i.e., BSE-2N (MCE_R) S_{M1} for Site Class BC, is equal to or greater than 0.75, then buildings in Risk Categories I, II, and III shall be assigned to Seismic Design Category E and buildings in Risk Category IV shall be assigned to Seismic Design Category F. For all Categories of buildings, the designer must identify if vertical or horizontal plan irregularities are present. Section ASCE/SEI 7 12.3 addresses irregularities and defines types of vertical and horizontal irregularity in Tables 12.3-1 and 12.3-2. ASCE/SEI 7 Section 12.3.3.1 identifies the types of irregularities that are not allowed for Categories D, E and F buildings. Also, for specific types of irregularities, ASCE/SEI 7 Section 12.3.3.4 increases

the design load requirements for buildings in Category D, E, and F by 25%.

It is vitally important that the design team for an assigned Category D, E or F new building be aware that under the requirements of ASCE/SEI 7 Section 12.3 that the configurations are more severely limited. That is, some classes of vertical and horizontal irregularity are not allowed. Tables 12.3-1 and 12.3-2 list respectively for Horizontal and Vertical irregularities what the added requirements are if specific irregularities are present. Unless these restrictions are accommodated in the earliest schematic development, the impact will be the need to redesign to meet these requirements once the requirement is discovered.

The following campuses have S_{M1} values that for the reference site condition trigger the design requirements for all new buildings to be Category D, E or F, with the attendant limitations of irregularities allowed in the configuration of the building:

- East Bay - Hayward
- Humboldt
- Humboldt Marine Lab – Trinidad
- San Bernardino
- San Francisco
- Sonoma

3.4 Applications to Existing Buildings

Part 10 of 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.

Whenever a construction project on an existing building is planned, CEBC requires, if any of the triggers defined in Section 317.3.1 are activated, 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.

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 seek to 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 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, expected to exist at the

maximum seismically-induced cyclic deformations expected to occur at the seismic performance level being assessed.

For projects that include modification, alteration, or a structurally connected addition to an existing building, CEBC applies to the entire modified building including the new construction work. Section 317.3 defines the project thresholds for structures proposed for retrofit, repair, or modification. Section 317.5 and Table 317.5 define the seismic performance requirements for assessment and design. For projects that include a structurally connected addition to an existing building, the Exception in Section 317.5 applies to the project. All new structural elements shall comply with the detailing requirements of the CBC.

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 do not compromise the gravity load supporting and lateral load resisting performance of the existing structure as determined using the provisions of CEBC.

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 this 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.

The cumulative cost of alterations made to a building since 1995 shall be computed in the following way. When permitted work is done in the building, whether it is structural or not, calculate the ratio of the cost of the current alteration divided by the building's current replacement value. Add this ratio to the sum of similarly computed ratios calculated for previous permitted work to determine the cumulative total. In this way, inflation is recognized in the computations. 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 from 1995 to the completion date of the seismic retrofit.

The cost basis for the Section 317.3.1 item 1 threshold 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 characterized as normal maintenance but caused by an earthquake is not considered as normal maintenance.

3.5 Code Enforcement

The California State University is responsible for enforcement of the California Building Standards Code (CBSC) which contains 12 parts covering all aspects of the construction process. The Chief of Architecture and Engineering in Capital Planning, Design, and Construction (CPDC) at the Office of the Chancellor, is the Building Official for the CSU. By delegation, one person at each campus is a Campus Deputy Building Official for that campus and its other administrative locations. This person is responsible for enforcing

the requirements of the California Building Standards Code for all construction at the campus. An assigned CSU Peer Reviewer provides the technical review of the seismic aspects of projects and reports findings to this person (Section 4). While the SRB is principally concerned with structural issues design and modifications of new and existing buildings, the design team must be concerned with all 12 Parts.

The Chairman of the SRB is designated a CSU Deputy Building Official for special purposes, including post-earthquake evaluation and repair of damaged buildings.

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 condition. Among these is the conditions is that:

5. A dangerous condition is not created.

Section 3.16.6 states that

… buildings in existence … may have the exiting 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 CBC. CSU has determined that for its buildings this term is defined as:

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

Such a determination must be peer reviewed and for accuracy by a Method B assessment of Section 321, where the peer review is limited to whether a dangerous condition is not created by the retrofit proposed.

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 other 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 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 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 can 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 SRB must approve selection of the engineer of a site study within a seismic zone prior to the initiation of the investigation. Once a geological study is completed, and the peer reviewer accepts the results, this study will provide a basis for design of the subject building for no more than five years after acceptance of the report by the 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 Section 317.3. Normal building maintenance and repair of mechanical systems does itself trigger retrofit requirements.

The SRB shall evaluate the hazard posed by fault rupture to all existing buildings within an Earthquake Fault Zone and include this hazard in their overall evaluation of the seismic risk of the building.

No new building shall be constructed or existing building's envelope extended where the closest portion of the building, including foundations, is less than 50 feet from a fault within an Earthquake Fault Zone.

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.

These procedures apply only to buildings that are occupied, and not to storage buildings that are not occupied by staff except for the purpose of 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 building element replacements-in-kind, or repairs and maintenance projects, the Campus Deputy Building Official is obligated to evaluate the nature of the contemplated work and at their election may self-certify compliance with these requirements (see also Section 5.5 Projects Not Warranting Peer Review). If the proposed work involves increases in weight from that in place of modifies the structural system as stated by the designer-of-record,

then peer review is not optional.

3.8 Peer Review Verification

Verification that the construction documents are in compliance with the CSU Seismic requirements 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, etc.) sufficient to identify the project and the specific document set considered in the peer reviewed. As construction continues, the 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 Engineer-of-Record (EOR) for the project through completion of construction. The Engineer-of-Record shall be determined at the beginning of the design process and may 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, for which he/she is in responsible charge.

3.10 Responsibility of Design Professionals during Construction

The CSU recognizes that regardless of the project delivery contract 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 modification proposed within their area of responsibility as a professional obligation prior to its execution. CSU project management team members do not have authority to approve substantive changes during construction without approval of the design professional and, where appropriate, the 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 consistent with the approved plans, CSU looks to the design professionals (including Structural-, Mechanical-, Geotechnical- and Architect-of record) to directly notify the CSU of potential construction changes or modification to the approved design documents that can substantively impact expected structural performance.

The CSU looks to the responsible Structural Engineer of Record (SEOR), or equivalent person, to make this assessment 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 *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 SEOR regardless of the project delivery contract employed.

In some cases, the SEOR, and/or contractor, may advise the CSU that the original Plan Check Agency review the altered plans for compliance with the approved design and the

CBC; deferred items from the original approved plans are in this category. CSU shall cause these reviews to be performed when it deems them appropriate. 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 in a timely manner and that sufficient time be allocated to complete the review.

3.11 Special Inspections

Chapter 17 of the California Building Standards Code (CBC) 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. The materials sections of the Code and many referenced standards therein, e.g. AISC Seismic Requirements, Table Q, make additional 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.

4. Peer Review

Peer review is a mandatory part of the construction process of the California State University system.

Peer review is to be performed for all building projects and for 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 Deputy Building Official. If the 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 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 review documentation and reviewed during the construction period when identified by the EOR's evaluation as having implications for the seismic performance.

Peer review is not intended to and does not replace the design responsibilities of the Engineer-of-Record. Peer review is not a plan check for detailed determination of the compliance of the developed plans to 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 peer reviewers for each campus (Attachment C) and will assign Peer Reviewers for locations not listed as needed.

The principal peer reviewer may assign one or more qualified individuals to provide

independent review under their direction. The SRB will periodically review such assignments.

A 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 Engineer-of-Record (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 detailed examination of the retrofit design. Any such actions by the peer reviewer will be limited to those deemed required to complete 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. 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 peer reviewer is responsible to review the expected seismic performance characteristics of the buildings, in light of the Trustees' Seismic Policy and specific CSU policies adopted to achieve this purpose, the review may exceed minimum building code requirements in assessing performance of the overall structural system(s).

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

4.1 Scope of Review

Documents for review shall include available construction documents, 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. Project review is both site- and building-specific, and considers proximity to faults, and soils and geologic conditions. The expected seismic performance characteristics for each building includes 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. 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 high quality design;
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 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.

The EOR for the project and CSU campus project manager shall provide to the peer reviewer all available information determined by the peer reviewer to be necessary for the completion of the peer review.

The effort undertaken in peer review is commensurate with 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 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.

Where the delivery method is design-build, the peer reviewer's effort begins when the Request for Proposals (RFP) is prepared, see Section 5.

4.3 Reports

The peer reviewer(s) shall prepare a written report to CSU and the responsible Deputy Building Official describing all aspects of the review performed, including conclusions reached by the reviewer. Reports shall be issued, as appropriate, after conceptual design, schematic design, during design development, and at completion of construction documents, but prior to their issuance for permit. On phased projects, a report shall be issued after completion of each phase. Such reports should include, at the minimum, statements of the following:

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. Ability of selected materials and framing systems to meet performance criteria with given loads and 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.

4.4 Responses and Corrective Actions

The EOR shall develop corrective actions and other responses as appropriate, based on the report submitted by the peer reviewer. Construction changes the affect the seismic 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 campus Project Manager for his use and distribution.

4.6 Design Professional Responsibility

The responsibility for structural design is fully and solely the responsibility of the design professional of record as outlines 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.

Although the peer reviewer will exercise usual and customary professional care in providing this review, the responsibility for the structural design remains fully with the Engineer-of-Record.

4.7 Resolution of Differences

If the EOR does not agree with the recommendation of the peer reviewer, then the SRB shall resolve such differences. Peer review should be a cooperative process between the structural EOR and project peer reviewer, both having the objective to produce a quality project. Direct and free communication between the Engineer-of-Record and project peer reviewer is vital to avoid misunderstanding. Despite this, honest differences may arise between the Engineer-of-Record and project peer reviewer. In such cases the EOR and project 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 Board for its consideration. The 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 fully executed, system wide master enabling seismic peer review agreements with each peer reviewer. Terms and conditions, including specific services and fees, have been fixed in these agreements. Peer review fees are based on total project construction costs and shall not be amended without CPDC concurrence. Copies of the agreements and amendments are provided for reference on the CPDC web site. To authorize services under these Agreements the campus need only execute a Service Order to the reviewer assigned to its campus.

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, then the project shall be peer reviewed in accordance with the requirements of this document.

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 given 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.

5.3 EOR References to Geotechnical Investigation

Construction document directions to 'see soils report' are not permitted on CSU projects. The structural Engineer of Record is one party that needs to 'see' the soils report and is the responsible party (not the contractor) to take from the soils report the relevant information and then convey it as a part of the construction documents.

The soils report itself shall not be portrayed as a part of the construction documents. The construction documents may reference the soils report as a 'supporting document' (providing name, title, author, date, etc.) for the contractor's reference and if desired, state that the soils report 'was relied upon in the development of the construction document.

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 this policy. The assigned 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 Campus Deputy Building Official determines that there are not be structural issues warranting a seismic peer review, the campus shall submit project documentation to the peer reviewer for an initial determination. If the peer reviewer concurs, the peer reviewer will provide a letter documenting this to the campus. This letter shall satisfy the requirements of peer review for this project. There is no charge to the campus for an initial determination.

The Campus Deputy Building Official is authorized to make an initial determination for projects with a total project cost of $3,000,000 or less, and at any amount, non-structural tenant improvements, building element replacements-in-kind, or repairs and maintenance projects. Should a peer review be deemed warranted, the campus shall issue a Service Order Authorization for seismic review of the project.

- Special project types the typically require peer review include: bridges, water, tank, cellular towers, field lighting that illuminates a surface 30' or greater below.
- Special project types not required to be submitted for peer review include: under 30' tall street light and traffic components installed consistent with Green Book (or equivalent) standards, public utilities elements installed by public utility, storm drainage elements, tree/palm installations.
- 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' total height from lowest adjacent ground plane do not require peer review. Taller structures and planed implosions require review. Even when not required the SRB and campus peer reviewer is available to the campus to provide technical advice and counsel on the seismic aspects for such projects.

5.7 Material Properties of Existing Buildings

Material properties (i.e. strength, stiffness, 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 41-06 establishes the methodology in ASCE Section 2.2.6 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. Section C2.2, ASCE/SEI 41 states "Where a destructive and non-destructive testing program is necessary to obtain as-built information, it is prudent to perform to preliminary calculations on key selected locations or parameters prior to establishing a detailed testing program." The ASCE standard for this notes the importance to obtain this "knowledge at a reasonable cost and with as little disruption as possible of construction features and materials 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 or locations on subsequent phase.
- Focus the tests on the critical structural elements.
- Utilize different or combined testing procedures (i.e. cores, Schmidt Hammer tests, etc.)

The methods used to determine the material values must be approved by the peer reviewer.

5.8 Design Build and CM at Risk Project

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

As noted in Section 4.2 seismic peer review of a project shall be initiated by the campus when the project plans specifications are in development, that is, well before the request for proposals or qualifications are 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 insure 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, the University. 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 with respect to the project are to the University as representative of the Trustees, and not to the contractor.

5.9 Special Moment Frame Structural Systems

The following requirements apply when special moment frames structural systems are used:

1. Where rigid elements, such as ramps, exist in the structure, a details 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 columns shall include special 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.

Note that this policy includes <u>all</u> moment frame structures, including concrete, masonry and steel.

5.10 Post-tensioned Structural Elements

CSU Guidelines for post-tensioned concrete structures in Attachment E are appended to these CSU Seismic Requirements. The Guidelines 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.

5.11 Alternate Methods of Construction

Construction assemblies not specified in the California Building Standards Code may be used provided that:

1. They have been accepted for use by the City of Los Angeles, Department of Building and Safety or the Division of the State Architect (DSA) and are used in accordance with the referenced research report or approved memorandum for application; or
2. The building Official approves the application under the allowance of CBC Appendix

A1 Alternate materials, alternate design and methods of construction. 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 equivalently rated oriented strand board (OSB) as an alternative to plywood in shear walls and diaphragms is prohibited.

   Exception: The use of oriented strand board (OSB) may be used in areas where exposure to moisture is prevented.

   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. 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 Cross Laminated Timber and variations of heavy timber construction on an alternate means basis.

5.13 Deferred Approvals or Multiple Design Packages

Some projects may include, in addition to the Engineer or Record (EOR) who is in responsible charge of the entire project, additional engineering firms contributing to the total design of the project. This may occur when there are deferred submittals in the project, (e.g. manufactured steel or wood framing elements, skylights, stairs, cladding or MEP supports and bracings), or when a portion of the project design is performed by design-build subcontractors (e.g. foundation, metal stud framing, fire suppression systems, or precast subcontractors). The structural design for such components or portions of a structure must be under the responsible charge of an engineer or architect, who is licensed in California, and must be signed and stamped by that individual. This individual is known as the Component Engineer of Record (CEOR).

In order to establish responsibility for the overall design and component design, the EOR and CEOR have responsibility as follows:

1. The EOR must establish written criteria for design of the components, and other requirements as necessary for coordination of the components and their Incorporation into the overall structural systems and its design. These requirements are required to be completed before the project is approved for construction and be submitted for peer review prior to approval of the project. The requirements shall be placed on the design drawings and related construction documents and specifications.

2. The CEOR shall provide, at a minimum, their design for the component the includes the following:

   A. Calculations indicated design criteria, applicable loads, properties, and

deformation analysis as required by the EOR construction documents.

B. Plans and details indicating all structural elements of the component, assemblage of elements, including as appropriate profiles, connections, welding, bracing, and attachments to elements designed by others.

C. The construction documents (plan and details) shall bear the stamp and signature of the CEOR before the stamp and signature of the EOR is placed on these documents. Appropriate notation by the CEOR should accompany their stamps describing or clarifying the work done under their responsible charge. For example, the CEOR may define his/her limited responsibilities with a note such as:

> *"The CEOR has prepared the component design and is responsible for its conformance to the project specifications and applicable code requirements. The CEOR did not participate in the design of the structure or other elements to which the component is attached except through meeting the required specification and applicable code requirements for the component."*

3. The EOR must review the structural design and related documents including calculations of each component designed by others, for conformance with the stated design criteria, and for coordination with the overall structural design including the ability of the structure to support or brace all components. Appropriate notation by the EOR should accompany their stamps describing or clarifying the work done under their responsible charge. For example, the EOR may define his/her limited responsibilities with a note such as:

> *The EOR has reviewed the building components engineered by others for conformance with the project specifications and has verified that the structure can support the components as detailed. The EOR was not in responsible charge of the component design, but did provide the specifications and design criteria to which these components were designed and reviewed."*

When specified in the design documents or requested by the seismic peer reviewer, the respective deferred submittal shall be provided to the seismic peer reviewer for review and approval after the EOR has reviewed, stamped and signed the submittal. The contractor is reminded of their obligation to secure required approvals, in advance of construction.

5.14 Pre-engineered Structures

Pre-engineered structures often have certificates from International Code Council Evaluation Service (ICCES) or other certification authorities that are provided in lieu of specific engineering calculations demonstrating adequate seismic performance for the project for the specific seismic zone. These and the vendor's technical documents usually contain requirements for installation, which must be followed for the certificated performance to be achieved. The following requirements apply to such structures, which may include "Butler"-style buildings, awnings, bridges, and antennas. All such structures must have design documents signed and stamped by a licensed California

professional.

When the proposed 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 provided that there will be no applied loads to the structure other than its self- loads. This precludes adding floors or mezzanines to such structures, or placing storage racks or equipment that is 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 or floors above grade level, then the structure shall be peer reviewed.

When the structure is not free standing, such as an environmental cover on a roof, an awning, 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 review of its seismic performance provided that 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 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 shall be peer reviewed.

Trailers or other transportable structures subject to Caltrans, not Title 24, regulations are considered to be pre-engineered structures. 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.

For structures with attachment requirements to other structural elements of existing or new construction, such an entrance cover, or for a portable classroom (trailer), shall have the attachment design peer reviewed. The construction documents shall provide information applicable to the site's seismic zone, and a report from a licensed architect, or civil or 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

5.15 Designated Seismic Systems

For projects that include Designated Seismic Systems as defined in CBC 1705.11, each system shall be identified within the construction documents by the Mechanical/Electrical/Plumbing engineer. The seismic qualification requirements of CBC 1708.5 apply. Qualifications must be at or above the BSE-I ground motion level of ASCE for mechanical and electrical elements.

For elements designated by the MEP-of-record as a Designated Seismic System(s) (i.e., emergency generators, emergency lighting, etc.) equipment listed as approved by the California Office of Statewide Hospital Planning and Development (OSHPD) or ICCS is considered to have met the certificate of compliance standard for use in CSU projects provided the intended use of the equipment is consistent with their requirements

and limitations.

5.16 Parking Structure Risk Category Determination

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

5.17 Phased and Voluntary Retrofit

CBC 3419.11 (Voluntary lateral-force-resisting system modifications) allows seismic enhancements to buildings to be implemented when CBC 3419.5 does not require a seismic retrofit. When work is proposed on a Section 7.1 Priority List 1 or List 2 building, the requirements of CBC 3419.3 are considered to require an evaluation, and conformance with CBC 3419.4 is required. Projects on Priority List 1 and List 2 buildings may have partial or phased retrofit corresponding to the requirements of CBC 3419.11 with the restriction that an approved date is given for the completion of the total retrofit.

Buildings not on List 1 or List 2 may have voluntary seismic retrofits consistent with the requirements of CBC 3419. All phased retrofits require written concurrence from CPDC. The request shall be signed by the campus Vice President for Administration. A confirming letter from the CPDC Assistant Vice Chancellor and co-signed by the CSU Senior Building Official shall be required for such a plan to be considered approved.

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.

5.18 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 peer reviewer's attention were satisfactorily resolved. A written statement will be provided by the CSU construction manager that issues raised during construction were satisfactorily resolved.

5.19 Earthquake Soil Pressures

Lateral pressures on basement or retaining walls shall, as well as other below-grade structures or elements, due to earthquake ground motion shall be determined 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. The 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 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.

5.20 Temporary Use of Buildings and Structures

The CBC defines temporary in relationship to buildings as

> *TEMPORARY [DSA-AC 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, temporary use is defined as a use for a period of not more than seven days. 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 occupation type and numbers until other Code-based actions are taken to change it (i.e. *A Special Event* permit). From time-to-time, a campus may wish to use a building space in a way non-conforming to its approved normal occupancy. When such is proposed, then the Deputy Building Official must make a determination that the hazard and risk posed by this use is acceptable and consistent with the direction of CBC Section 108.2. For the temporary use to be allowed, the Building Official 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 of the Deputy Building Official in making the decision 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 the govern the use of tents that extend beyond just fire hazards. They distinguish between temporary (45 days or less). The CFC references the CBC for issues that are structural, but they are the principal focus of regulations of temporary structures such as tens 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 the use of that tent is regulated by CFC Section 3104 (tents) and 3105 (temporary stages canopies) and that to receive a temporary use permit for 45 or fewer days requires submission to the Fire Marshal and to the responsible CSU Campus Building Official the documentation requirements of Section 3105.5 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, 3105 applications. Where hold down devices are used to stabilize the structure, then special inspection of the installations consistent with CBC code requirements for such elements.

6. POST EARTHQUAKE REVIEWS

When an earthquake occurs near a CSU campus or facility there is immediate need for evaluation of the safety of buildings and facilities at the campus. The Chairman of the CSU SRB serves as a Deputy Building Official for purposes of such safety determination. After a significant seismic event, the Chairman will contact the campus to determine if damage occurred at the campus. If so, or if there are other reasons based upon public reports to suspect that damage occurred, the Chairman has been authorized to act as the Designated Building Official to evaluate the safety of buildings on campus and make recommendations for 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 Deputy Building Official for the campus to enter buildings for the purpose of determining 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).

These designations shall be enforced by the University to limit the risk to occupants until such time as the placard is modified or removed. Please note that 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 Deputy Building Official who posted the building, or by the University Building Official. From time-to-time it is expected that re-postings may increase or decrease assess to the building, depending on new information or possibly additional damage occurring.

The restoration of the campus shall be completed to the requirements of CEBC. Plans for all repairs shall be approved for implementation by the SRB Chairman, or his designee, acting in his capacity as a CSU Deputy Building Official. The plans shall be peer reviewed as required above. 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 of time, as determined by the Chancellor's Office, the Campus Deputy Building Official 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 WSMF buildings in the region of strong motion 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 Deputy Building Official 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 condition that repair is not practical or that the building poses an unacceptably high seismic threat to other buildings. The Deputy Building Official has the authority to condemn buildings subject to review and confirmation by the CSU Building Official. Condemned buildings shall be demolished as soon as practical; in the interim period, the University shall take whatever actions are necessary to limit the possibility of injury to the public.

7. PROJECT PLANNING

7.1 Priority Lists

The Chancellor's Office maintains a seismic priority list of buildings identified by Seismic Review Board for which there are additional seismic retrofit requirements above CBC. This list is divided into two categories:

List 1: Those buildings that are a priority for seismic retrofit should be retrofitted as soon as resources are available without regard to other modifications of the building. The list is in two parts: List 1, Part A is for buildings that are in use and regularly occupied; List 1, Part B is for buildings that are not occupied and/or used for storage of occasionally used items. For those buildings identified in List 1Part A, CSU has administratively determined that whenever any work which is betterment, that is, not maintenance or repair, is performed to the building that a CBC seismic evaluation shall be performed and the building retrofitted to CBC seismic performance requirements. List 1, Part B buildings are those where the seismic risk has been mitigated by not using the buildings or limiting their use to storage and where the building's failure would not cause potential injuries to those outside the building. Once designated, as on Part B, the building cannot be used by occupants as a normal building without demonstrating that the building has been modified to the safety requirements of this Policy to allow occupancy.

List 2: Those buildings that must be retrofitted when a major capital project is allocated to the building, notwithstanding an allowance from CBC 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 pulled.

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.

Changes in use of a building triggers 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 following information shall be required for consideration in the approval of the altered use plan:

1. The total number of rooms and their total square footage affected by the changes, in relation to the building's total SF.
2. A detailed listing of the proposed changes, including items to be removed and the nature of the subsequent repairs and patching.
3. 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.

4. Confirmation that the proposed changes and/or change of use does not trigger associated fire protection or accessibility requirements or improvements.

The Campus Deputy Building Official shall consult with and receive concurrence from the University Building Official prior to approval.

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

7.2 Project Planning

All planned projects shall meet the specific technical requirements of the CBC and when 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.

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 new buildings under the CBC required higher than standard seismic performance, e.g., educational facilities having over 5,000 occupants, emergency operations center, buildings with contained quantities of highly hazardous materials, and must be designed and constructed to achieve the required performance levels consistent with the assigned CBC Risk Category.

The Trustees' Seismic Policy requires 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 all projects, including those that do not trigger Title 24 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 campus shall document in writing basis for 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.

8. SEISMIC SAFETY STANDARD FOR ACQUIRING BUILDING AND SPACE

It is Standard of California State University (CSU) to acquire buildings and/or space in buildings owned by others that provide adequate seismic life safety to 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., 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.)

8.1 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 determination the a *Waiver Letter* can be issued, see Section 8.2.B, or
2. A *FEMA Evaluation Report* that indicates the building is not expected to pose a seismic safety risk, see Section 8.2.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 8.2.C, or
4. An *Independent Review Report* the 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 campus, the building owner, or building owner's technical agent, and will be accepted subject to the review of the CSU as detailed in Section 8.2. 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 change in the standards of evaluating buildings that would change the report's or certificate's conclusions, and (iii) no seismic event 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 8.2.D, *Independent Review Report,* below. See also *Earthquake Performance Levels for Existing Buildings* in Attachment D.

Prior to 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 is 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 CSU's structural engineer.

The peer review shall be of the retrofit or modification design prior to construction and continue through 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.

8.2 Acceptable Evaluation Documents

A. Waiver Letter

The requirements for seismic evaluation under the Standard 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 a re-locatable structure, such as a trailer, even if permanently located, but only if the structure does not have a natural gas connection, or
5. The building is subject to the regulatory authority of the Office of Statewide Hospital Planning and Development, or is a schoolhouse regulated under the Field Act by the Division of the State Architect, (and accordingly is otherwise evaluated pursuant to a rigorous seismic safety standard) or
6. The space to be occupied is within a structure currently occupied by and previously evaluated and accepted under this Standard by any of the named entities, or
7. 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 of issued under one or more of the above allowances must be in writing by the person making such determination.

For any building not qualifying for a Waiver Letter, proceed to Section 8.2.B, below, *FEMA Evaluation report.*

B. FEMA Evaluation Report

Seismic compliance may be met by an evaluation using FEMA 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 ASCE 41 Table 4-6 (Benchmark Buildings) for different building types. All California counties are assumed to be in

areas of High Seismicity (H) for this purpose. In FEMA P-154, a total score, S, equal to or higher than 2 is determined as life-safe without further technical assessment. A total score below 2 requires that further technical investigation is required.

For any building not qualifying for a favorable FEMA P-154 report, proceed to Section 8.2.C or 8.2.D below.

FEMA P-154 evaluations may be performed by professional civil engineers, or registered architects, or by individuals within CSU who have been trained in the use of the Rapid Visual Screening method.

C. 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. 1997 or subsequent editions of the California Building Standards Code; or,
2. 1976 or subsequent editions of the Uniform Building Code and the building do not have any of the characteristics or conditions listed below:
   a. unreinforced masonry elements, whether load-bearing or not, or whether retrofitted or not; does not including brick veneer;
   b. precast, pre-stressed, or post-tensioned structural or architectural elements, except piles;
   c. flexible diaphragm (e.g. plywood)-shear wall (masonry or Concrete);
   d. apparent additions, alterations, or repairs to the structural system made without a building permit;
   e. constructed on a site with a slope with one or more stories partially below grade (taken as 50% or less) for a portion of their exterior;
   f. soft or weak story, including wood frame structures with cripple walls, or is construction over first-story parking;
   g. structural repairs from seismic damage;
   h. welded steel moment frames (WSMF) that constitute the primary seismic force-resisting system for the building, and the structure was designed to code requirements preceding those of the 1997 edition of the Uniform Building Code, and the building site has experienced an earthquake of sufficient magnitude and site peak ground motions that inspection is required when any of the conditions of Section 3.2 of FEMA 352 indicate an investigation of beam-column connections is warranted; i.e., visible signs of distress or deterioration of structural or non-structural systems, e.g., excessively cracked and/or spalling concrete walls or foundations, wood dry rot, etc.

D. Independent Review Report

An Independent Review Report of the entire building and of 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 I. A. above) require an Independent Review Report. The Entities will not approve for occupancy a newly leased building having earthquake damageability level of Level 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 original construction and subsequent modifications;
3. A qualitative (and quantitative, if needed) evaluation of the building's gravity and lateral load resisting structural systems;
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. A qualitative (and quantitative, if needed) evaluation of the expected seismic performance of the building following the loading requirements of the current edition of the California Building Standards Code, Title 24, Part 10, Section 4317, for the building type, site location, and physical conditions;
6. 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;
7. An evaluation of the earthquake damageability Level of the building using the definitions of the attached table, *Earthquake Performance Levels for Existing Buildings,* given in Attachment D;
8. A list of the documents, plans, and other materials examined;

For leases, if a landlord intends to complete modifications to bring a building into compliance with the required Level (minimum) shall: i) certify that the work to be completed will meet the requirements of this section, and (ii) provide a description of 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 execution of the real estate transaction.

Attachment A

California State University Seismic Review Board

The following persons are members of the CSU SRB:

- Charles Thiel Jr., Ph.D., Chairman; President, Telesis
- K. Dirk Bondy, S.E., President, Seneca Structural Engineers, Inc.
- John Egan, G.E.; Consulting Geotechnical Engineer.
- John A. Martin Jr., S.E.; President, John A. Martin and Associates, Inc.
- Richard Niewiarowski, S.E. Consulting Structural Engineer
- Maryann Phipps, S.E., President, Estructure, Inc.
- Thomas Sabol, Ph.D., S.E., Principal, Englekirk and Sabol Consulting Engineers
- Theodore Zsutty, Ph.D.; S.E., Consulting Structural Engineer

ATTACHMENT B

CSU Seismic Policy values for use on all projects subject to 2019 edition of the California Building Code

Seismic Coefficients for CSU Campus Locations

Seismic ground motion parameters for CSU campuses given in Table 1 below for Site Class designations corresponding to reference rock Site Class BC (V_{S30} = 760 m/s) as utilized by the U.S. Geological Survey (USGS) in developing the U.S. Seismic Design Maps, as well as Site Class C (very dense soil and soft rock), Site Class D (stiff soil), and Default Site Class D.

Site Class definitions are as 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.

As noted in Section 3.3 these values are to be used for all projects on the campus.

Use of the seismic ground motion parameters given in Table 1 supersedes 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 with Site Class D ground conditions. Site-specific ground motion hazard and/or site response analyses may still be 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.

If there is a known active fault that traverses the campus as determined by the California Geological Survey or the Seismic Review Board, then it is so indicated, see Section 3.6. CSU has not implemented the CBC January 1, 2014 Errata allowance to reduce the BSE-C and/or BSE-R if they exceed the BSE-2N (MCE_R) and BSE-1N (DE)values; the values determined below apply without modifications. If there is a known California Geological Survey liquefaction map that includes portions of the site that are subject to liquefaction, they have been noted. Note that some local jurisdictions publish supplemental liquefaction maps that should be referenced if they apply.

In addition, for investigations that are undertaken specifically to investigate the occurrence of geologic and geotechnical seismic hazards (e.g., faulting, liquefaction, landsliding), as well as site-specific ground motion hazard and/or site response analyses, the CSU Geotechnical Peer Reviewer, John Egan, shall be the peer reviewer for all locations within the CSU systems.

The Seismic Review Board should be contacted through the campus peer reviewer for assignment of the appropriate values for sites not listed or a site that are not a part of the contiguous campus.

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

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}
Office of the Chancellor	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
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

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}
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
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

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}
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
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

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}
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
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

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}
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
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	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	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	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 Marco	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

Continued…

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}
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
				Default 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 Jose fault is indicated on the map prepared for and issued by the CSU Seismic Review Board.
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).

ATTACHMENT C

Campus Assignments for Peer Reviewers

The following peer reviewers are assigned for the respective campuses and associated locations. All 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 Seismic Review Board will assign the peer reviewer.

Campus	Principal Peer Reviewer
Bakersfield	Dirk Bondy
Bakersfield – Antelope Valley	Dirk Bondy
California Maritime Academy	Charles Thiel
Office of the Chancellor	John A. Martin, Jr.
Channel Islands	John A. Martin, Jr.
Chico	Richard Niewiarowski
Dominguez Hills	Thomas Sabol
East Bay - Concord	Richard Niewiarowski
East Bay - Hayward	Richard Niewiarowski
Fresno	Maryann Phipps
Fullerton	John A. Martin, Jr.
Humboldt	Maryann Phipps
Humboldt - Trinidad	Maryann Phipps
Long Beach	Dirk Bondy
Los Angeles	Thomas Sabol
Monterey Bay-East Campus	Theodore Zsutty
Monterey Bay- West Campus	Theodore Zsutty
Northridge	Thomas Sabol
Pomona	John A. Martin, Jr.
Pomona - South	John A. Martin, Jr.
Sacramento	Maryann Phipps
San Bernardino	Dirk Bondy
San Bernardino-Palm Desert	Dirk Bondy
San Diego	John A. Martin, Jr.
San Diego-Brawley	John A. Martin, Jr.
San Diego-Imperial	John A. Martin, Jr.
San Diego-Mission Valley	John A. Martin, Jr.
San Francisco	Charles Thiel
San Francisco-Tiburon	Charles Thiel
San José	Theodore Zsutty
San José South Campus	Theodore Zsutty
SJSU - Moss Landing	Theodore Zsutty
SJSU - Marine Laboratory	Theodore Zsutty
San Luis Obispo	Thomas Sabol
San Marcos	Dirk Bondy
Sonoma	Richard Niewiarowski
Sonoma - Los Guilicos	Richard Niewiarowski
Stanislaus	Richard Niewiarowski
Stanislaus-Stockton	Richard Niewiarowski

ATTACHMENT D

Earthquake Performance Levels for Existing Buildings

(Table revision date: April 1, 2016)

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-yearreturn 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 CBS; this includes all requirements, including ground motions, analysis procedures, and detailing limitation.

ATTACHMENT E

Technical Guidelines

The CSU Seismic Policy 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 Policy 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 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 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

6. 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.

7. 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.

8. 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.

9. 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."

10. 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

11. 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

12. 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, reshores 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 reshores in closure/pour strip bays extend to the foundation level.

13. 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 peer reviewer will want to review the basis for their locations to assure good technical performance of the resulting structure.

14. The average compression in flat plates and flat slabs should be limited to a maximum of 250 psi, with 150-175 psi considered optimum.

15. 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.

16. 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 ft.

17. 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.

18. 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.
19. 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 conduit shall be independently chaired and not supported by the post-tensioning tendons.
20. 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.
21. Shear stud reinforcement should be used at two-way slab banded tendon anchorages in lieu of hairpin reinforcement to minimize congestion near anchorages.
22. In flat plates and two-way slabs, provide a minimum of #4 continuous (lapped) bottom reinforcement, spaced not more than 30" apart each way.
23. Shot pin embedment shall be limited to the cover of the concrete over the tendons.
24. 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.
25. 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.
26. Slabs 10 inches thick or greater should utilize column caps in lieu of shear studs for punching shear reinforcement.
27. Floor systems shall be required to be stressed within 3-5 days of the concrete pour to minimize shrinkage cracking.
28. Deck forms shall remain in place until the deck is poured and stressed completely. Reshores 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.
29. 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.

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.

ATTACHMENT G

Document history

	There are versions of the CSU Seismic Requirements that pre-date 2014.
7/14/2014	December 21, 2011 Document Edit - 7/14/2014 Revision Issued
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
9/10/2015	Corrected editorial items and provided accidentally deleted text.
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.
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.
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.
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 Peer Reviewers. Revised Attachment F References (to ASCE 7 & 41).