45-DAY EXPRESS TERMS
FOR
PROPOSED BUILDING STANDARDS
OF THE
DIVISION OF THE STATE ARCHITECT - STRUCTURAL SAFETY (DSA-SS AND DSA-SS/CC)

REGARDING PROPOSED CHANGES TO
2016 CALIFORNIA BUILDING CODE
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 2

The Division of the State Architect (DSA) proposes to adopt the 2015 edition of the International Building Code (IBC 2015) of International Code Council for codification and effectiveness in the 2016 edition of the California Building Code as presented on the following pages, including any necessary amendments. DSA further proposes to:

- Adopt new building standards that are not addressed by the 2015 model code proposed for adoption.
- Adopt new necessary amendments to the 2015 model code proposed for adoption.
- Relocate existing adopted and necessary amendments of the current model code into the format of the 2015 model code proposed for adoption. These amendments with editorial changes only are outside the rulemaking and are not subject to public comments. All amendments shown highlighted are existing and are not part of the rulemaking.

LEGEND FOR EXPRESS TERMS

1. Model code text: All International Building Code (IBC) text is shown in regular/*italics* type face.
2. Existing California amendments: All such language appears in *italics.*
3. Code language being modified: All such language appears in *italics and underlined*.
4. Repealed text: Repeal of 2015 IBC language appears in ~~strikeout~~.
5. Existing deletion: IBC model code language that was deleted in the previous Code Adoption Cycles is shown for clarity only. This language appears in ~~strikeout and highlight~~.
6. Existing amendments in Chapter 19A: Existing amendments in Sections 1903A through 1905A which are *underlined and italicized* appear in *underline, italics and highlight*. Deletion of existing amendments in Sections 1903A through 1905A appears in ~~*italics and strikeout.*~~
7. Instructions: Texts which are instructions only that are not amendments and will not be printed appears in blue highlight.

Note:
Following each chapter of the proposed regulations is a notation that cites specific statute(s) that authorizes the adoption of these regulations and statute that allows for regulations to clarify the subject matter being implemented, interpreted or made specific by the authority statute(s).

INITIAL EXPRESS TERMS

CHAPTER 1

SCOPE AND ADMINISTRATION

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below	**X**	**X**	
Division I			
1.1	X	X	
1.9.2	X	X	
1.9.2.1	X	-	
~~1.9.2.1.1~~	~~X~~	-	
~~1.9.2.1.2~~	~~X~~	-	
~~1.9.2.1.3~~	~~X~~	-	
1.9.2.2	-	X	
~~1.9.2.2.1~~	~~-~~	~~X~~	
~~1.9.2.2.2~~	~~-~~	~~X~~	
~~1.9.2.2.3~~	~~-~~	~~X~~	
~~1.9.2.2.4~~	~~-~~	~~X~~	
~~1.9.3~~		~~X~~	
Division II			
102.1	X	X	
102.2-102.4	X	X	
102.4.1	X	X	
102.4.3	X	X	
102.4.4	X	X	
102.5	X	X	
104.9	X	X	

104.10	X	X	
104.11	X	X	
106.1	X	X	
106.1.1	X	X	

(All existing amendments that are not revised below shall continue without any change.)

DIVISION I

CALIFORNIA ADMINISTRATION

SECTION 1.1

GENERAL

1.1.1 Title.
These regulations shall be known as the California Building Code, may be cited as such and will be referred to herein as "this code." The California Building Code is Part 2 of twelve parts of the official compilation and publication of the adoption, amendment and repeal of building regulations to the California Code of Regulations, Title 24, also referred to as the California Building Standards Code. This part incorporates by adoption the 2012 International Building Code of the International Code Council with necessary California amendments.

1.1.2 Purpose.
The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, access to persons with disabilities, sanitation, adequate lighting and ventilation and energy conservation; safety to life and property from fire and other hazards attributed to the built environment; and to provide safety to fire fighters and emergency responders during emergency operations.

1.1.3 Scope.
The provisions of this code shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout the State of California.

1.1.3.1 Nonstate-regulated buildings, structures and applications.
Except as modified by local ordinance pursuant to Section 1.1.8, the following standards in the California Code of Regulations, Title 24, Parts 2, 2.5, 3, 4, 5, 6, 9, 10 and 11 shall apply to all occupancies and applications not regulated by a state agency.

1.1.3.2 State-regulated buildings, structures and applications.
The model code, state amendments to the model code, and/or state amendments where there are no relevant model code provisions shall apply to the following buildings, structures, and applications regulated by state agencies as specified in Sections 1.2 through 1.14, except where modified by local ordinance pursuant to Section 1.1.8. When adopted by a state agency, the provisions of this code shall be enforced by the appropriate enforcing agency, but only to the extent of authority granted to such agency by the state legislature.

Note: *See Preface to distinguish the model code provisions from the California provisions.*

1. *State-owned buildings, including buildings constructed by the Trustees of the California State University, and to the extent permitted by California laws, buildings designed and constructed by the Regents of the University of California, and regulated by the Building Standards Commission. See Section 1.2 for additional scope provisions.*

2. *Local detention facilities regulated by the Corrections Standards Authority. See Section 1.3 for additional scope provisions.*

3. *Barbering, cosmetology or electrolysis establishments, acupuncture offices, pharmacies, veterinary facilities and structural pest control locations regulated by the Department of Consumer Affairs. See Section 1.4 for additional scope provisions.*

4. *Energy efficiency standards regulated by the California Energy Commission. See Section 1.5 for additional scope provisions.*

5. *Dairies and places of meat inspection regulated by the Department of Food and Agriculture. See Section 1.6 for additional scope provisions.*

6. *Organized camps, laboratory animal quarters, public swimming pools, radiation protection, commissaries serving mobile food preparation vehicles and wild animal quarantine facilities regulated by the Department of Public Health. See Section 1.7 for additional scope provisions.*

7. *Hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilets or cooking facilities. See Section 1.8.2.1.1 for additional scope provisions.*

8. *Accommodations for persons with disabilities in buildings containing newly constructed covered multifamily dwellings, new common use spaces serving existing covered multifamily dwellings, additions to existing buildings where the addition alone meets the definition of "COVERED MULTIFAMILY DWELLING," and common- use spaces serving covered multifamily dwellings, which are regulated by the Department of Housing and Community Development. See Section 1.8.2.1.2 for additional scope provisions.*

9. *Permanent buildings and permanent accessory buildings or structures constructed within mobile-home parks and special occupancy parks regulated by the Department of Housing and Community Development. See Section 1.8.2.1.3 for additional scope provisions.*

10. *Accommodations for persons with disabilities regulated by the Division of the State Architect. See Section 1.9.1 for additional scope provisions.*

11. *Public elementary and secondary schools, community college buildings and state-owned or state-leased essential service buildings regulated by the Division of the State Architect. See Section 1.9.2 for additional scope provisions.*

12. *Qualified historical buildings and structures and their associated sites regulated by the State Historical Building Safety Board with the Division of the State Architect. See Section 1.9.3 for additional scope provisions.*

13. *General acute care hospitals, acute psychiatric hospitals, skilled nursing and/or intermediate*

care facilities, clinics licensed by the Department of Public Health and correctional treatment centers regulated by the Office of Statewide Health Planning and Development. See Section 1.10 for additional scope provisions.

14. *Applications regulated by the Office of the State Fire Marshal include, but are not limited to, the following in accordance with Section 1.11:*
    - *14.1. Buildings or structures used or intended for use as an:*
        1. *Asylum, jail, prison*
        2. *Mental hospital, hospital, home for the elderly, children's nursery, children's home or institution, school or any similar occupancy of any capacity*
        3. *Theater, dancehall, skating rink, auditorium, assembly hall, meeting hall, nightclub, fair building or similar place of assemblage where 50 or more persons may gather together in a building, room or structure for the purpose of amusement, entertainment, instruction, deliberation, worship, drinking or dining, awaiting transportation, or education*
        4. *Small family day-care homes, large family day-care homes, residential facilities and residential facilities for the elderly, residential care facilities*
        5. *State institutions or other state-owned or state- occupied buildings*
        6. *High rise structures*
        7. *Motion picture production studios*
        8. *Organized camps*
        9. *Residential structures*
    - *14.2. Tents, awnings or other fabric enclosures used in connection with any occupancy*
    - *14.3. Fire alarm devices, equipment and systems in connection with any occupancy*
    - *14.4. Hazardous materials, flammable and combustible liquids*
    - *14.5. Public school automatic fire detection, alarm and sprinkler systems*
    - *14.6. Wildland-urban interface fire areas*
15. *Public libraries constructed and renovated using funds from the California Library Construction and Renovation Bond Act of 1988 and regulated by the State Librarian. See Section 1.12 for additional scope provisions.*
16. *Graywater systems regulated by the Department of Water Resources. See Section 1.13 for additional scope provisions.*
17. *For applications listed in Section 1.9.1 regulated by the Division of the State Architect—Access Compliance, outdoor environments and uses shall be classified according to accessibility uses described in Chapters 11B.*

18. *Marine Oil Terminals regulated by the California State Lands Commission. See Section 1.14 for additional scope provisions.*

1.1.4 Appendices.
Provisions contained in the appendices of this code shall not apply unless specifically adopted by a state agency or adopted by a local enforcing agency in compliance with Health and Safety Code Section 18901 et. seq. for Building Standards Law, Health and Safety Code Section 17950 for State Housing Law and Health and Safety Code Section 13869.7 for Fire Protection Districts. See Section 1.1.8 of this code.

1.1.5 Referenced codes.
The codes, standards and publications adopted and set forth in this code, including other codes, standards and publications referred to therein are, by title and date of publication, hereby adopted as standard reference documents of this code. When this code does not specifically cover any subject related to building design and construction, recognized architectural or engineering practices shall be employed. The National Fire Codes, standards, and the Fire Protection Handbook of the National Fire Protection Association are permitted to be used as authoritative guides in determining recognized fire prevention engineering practices.

1.1.6 Nonbuilding standards, orders and regulations.
Requirements contained in the California Building Code, or in any other referenced standard, code or document, which are not building standards as defined in Health and Safety Code Section 18909, shall not be construed as part of the provisions of this code. For nonbuilding standards, orders and regulations, see other titles of the California Code of Regulations.

1.1.7 Order of precedence and use.

1.1.7.1 Differences.
In the event of any differences between these building standards and the standard reference documents, the text of these building standards shall govern.

1.1.7.2 Specific provisions.
Where a specific provision varies from a general provision, the specific provision shall apply.

1.1.7.3 Conflicts.
When the requirements of this code conflict with the requirements of any other part of the California Building Standards Code, Title 24, the most restrictive requirements shall prevail.

1.1.8 City, county, or city and county amendments, additions or deletions.
The provisions of this code do not limit the authority of city, county, or city and county governments to establish more restrictive and reasonably necessary differences to the provisions contained in this code pursuant to complying with Section 1.1.8.1. The effective date of amendments, additions or deletions to this code by a city, county, or city and county filed pursuant to Section 1.1.8.1 shall be the date filed. However, in no case shall the amendments additions or deletions to this code be effective any sooner than the effective date of this code.

Local modifications shall comply with Health and Safety Code Section 18941.5 for Building Standards Law, Health and Safety Code Section 17958 for State Housing Law or Health and Safety Code Section 13869.7 for Fire Protection Districts.

1.1.8.1 Findings and filings.

1. *The city, county, or city and county shall make express findings for each amendment, addition or deletion based upon climatic, topographical or geological conditions.*

   Exception: *Hazardous building ordinances and programs mitigating unreinforced masonry buildings.*

2. *The city, county, or city and county shall file the amendments, additions or deletions expressly marked and identified as to the applicable findings. Cities, counties, cities and counties, and fire departments shall file the amendments, additions or deletions, and the findings with the California Building Standards Commission at 2525 Natomas Park Drive, Suite 130, Sacramento, CA 95833.*

3. *Findings prepared by fire protection districts shall be ratified by the local city, county or city and county and filed with the California Department of Housing and Community Development, Division of Codes and Standards, P.O. Box 1407, Sacramento, CA 95812-1407 or 1800 3rd Street, Room 260, Sacramento, CA 95811.*

1.1.9 Effective date of this code.
Only those standards approved by the California Building Standards Commission that are effective at the time an application for building permit is submitted shall apply to the plans and specifications for, and to the construction performed under, that permit. For the effective dates of the provisions contained in this code, see the History Note page of this code.

1.1.10 Availability of codes.
At least one complete copy each of Titles 8, 19, 20, 24 and 25 with all revisions shall be maintained in the office of the building official responsible for the administration and enforcement of this code. Each state department concerned and each city, county, or city and county shall have an up-to-date copy of the code available for public inspection. See Health and Safety Code Section 18942(d)(1) and (2).

1.1.11 Format.
This part fundamentally adopts the International Building Code by reference on a chapter-by-chapter basis. When a specific chapter of the International Building Code is not printed in the code and is marked "Reserved", such chapter of the International Building Code is not adopted as a portion of this code. When a specific chapter of the International Building Code is marked "Not adopted by the State of California" but appears in the code, it may be available for adoption by local ordinance.

Note: *Matrix Adoption Tables at the front of each chapter may aid the code user in determining which chapter or sections within a chapter are applicable to buildings under the authority of a specific state agency, but they are not to be considered regulatory.*

1.1.12 Validity.
If any chapter, section, subsection, sentence, clause or phrase of this code is for any reason held to be unconstitutional, contrary to statute, exceeding the authority of the state as stipulated by statutes or otherwise inoperative, such decision shall not affect the validity of the remaining portion of this code.

…

1.9.2 Division of the State Architect—Structural Safety.

1.9.2.1 DSA-SS Division of the State Architect-Structural Safety.

Application—*Public elementary and secondary schools, community colleges and state-owned or*

state-leased essential services buildings.

Enforcing agency—*The Division of the State Architect- Structural Safety (DSA-SS) has been delegated the responsibility and authority by the Department of General Services to review and approve the design and observe the construction of public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*

Authority cited—*Education Code Sections 17310 and 81142 and Health and Safety Code Section 16022.*

Reference—*Education Code Sections 17280 through 17317, and 81130 through 81147 and Health and Safety Code Sections 16000 through 16023.*

1.9.2.1.1 Applicable administrative standards.

1. ***Title 24, Part 1, California Code of Regulations:***

   1.1. *Sections 4-301 through 4-355, Group 1, Chapter 4, for public elementary and secondary schools and community colleges.*

   1.2. *Sections 4-201 through 4-249, Chapter 4, for state-owned or state-leased essential services buildings.*

2. ***Title 24, Part 2, California Code of Regulations:*** *[applies to public elementary and secondary schools, community colleges and state-owned or state-leased essential services building(s)]:*

   2.1. *Sections 1.1 and 1.9.2.1 of Chapter 1, Division I.*

   2.2. *Sections 102.1, 102.2, 102.3, 102.4, 102.5, 104.9, 104.10, 104.11 and 106.1 of Chapter 1, Division II.*

1.9.2.1.2 Applicable building standards.
California Building Standards Code, Title 24, Parts 2, 3, 4, 5, 6, 9, 10, 11 and 12, California Code of Regulations, for school buildings, community colleges and state-owned or state-leased essential service buildings.

The provisions of Title 24, Part 2, as adopted and amended by the Division of the State Architect—Structural Safety, shall apply to the applications listed in Section 1.9.2.1.

The Division of the State Architect—Structural Safety adopts the following building standards in Title 24, Part 2:

Chapters 2 through 10, 12, 14, 15, 16A, 17A, 18A, 19A, 20, 21A, 22A, 23, 24, 25, 26, 30, 31, 32, 33, ~~34,~~ and 35~~, and Appendix J~~.

1.9.2.1.3 Amendments.
Division of the State Architect—Structural Safety amendments in this code appear preceded with the acronym ***[DSA-SS].***

Exceptions:

1. *Chapters 16A, 17A, 18A, 19A, 21A, and 22A—Amendments appearing in these chapters without an acronym have been co-adopted by DSA-SS and OSHPD.*

2. ~~*Chapter 34, Sections 3417-3423—DSA-SS adopts these sections without the use of the DSA-SS acronym.*~~

1.9.2.1.4 Reference to other chapters.
Where reference is made within this code to sections in Chapters 16, 17, 18, 19, 21, and 22, the respective sections in Chapters 16A, 17A, 18A, 19A, 21A, and 22A shall apply instead.

1.9.2.2 DSA-SS/CC Division of the State Architect-Structural Safety/Community Colleges

Application—*Community Colleges. The Division of the State Architect has been delegated the authority by the Department of General Services to promulgate alternate building standards for application to community colleges, which a community college may elect to use in lieu of standards promulgated by DSA-SS in accordance with Section 1.9.2.1.*

Enforcing agency—*Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC)*

The Division of the State Architect has been delegated the authority by the Department of General Services to review and approve the design and oversee construction of community colleges electing to use the alternative building standards as provided in this section.

Authority cited—*Education Code Section 81053.*

Reference—*Education Code Sections 81052, 81053, and 81130 through 81147.*

1.9.2.2.1 Applicable administrative standards.

1. ***Title 24, Part 1, California Code of Regulations:***

   1.1. *Sections 4-301 through 4-355, Group 1, Chapter 4.*

2. ***Title 24, Part 2, California Code of Regulations:***

   2.1. *Sections 1.1 and 1.9.2 of Chapter 1, Division I.*

   2.2. *Sections 102.1, 102.2, 102.3, 102.4, 102.5, 104.9, 104.10, 104.11, and 106.1 of Chapter 1, Division II.*

1.9.2.2.2 Applicable building standards.
California Building Standards Code, Title 24, Parts 2, 3, 4, 5, 6, 9, 10, 11, and 12, California Code of Regulations.

The Division of the State Architect-Structural Safety/Community Colleges [DSA-SS/CC] adopts the following building standards in Title 24, Part 2:

Chapters 2 through 10, 12, 14, 15, 16, 17A, 18A, 19, 20, 21, 22, 23, 24, 25, 26, 30, 31, 32, 33, ~~34,~~ and 35~~, and Appendix J~~.

1.9.2.2.3 Amendments.

Division of the State Architect—Structural Safety/Community Colleges amendments in this code appear preceded with the acronym ***[DSA-SS/CC].***

Exceptions:

1. *Chapters 17A, and 18A—Amendments appearing in these chapters without an acronym have been co-adopted by DSA-SS, DSASS/CC, and OSHPD.*

2. ~~*Chapter 34, Sections 3417-3423—DSA-SS/CC adopts these sections without the use of the DSA-SS/CC acronym.*~~

1.9.2.2.4 Reference to other chapters.
Where reference is made within this code to sections in Chapters 17 and 18, the respective sections in Chapters 17A and 18A shall apply instead.

…

DIVISION II

SCOPE AND ADMINISTRATION

…

SECTION 102

APPLICABILITY

…

[A] 102.4 Referenced codes and standards. The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections 102.4.1 ~~and 102.4.2~~ *through 102.4.4*.

…

102.4.3 Code References. [DSA-SS & DSA-SS/CC] *All reference to International Codes or other similar codes in referenced standards shall be replaced by equivalent provisions in the California Building Standards Codes.*

102.4.4 Reference in Standards. [DSA-SS & DSA-SS/CC] *All references listed in reference standards shall be replaced by referenced standards listed in Chapter 35 of this code, where applicable, and shall include all amendments to the reference standards in this code.*

…

SECTION 104

DUTIES AND POWERS OF BUILDING OFFICIAL

…

[A] 104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons why the alternative was not *approved*. *[DSA-SS & DSA-SS/CC] Alternative system shall satisfy ASCE 7 Section 1.3, unless more restrictive requirements are established by this code for an equivalent system.*

[DSA-SS & DSA-SS/CC] Alternative systems shall also satisfy the California Administrative Code, Section 4-304.

…

SECTION 106
FLOOR AND ROOF DESIGN LOADS

[A] 106.1 Live loads posted. In commercial, institutional or industrial buildings, for each floor or portion thereof designed for live loads exceeding 50 psf (2.40 kN/m2), such design live loads shall be conspicuously posted by the owner or owner's authorized agent in that part of each *story* in which they apply, using durable signs. It shall be unlawful to remove or deface such notices.

106.1.1 Snow Load Posting. [DSA-SS & DSA-SS/CC] *Snow loads used in design shall be posted as for live loads.*

…

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 2

DEFINITIONS

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter			
Adopt entire chapter with amendments listed below	**X**	**X**	
Adopt only those sections listed below			
Active Equipment/Component	X	X	
Approved Agency	X	X	
~~Diaphragm, Rigid~~	~~X~~	~~X~~	
Enforcement Agent	X	X	
Next Generation Attenuation (NGA)	X	X	
Retrofit	X	X	
Rugged Equipment	X	X	
Significant Loss of Function	X	X	
Torque-controlled post-installed anchor	X	X	

(All existing California amendments that are not revised below shall continue without change)

...

SECTION 202

DEFINITIONS

...

ACTIVE EQUIPMENT/COMPONENT. [DSA-SS, DSA-SS/CC] *Equipment/Component containing moving or rotating parts, electrical parts such as switches or relays, or other internal components that are sensitive to earthquake forces and critical to the function of the equipment.*

…

[A] APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, where such agency has been *approved* by the *building official*.

[DSA-SS, DSA-SS/CC] *This term is synonymous with "laboratory of record" as referenced in Section 4-335 of the California Administrative Code.*

…

~~**Diaphragm, rigid.** [DSA-SS, DSA-SS/CC] A diaphragm is rigid for the purpose of distribution of story shear and torsional moment *where so indicated in Section 12.3.1 of ASCE 7.*~~

…

ENFORCEMENT AGENT. [DSA-SS, DSA-SS/CC] *That individual within the agency or organization charged with responsibility for agency or organization compliance with the requirements of this Code. Used interchangeably with Building Official and Code Official.*

…

NEXT GENERATION ATTENUATION (NGA). [DSA-SS, DSA-SS/CC] *Attenuation relations used for the 2008 United States Geological Survey (USGS) seismic hazards maps (for the Western United States) or their equivalent as determined by the enforcement agency.*

…

RETROFIT. [DSA-SS, DSA-SS/CC] *The construction of any new element or system, or the alteration of any existing element or system required to bring an existing building, or portion thereof, conforming to earlier code requirements, into conformance with standards of the currently effective California Building Standards Code.*

…

RUGGED EQUIPMENT. [DSA-SS, DSA-SS/CC] *Rugged equipment refers to an ampleness of construction that gives such equipment the ability to survive earthquake strong motions without significant loss of function.*

…

SIGNIFANT LOSS OF FUNCTION. [DSA-SS, DSA-SS/CC] *Significant loss of function for equipment or components means the equipment or component cannot be restored to its original function by competent*

technicians after a design earthquake because the equipment or component require parts that are not normally stocked by the owner or not readily available.

…

TORQUE-CONTROLLED POST-INSTALLED ANCHOR. [DSA-SS, DSA-SS/CC] *A post-installed anchor that is set by the expansion of one or more sleeves or other elements against the sides of the drilled hole through the application of torque, which pulls the cone(s) into the expansion sleeve(s); after setting, tensile loading can cause additional expansion (follow-up expansion).*

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 3
USE AND OCCUPANCY CLASSIFICATION

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 4 – SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 5 – GENERAL BUILDING HEIGHTS AND AREAS

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 6 – TYPES OF CONSTRUCTION

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 7 – FIRE AND SMOKE PROTECTION FEATURES

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 8 – INTERIOR FINISHES

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments

Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 9 – FIRE PROTECTION SYSTEMS

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 10 – MEANS OF EGRESS

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	

Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 12 – INTERIOR ENVIRONMENT

Adopt and/or codify entire chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 14

EXTERIOR WALLS

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments

Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	**X**	**X**	
Adopt only those sections listed below			
1405.1.1	X	X	
~~1410~~ 1411	X	X	

(All existing California amendments that are not revised below shall continue without change)

…

SECTION 1405

INSTALLATION OF WALL COVERINGS

…

1405.1.1 Additional requirements. [DSA-SS & DSA-SS/CC] *In addition to the requirements of Sections 1405.6, 1405.7, 1405.8, 1405.9, and 1405.10, the installation of anchored or adhered veneer shall comply with applicable provisions of Section ~~1410~~ 1411.*

…

SECTION ~~1410~~ 1411 [DSA-SS & DSA-SS/CC]

ADDITIONAL REQUIREMENTS FOR ANCHORED AND ADHERED VENEER.

1411.1 ~~1410.1~~ General. *In no case shall veneer be considered as part of the backing in computing strength or deflection nor shall it be considered a part of the required thickness of the backing.*

Veneer shall be anchored in a manner which will not allow relative movement between the veneer and the wall.

Anchored or adhered veneer shall not be used on overhead horizontal surfaces.

1411.2 ~~1410.2~~ Adhered veneer. *Units of tile, masonry, stone or terra cotta which exceed 5/8 inch (16 mm) in thickness shall be applied as for anchored veneer where used over exit ways or more than 20 feet (6096 mm) in height above adjacent ground elevation.*

1411.2.1 ~~1410.2.1~~ Bond strength and tests. *Veneer shall develop a bond to the backing in*

accordance with TMS 402, Section ~~6.3.2.4~~ 12.3.2.4.

Not less than two shear tests shall be performed for the adhered veneer between the units and the supporting element. At least one shear test shall be performed at each building for each 5,000 square feet (465 m^2) of floor area or fraction thereof.

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 15

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter			
Adopt entire chapter with amendments listed below	**X**	**X**	
Adopt only those sections listed below			
1507.3.10	X	X	
1507.7.8	X	X	
~~1509.7.1~~ 1510.7.1 Exception	X	X	
~~1512~~ 1513	X	X	

(All existing California amendments that are not revised below shall continue without change)

…

SECTION 1507

REQUIREMENTS FOR ROOF COVERINGS

…

1507.3.10 Additional requirements. [DSA-SS & DSA-SS/CC] *In addition to the requirements of 1507.3.6 and 1507.3.7, the installation of clay and concrete tile roof coverings shall comply with seismic anchorage provisions of Section 1513. ~~1512.~~*

…

1507.7.8 Additional requirements. [DSA-SS & DSA-SS/CC] *In addition to the requirements of Sections ~~1507.7.5~~, the installation of slate shingle roof coverings shall comply with the requirements of Sections 1507.3.6 and 1507.3.7, and the seismic anchorage provisions of Section ~~1512~~1513.*

…

~~1509.7.1~~ 1510.7.1 Wind resistance. Rooftop-mounted photovoltaic panels and modules shall be designed for component and cladding wind loads in accordance with Chapter 16 using an effective wind area based on the dimensions of a single unit frame.

Exception: [DSA-SS, DSA-SS/CC] *The effective wind area shall be in accordance with Chapter 16 and ASCE 7 Section 26.2.*

…

SECTION 1513 ~~1512~~ [DSA-SS & DSA-SS/CC]
SEISMIC ANCHORAGE OF SLATE SHINGLE, CLAY
AND CONCRETE TILE ROOF COVERINGS

1513.1 ~~1512.1~~ Fasteners*. Nails shall be long enough to penetrate into the sheathing 3/4 inch (19 mm). Where sheathing is less than 3/4 inch (19 mm) in thickness, nails shall be driven into supports, unless nails with ring shanks are used.*

All fasteners shall be corrosion resistant and fabricated of copper, stainless steel, or brass, or shall have a hot dipped galvanized coating not less than 1.0 ounce of zinc per square foot (305 gm/m^2).

Nails for slate shingles and clay or concrete tile shall be copper, brass or stainless steel with gage and length per common ferrous nails.

1513.2 ~~1512.2~~ Wire. *Wire for attaching slate shingles and clay or concrete tile shall be copper, brass or stainless steel capable of supporting four times the weight of tile.*

Wire supporting a single tile or shingle shall not be smaller than 1/16 inch (1.6 mm) in diameter. Continuous wire ties supporting more than one tile shall not be smaller than 0.084 inch (2 mm) in diameter.

1513.3 ~~***1512.3***~~ ***Metal strips.*** *Metal strips for attaching slate shingles and clay or concrete tile shall be copper, brass or stainless steel capable of supporting four times the weight of tile.*

1513.4 ~~***1512.4***~~ ***Clay or concrete tiles.*** *Clay or concrete tile shall be installed in accordance with Table 1507.3.7 and as described herein.*

1. *On wood roofs or roofs of other material to which wood strips are secured, every cover or top tile when fastened with nails shall be nailed directly into 1-1/4 inches (32 mm) sound grain soft wood strips of sufficient height to support the tile.*

   Pan or bottom tiles shall be nailed directly to the roof sheathing or to wood strips. Wood strips shall be secured to the roof by nails spaced not over 12 inches (305 mm) apart.

2. *On concrete roofs, wires shall be secured in place by wire loops embedded into the concrete not less than 2 inches (51 mm). The wire loops shall be spaced not more than 36 inches (914 mm) on center parallel to the eaves, and spaced vertically to allow for the minimum 3 inches (76 mm) lapping of the tile.*

3. *Where continuous ties of twisted wire, interlocking wires or metal strips extending from the ridge to eave are used to attach tile, the ties shall be attached to the roof construction at the ridge, eave, and at intervals not exceeding 10 feet 0 inch (3048 mm) on center. The ties within 2 feet 0 inch (610 mm) of the rake shall be attached at intervals of 5 feet 0 inch (1524 mm).*

   Attachment for continuous ties shall be nails, screws, staples or approved clips of the same material as the ties and shall not be subjected to withdrawal forces. Attachments for continuous ties shall have an allowable working stress shear resistance of not less than twice the dead weight of the tile tributary to the attachment, but not less than 300 pounds (136 kg).

4. *Tile with projecting anchor lugs at the bottom of the tiles shall be held in position by means of 1-inch by 2-inch (25mm by 51mm) wood stripping nailed to the roof sheathing over the underlay.*

5. *Clay or concrete tile on roofs with slopes exceeding 24 units vertical in 12 units horizontal (200 percent slope) shall be attached as required for veneer in Chapter 14. The nose of all tiles shall be securely fastened.*

6. *Clay or concrete tile shall have a minimum of two fasteners per tile. Tiles that are 8 inches (203 mm) in width or less are permitted to be fastened at the center of the head with one fastener per tile.*

7. *Interlocking clay or concrete tile shall have a minimum of one nail near center of head or two wire ties per tile.*

1513.5 ***~~1512.5~~*** ***Slate shingles.*** *Slate shingles on roofs with slopes exceeding 24 units vertical in 12 units horizontal (200 percent slope) shall be attached as required for veneer in accordance with Chapter 14.*

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 16

STRUCTURAL DESIGN

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	-	**X**	
Adopt only those sections listed below			
1601.1.1		X	
1601.1.2		X	
1601.1.3		X	
1601.1.4		X	
1601.2		X	

~~1601.3~~		~~X~~	
1616		X	

(All existing California amendments that are not revised below shall continue without change)

SECTION 1601
GENERAL

1601.1 Scope. The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof regulated by this code.

1601.1.1 Application. [DSA-SS/CC] *The scope of application of Chapter 16 is as follows:*

Community college buildings regulated by the Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC), as listed in Section 1.9.2.2.

1601.1.2 Identification of amendments. [DSA-SS/CC]
Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC) amendments appear in this chapter preceded with the appropriate acronym, as follows:

Division of the State Architect - Structural Safety/Community Colleges: ***[DSA-SS/CC]*** *- For community college buildings listed in Section 1.9.2.2*

1601.1.3 Reference to other chapters. [DSA-SS/CC]
Where reference within this chapter is made to sections in Chapters 17 and 18, the provisions in Chapters 17A and 18A respectively shall apply instead.

1601.1.4 Amendments. [DSA-SS/CC] *See Section 1616 for additional requirements.*

1601.2 Enforcement agency approval. [DSA-SS/CC] *In addition to requirements of the California Administrative Code and the California Building Code, any aspect of project design, construction, quality assurance or quality control programs for which this code requires approval by the Registered ~~d~~ Design ~~p~~ Professional (RDP), are also subject to approval by the enforcement agency.*

...

SECTION 1616
ADDITIONAL REQUIREMENTS FOR COMMUNITY COLLEGES [DSA-SS/CC]

1616.1 Construction documents.

1616.1.1 *Additional requirements for construction documents are included in Sections 4-210 and 4-317 of the California Administrative Code (Part 1, Title 24, C.C.R).*

1616.1.2 Connections. *Connections that resist design seismic forces shall be designed and detailed on the design drawings.*

1616.1.3 Construction procedures. *Where unusual erection or construction procedures are considered essential by the project structural engineer or architect in order to accomplish the intent of the design or influence the construction ~~design~~, such procedure shall be indicated on the plans or in the specifications.*

1616.2 General design requirements.

1616.2.1 Lateral load deflections.

1616.2.1.1 Horizontal diaphragms. *The maximum span-~~width~~ depth ratio for any roof or floor diaphragm consisting of steel and composite steel slab decking or concrete shall be based on ~~not exceed those given in Table 4.2.4 of AF & PA SDPWS for wood sheathed diaphragms. For other diaphragms,~~ test data and design calculations acceptable to the enforcement agency ~~shall be submitted and approved for span-width ratios~~.*

1616.2.1.2 Veneers. *The deflection shall not exceed l/600 for veneered walls, anchored veneers and adhered veneers over 1 inch (25 mm) thick, including the mortar backing.*

1616.2.1.3 Risk Category of buildings and other structures. *Risk Category IV includes structures as defined in the California Administrative Code, Section 4-207 and all structures required for their continuous operation or access/egress.*

1616.2.1.4 Analysis. *Structural analysis shall explicitly include consideration of stiffness of diaphragm in accordance with ASCE 7 Section 12.3.1. A diaphragm is rigid for the purpose of distribution of story shear and torsional moment where so indicated in Section 12.3.1 of ASCE 7.*

1616.2.2 Structural walls*. For anchorage of concrete or masonry walls to roof and floor diaphragms, the out-of plane strength design force shall not be less than 280 lb/linear ft (4.09 kN/m) of wall.*

1616.3 Load combinations.

1616.3.1 Stability. *When checking stability under the provisions of Section 1605.1.1 using allowable stress design, the factor of safety for soil bearing values shall not be less than the overstrength factor of the structures supported.*

1616.4 Roof dead loads. *The design dead load shall provide for the weight of at least one additional roof covering in addition to other applicable loadings if the new roof covering is permitted to be applied over the original roofing without its removal, in accordance with Section 1511. ~~1510~~.*

1616.5 Live loads.

1616.5.1 Modifications to Table 1607.1.

1616.5.1.1 Item 4. Assembly areas. *The following minimum loads for stage accessories apply:*

1. Gridirons and fly galleries: 75 pounds per square foot uniform live load.

2. Loft block wells: 250 pounds per lineal foot vertical load and lateral load.

3. Head block wells and sheave beams: 250 pounds per lineal foot vertical load and lateral load. Head block wells and sheave beams shall be designed for all tributary loft block well loads. Sheave blocks shall be designed with a safety factor of five.

4. Scenery beams where there is no gridiron: 300 pounds per lineal foot vertical load and lateral load.

5. Ceiling framing over stages shall be designed for a uniform live load of 20 pounds per square foot. For members supporting a tributary area of 200 square feet or more, this additional load may be reduced to 15 pounds per square foot (0.72 kN/m2).

1616.5.1.2 Item 24. Reviewing stands, grandstands and bleachers. *The minimum uniform live load for a press box floor or accessible roof with railing is 100 psf.*

1616.5.1.3 Item 35. Yards and terraces, pedestrians. *Item 35 applies to pedestrian bridges and walkways that are not subjected to uncontrolled vehicle access.*

1616.5.1.4 Item 36. Storage racks and wall-hung cabinets. *The minimum vertical design live load shall be as follows:*

Paper media:
12-inch-deep (305 mm) shelf - 33 pounds per lineal foot (482 N/m)
15-inch-deep (381 mm) shelf - 41 pounds per lineal foot (598 N/m), or 33 pounds per cubic foot (5183 N/m3) per total volume of the rack or cabinet, whichever is less.

Film media:
18-inch-deep (457 mm) shelf - 100 pounds per lineal foot (1459 N/m), or 50 pounds per cubic foot (7853 N/m3) per total volume of the rack or cabinet, whichever is less.

Other media:
20 pounds per cubic foot (311 N/m3) or 20 pounds per square foot (958 Pa), whichever is less, but not less than actual loads.

1616.5.2 Uncovered open-frame roof structures. *Uncovered open-frame roof structures shall be designed for a vertical live load of not less than 10 pounds per square foot (0.48 kN/m2) of the total area encompassed by the framework.*

1616.6 Determination of snow loads. *The ground snow load or the design snow load for roofs shall conform with the adopted ordinance of the city, county, or city and county in which the project site is located, and shall be approved by DSA.*

1616.7 Wind loads.

1616.7.1 Story drift for wind loads. *The calculated story drift due to wind pressures with ultimate design wind speed, Vult , shall not exceed 0.008 times the story height for buildings less*

than 65 feet (19,812 mm) in height or 0.007 times the story height for buildings 65 feet (19,812mm) or greater in height.

Exception: *This story drift limit need not be applied for single-story open ~~structures~~ buildings in Risk Category I and II.*

1616.8 Establishment of flood hazard areas. *Flood hazard maps shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency's Flood Insurance Study (FIS) adopted by the local authority having jurisdiction where the project is located, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto.*

1616.9 Earthquake loads.

1616.9.1 Seismic design category. *The seismic design category for a structure shall be determined in accordance with Section 1613.*

1616.9.2 Definitions. *In addition to the definitions in Section 1613.2, the following words and terms shall, for the purposes of this section, have the meanings shown herein.*

ACTIVE EARTHQUAKE FAULT. *A fault that has been the source of earthquakes or is recognized as a potential source of earthquakes, including those that have exhibited surface displacement within Holocene time (about 11,000 years) as determined by California Geological Survey (CGS) under the Alquist-Priolo Earthquake Fault Zoning Act, those included as type A or type B faults for the U.S. Geological Survey (USGS) National Seismic Hazard Maps, and faults considered to have been active in Holocene time by an authoritative source, federal, state or local governmental agency.*

~~***BASE.*** *The level at which the horizontal seismic ground motions are considered to be imparted to the structure or the level at which the structure as a dynamic vibrator is supported. This level does not necessarily coincide with the ground level.*~~

DISTANCE FROM AN ACTIVE EARTHQUAKE FAULT. *Distance measured from the nearest point of the building to the closest edge of an Alquist-Priolo Earthquake fault zone for an active fault, if such a map exists, or to the closest mapped splay of the fault.*

IRREGULAR STRUCTURE. *A structure designed as having one or more plan or vertical irregularities per ASCE 7 Section 12.3.*

~~***STRUCTURAL ELEMENTS.*** *Floor or roof diaphragms, decking, joists, slabs, beams, or girders, columns, bearing walls, retaining walls, masonry or concrete nonbearing walls exceeding one story in height, foundations, shear walls or other lateral-force-resisting members, and any other elements necessary to the vertical and lateral strength or stability of either the building as a whole or any of its parts, including connection between such elements.*~~

1616.9.3 Mapped acceleration parameters. *Seismic Design Category shall be determined in accordance with Section 1613.3.5.*

1616.9.4 Determination of seismic design category. *Structures not assigned to Seismic Design Category E or F, in accordance with Section 1613.3, shall be assigned to Seismic Design Category D.*

1616.9.4.1 Alternative seismic design category determination. *The alternative Seismic Design Category determination procedure of Section 1613.3.5.1 is not permitted by DSA-SS/CC.*

1616.9.4.2 Simplified design procedure. *The simplified design procedure of Section 1613.3.5.2 is not permitted by DSA-SS/CC.*

~~***1616.9.5 Automatic sprinkler systems.*** *The allowable values for design of anchors, hangers, and bracing elements shall be determined in accordance with material chapters of this code in lieu of those in NFPA 13.*~~

1616.10 Modifications to ASCE 7. *The text of ASCE 7 shall be modified as indicated in Sections 1616.10.1 through 1616.10.24.*

1616.10.1 ASCE 7, Section 1.3. *Modify ASCE 7 Section 1.3 by adding Section 1.3.6 as follows:*

1.3.6 Structural design criteria. *Where design is based on ASCE 7 Chapters 16, 17, 18, or 31, the ground motion, wind tunnel design recommendations, analysis, and design methods, material assumptions, testing requirements, and acceptance criteria proposed by the engineer shall be submitted to the enforcement agency in the form of structural design criteria for approval.*

Peer review requirements in ~~Section 3422 of this code~~ Section 322 of the California Existing Buildings Code shall apply to design reviews required by ASCE 7 Chapters 17 and 18.

1616.10.2 ASCE 7, Section 11.4.7. *Modify ASCE 7 Section 11.4.7 by adding the following:*

For buildings assigned to Seismic Design Category E and F, or when required by the building official, a ground motion hazard analysis shall be performed in accordance with ASCE 7 Chapter 21, as modified by Section 1803A.6 of this code.

1616.10.3 ASCE 7, Table 12.2-1. *Modify ASCE 7 Table 12.2-1 as follows:*

A. BEARING WALL SYSTEMS

17. Light-framed walls with shear panels of all other materials - Not permitted by DSA-SS/CC.

B. BUILDING FRAME SYSTEMS

24. Light-framed walls with shear panels of all other materials - Not permitted by DSA-SS/CC.

C. MOMENT RESISTING FRAME SYSTEMS

12. Cold-formed steel — special bolted moment frame - Not permitted by DSA-SS/CC.

Exception:

1) Systems listed in this section can be used as an alternative system when preapproved by the enforcement agency.

2) Rooftop or other supported structures not exceeding two stories in height and 10 percent of the total structure weight can use the systems in this section when designed as components per ASCE 7 Chapter 13.

3) Systems listed in this section can be used for seismically isolated buildings when permitted by Section 1613.4.1.

1616.10.4 ASCE 7, Section 12.2.3.1. *Replace ASCE 7 Section 12.2.3.1, Items 1 and 2 by the following:*

The value of the response modification coefficient, R, used for design at any story shall not exceed the lowest value of R that is used in the same direction at any story above that story. Likewise, the deflection amplification factor, C_d , and the system over strength factor, Ω_0, used for the design at any story shall not be less than the largest value of these factors that are used in the same direction at any story above that story.

1616.10.5 ASCE 7, Section 12.2.3.2. *Modify ASCE 7 Section 12.2.3.2 by adding the following additional requirements for a two stage equivalent lateral force procedure or modal response spectrum procedure:*

f. Where design of elements of the upper portion is governed by special seismic load combinations, the special loads shall be considered in the design of the lower portions.

1616.10.6 ASCE 7, Section 12.2.5.6.1. *The exception in Item a is not permitted by DSA-SS/CC.*

1616.10.7 ASCE 7, Section 12.2.5.7.1. *The exception in Item a is not permitted by DSA-SS/CC.*

1616.10.8 ASCE 7, Section 12.2.5.7.2. *The exception in Item a is not permitted by DSA-SS/CC.*

1616.10.9 ASCE 7, Section 12.3.3.1. *Modify ASCE 7 Section 12.3.3.1 as follows:*

12.3.3.1 Prohibited horizontal and vertical irregularities for Seismic Design Categories D through F. *Structures assigned to Seismic Design Category E or F having horizontal structural irregularity Type 1b of Table 12.3-1 or vertical structural irregularities Type 1b, 5a or 5b of Table 12.3-2 shall not be permitted. Structures assigned to Seismic Design Category D having vertical irregularity Type 1b or 5b of Table 12.3-2 shall not be permitted.*

1616.10.10 ASCE 7, Section 12.7.2. *Modify ASCE 7 Section 12.7.2 by adding Item 6 to read as follows:*

6. Where buildings provide lateral support for walls retaining earth, and the exterior grades on opposite sides of the building differ by more than 6 feet (1829 mm), the load combination of the seismic increment of earth pressure due to earthquake acting on the higher side, as determined by a Geotechnical engineer qualified in soils engineering, plus the difference in earth pressures shall be added to the lateral forces provided in this section.

1616.10.11 ASCE 7, Section 12.8.1.3. *Replace ASCE 7*

Section 12.8.1.3 by the following:

> ***~~12.8.1.3 Maximum Ss value in determination of Cs .~~*** *~~For regular structures five stories or less above the base, as defined in Section 11.2 and with a period, T, of 0.5 s or less, CS is permitted to be calculated using the larger of either SS =1.5 or 80 percent of the value of SS determined per Section 11.4.1 or 11.4.7.~~*
>
> ***12.8.1.3 Maximum S_{DS} Value in Determination of C_s and E_v***
> *The value of Cs and E_v are permitted to be calculated using a value of S_{DS} equal to 1.0, but not less than 70% of S_{DS} as defined in Section 11.4.4, provided that all of the following criteria are met:*
>
> 1. *The structure does not have irregularities, as defined in Section 12.3.2;*
> 2. *The structure does not exceed five stories above the base as defined in Section 11.2;*
> 3. *The structure has a fundamental period, T, that does not exceed 0.5 seconds, as determined using Section 12.8.2;*
> 4. *The structure meets the requirements necessary for the redundancy factor, ρ, to be permitted to be taken as 1.0, in accordance with Section 12.3.4.2;*
> 5. *The site soil properties are not classified as Site Class E or F, as defined in Section 11.4.2; and*
> 6. *The structure is classified as Risk Category I or II, as defined in Section 1.5.1.*

1616.10.12 ASCE 7, Section 12.9.4. *Replace ASCE 7 Section 12.9.4 as follows:*

> ***12.9.4 Scaling design values of combined response.*** *Modal base shears used to determine forces and drifts shall not be less than the base shear calculated using the equivalent lateral force procedure of Section 12.8.*

1616.10.13 ASCE 7, Section 12.10.2.1. *Replace ASCE 7 Exception 1 of Section 12.10.2.1 by the following:*

> ***Exception:*** *The forces calculated above need not exceed those calculated using the load combinations of Section 12.4.3.2 with seismic forces determined by Equation 12.10-3 and transfer forces, where applicable.*

1616.10.14 ASCE 7, Section 12.13.1. *Modify ASCE 7 Section 12.13.1 by adding Section 12.13.1.1 as follows:*

> ***12.13.1.1 Foundations and superstructure-to-foundation connections.*** *The foundation shall be capable of transmitting the design base shear and the overturning forces from the structure into the supporting soil. Stability against overturning and sliding shall be in accordance with Section 1605.1.1.*
>
> *In addition, the foundation and the connection of the superstructure elements to the foundation shall have the strength to resist, in addition to gravity loads, the lesser of the following seismic loads:*
>
> 1. *The strength of the superstructure elements*

2. The maximum forces that ~~would occur~~ can be delivered to the foundation in ~~the~~ a fully yielded structural system

3. Forces from the Load Combinations with overstrength factor in accordance with ASCE 7 Section 12.4.3.2

Exceptions:

1. Where referenced standards specify the use of higher design loads.

2. When it can be demonstrated that inelastic deformation of the foundation and superstructure-to-foundation connection will not result in a weak story or cause collapse of the structure.

3. Where ~~basic structural system~~ seismic force-resisting system consists of light-framed walls with shear panels, unless the reference standard specifies the use of higher design loads.

Where the computation of the seismic overturning moment is by the equivalent lateral-force method or the modal analysis method, reduction in overturning moment permitted by Section 12.13.4 of ASCE 7 may be used.

Where moment resistance is assumed at the base of the superstructure elements, the rotation and flexural deformation of the foundation as well as deformation of the superstructure-to-foundation connection shall be considered in the drift and deformation compatibility analyses.

1616.10.15 ASCE 7, Section 13.1.4. *Replace ASCE 7 Section 13.1.4 by the following:*

13.1.4 Exemptions. *The following nonstructural components are exempt from the requirements of this section:*

1. Furniture (except storage cabinets as noted in Table 13.5-1).

2. Temporary or moveable (mobile) equipment.

Exceptions:

1) Equipment shall be anchored if it is permanently attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, "permanently attached" shall include all electrical connections except plugs for duplex receptacles.

2) The enforcement agency shall be permitted to require temporary attachments for movable equipment which is usually stationed in one place and heavier than 400

pounds or has a center of mass located 4 feet (1.22 m) or more above the adjacent floor or roof level that directly support the component, when they are not in use for a period longer than 8 hours at a time.

3. Mechanical and electrical components in Seismic Design Categories D, E or F where all of the following apply:

a. The component is positively attached to the structure;

b. Flexible connections are provided at seismic separation joints and between the component and associated ductwork, piping and conduit; and either:

i. The component weighs 400 lb (1780N) or less and has a center of mass located 4 ft. (1.22 m) or less above the adjacent floor or roof level;

***Exception:** Special Seismic Certification requirements of this code in accordance with Section 1705A.12.3 shall be applicable.*

Or

ii. The component weighs 20 lb (89 N) or less or, in the case of a distributed system, 5 lb/ft (73 N/m) or less.

***Exception:** The enforcement agency shall be permitted to require attachments for equipment with hazardous contents to be shown on construction documents irrespective of weight.*

***1616.10.16 ASCE 7, Section 13.5.6.** Replace ASCE 7, Section 13.5.6 by the following:*

***13.5.6 Suspended ceilings.** Suspended ceilings shall be in accordance with this section.*

***13.5.6.1 Seismic forces.** The weight of the ceiling, Wp, shall include the ceiling grid; ceiling tiles or panels; light fixtures if attached to, clipped to, or laterally supported by the ceiling grid; and other components that are laterally supported by the ceiling. Wp shall be taken as not less than 4 psf (19 N/m2).*

The seismic force, Fp, shall be transmitted through the ceiling attachments to the building structural elements or the ceiling-structure boundary.

***13.5.6.2 Industry standard construction for acoustical tile or lay-in panel ceilings.** Unless designed in accordance with ASTM E 580 Section 5.2.8, or seismically qualified in accordance with Sections 13.2.5 or 13.2.6, acoustical tile*

or lay-in panel ceilings shall be designed and constructed in accordance with this section.

13.5.6.2.1 Seismic Design Categories D through F. *Acoustical tile or lay-in panel ceilings in Seismic Design Categories D, E and F shall be designed and installed in accordance with ASTM C 635, ASTM C 636, and ASTM E 580, Section 5 - Seismic Design Categories D, E and F as modified by this section.*

Exception to Section 13.5.8.1 shall not be used in accordance with ASTM E 580 Section 5.5.

13.5.6.2.2 Modification to ASTM E 580. *Modify ASTM E 580 by the following:*

1. ***Exitways.*** *Lay-in ceiling assemblies in exitways of hospitals and essential services buildings shall be installed with a main runner or cross runner surrounding all sides of each piece of tile, board or panel and each light fixture or grille. A cross runner that supports another cross runner shall be considered as a main runner for the purpose of structural classification. Splices or intersections of such runners shall be attached with through connectors such as pop rivets, screws, pins, plates with end tabs or other approved connectors. Lateral force diagonal bracing may be omitted in the short or transverse direction of exitways, not exceeding 8 feet wide, when perimeter support in accordance with ASTM E 580 Sections 5.2.2 and 5.2.3 is provided and the perimeter wall laterally supporting the ceiling in the short or transverse direction is designed to carry the ceiling lateral forces. The connections between the ceiling grid, wall angle and the wall shall be designed to resist the ceiling lateral forces.*

2. ***Corridors and lobbies.*** *Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors and lobbies or other similar areas.*

3. ***Lay-in panels.*** *Metal panels and panels weighing more than 1/2 pounds per square foot (24 N/m2) other than acoustical tiles shall be positively attached to the ceiling suspension runners.*

4. ***Lateral force bracing.*** *Lateral force bracing is required for all ceiling areas except that they shall be permitted to be omitted in rooms with floor areas up to 144 square feet when perimeter support in accordance with ASTM E 580 Sections 5.2.2 and 5.2.3 are provided and perimeter walls are designed to carry the ceiling lateral forces. The connections between the ceiling grid, wall angle and the wall shall be designed to resist the ceiling lateral forces. Horizontal restraint point spacing shall be justified by analysis or test and shall not exceed a spacing of 12 feet by 12 feet. ~~Restraint~~ Bracing wires shall be secured with four tight twists in 11/2 inches, or an approved alternate connection.*

5. Ceiling support and bracing wires shall be spaced a minimum of 6" from all pipes, ducts, conduits and equipment that are not braced for horizontal forces, unless approved otherwise by the building official.

~~*5. **Ceiling fixtures.** Fixtures installed in acoustical tile or lay-in panel ceilings shall be mounted in a manner that will not compromise ceiling performance.*~~

~~*All recessed or drop-in light fixtures and grilles shall be supported directly from the fixture housing to the structure above with a minimum of two 12-gage wires located at diagonally opposite corners. Leveling and positioning of fixtures may be provided by the ceiling grid. Fixture support wires may be slightly loose to allow the fixture to seat in the grid system. Fixtures shall not be supported from main runners or cross runners if the weight of the fixtures causes the total dead load to exceed the deflection capability of the ceiling suspension system.*~~

~~*Fixtures shall not be installed so that the main runners or cross runners will be eccentrically loaded.*~~

~~*Surface-mounted fixtures shall be attached to the main runner with at least two positive clamping devices made of material with a minimum of 14 gage. Rotational spring catches do not comply. A 12-gage suspension wire shall be attached to each clamping device and to the structure above.*~~

~~*6. **Partitions.** Where the suspended ceiling system is required to provide lateral support for the permanent or relocatable partitions, the connection of the partition to the ceiling system, the ceiling system members and their connections, and the lateral force bracing shall be designed to support the reaction force of the partition from prescribed loads applied perpendicular to the face of the partition. Partition connectors, the suspended ceiling system and the lateral-force bracing shall all be engineered to suit the individual partition application and shall be shown or defined in the drawings or specifications.*~~

1616.10.17 ASCE 7, Section 13.6.5. *Modify ASCE 7, Section 13.6.5.6, Exceptions 1 and 2, as follows:*

Exceptions:

1. Design for the seismic forces of Section 13.3 shall not be required for raceways where either:

a. Trapeze assemblies are used to support raceways and the total weight of the raceway supported by trapeze assemblies is less than 10lb/ft (146 N/m), or

b. The raceway is supported by hangers and each hanger in the raceway run is 12 in. (305mm) or less in length from the raceway support point to the supporting structure. Where rod hangers are used, they shall be equipped with swivels to prevent inelastic bending in the rod.

2. Design for the seismic forces of Section 13.3 shall not be required for conduit, regardless of the value of Ip, where the conduit is less than 2.5 in. (64 mm) trade size.

1616.10.18 ASCE 7, Section 13.6.7. *Replace ASCE 7, Section 13.6.7, Exceptions 1 and 2, by the following:*

Exceptions:

The following exceptions pertain to ductwork not designed to carry toxic, highly toxic or flammable gases, or used for smoke control:

1. Design for the seismic forces of Section 13.3 shall not be required for ductwork where either:

a. Trapeze assemblies are used to support ductwork and the total weight of the ductwork supported by trapeze assemblies is less than 10 lb/ft (146 N/m); or

b. The ductwork is supported by hangers and each hanger in the duct run is 12 in. (305 mm) or less in length from the duct support point to the supporting structure. Where rod hangers are used, they shall be equipped with swivels to prevent inelastic bending in the rod.

2. Design for the seismic forces of Section 13.3 shall not be required where provisions are made to avoid impact with larger ducts or mechanical components or to protect the ducts in the event of such impact; and HVAC ducts have a cross-sectional area of 6 ft2 (0.557 m2) or less, or weigh 10 lb/ft (146 N/m) or less.

~~***1616.10.19 ASCE 7, Section 13.6.8.*** *Modify ASCE 7, Section 13.6.8.2 by adding exception as follows:*~~

~~***Exception:*** *Anchor capacities shall be determined in accordance with material chapters of this code in lieu of using those in NFPA 13 and demand shall be based on ASCE 7.*~~

1616.10.19 ~~***1616.10.20***~~ ***ASCE 7, Section 13.6.8.3.*** *Replace ASCE 7, Section 13.6.8.3 with the following:*

13.6.8.3 Exceptions. *Design of piping systems and attachments for the seismic forces of Section 13.3 shall not be required where one of the following conditions apply:*

1. Trapeze assemblies are used to support piping whereby no single pipe exceeds the limits set forth in 3a. or b. below and the total weight of the piping supported by the trapeze assemblies is less than 10 lb/ft (146 N/m).

2. The piping is supported by hangers and each hanger in the piping run is 12 in. (305 mm) or less in length from the top of the pipe to the supporting structure. Where pipes are supported on a trapeze, the trapeze shall be supported by hangers having a length of 12 in. (305

mm) or less. Where rod hangers are used, they shall be equipped with swivels, eye nuts or other devices to prevent bending in the rod.

3. Piping having an Rp in Table 13.6-1 of 4.5 or greater is used and provisions are made to avoid impact with other structural or nonstructural components or to protect the piping in the event of such impact and where the following size requirements are satisfied:

a. For Seismic Design Categories D, E or F and values of Ip greater than one, the nominal pipe size shall be 1 inch (25 mm) or less.

b. For Seismic Design Categories D, E or F where Ip = 1.0 the nominal pipe size shall be 3 inches (80 mm) or less.

The exceptions above shall not apply to elevator piping.

1616.10.20 ***~~1616.10.21~~*** ***ASCE 7, Section 13.6.10.1.*** *Modify ASCE 7 Section 13.6.10.1 by adding Section 13.6.10.1.1, as follows:*

13.6.10.1.1 Elevators guide rail support. *The design of guide rail support bracket fastenings and the supporting structural framing shall use the weight of the counterweight or maximum weight of the car plus not more than 40 percent of its rated load. The seismic forces shall be assumed to be distributed one-third to the top guiding members and two-thirds to the bottom guiding members of cars and counterweights, unless other substantiating data are provided. In addition to the requirements of ASCE 7 Section 13.6.10.1, the minimum seismic forces shall be 0.5g acting in any horizontal direction.*

1616.10.21 ***~~1616.10.22~~*** ***ASCE 7, Section 13.6.10.4.*** *Replace ASCE 7 Section 13.6.10.4, as follows:*

13.6.10.4 Retainer plates. *Retainer plates are required at the top and bottom of the car and counterweight, except where safety devices acceptable to the enforcement agency are provided which meet all requirements of the retainer plates, including full engagement of the machined portion of the rail. The design of the car, cab stabilizers, counterweight guide rails and counterweight frames for seismic forces shall be based on the following requirements:*

1. The seismic force shall be computed per the requirements of ASCE 7 Section 13.6.10.1. The minimum horizontal acceleration shall be 0.5g for all buildings.

2. Wp shall equal the weight of the counterweight or the maximum weight of the car plus not less than 40 percent of its rated load.

3. With the car or counterweight located in the most adverse position, the stress in the rail shall not exceed the limitations specified in these regulations, nor shall the deflection of the rail relative to its supports exceed the deflection listed below:

TABLE 1224.4.11

ACCEPTABLE CEILING AND CARPET LOCATIONS

RAIL SIZE (weight per foot of length, pounds)	***WIDTH OF MACHINED SURFACE (inches)***	***ALLOWABLE RAIL DEFLECTION (inches)***
8	*$1^1/_4$*	*0.20*
11	*$1^1/_2$*	*0.30*
12	*$1^3/_4$*	*0.40*
15	*$1^{31}/_{32}$*	*0.50*
$18^1/_2$	*$1^{31}/_{32}$*	*0.50*
$22^1/_2$	*2*	*0.50*
30	*$2^1/_4$*	*0.50*

For SI: 1 inch = 25 mm, 1 foot = 305 mm, 1 pound = 0.454 kg.
Note: Deflection limitations are given to maintain a consistent factor of safety against disengagement of retainer plates from the guide rails during an earthquake.

4. Where guide rails are continuous over supports and rail joints are within 2 feet (610 mm) of their supporting brackets, a simple span may be assumed.

5. The use of spreader brackets is allowed.

6. Cab stabilizers and counterweight frames shall be designed to withstand computed lateral load with a minimum horizontal acceleration of 0.5g.

1616.10.22 ***~~1616.10.23~~*** ***ASCE 7, Section 16.1.4.*** *Remove ASCE 7 Sections 16.1.4.1 and 16.1.4.2 and modify 16.1.4 by the following:*

Maximum scaled base shears used to determine forces and drifts shall not be less than the base shear calculated using the equivalent lateral force procedure of Section 12.8.

1616.10.23 ***~~1616.10.24~~*** ***ASCE 7, Section 16.2.4.*** *Modify ASCE 7 Section 16.2.4 by the following:*
a) Where site is located within 3.1 miles (5 km) of an active fault at least seven ground motions shall be analyzed and response parameters shall be based on larger of the average of the maximum response with ground motions applied as follows:

1. Each of the ground motions shall have their maximum component at the fundamental period aligned in one direction.

2. Each of the ground motion's maximum component shall be rotated orthogonal to the previous analysis direction.

b) Where site is located more than 3.1 miles (5 km) from an active fault at least 10 ground motions shall be analyzed. The ground motions shall be applied such that one-half shall have their maximum component aligned in one direction and the other half aligned in the orthogonal direction. The average of the maximum response of all the analyses shall be used for design.

~~***1616.10.25 ASCE 7, Section 17.2.1.*** *Modify ASCE 7 Section 17.2.1 by adding the following:*~~

~~*The importance factor, Ip , for parts and portions of a seismically isolated building shall be the same as that required for a fixed-base building of the same risk category.*~~

1616.10.24 ~~***1616.10.26***~~ ***ASCE 7 Section 17.2.4.7.*** *Modify ASCE 7 Section 17.2.4.7 by adding the following to the end of the section:*

The effects of uplift ~~*and/or rocking*~~ *shall be explicitly accounted for* ~~*in the analysis and*~~ *in the testing of the isolator units.*

~~***1616.10.27 ASCE 7, Section 17.2.5.2.*** *Modify ASCE 7, Section 17.2.5.2 by adding the following:*~~

~~*The separation requirements for the building above the isolation system and adjacent buildings shall be the sum of the factored displacements for each building. The factors to be used in determining separations shall be:*~~

~~*1. For seismically isolated buildings, the deformation resulting from the analyses using the maximum considered earthquake unmodified by RI.*~~

~~*2. For fixed based buildings, Cd times the elastic deformations resulting from an equivalent static analysis using the seismic base shear computed via ASCE 7 Section 12.8.*~~

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 16*A*

STRUCTURAL DESIGN

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter as amended	**X**	**-**	
Adopt only those sections listed below			

(All existing California amendments that are not revised below shall continue without change)

SECTION 1601*A*
GENERAL

1601*A*.1 Scope. The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof regulated by this code.

1601A.1.1 Application. *The scope of application of Chapter 16A is as follows:*

1. *Applications listed in Section 1.9.2.1, regulated by the Division of the State Architect-Structural Safety (DSASS).These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*

2. *(Reserved for OSHPD)*

Exception: [Reserved for OSHPD]

1601A.1.2 Amendments in this chapter. *DSA-SS adopt this chapter and all amendments.*

Exception: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. *Division of the State Architect-Structural Safety:* ***[DSA-SS] –*** *For applications listed in Section 1.9.2.1.*

2. ***(****Reserved for OSHPD)*

1601A.2 Enforcement Agency Approval. *In addition to requirements of the California Administrative Code and the California Building Code, any aspect of project design, construction, quality assurance, or quality control programs for which this code requires approval by the Registered ~~d~~ Design ~~p~~ Professional (RDP), are also subject to approval by the enforcement agency.*

SECTION 1602A
DEFINITIONS AND NOTATIONS

1602*A*.1 Definitions. The following terms are defined in Chapter 2 *except those defined below which shall, for the purposes of this section, have the meanings shown herein.*

…

~~***HOSPITAL BUILDING****. Any building defined in Section 129725, Health and Safety Code.*~~

…

SECTION 1603*A*

CONSTRUCTION DOCUMENTS

1603*A*.1 General. Construction documents shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603A.1.1 through ~~1603.1.8~~ *1603A.1.9* shall be indicated on the *construction documents*.

…

[DSA-SS] *Additional requirements are included in Section 4-210 and 4-317 of the California Administrative Code (Part 1,Title 24, C.C.R).*

[Reserved for OSHPD]

…

1603*A*.1.5 Earthquake design data. The following information related to seismic loads shall be shown, regardless of whether seismic loads govern the design of the lateral-force-resisting system of the building:

1. Risk Category
2. Seismic importance factor, I_e..
3. Mapped spectral response accelerations, S_S and S_1.
4. Site class.
5. Design spectral response acceleration parameters, S_{DS} and S_{D1}.
6. Seismic design category.

7. Basic seismic-force-resisting system(s).
8. Design base shear.
9. Seismic response coefficient(s), C_S.
10. Response modification factor(s), *R*.
11. Analysis procedure used.
12. *Applicable horizontal structural irregularities.*
13. *Applicable vertical structural irregularities.*
14. *Location of base as defined in Section 1613A.2.*

1603A.1.5.1 Connections. *Connections that resist design seismic forces shall be designed and detailed on the design drawings.*

...

1603A.1.9 ***~~1603A.1.10~~*** ***Construction Procedures.*** *Where unusual erection or construction procedures are considered essential by the Registered Design Professional (RDP) in order to accomplish the intent of the design or influence the construction ~~design~~, such procedure shall be indicated on the construction documents.*

1603A.2 Site Data Reports. *Geotechnical and Geohazard reports for review by the enforcement agency shall be accompanied by a description of the project prepared by the Registered Design Professional (RDP) in responsible charge, which shall include the following:*

1. *Type of service such as General Acute Care Facility, Skilled Nursing Facility, Intermediate Care Facility, Acute Psychiatric Facility, Central Utility Plants, K-12 school, community college, essential service, etc.*
2. *Construction materials used for the project such as Steel, Concrete. Masonry, Wood, etc.*
3. *Type of construction project such as new, addition, alteration, repair, etc.*
4. *For existing buildings, extent of construction such as incidental, minor, major, and/or voluntary seismic improvements as defined in Section 318, Part 10, Title 24, C.C.R ~~3418~~* ***[DSA-SS]*** *Sections 202 and 3402A* ***[OSHPD 1 & 4]****.*
5. *Seismic Force Resisting System used for each structure in the project.*
6. *Foundation system that will be used for each structure in the project such as spread footing, drilled piers, etc.*
7. *Analysis procedure used and basis of design such as ASCE 7 Equivalent Lateral Force Procedure, ASCE 41 Nonlinear Dynamic Procedure, etc.*

8. *Building characteristics such as number of stories above and below grade, foot print area at grade, grade slope on site, etc.*
9. *Special features such as requirement for shoring, underpinning, retaining walls, etc.*

1603A.3 Structural Design Basis and Calculations. *The application for the approval of construction documents that involves structural elements or components shall be accompanied by complete and accurate structural design computations, which shall comply with requirements prescribed by the enforcement agency:*

1. *The computations shall be preceded by a detailed index.*
2. *The computations including each major subsection shall be prefaced by a statement clearly and concisely outlining the basis for the structural design and indicating the manner in which the structure will resist the vertical loads and lateral forces.*
3. *The computations shall be sufficiently complete to the extent that calculations for the individual structural members and connections can be readily interpreted.*

SECTION 1604*A*

GENERAL DESIGN REQUIREMENTS

…

1604*A*.3 Serviceability. Structural systems and members thereof shall be designed to have adequate stiffness to limit deflections and lateral drift. See Section 12.12.1 of ASCE 7 for drift limits applicable to earthquake loading.

1604*A*.3.1 Deflections. The deflections of structural members shall not exceed the more restrictive of the limitations of Sections 1604*A*.3.2 through *1604A.3.6* or that permitted by Table 1604*A*.3.

TABLE 1604*A*.3 - DEFLECTION LIMITS[a, b, c, h, i]

CONSTRUCTION	*L or L_r*	*S* or *W*[f]	*D + (L or L_r)*[d,g]
…	…	…	…

... *Veneered walls, anchored veneers and adhered veneers over 1 inch (25 mm) thick, including the mortar backing*	**...** —	**...** *l/600*	… –
Farm buildings	—	—	*l*/180
Greenhouses	—	—	*l*/120

...

1604A.3.7 Horizontal diaphragms. *The maximum span-~~width~~ depth ratio for any roof or floor diaphragm consisting of steel and composite steel slab decking shall not exceed those given in ~~Table 4.2.4 of AF & PA SDPWS for wood or maximum span-depth ratio given in~~ Table 1604A.4 ~~for steel and composite steel-slab decking~~, unless test data and design calculations acceptable to the enforcement agency are submitted and approved for the use of other ~~span-width or~~ span-depth ratios. Concrete diaphragms shall not exceed the span- depth ratios for the equivalent composite steel-slab diaphragm in Table 1604A.4.*

TABLE 1604A.4 – MAXIMUM HORIZONTAL DIAPHRAGM SPAN AND SPAN-DEPTH RATIOS[1,3,4]

FLEXIBILITY FACTOR(F)[2]	***MAXIMUM DIAPHRAGM SPAN FOR MASONRY OR CONCRETE WALLS (feet)***	***DIAPHRAGM SPAN-DEPTH LIMITATION***			
		Rotation (torsion) Not Considered in Diaphragm		***Rotation (torsion) Considered in Diaphragm***	
		Masonry or Concrete Walls	***Flexible Walls***	***Masonry or Concrete Walls***	***Flexible Walls***
More than 150	*Not to be used*	*Not to be used*	*2:1*	*Not to be used*	*1-1/2:1*
70-150	*200*	*2:1 or as required for deflection*	*3:1*	*Not to be used*	*2:1*

10-70	*400*	*2-1/2:1 or as required for deflection*	*4:1*	*As required for deflection*	*2-1/2:1*
1-10	*No limitation*	*3:1 or as required for deflection*	*5:1*	*As required for deflection*	*3:1*
Less than 1	*No limitation*	*As required for deflection*	*No limitation*	*As required for deflection*	*3-1/2:1*

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 plf = 14.6 N/m, 1 psi = 6894 Pa

[1] Diaphragms shall satisfy span-depth limitations based on flexibility.

[2] Flexibility Factor (F) is the average deflection in micro inches (10^{-6}) or µm of the diaphragm web per foot (m) of span stressed with a shear of 1 pound per foot (N/m).

[3] The total deflection Δ of the diaphragm may be computed from the equation: $\Delta = \Delta_f + \Delta_w$.

Where:

Δ_f = Flexural deflection of the diaphragm determined in the same manner as the deflection of beams. The flexural stiffness of the web of diaphragms consisting of bare steel decking shall be neglected.

Δ_w = Web deflection of the diaphragm may be determined solving the following equation:

$$F = \frac{\Delta_w x 10^6}{q_{ave} L}$$

Where:

L = Distance in feet (m) between the vertical resisting element (such as a shear wall) and the point to which the deflection is to be determined.

q_{ave} = Average shear in the diaphragm in pounds per foot (N/m) over length L.

[4] When applying these limitations to cantilevered diaphragms, the allowable span-depth ratio will be half of that shown.

***1604A.3.8 Deflections**. Deflection criteria for materials not specified shall be developed by the project architect or structural engineer in a manner consistent with the provisions of this section and*

approved by the enforcement agency.

1604A.4 Analysis. Load effects on structural members and their connections shall be determined by methods of structural analysis that take into account equilibrium, general stability, geometric compatibility and both short- and long-term material properties.

Members that tend to accumulate residual deformations under repeated service loads shall have included in their analysis the added eccentricities expected to occur during their service life.

Any system or method of construction to be used shall be based on a rational analysis in accordance with well-established principles of mechanics. Such analysis shall result in a system that provides a complete load path capable of transferring loads from their point of origin to the load-resisting elements.

The total lateral force shall be distributed to the various vertical elements of the lateral force-resisting system in proportion to their rigidities, considering the rigidity of the horizontal bracing system or diaphragm. Rigid elements assumed not to be a part of the lateral force-resisting system are permitted to be incorporated into buildings provided their effect on the action of the system is considered and provided for in the design. Structural analysis shall explicitly include consideration of stiffness of diaphragms in accordance with ASCE 7 Section 12.3.1. ~~A diaphragm is rigid for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is less than or equal to two times the average story drift.~~ Where required by ASCE 7, provisions shall be made for the increased forces induced on resisting elements of the structural system resulting from torsion due to eccentricity between the center of application of the lateral forces and the center of rigidity of the lateral force resisting system.

Every structure shall be designed to resist the overturning effects caused by the lateral forces specified in this chapter. See Section 1609 for wind loads, Section 1610 for lateral soil loads and Section 1613 for earthquake loads.

...

1604A.5 Risk category. Each building and structure shall be assigned a *risk category* in accordance with Table 1604A.5. Where a referenced standard specifies an occupancy category, the risk category shall not

be taken as lower than the occupancy category specified therein. Where a referenced standard specifies that the assignment of a risk category be in
accordance with ASCE 7, Table 1.5-1, Table 1604.5 shall be used in lieu of ASCE 7, Table 1.5-1.

...

TABLE 1604*A*.5 - RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
...	**...**
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: **...** • ~~Group I-2 occupancies with an occupant load of 50 or more resident care recepients, but not having surgery or emergency treatment facilities.~~ **...**
IV	Buildings and other structures designated as essential facilities, including but not limited to: • ~~Group I-2 occupancies having surgery or emergency treatment facilities.~~ **...** • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response~~.~~ ***[DSA-SS]*** *as defined in the California Administrative Code (Title 24, Part 1, CCR), Section 4-207 and all structures required for their continuous operation or access/egress.* **...**

…

1604A.8.2 Structural walls. Walls that provide vertical load-bearing resistance or lateral shear resistance for a portion of the structure shall be anchored to the roof and to all floors and members that provide lateral support for the wall or that are supported by the wall. The connections shall be capable of resisting the horizontal forces specified in Section 1.4.4 of ASCE 7 for walls of structures assigned to Seismic Design Category A and to Section 12.11 of ASCE 7 for walls of structures assigned to all other seismic design categories. *For anchorage of concrete or masonry walls to roof and floor diaphragms, the out-of-plane strength design force shall not be less than 280 lb/linear ft (4.09 kN/m) of wall.* Required anchors in masonry walls of hollow units or cavity walls shall be embedded in a reinforced grouted structural element of the wall. See Sections 1609*A* for wind design requirements and 1613*A* for earthquake design requirements.

…

SECTION 1605*A*
LOAD COMBINATIONS

1605*A*.1 General. Buildings and other structures and portions thereof shall be designed to resist:

…

1605*A*.1.1 Stability. Regardless of which load combinations are used to design for strength, where overall structure stability (such as stability against overturning, sliding, or buoyancy) is being verified, use of the load combinations specified in Section 1605*A*.2 or 1605*A*.3 shall be permitted. Where the load combinations specified in Section 1605*A*.2 are used, strength reduction factors applicable to soil resistance shall be provided by a *registered design professional*. The stability of retaining walls shall be verified in accordance with Section 1807*A*.2.3. *When using allowable stress design, factor of safety for soil bearing values shall not be less than the overstrength factor of the structures supported.*

…

SECTION 1606*A*

DEAD LOADS

…

1606A.3 Roof Dead Loads. *The design dead load shall provide for the weight of at least one additional roof covering in addition to other applicable loadings if the new roof covering is permitted to be applied over the original roofing without its removal, in accordance with Section 1511. ~~1510.~~*

…

SECTION 1607*A*

LIVE LOADS

…

1607*A*.1 General. Live loads are those loads defined in Chapter 2 of this code.

1607*A*.2 Loads not specified. For occupancies or uses not designated in Table 1607*A*.1, the live load shall be determined in accordance with a method approved by the building official.

1607*A*.3 Uniform live loads. The live loads used in the design of buildings and other structures shall be the maximum loads expected by the intended use or occupancy but shall in no case be less than the minimum uniformly distributed unit loads required by Table 1607*A*.1.

…

TABLE 1607*A*.1 - MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
. . .	. . .	. . .
4. Assembly areas [o,q] Fixed seats (fastened to floor) Follow spot, projections and control rooms Lobbies Movable seats Stage floors Platforms (assembly) Other assembly areas	 60 [m] 50 100 [m] 100 [m] 150 [m] 100 [m] 100 [m]	—
. . .	. . .	. . .
19. Libraries [n] Corridors above first floor	80 60	1,000 1,000

Reading rooms Stack rooms	150 [b,m]	1,000
. . .	. . .	. . .
22. Office buildings [n] Corridors above first floor File and computer rooms shall be designed for heavier loads based on anticipated occupancy Lobbies and first-floor corridors Offices	 80 — 100 50	 2,000 — 2,000 2,000
. . .	. . .	. . .
24. …. Reviewing stands, grandstands and bleachers [q] …	 100[c,m]	
. . .	. . .	. . .
27. Schools [n] Classrooms Corridors above first floor First-floor corridors	 40 [p] 80 100	 1,000 1,000 1,000
. . .	. . .	. . .
35. Yards and terraces, pedestrians [r]	100[m]	—
36. Storage racks and wall-hung cabinets.	*Total Loads* [n]	—

. . .

n. The minimum vertical design live load shall be as follows:

Paper media:
12-inch-deep (305 mm) shelf 33 pounds per lineal foot (482 N/m)
15-inch-deep (381 mm) shelf 41 pounds per lineal foot (598 N/m), or
33 pounds per cubic foot (5183 N/m^3) per total volume of the rack or cabinet, whichever is less.

Film media:
18-inch-deep (457 mm) shelf 100 pounds per lineal foot (1459 N/m), or
50 pounds per cubic foot (7853 N/m^3) per total volume of the rack or cabinet, whichever is less.

Other media:
20 pounds per cubic foot (311 N/m^3) or 20 pounds per square foot (958 Pa), whichever is less, but not less than actual loads.

o. ***[DSA-SS]*** *The following minimum loads for stage accessories apply:*

1. Gridirons and fly galleries: 75 pounds per square foot uniform live load.

2. Loft block wells: 250 pounds per lineal foot vertical load and lateral load.

3. Head block wells and sheave beams: 250 pounds per lineal foot vertical load and lateral load. Head block wells and sheave beams shall be designed for all tributary loft block well loads. Sheave blocks shall be designed with a safety factor of five.

4. Scenery beams where there is no gridiron: 300 pounds per lineal foot vertical load and lateral load.

5. Ceiling framing over stages shall be designed for a uniform live load of 20 pounds per square foot. For members supporting a tributary area of 200 square feet or more, this additional load may be reduced to 15 pounds per square foot.

p. ***[DSA-SS]*** *The minimum uniform live load for classroom occupancies is 50 psf. Live load reduction is not permitted for classrooms classified as Group A occupancies unless specific exception of Section 1607A.10 apply.*

q. ***[DSA-SS]*** *The minimum uniform live load for a press box floor or accessible roof with railing is 100 psf.*

r. ***[DSA-SS]*** *Item 35 applies to pedestrian bridges and walkways that are not subjected to uncontrolled vehicle access.*

…

1607A.12.6 ***~~1607A.12.5~~*** ***Uncovered open-frame roof structures.*** *Uncovered open-frame roof structures shall be designed for a vertical live load of not less than 10 pounds per square foot (0.48 kN/m^2) of the total area encompassed by the framework.*

…

1607*A*.14 Interior walls and partitions. Interior walls and partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength and stiffness to resist the loads to which they are subjected but not less than a horizontal load of 5 psf (0.240 kN/m^2). *The 5 psf (0.24 kN/m^2)* ~~*working*~~ *service load need not be applied simultaneously with wind or seismic loads. The deflection of such walls under a load of 5 psf (0.24 kN/m^2) shall not exceed the limits in Table 1604A.3.*

…

SECTION 1608*A*

SNOW LOADS

1608*A*.2 Ground snow loads. The ground snow loads to be used in determining the design snow loads for roofs shall be determined in accordance with ASCE 7 or Figure 1608*A*.2 for the contiguous United States ~~and Table 1608.2 for Alaska~~. Site-specific case studies shall be made in areas designated "CS" in Figure 1608*A*.2. Ground snow loads for sites at elevations above the limits indicated in Figure 1608*A*.2 and for all sites within the CS areas shall be approved. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a

value with a 2-percent annual probability of being exceeded (50-year mean recurrence interval). ~~Snow loads are zero for Hawaii, except in mountainous regions as approved by the building official.~~

~~TABLE 1608.2 - GROUND SNOW LOADS, pg , FOR ALASKAN LOCATIONS~~

~~LOCATION~~	~~POUNDS PER SQUARE FOOT~~	~~LOCATION~~	~~POUNDS PER SQUARE FOOT~~	~~LOCATION~~	~~POUNDS PER SQUARE FOOT~~
~~Adak~~	~~30~~	~~Galena~~	~~60~~	~~Petersburg~~	~~150~~
~~Anchorage~~	~~50~~	~~Gulkana~~	~~70~~	~~St. Paul Islands~~	~~40~~
~~Angoon~~	~~70~~	~~Homer~~	~~40~~	~~Seward~~	~~50~~
~~Barrow~~	~~25~~	~~Juneau~~	~~60~~	~~Shemya~~	~~25~~
~~Barter Island~~	~~35~~	~~Kenai~~	~~70~~	~~Sitka~~	~~50~~
~~Bethel~~	~~40~~	~~Kodiak~~	~~30~~	~~Talkeetna~~	~~120~~
~~Big Delta~~	~~50~~	~~Kotzebue~~	~~60~~	~~Unalakleet~~	~~50~~
~~Cold Bay~~	~~25~~	~~McGrath~~	~~70~~	~~Valdez~~	~~160~~
~~Cordova~~	~~100~~	~~Nenana~~	~~80~~	~~Whittier~~	~~300~~
~~Fairbanks~~	~~60~~	~~Nome~~	~~70~~	~~Wrangell~~	~~60~~
~~Fort Yukon~~	~~60~~	~~Palmer~~	~~50~~	~~Yakutat~~	~~150~~

~~For SI: 1 pound per square foot = 0.0479 kN/m2.~~

(FIGURE 1608*A*.2 - Not shown for Clarity)

…

1608A.4 Determination of snow loads. [DSA-SS] *The ground snow load or the design snow load for roofs shall conform with the adopted ordinance of the city, county, or city and county in which the project site is located, and shall be approved by DSA.*

SECTION 1609A
WIND LOADS

…

1609A.1.3 Story Drift for Wind Loads*. The calculated story drift due to wind pressures with ultimate design wind speed, V_{ult}, shall not exceed 0.008 times the story height for buildings less than 65 feet (19,812 mm) in height or 0.007 times the story height for buildings 65 feet (19,812 mm) or greater in height.*

Exception: [DSA-SS] *This story drift limit need not be applied for single-story open ~~structures~~ buildings in Risk Category I and II.*

…

SECTION 1612*A*
FLOOD LOADS

…

1612*A*.3 Establishment of flood hazard areas. To establish *flood hazard areas*, the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management ~~Agency in an engineering report entitled "The Flood Insurance Study for [INSERT NAME OF JURISDICTION]," dated [INSERT DATE OF ISSUANCE],~~ *Agency's Flood Insurance Study (FIS) adopted by the local authority having jurisdiction where the project is located*, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

…

SECTION 1613*A*
EARTHQUAKE LOADS

1613*A*.1 Scope. Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with ASCE 7 *with all the modifications incorporated herein*, excluding Chapter 14 and Appendix 11A. The seismic design category for a structure ~~is permitted to~~ *shall* be determined in accordance with Section 1613*A* ~~or ASCE 7~~.

Exceptions:

~~1. Detached one- and two-family dwellings, assigned to Seismic Design Category A, B or C, or located where the mapped short-period spectral response acceleration, SS, is less than 0.4 g.~~

~~2. The seismic-force-resisting system of wood-frame buildings that conform to the provisions of Section 2308 are not required to be analyzed as specified in this section.~~

~~3. Agricultural storage structures intended only for incidental human occupancy.~~

Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.

1613*A*.2 Definitions. The following terms are defined in Chapter 2 *except those defined below which shall, for the purposes of this section, have the meanings shown herein. Definition provided in ASCE 7 Section 11.2 and* ***[OSHPD 1 & 4]*** *Section 3402A.1* ~~*and ASCE 7 Section 11.2*~~ *shall apply when appropriate in addition to terms defined in this section.*

ACTIVE EARTHQUAKE FAULT. *A fault that has been the source of earthquakes or is recognized as a potential source of earthquakes, including those that have exhibited surface displacement within Holocene time (about 11,000 years) as determined by California Geological Survey (CGS) under the Alquist-Priolo Earthquake Fault Zoning Act, those included as type A or type B faults for the U.S.*

Geological Survey (USGS) National Seismic Hazard Maps, and faults considered to have been active in Holocene time by any authoritative source, Federal, State or Local Governmental Agency.

BASE. *~~The level at which the horizontal seismic ground motions are considered to be imparted to the structure or the level at which the structure as a dynamic vibrator is supported. This level does not necessarily coincide with the ground level.~~ See ASCE 7.*

…

DISTANCE FROM AN ACTIVE EARTHQUAKE FAULT. *Distance measured from the nearest point of the building to the closest edge of an Alquist-Priolo Earthquake fault zone for an active fault, if such a map exists, or to the closest mapped splay of the fault.*

GENERAL ACUTE CARE HOSPITAL*. See Section 1224.3.*

~~***HOSPITAL BUILDINGS.*** *Hospital buildings and all other medical facilities as defined in Section 1250, Health and Safety Code.*~~

IRREGULAR STRUCTURE. *A structure designed as having one or more plan or vertical irregularities per ASCE 7 Section 12.3.*

…

~~***STRUCTURAL ELEMENTS.*** *Floor or roof diaphragms, decking, joists, slabs, beams, or girders, columns, bearing walls, retaining walls, masonry or concrete nonbearing walls exceeding one story in height, foundations, shear walls or other lateral-force-resisting members, and any other elements necessary to the vertical and lateral strength or stability of either the building as a whole or any of its parts, including connection between such elements.*~~

…

1613*A*.3 Seismic ground motion values. Seismic ground motion values shall be determined in accordance with this section.

1613A.3.1 Mapped acceleration parameters. The parameters S_s and S_1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.3.1(1) through 1613.3.1(8). ~~Where S_1 is less than or equal to 0.04 and S_s is less than or equal to 0.15, the structure is permitted to be assigned to Seismic Design Category A. --~~

(Figures 1613.3.1(1) through 1613.3.1(8) were stricken in the CBC 2013 and will not be shown in Chapter 16A. These figures are shown in Chapter 16)

…

1613*A*.3.5 Determination of seismic design category. Structures classified as Risk Category I, II or III that are located where the mapped spectral response acceleration parameter at 1-second period, S_I, is greater than or equal to 0.75 shall be assigned to Seismic Design Category E. Structures classified as Risk Category IV that are located where the mapped spectral response acceleration parameter at 1-second period, S_1, is greater than or equal to 0.75 shall be assigned to Seismic Design Category F. All other structures shall be assigned to *Seismic Design Category D.* ~~a seismic design category based on their occupancy category and the design spectral response acceleration coefficients, S_{DS} and S_{D1}, determined in accordance with Section 1613.5.4 or the site-specific procedures of ASCE 7. Each building and structure shall be assigned to the more severe seismic design category in accordance with Table 1613.5.6(1) or 1613.5.6(2), irrespective of the fundamental period of vibration of the structure, T.~~

~~**TABLE 1613.3.5(1) - SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATIONS**~~

~~**VALUE OF S_{DS}**~~	~~**RISK CATEGORY**~~		
	~~**I or II**~~	~~**III**~~	~~**IV**~~
~~$S_{DS} < 0.167g$~~	~~A~~	~~A~~	~~A~~
~~$0.167g \le S_{DS} < 0.33g$~~	~~B~~	~~B~~	~~C~~
~~$0.33g \le S_{DS} < 0.50g$~~	~~C~~	~~C~~	~~D~~
~~$0.50g \le S_{DS}$~~	~~D~~	~~D~~	~~D~~

~~**TABLE 1613.3.5(2) - SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION**~~

~~**VALUE OFS$_{D1}$**~~	~~**RISK CATEGORY**~~		
	~~**I or II**~~	~~**III**~~	~~**IV**~~
~~$S_{D1} < 0.067g$~~	~~A~~	~~A~~	~~A~~
~~$0.067g \le S_{D1} < 0.133g$~~	~~B~~	~~B~~	~~C~~
~~$0.133g \le S_{D1} < 0.20g$~~	~~C~~	~~C~~	~~D~~
~~$0.20g \le S_{D1}$~~	~~D~~	~~D~~	~~D~~

1613*A*.3.5.1 Alternative seismic design category determination. *Not permitted by DSA-SS.* ~~Where S_1 is less than 0.75, the seismic design category is permitted to be determined from Table 1613.3.5(1) alone when all of the following apply:~~

~~1. In each of the two orthogonal directions, the approximate fundamental period of the structure, T_a, in each of the two orthogonal directions determined in accordance with Section 12.8.2.1 of ASCE 7, is less than 0.8 T_s determined in accordance with Section 11.4.5 of ASCE 7.~~

~~2. In each of the two orthogonal directions, the fundamental period of the structure used to calculate the story drift is less than T_s.~~

~~3. Equation 12.8-2 of ASCE 7 is used to determine the seismic response coefficient, C_s.~~

~~4. The diaphragms are rigid or are permitted to be idealized as rigid in accordance with Section 12.3.1 in ASCE 7 or for diaphragms permitted to be idealized as flexible in accordance with Section 12.3.1 of ASCE 7, the distance between vertical elements of the seismic-force-resisting system does not exceed 40 feet (12 192 mm).~~

1613*A*.3.5.2 Simplified design procedure. *Not permitted by DSA-SS.* ~~Where the alternate simplified design procedure of ASCE 7 is used, the seismic design category shall be determined in accordance with ASCE 7.~~

…

1613*A*.4.1 Additional seismic-force-resisting systems for seismically isolated structures. Add the following exception to the end of Section 17.5.4.2 of ASCE 7:

Exception: For isolated structures designed in accordance with this standard, the structural system limitations including the structural height limitations in Table 12.2-1 for ordinary steel concentrically braced frames (OCBFs) as defined in Chapter 11 and ~~ordinary~~ *intermediate* moment frames ~~(OMFs)~~ *(IMFs)* as defined in Chapter 11 are permitted to be taken as 160 feet (48 768 mm) for structures assigned to Seismic Design Category D, E or F, provided that the following conditions are satisfied:

1. The value of R_I as defined in Chapter 17 is taken as 1.

2. For ~~OMFs and~~ OCBFs, design is in accordance with AISC 341.

3. For IMFs, design is in accordance with AISC 341. In addition, requirements of Section E3.6e of AISC 341 shall be satisfied.

...

SECTION 1615*A*
STRUCTURAL INTEGRITY

1615*A*.1 General. High-rise buildings that are assigned to Risk Category III or IV shall comply with the requirements of this section. Frame structures shall comply with the requirements of Section 1615*A*.3. Bearing wall structures shall comply with the requirements of Section 1615*A*.4.

1615*A*.2 Definitions. The following words and terms are defined in Chapter 2 *except those defined below shall, for the purposes of this section, have the meanings shown herein.*

...

HIGH-RISE BUILDING. *A building with an occupied floor located more than 75 feet (22 860 mm) above the base.*

…

SECTION 1616A
MODIFICATIONS TO ASCE 7

1616A.1 General. *The text of ASCE 7 shall be modified as indicated in Sections 1616A.1.1 through 1616A.1.40 ~~1616A.1.42~~.*

1616A.1.1 ASCE 7, Section 1.3. *Modify ASCE 7 Section 1.3 by adding Section 1.3.6 as follows:*

1.3.6 Structural Design Criteria. *Where design is based on ASCE 7 Chapters 16, 17, or 18, ~~and 31,~~ the ground motion, ~~wind tunnel design recommendations,~~ analysis, and design methods, material assumptions, testing requirements, and acceptance criteria proposed by the engineer shall be submitted to the enforcement agency in the form of structural design criteria for approval. (relocated from above)* ***[DSA-SS]*** *Structural design criteria including wind tunnel design recommendations are required where design is based on ASCE 7 Chapter 31.*
[DSA-SS] *Peer review requirements in ~~Section 3414A of this code~~ Section 322 of the California Existing Buildings Code shall apply to design reviews required by ASCE 7 Chapters 17 and 18.*

1616A.1.2 ASCE 7, Section 11.1.3. *Replace last paragraph of ASCE 7 Section 11.1.3 by the following:*

Buildings shall be designed and detailed in accordance with Chapter 12.

1616A.1.3 ASCE 7, Section 11.4.7. *Modify ASCE 7 Section 11.4.7 by adding the following:*

For buildings assigned to Seismic Design Category E or F, or when required by the building official, a ground motion hazard analysis shall be performed in accordance with ASCE 7 Chapter 21 as modified by Section 1803A.6 of this code.

1616A.1.4 ASCE 7, Table 12.2 -1. *Modify ASCE 7 Table 12.2-1 as follows:*

A. BEARING WALL SYSTEMS

5. (Reserved for OSHPD)

17. Light-framed walls with shear panels of all other materials – Not permitted by DSA-SS.

B. BUILDING FRAME SYSTEMS

3. (Reserved for OSHPD)

8. (Reserved for OSHPD)

24. Light-framed walls with shear panels of all other materials – Not permitted by DSA-SS.

26. (Reserved for OSHPD)

C. MOMENT RESISTING FRAME SYSTEMS

2. (Reserved for OSHPD).

3. (Reserved for OSHPD).

4. (Reserved for OSHPD).

12. ~~5.~~ Cold-formed steel –special bolted moment frame - Not permitted by DSA-SS.

Exception:

1) Systems listed in this section can be used as an alternative system when pre-approved by the enforcement agency.

2) Rooftop or other supported structures not exceeding two stories in height and 10 percent of the total structure weight can use the systems in this section when designed as components per ASCE 7 Chapter 13.

3) Systems listed in this section can be used for seismically isolated buildings when permitted by Section 1613A.4.1.

1616A.1.5 ASCE 7, Section 12.2.3.1. *Replace ASCE 7 Section 12.2.3.1 Items # 1 and # 2 by the following:*

The value of the response modification coefficient, R, used for design at any story shall not exceed the lowest value of R that is used in the same direction at any story above that story. Likewise, the deflection amplification factor, C_d , and the system over strength factor, Ω_0, used for the design at any story shall not be less than the largest values of these factors that are used in the same direction at any story above that story.

1616A.1.6 ASCE 7, Section 12.2.3.2. *Modify ASCE 7 Section 12.2.3.2 by adding the following additional requirement:*

f. Where design of elements of the upper portion is governed by special seismic load combinations, the special loads shall be considered in the design of the lower portion.

1616A.1.7 *ASCE 7, Section 12.2.5.6.1 [DSA-SS] The exception after the first paragraph is not permitted by DSA-SS.*

1616A.1.8 *ASCE 7, Section 12.2.5.7.1 [DSA-SS] The exception after the first paragraph is not permitted by DSA-SS.*

1616A.1.9 *ASCE 7, Section 12.2.5.7.2 [DSA-SS] The exception after the first paragraph is not permitted by DSA-SS.*

1616A.1.10 ASCE 7, Section 12.3.3. *Modify first sentence of ASCE 7 Section 12.3.3.1 as follows:*

12.3.3.1 Prohibited Horizontal and Vertical Irregularities for Seismic Design Categories D through F. *Structures assigned to Seismic Design Category D, E, or F having horizontal structural irregularity Type 1b of Table 12.3-1 or vertical structural irregularities Type 1b, 5a or 5b of Table 12.3-2 shall not be permitted.*

1616A.1.11 ASCE 7, Section 12.7.2. *Modify ASCE 7 Section 12.7.2 by adding item 6 to read as follows:*

6. Where buildings provide lateral support for walls retaining earth, and the exterior grades on opposite sides of the building differ by more than 6 feet (1829 mm), the load combination of the seismic increment of earth pressure due to earthquake acting on the higher side, as determined by a Geotechnical engineer qualified in soils engineering plus the difference in earth pressures shall be added to the lateral forces provided in this section.

1616A.1.12 ASCE 7, Section 12.8.1.3. *Replace ASCE 7 Section 12.8.1.3 by the following:*

~~***12.8.1.3 Maximum S_s Value in Determination of C_s.*** *For regular structures five stories or less above the base as defined in Section 11.2 and with a period, T, of 0.5 s or less, C_S is permitted to be calculated using the larger of either S_S =1.5 or 80% of the value of S_S determined per Sections 11.4.1 or 11.4.7.*~~

12.8.1.3 Maximum S_{DS} Value in Determination of C_s and E_v
The value of Cs and E_v are permitted to be calculated using a value of S_{DS} equal to 1.0, but not less than 70% of S_{DS} as defined in Section 11.4.4, provided that all of the following criteria are met:

7. *The structure does not have irregularities, as defined in Section 12.3.2;*
8. *The structure does not exceed five stories above the base as defined in Section 11.2;*
9. *The structure has a fundamental period, T, that does not exceed 0.5 seconds, as determined using Section 12.8.2;*
10. *The structure meets the requirements necessary for the redundancy factor, ρ, to be permitted to be taken as 1.0, in accordance with Section 12.3.4.2;*
11. *The site soil properties are not classified as Site Class E or F, as defined in Section 11.4.2; and*
12. *The structure is classified as Risk Category I or II, as defined in Section 1.5.1.*
13. ***[Reserved for OSHPD]***

1616A.1.13 ASCE 7, Section 12.9.4. *Replace ASCE 7 Section 12.9.4 as follows:*

12.9.4 Scaling Design Values of Combined Response. *Modal base shears used to determine forces and drifts shall not be less than the base shears calculated using the equivalent lateral force procedure of section 12.8.*

1616A.1.14 ASCE 7, Section 12.10.2.1. *Replace ASCE 7 Exception 1. of Section 12.10.2.1 by the following:*

EXCEPTIONS:

1. The forces calculated above need not exceed those calculated using the load combinations with overstrength factor of Section 12.4.3.2 with seismic forces determined by Equation 12.10- 3 and transfer forces, where applicable.

1616A.1.15 ASCE 7, Section 12.12.3. [Reserved for OSHPD]

1616A.1.16 ASCE 7, Section 12.13.1. *Modify ASCE 7 section 12.13.1 by adding Section 12.13.1.1 as follows:*

12.13.1.1 Foundations and superstructure-to-foundation connections. *The foundation shall be capable of transmitting the design base shear and the overturning forces from the structure into the supporting soil. Stability against overturning and sliding shall be in accordance with Section 1605A.1.1.*

In addition, the foundation and the connection of the superstructure elements to the foundation shall have the strength to resist, in addition to gravity loads, the lesser of the following seismic loads:

1. The strength of the superstructure elements.

2. The maximum forces that ~~would occur~~ can be delivered to the foundation in ~~the~~ a fully yielded structural system.

3. Forces from the Load Combinations with overstrength factor in accordance with ASCE 7 Section 12.4.3.2.

Exceptions:

1. Where reference standards specify the use of higher design loads.

2. When it can be demonstrated that inelastic deformation of the foundation and superstructure-to-foundation connection will not result in a weak story or cause collapse of the structure.

3. Where ~~basic structural system~~ seismic force-resisting system consists of light framed walls with shear panels, unless the reference standard specifies the use of higher design loads.

Where the computation of the seismic overturning moment is by the equivalent lateral-force method or the modal analysis method, reduction in overturning moment permitted by section 12.13.4 of ASCE 7 may be used.

Where moment resistance is assumed at the base of the superstructure elements, the rotation and flexural deformation of the foundation as well as deformation of the superstructure-to-foundation connection shall be considered in the drift and deformation compatibility analyses.

1616A.1.17 ASCE 7, Section 13.1.3. [Reserved for OSHPD]

1616A.1.18 ASCE 7, Section 13.1.4. *Replace ASCE 7 Section 13.1.4 with the following:*

13.1.4 Exemptions. *The following nonstructural components are exempt from the requirements of this section:*

1. Furniture (except storage cabinets as noted in Table 13.5-1).
2. Temporary or moveable (mobile) equipment.

Exceptions:

a) Equipment shall be anchored if it is permanently attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, "permanently attached" shall include all electrical connections except plugs for duplex receptacles.

b) The enforcement agency shall be permitted to require temporary attachments for movable equipment which is usually stationed in one place and heavier than 400 pounds or has a center of mass located 4 feet (1.22 m) or more above the adjacent floor or roof level that directly support the component, when they are not in use for a period longer than 8 hours at a time.

3. Architectural, mechanical and electrical components in Seismic Design Categories D, E, or F where all of the following apply:

a. The component is positively attached to the structure;

b. Flexible connections are provided at seismic separation joints and between the component and associated ductwork, piping, and conduit; and either:

i. The component weighs 400 pounds (1780 N) or less and has a center of mass located 4 feet (1.22 m) or less above the adjacent floor or roof level that directly support the component;

Exception: *Special Seismic Certification requirements of this code in accordance with Section 1705A.13.3 ~~1705A.12.4~~ shall be applicable.*

or

ii. The component weighs 20 pounds (89 N) or less or, in the case of a distributed system, 5 lb/ft (73 N/m) or less.

Exception: *The enforcement agency shall be permitted to require attachments for equipment with hazardous contents to be shown on construction documents irrespective of weight.*

1616A.1.19 ASCE 7, Section 13.4. *Replace ASCE 7 Section 13.4.2.3 with the following:*

13.4.2.3 Prequalified ~~P~~ post-installed anchors and specialty inserts in Concrete and Masonry.

Post-installed anchors and specialty inserts in concrete that are ~~used for component anchorage shall be~~ pre-qualified for seismic applications in accordance with ACI 355.2, ACI 355.4, ICC-ES AC193, ICC-ES AC232, ~~or~~ ICC-ES AC308 or ICC-ES AC446 shall be permitted. Post-installed anchors in masonry ~~used for component anchorage~~ shall be pre-qualified for seismic applications in accordance with ICC-ES AC01, AC58, or AC106.

Use of screw anchors shall be limited to dry interior conditions and shall not be used in building enclosure walls. Re-use of screw anchors or screw anchor holes shall not be permitted.

Exception: [DSA-SS] *Screw anchors are not prohibited for use in building enclosure walls.*

1616A.1.20 ASCE 7, Section 13.4.5 *Modify ASCE 7 Section 13.4.5 by adding Section 13.4.5.1 as follows:*

(Relocated from Section 1908A.1.1) ***13.4.5.1*** ~~***1908A.1.1***~~ ***Power Actuated Fasteners:*** *Power actuated fasteners qualified in accordance with ICC-ES AC 70 shall be deemed to satisfy the requirements of Section 13.4.5.* ~~*this section.*~~

Power actuated fasteners shall be permitted in seismic shear for components exempt from permit requirements by Section 1616A.1.18 of this code and for interior non-bearing non-shear wall partitions only. Power actuated fastener shall not be used to anchor seismic bracing, exterior cladding or curtain wall systems.

Exception: Power actuated fasteners in steel to steel connections prequalified for seismic application by cyclic tests in accordance with ICC-ES AC 70 shall be permitted for seismic design.

1616A.1.21 ~~***1616A.1.20***~~ ***ASCE 7, Section 13.5.6.*** *Replace ASCE 7, Section 13.5.6 with the following:*

13.5.6 Suspended Ceilings. *Suspended ceilings shall be in accordance with this section.*

13.5.6.1 Seismic Forces. *The weight of the ceiling, W_p, shall include the ceiling grid; ceiling tiles or panels; light fixtures if attached to, clipped to, or laterally supported by the ceiling grid; and other components that are laterally supported by the ceiling. W_p shall be taken as not less than 4 psf (19 N/m^2).*

The seismic force, F_p, shall be transmitted through the ceiling attachments to the building structural elements or the ceiling-structure boundary.

***13.5.6.2 Seismic Design Requirements**. Suspended acoustical tile or lay-in panel ceilings shall be designed in accordance with ASTM E 580 Section 5.2.8 and the requirements of Sections 13.5.6.2.1 and 13.5.6.2.2, or be designed in accordance with Section 13.2.1.1, or be seismically qualified in accordance with Sections 13.2.5 or 13.2.6.*

***13.5.6.2.1. Industry Standard Construction for Acoustical Tile or Lay-In Panel Ceilings.** Acoustical tile or lay-in panel ceilings in Seismic Design Categories D, E, and F shall be designed and installed in accordance with ASTM C635, ASTM C636, and ASTM E 580, Section 5 - Seismic Design Categories D, E, and F as modified by Section 13.5.6.2.2.*

Exception to Section 13.5.8.1 shall not be used in accordance with ASTM E 580 Section 5.5.

***13.5.6.2.2 Modification to ASTM E 580.** Modify ASTM E 580 by the following:*

1. ***Exitways**. Lay-in ceiling assemblies in exitways of hospitals and essential services buildings shall be installed with a main runner or cross runner surrounding all sides of each piece of tile, board or panel and each light fixture or grille. A cross runner that supports another cross runner shall be considered as a main runner for the purpose of structural classification. Splices or intersections of such runners shall be attached with through connectors such as pop rivets, screws, pins, plates with end tabs or other approved connectors. Lateral force diagonal bracing may be omitted in the short or transverse direction of exitways, not exceeding 8 feet wide, when perimeter support in accordance with ASTM E 580 Sections 5.2.2 and 5.2.3 is provided and the perimeter wall laterally supporting the ceiling in the short or transverse direction is designed to carry the ceiling lateral forces. The connections between the ceiling grid, wall angle and the wall shall be designed to resist the ceiling lateral forces.*

2. ***Corridors and Lobbies.** Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors and lobbies or other similar areas.*

3. ***Lay-in panels.** Metal panels and panels weighing more than 1/2 pounds per square foot (24 N/m^2) other than acoustical tiles shall be positively attached to the ceiling suspension runners.*

4. ***Lateral force bracing.*** *Lateral force bracing is required for all ceiling areas except that they shall be permitted to be omitted in rooms with floor areas up to 144 square feet when perimeter support in accordance with ASTM E 580 Sections 5.2.2 and 5.2.3 are provided and perimeter walls are designed to carry the ceiling lateral forces. The connections between the ceiling grid, wall angle and the wall shall be designed to resist the ceiling lateral forces. Horizontal restraint point spacing shall be justified by analysis or test and shall not exceed a spacing of 12 feet by 12 feet. ~~Restraint~~ Bracing wires shall be secured with four tight twists in 1 1/2 inches, or an approved alternate connection.*

5. *Ceiling support and bracing wires shall be spaced a minimum of 6" from all pipes, ducts, conduits and equipment that are not braced for horizontal forces, unless approved otherwise by the building official.*

~~5. **Ceiling fixtures.** Fixtures installed in acoustical tile or lay-in panel ceilings shall be mounted in a manner that will not compromise ceiling performance.~~

~~All recessed or drop-in light fixtures and grilles shall be supported directly from the fixture housing to the structure above with a minimum of two 12 gage wires located at diagonally opposite corners. Leveling and positioning of fixtures may be provided by the ceiling grid. Fixture support wires may be slightly loose to allow the fixture to seat in the grid system. Fixtures shall not be supported from main runners or cross runners if the weight of the fixtures causes the total dead load to exceed the deflection capability of the ceiling suspension system.~~

~~Fixtures shall not be installed so that the main runners or cross runners will be eccentrically loaded.~~

~~Surface-mounted fixtures shall be attached to the main runner with at least two positive clamping devices made of material with a minimum of 14 gage. Rotational spring catches do not comply. A 12 gage suspension wire shall be attached to each clamping device and to the structure above.~~

~~6. **Partitions.** Where the suspended ceiling system is required to provide lateral support for the permanent or relocatable partitions, the connection of the partition to the ceiling system, the ceiling system members and their connections, and the lateral force bracing shall be designed to support the reaction force of the partition from prescribed~~

~~*loads applied perpendicular to the face of the partition. Partition connectors, the suspended ceiling system and the lateral-force bracing shall all be engineered to suit the individual partition application and shall be shown or defined in the drawings or specifications.*~~

1616A.1.22 ~~***1616A.1.21***~~***. [Reserved for OSHPD]***

1616A.1.23 ~~***1616A.1.22***~~ ***ASCE 7 Tables 13.5-1 and 13.6-1.*** *Modify ASCE 7, Tables 13.5-1 & 13.6-1 by the following:*

1. *For components with R_p greater than 1.5, overstrength factor (Ω_0) for design of anchorage to concrete and vibration isolators along with associated snubbers/connections shall be 2.0.*
2. *For Exterior Nonstructural Wall Elements and Connections, overstrength factor (Ω_0) shall be 1.0.*

1616A.1.24 ~~***1616A.1.23***~~ ***ASCE 7, Section 13.6.5.*** *Modify ASCE 7, Section 13.6.5.6 Exceptions 1 and 2 as follows:*

Exceptions:

1. *Design for the seismic forces of Section 13.3 shall not be required for raceways where either:*

   a. *Trapeze assemblies are used to support raceways and the total weight of the raceway supported by trapeze assemblies is less than 10 lb/ft (146 N/m), or*
   b. *The raceway is supported by hangers and each hanger in the raceway run is 12 in. (305 mm) or less in length from the raceway support point to the supporting structure. Where rod hangers are used with a diameter greater than 3/8 inch, they shall be equipped with swivels to prevent inelastic bending in the rod.*

2. *Design for the seismic forces of Section 13.3 shall not be required for conduit, regardless of the value of I_p, where the conduit is less than 2.5 in. (64 mm) trade size.*

1616A.1.25 ~~***1616A.1.24***~~ ***ASCE 7, Section 13.6.7.*** *Replace ASCE 7, Section 13.6.7 Exceptions 1 and 2 with the following:*

Exceptions:

The following exceptions pertain to ductwork not designed to carry toxic, highly toxic, or flammable gases or used for smoke control:

1. Design for the seismic forces of Section 13.3 shall not be required for ductwork where either:

a. Trapeze assemblies are used to support ductwork and the total weight of the ductwork supported by trapeze assemblies is less than 10 lb/ft (146 N/m); or

b. The ductwork is supported by hangers and each hanger in the duct run is 12 in. (305 mm) or less in length from the duct support point to the supporting structure. Where rod hangers are used with a diameter greater than 3/8 inch, they shall be equipped with swivels to prevent inelastic bending in the rod.

2. Design for the seismic forces of Section 13.3 shall not be required where provisions are made to avoid impact with larger ducts or mechanical components or to protect the ducts in the event of such impact; and HVAC ducts have a cross-sectional area of 6 ft^2 (0.557 m^2) or less, or weigh 10 lb/ft (146 N/m) or less.

~~***1616A.1.25 ASCE 7, Section 13.6.8.2.*** *Modify ASCE 7, Section 13.6.8.2 by adding Exception as follows:*~~

~~*Exception: Anchor capacities shall be determined in accordance with material chapters of this code in lieu of using those in NFPA 13 and demand shall be based on ASCE 7.*~~

1616A.1.26 ASCE 7, Section 13.6.8.3. *Replace ASCE 7, Section 13.6.8.3 with the following:*

13.6.8.3 Exceptions. *Design of piping systems and attachments for the seismic forces of Section 13.3 shall not be required where one of the following conditions apply:*

1. Trapeze assemblies are used to support piping whereby no single pipe exceeds the limits set forth in 3a. or b. below and the total weight of the piping supported by the trapeze assemblies is less than 10 lb/ft (146 N/m).

2. The piping is supported by hangers and each hanger in the piping run is 12 in. (305 mm) or less in length from the top of the pipe to the supporting structure. Where pipes are supported on a trapeze, the trapeze shall be supported by hangers having a length of 12 in. (305 mm)

or less. Where rod hangers are used with a diameter greater than 3/8 inch, they shall be equipped with swivels to prevent inelastic bending in the rod.

3. *Piping having an R_p in Table 13.6-1 of 4.5 or greater is used and provisions are made to avoid impact with other structural or nonstructural components or to protect the piping in the event of such impact and where the following size requirements are satisfied:*

   a. For Seismic Design Categories D, E, or F and values of I_p greater than one, the nominal pipe size shall be 1 inch (25 mm) or less.
   b. For Seismic Design Categories D, E, or F, where I_p = 1.0 the nominal pipe size shall be 3 inches (80 mm) or less.

The exceptions above shall not apply to elevator piping.

1616A.1.27 ASCE 7, Section 13.6.10.1. *Modify ASCE 7 Section 13.6.10.1 by adding Section 13.6.10.1.1 as follows:*

13.6.10.1.1 Elevators guide rail support. *The design of guide rail support-bracket fastenings and the supporting structural framing shall use the weight of the counterweight or maximum weight of the car plus not less than 40 percent of its rated load. The seismic forces shall be assumed to be distributed one third to the top guiding members and two thirds to the bottom guiding members of cars and counterweights, unless other substantiating data are provided. In addition to the requirements of ASCE 7 Section 13.6.10.1, the minimum seismic forces shall be 0.5g acting in any horizontal direction.*

1616A.1.28 ASCE 7, Section 13.6.10.4. *Replace ASCE 7, Section 13.6.10.4 as follows:*

13.6.10.4 Retainer plates. *Retainer plates are required at the top and bottom of the car and counterweight, except where safety devices acceptable to the enforcement agency are provided which meet all requirements of the retainer plates, including full engagement of the machined portion of the rail. The design of the car, cab stabilizers, counterweight guide rails and counterweight frames for seismic forces shall be based on the following requirements:*

1. *The seismic force shall be computed per the requirements of ASCE 7 13.6.10.1. The minimum horizontal acceleration shall be 0.5g for all buildings.*

2. W_p shall equal the weight of the counterweight or the maximum weight of the car plus not less than 40 percent of its rated load.

3. With the car or counterweight located in the most adverse position, the stress in the rail shall not exceed the limitations specified in these regulations, nor shall the deflection of the rail relative to its supports exceed the deflection listed below:

RAIL SIZE (weight per foot of length, pounds)	*WIDTH OF MACHINED SURFACE (inches)*	*ALLOWABLE RAIL DEFLECTION (inches)*
8	*1 ¼*	*0.20*
11	*1 ½*	*0.30*
12	*1 ¾*	*0.40*
15	*1 31/32*	*0.50*
18 ½	*1 31/32*	*0.50*
22 ½	*2*	*0.50*
30	*2 ¼*	*0.50*

For SI: 1 inch = 25 mm, 1 foot = 305 mm.

NOTE: Deflection limitations are given to maintain a consistent factor of safety against disengagement of retainer plates from the guide rails during an earthquake.

4. Where guide rails are continuous over supports and rail joints are within 2 feet (610 mm) of their supporting brackets, a simple span may be assumed.

5. The use of spreader brackets is allowed.

6. Cab stabilizers and counterweight frames shall be designed to withstand computed lateral load with a minimum horizontal acceleration of 0.5g.

1616A.1.29 ASCE 7, Section 16.1.4. *Remove ASCE 7 Sections 16.1.4.1 and 16.1.4.2 and modify Section 16.1.4 by the following:*

Maximum scaled base shears used to determine forces and drifts shall not be less than the base shears calculated using the equivalent lateral force procedure of Section 12.8.

1616A.1.30 ASCE 7, Section 16.2.2. *Modify ASCE 7 Section 16.2.2 by adding the following:*

Requirements of this section shall be deemed to be satisfied for new buildings, using acceptance criteria in Section 16.2.4.2, by the nonlinear modeling parameters in ASCE 41.

1616A.1.31 ASCE 7, Section 16.2.3. *Modify ASCE 7 Section 16.2.3 by adding the following:*

Requirements of this section shall be deemed to be satisfied by using load combinations in Sections 12.4.2.3 and 12.4.3.2 with 25% of the required live loads.

1616A.1.32 ASCE 7, Section 16.2.4. *Modify ASCE 7 Section 16.2.4 by the following:*

a) Where site is located within 3.1 miles (5 km) of an active fault at least seven ground motions shall be analyzed and response parameters shall be based on larger of the average of the maximum response with ground motions applied as follows:

1. *Each of the ground motions shall have their maximum component at the fundamental period aligned in one direction.*
2. *Each of the ground motion's maximum component shall be rotated orthogonal to the previous analysis direction.*

b) Where site is located more than 5 km from an active fault at least 10 ground motions shall be analyzed. The ground motions shall be applied such that one-half shall have their maximum component aligned in one direction and the other half aligned in the orthogonal direction. The average of the maximum response of all the analyses shall be used for design.

1616A.1.33 ASCE 7, Section 16.2.4.1. [Reserved for OSHPD]

1616A.1.34 ASCE 7, Section 16.2.4.2. [Reserved for OSHPD]

~~***1616A.1.35 ASCE 7, Section 17.2.1.*** *Modify ASCE 7, Section 17.2.1 by adding the following:*~~

~~*The importance factor, I_p, for parts and portions of a seismic-isolated building shall be the same as that required for a fixed-base building of the same risk category.*~~

1616A.1.35 ~~***1616A.1.36***~~ ***ASCE 7 Section 17.2.4.7.*** *Modify ASCE 7, Section 17.2.4.7 by adding the following:*

The effects of uplift ~~*and/or rocking*~~ *shall be explicitly accounted for* ~~*in the analysis and*~~ *in the testing of the isolator units.*

~~***1616A.1.37 ASCE 7, Section 17.2.5.2.*** *Modify ASCE 7, Section 17.2.5.2 by adding the following:*~~

~~*The separation requirements for the building above the isolation system and adjacent buildings shall be the sum of the factored displacements for each building. The factors to be used in determining separations shall be:*~~

1. ~~*For seismically isolated buildings, the deformation resulting from the analyses using the Risk-Targeted Maximum Considered Earthquake unmodified by R_I.*~~

2. ~~*For fixed based buildings, C_d times the elastic deformations resulting from an equivalent static analysis using the seismic base shear computed via ASCE 7, Section 12.8.*~~

1616A.1.36 ~~***1616A.1.38***~~ ***ASCE 7, Section 17.4.*** *Modify ASCE 7, Section 17.4.2 by adding the following:*

17.4.2.3 Linear Procedure. *Linear procedures shall not be used in Seismic Design Category E & F structures.* ~~*be limited to structures located at sites where mapped value of S_1 is less than 0.6g.*~~

1616A.1.37 ~~***1616A.1.39***~~ ***ASCE 7, Section*** *17.6 Modify ASCE 7, Section 17.6 by adding the following:*

17.6.1.1 Minimum Seismic Force*. For the response spectrum and linear response history procedures, V_b and V_s, shall not be taken less than those calculated in accordance with Equations 17.5-7 and 17.5-8.*

1616A.1.38 ~~***1616A.1.40***~~ ***ASCE 7, Section 18.3.1.*** *Modify ASCE 7, Section 18.3.1 by replacing the third paragraph with the following:*

If the calculated force in an element of the seismic force resisting system does not exceed 1.5 times its nominal strength for the Risk-Targeted Maximum Considered Earthquake (MCE_R) nor its nominal strength for the Design Earthquake (DE), the element is permitted to be modeled as linear. For this section, the MCE_R and DE response shall be based on largest response due to a single ground motion and not the average response of suite of ground motions.

1616A.1.39 ~~***1616A.1.41***~~ ***[Reserved for OSHPD]***

1616A.1.40 ~~***1616A.1.42***~~ ***[Reserved for OSHPD]***

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

CHAPTER 17*A*

SPECIAL INSPECTIONS AND TESTS

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter as amended	**X**	**X**	
Adopt only those sections listed below			

(All existing California amendments that are not revised below shall continue without change)

SECTION 1701*A*

GENERAL

1701*A*.1 Scope. The provisions of this chapter shall govern the quality, workmanship and requirements for materials covered. Materials of construction and tests shall conform to the applicable standards listed in this code.

1701A.1.1 Application. *The scope of application of Chapter 17A is as follows:*

1. ***[DSA-SS & DSA-SS/CC]*** *Structures regulated by the Division of the State Architect-Structural Safety, which include those applications listed in Sections 1.9.2.1 (DSA-SS), and 1.9.2.2 (DSA-SS/CC). These applications include public elementary and secondary schools, community colleges and state-owned or state leased essential services buildings*

2. *(Reserved for OSHPD)*

Exception: [Reserved for OSHPD]

1701A.1.2 Amendments in this chapter. *DSA-SS adopts this chapter and all amendments.*

Exception: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. *Division of the State Architect - Structural Safety:*
[DSA-SS] *For applications listed in Section 1.9.2.1.*
[DSA-SS/CC] *For applications listed in Section 1.9.2.2.*

2. ***[Reserved for OSHPD]***

1701A.1.3 Reference to other chapters.

1701A.1.3.1 [DSA-SS/CC] *Where reference within this chapter is made to sections in Chapters 16A, 19A, 21A, and 22A, ~~and 34A,~~ the provisions in Chapters 16, 19, 21, and 22, ~~and 34~~ respectively, shall apply instead.*

...

1701A.3 ~~1701A.4~~ Special ~~inspectors~~ inspections and tests. [Reserved for OSHPD]

1701A.4 ***~~1701A.5~~*** ***Special ~~inspectors~~ inspections and tests. [DSA-SS & DSA-SS/CC]*** *In addition to the project inspector required by the California Administrative Code (CCR, Title 24, Part 1), Section 4-333,the owner shall employ one or more approved agencies ~~special inspectors~~ to provide special inspections and tests as required by the enforcement agency during construction on the types of work listed under Chapters 17A, 18A, 19A, 20, 21A, 22A, 23, and 25 and ~~34 of~~ the California Existing Building Code and noted in the special test, inspection and observation plan required by Section 4-335 of the California Administrative Code.*

SECTION 1702*A*

DEFINITIONS

1702*A*.1 Definitions. The following terms are defined in Chapter 2 *except those defined below which shall, for the purposes of this ~~section~~ chapter, have the meanings shown herein.*

…

PROJECT INSPECTOR. [DSA-SS, DSA-SS/CC] *The person approved to provide inspection in accordance with the California Administrative Code, Section 4-333(b). The term "project inspector" is synonymous with "inspector of record."*

…

Quality Assurance (*QA). Special inspections and testing provided by an approved agency employed by the Owner. Project specific testing required by approved construction documents shall be performed by the approved agency responsible for Quality Assurance (QA), unless approved otherwise by the building official.*

Quality Control (QC). *Inspections and materials/functionality testing provided by the fabricator, erector, manufacturer or other responsible contractor as applicable.*

…

SPECIAL INSPECTION.

Continuous special inspection. *The full-time observation of work requiring special inspection by a special inspector who is present in the area where the work is being performed.*

Periodic special inspection. *The part-time or intermittent observation of work requiring special inspection by a special inspector who is present in the area where the work has been or is being performed and at the completion of the work.*

...

SECTION 1704*A*
SPECIAL INSPECTIONS, AND TESTS,
CONTRACTOR RESPONSIBILITY AND
STRUCTURAL OBSERVATION

...

1704*A*.2 Special inspections and tests. Where application is made to the building official for construction as specified in Section 105, the owner ~~or the owners authorized agent, other than contractor,~~ shall employ one or more *approved agencies* to provide special inspections and tests during construction on the types of work specified in Section 1705*A* and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections by the building official that are identified in Section 110.

Exception~~s~~:

1. *Special inspections* and tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as *approved* by the *building official*.

2. [DSA-SS, DSA-SS/CC] Reference to Section 105 and Section 110 shall be to the California Administrative Code instead.

~~2. Unless otherwise required by the building official, special inspections are not required for Group U occupancies that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1.~~

~~3. Special inspections are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.~~

~~4. The contractor is permitted to employ the approved agencies where the contractor is also the owner.~~

…

1704A.2.3 Statement of special inspections. The applicant shall submit a statement of *special inspections prepared by the registered design professional in responsible charge* in accordance with Section 107.1as a condition for ~~permit issuance~~ *construction documents review*. This statement shall be in accordance with Section 1704*A*.3.

[DSA-SS, DSA-SS/CC] Reference to Section 107.1 shall be to the California Administrative Code instead.

~~**Exception:** A statement of *special inspections* is not required for portions of structures designed and constructed in accordance with the cold-formed steel light frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.~~

1704*A*.2.4 Report requirement. *The inspector(s) of record and* ~~A~~ approved agencies shall keep records of special inspections and tests. The *inspector of record and* approved agency shall submit reports of special inspections and tests to the building official, and to the registered design professional in responsible charge *as required by the California Administrative Code.* Reports shall indicate that work inspected or tested was or was not completed in conformance to approved construction documents *as required by the California Administrative Code and this code.* ~~*Title 24 Parts 1 and 2.*~~ Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted at a point in time agreed upon prior to the start of work by the owner or owner's authorized agent to the building official.

1704*A*.2.5 Special inspection of fabricated items. Where fabrication of structural, load-bearing or lateral load resisting members or assemblies is being conducted on the premises of a fabricator's shop, *special inspection* of the fabricated items shall be performed during fabrication.

Exception~~s~~: *(Reserved for OSHPD)*

~~1) Special inspections during fabrication are not required where the fabricator maintains approved detailed fabrication and quality control procedures that provide a basis for control of the workmanship and the fabricator's ability to conform to *approved construction documents* and this code. Approval shall be based upon review of fabrication and quality control procedures and periodic inspection of fabrication practices by the building official.~~

~~2) *Special inspections* are not required where fabricator is registered and approved in accordance with Section 1704.2.5.1.~~

~~**1704.2.5.1 Fabricator approval.** *Special inspections* during fabrication are not required where the work is done on the premises of a fabricator registered and *approved* to perform such work without *special inspection*. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an *approved* agency. At completion of fabrication, the *approved* fabricator shall submit a *certificate of compliance* to the owner or owner's authorized agent for submittal to the *building official as specified in Section 1704.5* stating that the work was performed in accordance with the *approved construction documents*.~~

...

1704*A*.3.2 Seismic requirements in the statement of special inspections. Where Section 1705*A*.12 or 1705*A*.13 specifies *special inspections* or tests for seismic resistance, the statement of special inspections shall identify the *equipment/components that require special seismic certification* ~~designated seismic systems~~ and seismic force resisting systems that are subject to *special inspections* or tests.

...

1704*A*.4 Contractor responsibility. Each contractor responsible for the construction of a main wind- or seismic force resisting system, *installation of equipment/components requiring special seismic certification* ~~designated seismic system~~ or a wind- or seismic-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the *building official* and the owner or the Owner's authorized agent prior to the commencement of work on the system or component.

The contractor's statement of responsibility shall contain acknowledgement of awareness of the special requirements contained in the statement of *special inspections*.

1704A.5 Submittal to the Building official. In addition to the submittal of reports of *special inspections* and tests in accordance with Section 1704A.2.4, reports and certificates shall be submitted by the owner or owner's authorized agent to the building official for each of the following:

1. *(Reserved for OSHPD)* ~~*Certificate of Compliance* for the fabrication of structural, load-bearing or lateral load-resisting members or assemblies on the premises of a registered and *approved fabricator* in accordance with Section 1704.2.5.1.~~
2. *Certificate of compliance* for the ~~seismic qualification~~ *manufacturer's certification* of non-structural components, supports and attachments in Section 1705*A*.13.2.
3. *Certificate of compliance* for the ~~designated seismic system~~ *equipment/components requiring special seismic certification* in accordance with Section 1705*A*.13.3.

…

1704*A*.6 Structural observations. ~~Where required by the provisions of Section 1704.6.1 or 1704.6.2, t~~ *T*he owner ~~or the owner's authorized agent~~ shall employ a *registered design professional* to perform structural observations. Structural observation does not include or waive the responsibility for inspection in Section 110 or the special inspections in Section 1705A or other sections of this code.

Prior to the commencement of observations, the structural observer shall submit to the *building official* a written statement identifying the frequency and extent of structural observations.

At the conclusion of the work included in the permit, the structural observer shall submit to the *building official* a written statement that the site visits have been made and identify any reported deficiencies that, to the best of the structural observer's knowledge, have not been resolved.

[DSA-SS, DSA-SS/CC] Reference to Section 110 shall be to the California Administrative Code instead.

~~**1704.6.1 Structural observations for seismic resistance.** Structural observations shall be provided for those structures assigned to *Seismic Design Category* D, E or F where one or more of the following conditions exist:~~

~~1. The structure is classified as *Risk Category* III or IV.~~

~~2. The height of the structure is greater than 75 feet (22 860 mm) above the base as defined in ASCE 7.~~

~~3. The structure is assigned to *Seismic Design Category* E, is classified as *Risk Category* I or II, and is greater than two *stories above grade plane*.~~

~~4. When so designated by the *registered design professional* responsible for the structural design.~~

~~5. When such observation is specifically required by the *building official*.~~

~~**1704.6.2 Structural observations for wind requirements.** Structural observations shall be provided for those~~
~~structures sited where *Vasd* as determined in accordance with Section 1609.3.1 exceeds 110 mph (49 m/sec), where one or more of the following conditions exist:~~

~~1. The structure is classified as *Risk Category* III or IV.~~

~~2. The *building height* is greater than 75 feet (22 860 mm).~~

~~3. When so designated by the *registered design professional* responsible for the structural design.~~

~~4. When such observation is specifically required by the *building official*.~~

SECTION 1705*A*

REQUIRED SPECIAL INSPECTIONS AND TESTS

…

1705A.2.1 Structural steel. *Special inspections* and nondestructive testing of structural steel elements in buildings, structures and portions thereof shall be in accordance with the quality assurance ~~inspection~~ requirements ~~of AISC 360~~ *of this section*, ~~*and*~~ *Chapter 22A* *<u>and quality control requirements of AISC 360, AISC 341 and AISC 358</u>*.

Exception: *Special inspection* of railing systems composed of structural steel elements shall be limited to welding inspection of welds at the base of cantilevered rail post.

AISC 360, Chapter N and AISC 341, Chapter J are adopted, except as noted below:

The following provisions of AISC 360, Chapter N are not adopted:

1. *N4., Item 2. (Quality Assurance Inspector Qualifications)*
2. *N5., Item 2. (Quality Assurance)*
3. ***[DSA-SS, DSA-SS/CC]*** *N5., Item 3. (Coordinated Inspection)*
4. ***[DSA-SS, DSA-SS/CC]*** *N5., Item 4. (Inspection of Welding)*
5. ***[DSA-SS, DSA-SS/CC]*** *N7 (Approved Fabricators and Erectors)*
6. ***[DSA-SS, DSA-SS/CC]*** *N8 (Nonconforming Material and Workmanship)*

In addition to the quality assurance inspection requirements contained in AISC 360, Section N5 ~~Item 6 (Inspection of High Strength Bolting)~~ (Minimum Requirements for Inspection of Structural Steel Buildings), the requirements of Table 1705A.2.1 of the California Building Code shall apply.

In addition to the quality assurance requirements contained in AISC 360, Section N6 (Minimum Requirements for Inspection of Composite Construction), the requirements of Table 1705A.2.1 of the California Building Code shall apply.

In addition to the quality assurance requirements contained in AISC 341, Chapter J, Section J5 (Inspection Tasks), the requirements of Section 1704A.3 and Table 1705A.2.1 of the California Building Code shall apply.

TABLE 1705A.2.1 REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	***CONTINUOUS***	***PERIODIC***	***REFERENCED STANDARD[a]***	***CBC REFERENCE***
1. Material verification of high-strength bolts, nuts and washers:				
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	-	*X*	*AISC 360, Section A3.3 and applicable ASTM material standards*	-
b. Manufacturer's certificate of compliance required.	-	*X*	-	-
2. Inspection of high-strength bolting:				

a. Snug-tight joints.	-	*X*	*AISC 360, Section M2.5*	-
b. Pretensioned and slip-critical joints using turn-of-nut with matchmarking, twist-off bolt or direct tension indicator methods of installation.	-	*X*		
c. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation.	*X*	-		
3. Material verification of structural steel and cold-formed steel deck:				
a. For structural steel, identification markings to conform to AISC 360.	-	*X*	*AISC 360, Section A3.1*	*2203A.1*
b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents.	-	*X*	*Applicable ASTM material standards*	
c. Manufacturer's certified test reports.	-	*X*		
4. Material verification of weld filler materials:				
a. Identification markings to conform to AWS specification in the approved construction documents.	-	*X*	*AISC 360, Section A3.5 and applicable AWS A5 documents*	-
b. Manufacturer's certificate of compliance required.	-	*X*	-	-
5. Inspection of welding:				
a. Structural steel and cold-formed steel deck:				
1) Complete and partial joint penetration groove welds.	*X*	-	*AWS D1.1* <u>*AWS D1.8*</u>	*1705A.2.1*
2) Multipass fillet welds.	*X*	-		
3) Single-pass fillet welds > $^{5}/_{16}$"	*X*	-		
4) Plug and slot welds.	*X*	-		
5) Single-pass fillet welds ≤ $^{5}/_{16}$"	-	*X*		

6) Floor and roof deck welds.	*-*	*X*	*AWS D1.3*	

TABLE 1705A.2.1- continued

REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	***CONTINUOUS***	***PERIODIC***	***REFERENCED STANDARD[a]***	***CBC REFERENCE***
b. Reinforcing steel:				*-*
1) Verification of weldability of reinforcing steel other than ASTM A 706.	*-*	*X*	*AWS D1.4 ACI 318: Sections 26.6.4.1, 18.2.8, 25.5.7.4 ~~3.5.2~~*	
2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.	*X*	*-*		
3) Shear reinforcement.	*X*	*-*		
4) Other reinforcing steel.	*-*	*X*		
6. Inspection of steel frame joint details for compliance:				
a. Details such as bracing and stiffening.	*-*	*X*	*-*	*1705A.2.1 ~~1705A.2.2~~*
b. Member locations.	*-*	*X*		
c. Application of joint details at each connection.	*-*	*X*		

For SI: 1 inch = 25.4 mm.

a. Where applicable, see also Section ~~1705A.11~~ 1705A.12, Special inspection for seismic resistance

1705A.2.2 Cold-formed steel deck. *Special inspections* ~~and qualification of welding special inspectors~~ for cold formed steel floor and roof deck shall be in accordance with the quality assurance inspection requirements of SDI QA/QC.

Deck weld special inspection shall also satisfy requirements in Table 1705A.2.1 and Section 1705A.2.5.

...

1705A.2.3.1 ~~***1705A.2.2.3***~~ ***Steel joist and joist girder inspection.*** *Special inspection is required during the manufacture and welding of steel joists or joist girders. The approved agency* ~~*special inspector*~~ *shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. The approved agency* ~~*special inspector*~~ *shall place a distinguishing mark, and/or tag with this distinguishing mark, on each inspected joist or joist girder. This mark or tag shall remain on the joist or joist girder throughout the job site receiving and erection process.*

...

1705A.2.4.1 ~~***1705A.2.2.4***~~ ***Light-framed steel truss inspection.*** *The manufacture of cold-formed light framed steel trusses shall be continuously inspected by an approved agency* ~~*a qualified special inspector approved by the enforcement agency*~~*. The approved agency* ~~*special inspector*~~ *shall verify conformance of materials and manufacture with approved plans and specifications. The approved agency* ~~*special inspector*~~ *shall place a distinguishing mark, and/or tag with this distinguishing mark, on each inspected truss. This mark or tag shall remain on the truss throughout the job site receiving and erection process.*

1705A.2.5 ~~***1705A.2.2.5***~~ ***Inspection of structural welding.*** *Inspection of all shop and field welding operations shall be made by a qualified welding inspector approved by the enforcement agency. The minimum requirements for a qualified welding inspector shall be as those for an AWS Certified Welding Inspector (CWI), as defined in the provisions of the AWS QC1.* ~~*All welding inspectors shall be as approved by the enforcement agency*~~*.*

Exception: *(reserved for OSHPD)*

The welding inspector shall make a systematic daily record of all welds. In addition to other records, this record shall include:

1. *Identification marks of welders.*

2. List of defective welds.

3. Manner of correction of defects.

The welding inspector shall check the material, details of construction and procedure, as well as workmanship of the welds. The inspector shall verify that the installation of end-welded stud shear connectors is in accordance with the requirements of AWS D1.1 and the approved plans and specifications. The ~~inspector~~ approved agency shall furnish the architect, structural engineer, and the enforcement agency with a verified report, that the welding ~~is proper and~~ has been done in conformance ~~conformity~~ with AWS D1.1, D1.3, D1.8, and the approved construction documents.

1705A.3 Concrete construction. *Special inspections* and tests of concrete construction shall be performed in accordance with this section and Table 1705*A*.3.

Exception: *Special inspections and tests* shall not be required for~~:~~

~~1. Isolated spread concrete footings of buildings three stories or less above *grade plane* that are fully supported on earth or rock.~~

~~2. Continuous concrete footings supporting walls of buildings three stories or less above *grade plane* that are fully supported on earth or rock where:~~

~~2.1. The footings support walls of light-frame construction;~~

~~2.2. The footings are designed in accordance with Table 1809.7; or~~

~~2.3. The structural design of the footing is based on a specified compressive strength, f'_c, no greater than 2,500 pounds per square inch (psi) (17.2 MPa), regardless of the compressive strength specified in the approved *construction documents* or used in the footing construction.~~

~~3. Nonstructural concrete slabs supported directly on the ground, including prestressed slabs on grade, where the effective prestress in the concrete is less than 150 psi (1.03 MPa).~~

~~4. Concrete foundation walls constructed in accordance with Table 1807.1.6.2.~~

~~5. C~~ concrete patios, driveways and sidewalks, on grade.

...

1705A.3.3 ***~~1705A.3.2~~*** ***Batch plant inspection.*** *Except as provided under this ~~S~~ section ~~1705A.3.3~~, the quality and quantity of materials used in transit-mixed concrete and in batched aggregates shall be*

continuously inspected by an approved agency ~~special inspector~~ at the location where materials are measured.

1705A.3.3.1 ***~~1705A.3.3~~*** ***Waiver of continuous batch plant inspection.*** *Continuous batch plant inspection may be waived by the registered design professional, subject to approval by the enforcement agency under either of the following conditions:*

1. *The concrete plant complies fully with the requirements of ASTM C 94, Sections 9 ~~8~~ and 10 ~~9~~, and has a current certificate from the National Ready Mixed Concrete Association or another agency acceptable to the enforcement agency. The certification shall indicate that the plant has automatic batching and recording capabilities.*

2. *For single-story light-framed construction (without basement or retaining wall higher than 6' in height measured from bottom of footing to top of wall) ~~buildings~~ and isolated foundations supporting equipment only, where deep foundation elements are not used.~~, where the specified compressive strength f'c of the concrete delivered to the jobsite is 3,500 psi (24.13 MPa) and where the f'c used in design is not greater than 3,000 psi (20.68 MPa)~~.*

When continuous batch plant inspection is waived, the following ~~periodic inspection~~ requirements shall apply and shall be described in the construction documents:

1. *~~Qualified technician of the~~ An approved agency ~~testing laboratory~~ shall check the first batch at the start of the day to verify materials and proportions conform to the approved mix design.*

2. *A ~~L~~ licensed weighmaster shall ~~to~~ positively identify quantity of materials ~~as to quantity~~ and certify ~~to~~ each load by a batch ticket.*

3. *Batch tickets, including material quantities and weights shall accompany the load, shall be transmitted to the inspector of record by ~~a~~ the truck driver with load identified thereon. The load shall not be placed without a batch ticket identifying the mix. The inspector of record shall ~~will~~ keep a daily record of placements, identifying each truck, its load, and time of receipt at the jobsite, and approximate location of deposit in the structure and shall maintain ~~will transmit~~ a copy of the daily record as required by ~~to~~ the enforcement agency.*

1705A.3.3.2 Batch plant inspection not required. [DSA-SS, DSA-SS/CC] *Batch plant inspection is not required for any of the following conditions, provided they are identified on the approved construction documents and the licensed weighmaster and batch ticket requirements of Section 1705A.3.3.1 are implemented:*

1. *Site flatwork*
2. *Unenclosed site structures, including but not limited to lunch or car shelters, bleachers, solar structures, flag or light poles, or retaining walls.*
3. *Controlled low-strength material backfill*
4. *Single-story relocatable buildings less than 2,160 square feet.*

1705A.3.4 Inspection of prestressed concrete.

1. *In addition to the general inspection required for concrete work, all plant fabrication of prestressed concrete members or tensioning of posttensioned members constructed at the site shall be continuously inspected by an inspector specially approved for this purpose by the enforcement agency.*

2. *The prestressed concrete plant fabrication inspector shall check the materials, equipment, tensioning procedure and construction of the prestressed members and prepare daily written reports. The ~~inspector~~ approved agency shall make a verified report identifying the members by mark and shall include such pertinent data as lot numbers of tendons used, tendon jacking forces, age and strength of concrete at time of tendon release and such other information that may be required.*

3. *The inspector of prestressed members posttensioned at the site shall check the condition of the prestressing tendons, anchorage assemblies and concrete in the area of the anchorage, the tensioning equipment and the tensioning procedure and prepare daily written reports. The ~~inspector~~ approved agency shall make a verified report of the prestressing operation identifying the members or tendons by mark and including such pertinent data as the initial cable slack, net elongation of tendons, jacking force developed, and such other information as may be required.*

4. *The verified reports of construction shall show that of the inspector's own personal knowledge, the work covered by the report has been performed and materials used and installed in every material respect in compliance with the duly approved plans and specifications for plant fabrication inspection. The verified report shall be accompanied by test reports required for materials used. For*

site posttensioning inspections the verified report shall be accompanied by copies of calibration charts, certified by an approved testing laboratory, showing the relationship between gage readings and force applied by the jacks used in the prestressing procedure.

1705A.3.5 Concrete pre-placement inspection. *Concrete shall not be placed until the forms and reinforcement have been inspected, all preparations for the placement have been completed, and the preparations have been checked by the inspector of Record.*

1705A.3.6 Placing record*. A record shall be kept on the site of the time and date of placing the concrete in each portion of the structure. Such record shall be kept until the completion of the structure and shall be open to the inspection of the enforcement agency.*

TABLE 1705*A*.3
REQUIRED SPECIAL INSPECTION AND TESTS OF CONCRETE CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTIO	REFERENCE STANDARS	CBC REFERENCE
...				
4. Inspect anchors post installed in hardened concrete members. [b,c] a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads. b. Mechanical anchors and adhesive anchors not defined in 4.a. ...	X	X	ACI 318: 17.8.2.4 ACI 318: 17.8.2	
...				
...				
~~13. Inspection of adhesive anchors in horizontal and upwardly inclined positions.~~ [~~e~~]		~~X~~	~~ACI318: D.9.2.2~~	—

...

c. Installation of all adhesive anchors in horizontal and upwardly inclined positions shall be performed by an ACI/CRSI Certified Adhesive Anchor Installer, except where the factored design tension on the anchors is less than 100 lbs and those anchors are clearly noted on the approved construction documents or where the anchors are shear dowels across cold joints in slabs on grade where the slab is not part of the lateral force resisting system.

1705A.4 Masonry construction. *Special inspections* and tests of masonry construction shall be performed in accordance with the quality assurance program requirements of TMS 402/ACI 530/ASCE 5, *as set forth in Table 3.1.3 Level C requirements,* and TMS 602/ACI 530.1/ASCE 6. ~~*, as set forth in Table 1.19.3 Level C* requirements.~~ *Special* ~~I~~ *inspection and testing of post-installed anchors in masonry shall be required in accordance with requirements for concrete in Chapters 17A and 19A.*

~~**Exception:** *Special inspections and tests* shall not be required for:~~

~~1. Empirically designed masonry, glass unit masonry or masonry veneer designed in accordance with Section 2109, 2110 or Chapter 14, respectively, where they are part of structures classified as *Risk Category* I, II or III.~~
~~2. Masonry foundation walls constructed in accordance with Table 1807.1.6.3(1), 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4).~~
~~3. Masonry fireplaces, masonry heaters or masonry chimneys installed or constructed in accordance with Section 2111, 2112 or 2113, respectively.~~

1705*A*.4.1 ~~Empirically designed masonry, g~~ Glass unit masonry and masonry veneer in Risk ~~Category~~ *Categories II, III or* IV. *Special inspections* and tests for ~~empirically designed masonry,~~ glass unit masonry or masonry veneer designed by Section ~~2109,~~ 2110*A* or Chapter 14, respectively, in structures classified as *Risk* ~~*Category*~~ *Categories II, III or* IV, shall be performed in accordance with TMS 402/ACI 530/ASCE 5 Level B Quality Assurance.

...

1705*A*.5 Wood construction. *Special inspections* of prefabricated wood structural elements and assemblies shall be in accordance with Section 1704*A*.2.5 *except as modified in this section*. *Special inspections* of site-built assemblies shall be in accordance with this section.

...

1705A.5.3 Wood structural elements and assemblies. *Special inspection of wood structural elements and assemblies is required, as specified in this section, to ensure conformance with ~~drawings and specifications~~ construction documents, and applicable standards.*

The approved agency ~~special inspector~~ shall furnish a verified report to the design professional in general responsible charge of construction observation, the structural engineer, and the enforcement agency, in accordance with the California Administrative code and this chapter. The verified report shall list all inspected members or trusses, and shall indicate whether or not the inspected members or trusses conform with applicable standards and the approved drawings and specifications. Any non-conforming items shall be indicated on the verified report.

1705A.5.4 Structural glued laminated timber. *Manufacture of all structural glued laminated timber shall be continuously inspected by an approved agency ~~a qualified special inspector approved by the enforcement agency~~.*

The approved agency ~~special inspector~~ shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. Each inspected member shall be stamped by the approved agency ~~special inspector~~ with an identification mark.

> ***Exception****: Special Inspection is not required for non-custom members of 5-1/8 inch maximum width and 18 inch maximum depth, and with a maximum clear span of 32 feet, manufactured and marked in accordance with ANSI/AITC A 190.1 Section 6.1.1 for non-custom members.*

1705A.5.5 Manufactured open web trusses. *The manufacture of open web trusses shall be continuously inspected by an approved agency ~~a qualified special inspector approved by the enforcement agency~~.*

The approved agency ~~special inspector~~ shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. Each inspected truss shall be stamped with an identification mark by the ~~special inspector~~ approved agency.

1705A.5.6 Timber connectors. *The installation of all split ring and shear plate timber connectors, and timber rivets shall be continuously inspected by an approved agency ~~a qualified inspector approved by the enforcement agency~~. The approved agency ~~inspector~~ shall furnish the architect, structural engineer*

and the enforcement agency with a report verifying ~~duly verified by him~~ that the materials, timber connectors and workmanship conform to the approved ~~plans and specifications~~ construction documents.

...

1705A.6.1 Soil fill. *All fills used to support the foundations of any building or structure shall be continuously inspected by the geotechnical engineer or his or her qualified representative. It shall be the responsibility of the geotechnical engineer to verify that fills meet the requirements of the approved construction documents and to coordinate all fill inspection and testing during the construction involving such fills.*

The duties of the geotechnical engineer or his or her qualified representative shall include, but need not be limited to, the inspection of cleared areas and benches prepared to receive fill; inspection of the removal of all unsuitable soils and other materials; the approval of soils to be used as fill material; the inspection of placement and compaction of fill materials; the testing of the completed fills; the inspection or review of geotechnical drainage devices, buttress fills or other similar protective measures in accordance with the approved construction documents.

A verified report shall be submitted by the geotechnical engineer as required by the California Administrative Code. The report shall indicate that all tests and inspection required by the approved construction documents were completed and that the tested materials and/or inspected work meet the requirements of the approved construction documents.

...

1705*A*.7.1 *Driven deep foundations observation.* *The installation of driven deep foundations shall be continuously inspected by a qualified representative of the geotechnical engineer responsible for that portion of the project.*

The representative of the geotechnical engineer shall make a report of the deep foundation pile-driving operation giving such pertinent data as the physical characteristics of the deep foundation pile-driving equipment, identifying marks for each deep foundation pile, the total depth of embedment for each deep foundation; and when the allowable deep foundation pile loads are determined by a dynamic load formula, the design formula used, and the permanent

penetration under the last 10 blows. One copy of the report shall be sent to the enforcement agency.

...

1705*A*.11.1 Structural wood. Continuous special inspection is required during field gluing operations of elements of the main windforce-resisting system. Periodic special inspection is required for nailing, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.

~~**Exception:** *Special inspections are* not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other components of the main windforce-resisting system, where the fastener spacing of the sheathing is more than 4 inches (102 mm) on center.~~

1705*A*.11.2 Cold-formed steel light-frame construction. Periodic special inspection is required for welding operations of elements of the main windforce-resisting system. Periodic special inspection is required for screw attachment, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

~~**Exception:** *Special inspections are* not required for cold formed steel light-frame shear walls and diaphragms, including screwing, bolting, anchoring and other fastening to components of the windforce resisting system, where either of the following apply:~~

~~1. The sheathing is gypsum board or fiberboard.~~
~~2. The sheathing is wood structural panel or steel sheets on only one side of the shear wall, shear panel or diaphragm assembly and the fastener spacing of the sheathing is more than 4 inches (102 mm) on center (o.c.).~~

...

1705*A*.12 Special inspections for seismic resistance. *Special inspections* for seismic resistance shall be required as specified in Sections 1705*A*.12.1 through 1705*A*.12.9, unless exempted by the exceptions of Section 1704*A*.2.

~~**Exception:** The special inspections specified in Sections 1705.12.1 through 1705.12.9 are not required for structures designed and constructed in accordance with one of the following:~~

~~1. The structure consists of light-frame construction; the design spectral response acceleration at short periods, S_{DS}, as determined in Section 1613.3.4, does not exceed 0.5; and the building height of the structure does not exceed 35 feet (10 668 mm).~~

~~2. The seismic force-resisting system of the structure consists of reinforced masonry or reinforced concrete; the design spectral response acceleration at short periods, S_{DS}, as determined in Section 1613.3.4, does not exceed 0.5; and the building height of the structure does not exceed 25 feet (7620 mm).~~

~~3. The structure is a detached one- or two-family dwelling not exceeding two *stories above grade plane* and does not have any of the following horizontal or vertical irregularities in accordance with Section 12.3 of ASCE 7:~~

~~3.1. Torsional or extreme torsional irregularity.~~

~~3.2. Nonparallel systems irregularity.~~

~~3.3. Stiffness-soft story or stiffness-extreme soft story irregularity.~~

~~3.4. Discontinuity in lateral strength-weak story irregularity.~~

1705A.12.1 Structural steel. *Special inspections* for structural steel shall be in accordance with Section 1705A.12.1.1 or 1705A.12.1.2, as applicable.

1705A.12.1.1 Seismic Force-Resisting Systems. *Special inspections* of structural steel in the seismic force resisting systems of buildings and structures assigned to *Seismic Design Category* ~~B, C,~~ D, E or F shall be performed in accordance with quality assurance requirements of AISC 341 *as modified by Section 1705A.2.1 of this code*.

~~**Exception:** *Special inspections* the seismic force-resisting systems of buildings and structures assigned to *Seismic Design Category* B or C that are not specifically detailed for seismic resistance, with a response modification coefficient, *R*, of 3 or less, excluding cantilever column systems.~~

1705A.12.1.2 Structural Steel Elements. *Special inspections* of *structural steel elements* in the seismic force resisting systems of buildings and structures assigned to *Seismic Design Category* ~~B,~~

~~C,~~ D, E or F, other than those covered in Section 1705*A*.12.1.1, including struts, collectors, chords, and foundation elements, shall be performed in accordance with quality assurance requirements of AISC 341 *as modified by Section 1705A.2.1 of this code*.

~~**Exception:** *Special inspections* of *structural steel element* are not required in the seismic force-resisting systems of buildings and structures assigned to *Seismic Design Category* B or C with a response modification coefficient, *R*, of 3 or less.~~

1705*A*.12.2 Structural wood. For the seismic force-resisting system of structures assigned to *Seismic Design Category* ~~C,~~ D, E or F:

...

~~**Exception:** *Special inspections* are not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other elements of the seismic force-resisting system, where the fastener spacing of the sheathing is more than 4 inches (102 mm) on center.~~

1705*A*.12.3 Cold-formed steel light-frame construction. For the seismic force-resisting system of structures assigned to *Seismic Design Category* ~~C,~~ D, E or F, periodic special inspection shall be required:

...

~~**Exception:** *Special inspections* are not required for cold formed steel light-frame shear walls and diaphragms, including screw installation, bolting, anchoring and other fastening to components of the seismic force-resisting system, where either of the following applies:~~

~~1. The sheathing is gypsum board or fiberboard.~~
~~2. The sheathing is wood structural panel or steel sheets on only one side of the shear wall, shear panel or diaphragm assembly and the fastener spacing of the sheathing is more than 4 inches (102 mm) on center.~~

...

1705*A*.12.4 *Special Inspection for Special Seismic Certification.* ~~**Designated seismic systems.**~~ For structures assigned to *Seismic Design Category* ~~C,~~ D, E or F, the special inspector shall examine *equipment and components* ~~designated seismic systems~~ requiring *special* seismic *certification* ~~qualification~~ in accordance with *Section* *1705A.13.3 or* ASCE 7 Section 13.2.2 and verify that the *label*, anchorage and mounting conforms to the *certificate of compliance*.

1705A.12.5 Architectural components. *Periodic special inspection* is required for the erection and fastening of exterior cladding, interior and exterior nonbearing walls*, ceilings*, and interior and exterior veneer in structures assigned to *Seismic Design Category* D, E or F.

~~**Exceptions:** *Periodic special inspection* is not required for the following:~~

~~1. Exterior cladding, interior and exterior nonbearing walls and interior and exterior veneer 30 feet (9144 mm) or less in height above grade or walking surface.~~

~~2. *E*xterior cladding and interior and exterior veneer weighing 5 psf (24.5 N/m^2) or less.~~

~~3. Interior nonbearing walls weighing 15 psf (73.5 N/m^2) or less.~~

…

1705*A*.12.6 Plumbing, mechanical and electrical components. *Periodic special inspection* of plumbing, mechanical and electrical components shall be required for the following:

1. Anchorage of electrical equipment for emergency or standby power systems in structures assigned to *Seismic Design Category* ~~C,~~ D, E or F.
2. Anchorage of other electrical equipment in structures assigned to *Seismic Design Category D,* E or F.
3. Installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units in structures assigned to *Seismic Design Category* ~~C,~~ D, E or F.
4. Installation and anchorage of ductwork designed to carry hazardous materials in structures assigned to *Seismic Design Category* ~~C,~~ D, E or F.
5. Installation and anchorage of vibration isolation systems in structures assigned to *Seismic Design Category* ~~C,~~ D, E or F where the approved *construction documents* require a nominal clearance of 1/4 inch (6.4 mm) or less between the equipment support frame and restraint.

…

1705A.12.8 Seismic isolation *and damping* systems. Periodic special inspection shall be provided for seismic isolation *and damping* systems in ~~seismically isolated~~ structures assigned to Seismic Design Category ~~B, C~~, D, E or F during the fabrication and installation of isolator units and energy dissipation devices*. Continuous special inspection is required for prototype and production testing of isolator units and damping devices.*

~~***1705.12.9 Cold-formed steel special bolted moment frames.*** *Periodic special inspection shall be provided for the installation of cold-formed steel special bolted moment frames in the seismic force-resisting systems of structures assigned to Seismic Design Category D, E or F.*~~

1705*A*.13 Testing for seismic resistance. Testing for seismic resistance shall be required as specified in Sections 1705*A*.13.1.1 through 1705*A*.13.4, unless exempted from special inspections by exception~~s~~ of Section 1704*A*.2.

1705A.13.1 Structural Steel. Nondestructive testing for seismic resistance shall be in accordance with Section 1705*A*.13.1.1 or 1705*A*.13.1.2, as applicable.

1705A.13.1.1 Seismic Force-Resisting Systems. Nondestructive testing of structural steel in the seismic force resisting systems of buildings and structures assigned to Seismic Design Category ~~B, C,~~ D, E or F shall be performed in accordance with the quality assurance requirements of AISC 341.

~~**Exception:** Nondestructive testing is not required in the seismic force-resisting systems of buildings and structures assigned to *Seismic Design Category* B or C that are not specifically detailed for seismic resistance, with a response modification coefficient, *R*, of 3 or less, excluding cantilever column systems.~~

1705A.13.1.2 Structural Steel Elements. Nondestructive testing of *structural steel elements* in the seismic force resisting systems of buildings and structures assigned to *Seismic design Category* ~~B, C,~~ D, E or F, other than those covered in Section 1705*A*.13.1.1, including struts, collectors, chords, and foundation elements, shall be performed in accordance with quality assurance requirements of AISC 341.

~~**Exception:** Nondestructive testing of *structural steel element* is not required in the seismic force-resisting systems of buildings and structures assigned to *Seismic Design Category* B or C with a response modification coefficient, *R*, of 3 or less.~~

1705A.13.2 Nonstructural Components. For structures assigned to *Seismic design Category* ~~B, C,~~ D, E or F, where requirements of Section 13.2.1 of ASCE 7 for non-structural components, supports, or attachments are met by *manufacturer's certification* ~~seismic qualification~~ as specified in Item 2 therein, the *registered design professional* shall specify on the *approved construction documents* the requirements for seismic *certification* ~~qualification~~ by analysis~~,~~ *or* testing. ~~or experience data.~~ *Certificates of compliance* for the ~~seismic qualification~~ *manufacturer's certification* shall be submitted to the building official as specified in Section 1704*A*.5.

Seismic sway braces satisfying requirements of FM 1950 shall be deemed to satisfy the requirements of this Section. Component tests shall be supplemented by assembly tests, when required by the building official.

1705A.13.3 *Special Seismic Certification*. ~~**Designated Seismic System.**~~ For structures assigned to *Seismic design Category* ~~C,~~ D, E or F, ~~and with *designated seismic systems*~~ *equipment and components* that are subject to the requirements of Section 13.2.2 of ASCE 7 for *special seismic* certification, the *registered design professional* shall specify on the *approved construction documents* the requirements to be met by analysis~~,~~ *or* testing ~~or experience data~~ as specified therein. *Certificate of compliance* documenting that the requirements are met shall be submitted to the building official as specified in Section 1704*A*.5.

Active or energized equipment and components shall be certified exclusively on the basis of approved shake table testing in accordance with ICC-ES AC 156. Minimum of two equipment/components shall be tested for a product line with similar structural configuration. Where a range of products are tested, the two equipment/components shall be either the largest and a small unit, or approved alternative representative equipment/components.

> *Exception: When a single product (and not a product line with more than one product with variations) is certified and manufacturing process is ISO 9001 certified, one test shall be permitted.*

For a multi-component system, where active or energized components are certified by tests, connecting elements, attachments, and supports can be justified by supporting analysis.

1705A.13.3.1 ~~***1705A.12.4.1***~~ ***[Reserved for OSHPD]***

1705A.13.4 Seismic isolation *and damping* systems. Seismic isolation *and damping* systems in ~~seismically isolated~~ structures assigned to Seismic Design Category ~~B, C,~~ D, E or F shall be tested in accordance with Section 17.8 *and 18.9* of ASCE 7.

Prototype and production testing and associated acceptance criteria for isolator units and damping devices shall be subject to preapproval by the building official. Testing exemption for similar units shall require approval by the building official.

...

1705A.19 ~~***1705A.18***~~ ***Shotcrete.*** *All shotcrete work shall be continuously inspected during placing by an approved agency* ~~*inspector specially approved for that purpose by the enforcement agency*~~*. The special shotcrete inspector shall check the materials, placing equipment, details of construction and construction procedure. The* ~~*inspector*~~ *an approved agency shall furnish a verified report that of his or her own personal knowledge the work covered by the report has been performed and materials used and installed in every material respect in compliance with the duly approved plans and specifications.*

1705A.19.1 ~~***1705A.18.1***~~ ***Visual examination for structural soundness of in-place shotcrete.*** *Completed shotcrete work shall be checked visually for reinforcing bar embedment, voids, rock pockets, sand streaks and similar deficiencies by examining a minimum of three 3-inch (76 mm) cores taken from three areas chosen by the design engineer which represent the worst congestion of reinforcing bars occurring in the project. Extra reinforcing bars may be added to noncongested areas and cores may be taken from these areas. The cores shall be examined by the special inspector and a report submitted to the enforcement agency prior to final approval of the shotcrete.*

Exception: *Shotcrete work fully supported on earth, minor repairs, and when, in the opinion of the enforcement agency, no special hazard exists.*

...

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 18*A*

SOILS AND FOUNDATIONS

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter WITHOUT AMENDMENTS			
Adopt entire chapter as amended	**X**	**X**	
Adopt only those sections listed below			

(All existing California amendments that are not revised below shall continue without change)

SECTION 1801*A*

GENERAL

1801*A*.1 Scope. The provisions of this chapter shall apply to building and foundation systems.

~~*Refer to Appendix J, Grading, for requirements governing grading, excavation and earthwork construction, including fills and embankments.*~~

1801A.1.1 Application. *The scope of application of Chapter 18A is as follows:*

1. Structures regulated by the Division of the State Architect—Structural Safety, which include

those applications listed in Section 1.9.2.1 (DSA-SS), and 1.9.2.2 (DSA-SS/CC). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings

2. ***[Reserved for OSHPD]***

1801A.1.2 Amendments in this chapter. *DSA –SS & DSA –SS/CC adopt this chapter and all amendments.*

Exception: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. *Division of the State Architect-Structural Safety:*
   [DSA-SS] *For applications listed in Section 1.9.2.1.*
   [DSA-SS/CC] *For applications listed in Section 1.9.2.2.*

2. ***[Reserved for OSHPD]***

1801A.1.3 Reference to other chapters.

1801A.1.3.1 ***[DSA-SS/CC]*** *Where reference within this chapter is made to sections in Chapters 16A,19A, 21A, and 22A, ~~and 34A~~, the provisions in Chapters 16, 19, 21, and 22, ~~and 34~~ respectively shall apply instead.*

...

SECTION 1803*A*

GEOTECHNICAL INVESTIGATIONS

1803*A*.1 General. Geotechnical investigations shall be conducted in accordance with Section 1803*A*.2 and reported in accordance with Section ~~1803.6~~ *1803A.7*. ~~Where required by the *building official* or where geotechnical investigations involve in-situ testing, laboratory testing or engineering calculations, such investigations shall be conducted by a *registered design professional*.~~ *The classification and investigation of the soil shall be made under the responsible charge of a California registered geotechnical engineer. All recommendations contained in geotechnical and geohazard reports shall be subject to the approval of the enforcement agency. All reports shall be prepared and signed by a registered geotechnical engineer,*

certified engineering geologist, and a registered geophysicist, where applicable.

1803*A*.2 Investigations required. Geotechnical investigations shall be conducted in accordance with Sections 1803*A*.3 through ~~1803*A*.5~~ *1803A.6*.

Exceptions: ~~The *building official* shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.11.~~

1. *Geotechnical reports are not required for one-story, wood-frame and light-steel-frame buildings of Type II or Type V construction and 4,000 square feet (371 m^2) or less in floor area, not located within Earthquake Fault Zones or Seismic Hazard Zones as shown in the most recently published maps from the California Geological Survey (CGS) or in seismic hazard zones as defined in the Safety Element of the local General Plan. Allowable foundation and lateral soil pressure values may be determined from Table 1806A.2.*

2. *A previous report for a specific site may be resubmitted, provided that a reevaluation is made and the report is found to be currently appropriate.*

...

1803*A*.3 Basis of investigation. Soil classification shall be based on observation and any necessary tests of the materials disclosed by borings, test pits or other subsurface exploration made in appropriate locations. Additional studies shall be made as necessary to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on soil-bearing capacity, compressibility, liquefaction and expansiveness.

1803*A*.3.1 Scope of investigation. The scope of the geotechnical investigation including the number and types of borings or soundings, the equipment used to drill or sample, the in-situ testing equipment and the laboratory testing program shall be determined by a *registered design professional*.

There shall not be less than one boring or exploration shaft for each 5,000 square feet (465 m^2) of building area at the foundation level with a minimum of two provided for any one

building. A boring may be considered to reflect subsurface conditions relevant to more than one building, subject to the approval of the enforcement agency.

Borings shall be of sufficient size to permit visual examination of the soil in place or, in lieu thereof, cores shall be taken.

Borings shall be of sufficient depth and size to adequately characterize sub-surface conditions.

...

1803*A*.5.4 Ground-water table. A subsurface soil investigation shall be performed to determine whether the existing ground-water table is above or within 5 feet (1524 mm) below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation.

~~**Exception:** A subsurface soil investigation to determine the location of the ground-water table shall not be required where waterproofing is provided in accordance with Section 1805.~~

...

1803A.6. Geohazard Reports. *Geohazard reports shall be required for all proposed construction.*

Exceptions:

1. *Reports are not required for one-story, wood-frame and light-steel-frame buildings of Type II or Type V construction and 4,000 square feet (371m^2) or less in floor area, not located within Earthquake Fault Zones or Seismic Hazard Zones as shown in the most recently published maps from the California Geological Survey (CGS) or in seismic hazard zones as defined in the Safety Element of the local General Plan; nonstructural, associated structural or voluntary structural alterations, and incidental structural additions or alterations, and structural repairs for other than earthquake damage.*

2. *A previous report for a specific site may be resubmitted, provided that a reevaluation is made and the report is found to be currently appropriate.*

The purpose of the geohazard report shall be to identify geologic and seismic conditions that may require project mitigations. The reports shall contain data which provide an assessment of the nature of the site and potential for earthquake damage based on appropriate investigations of the regional and site geology, project foundation conditions and the potential seismic shaking at the site. The report shall be prepared by a California-certified engineering geologist in consultation with a California-registered geotechnical engineer.

The preparation of the geohazard report shall consider the most recent CGS Note 48: Checklist for the Review of Engineering Geology and Seismology Reports for California Public School, Hospitals, and Essential Services Buildings. In addition, the most recent version of CGS Special Publication 42, Fault Rupture Hazard Zones in California, shall be considered for project sites proposed within an Alquist-Priolo Earthquake Fault Zone. The most recent version of CGS Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California, shall be considered for project sites proposed within a Seismic Hazard Zone. All conclusions shall be ~~fully~~ supported by satisfactory data and analysis.

In addition to requirements in Sections 1803A.5.11 and 1803A.5.12, the report shall include, but shall not be limited to, the following:

1. *Site Geology.*

2. *Evaluation of the known active and potentially active faults, both regional and local.*

3. *Ground-motion parameters, as required by Sections 1613A, 1616A, & ASCE 7.*

The three Next Generation Attenuation (NGA) relations used for the 2008 USGS seismic hazards maps for Western United States (WUS) shall be utilized to determine the site-specific ground motion. When supported by data and analysis, other NGA (NGA West 1) relations, that were not used for the 2008 USGS maps, shall be permitted as additions or substitutions. No fewer than three NGA relations shall be utilized.

1803A.7 ~~**1803.6**~~ ***Geotechnical*** **Reporting.** Where geotechnical investigations are required, a written report of the investigations shall be submitted to the *building official* by the permit applicant at the time of *permit* application. *The geotechnical report shall provide completed evaluations of the foundation conditions of the site and the potential geologic/seismic hazards affecting the site. The geotechnical report shall include, but shall not be limited to, site-specific evaluations of design criteria related to the nature and extent of foundation materials, groundwater conditions, liquefaction potential, settlement potential and slope stability. The report shall contain the results of the analyses of problem areas identified in the geohazard report. The geotechnical report shall incorporate estimates of the characteristics of site ground motion provided in the geohazard report.* This geotechnical report shall include, but need not be limited to, the following information:

1. A plot showing the location of the soil investigations.
2. A complete record of the soil boring and penetration test logs and soil samples.
3. A record of the soil profile.
4. Elevation of the water table, if encountered. *Historic high ground water elevations shall be addressed in the report to adequately evaluate liquefaction and settlement potential.*
5. Recommendations for foundation type and design criteria, including but not limited to: bearing capacity of natural or compacted soil; provisions to mitigate the effects of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; and the effects of adjacent loads.
6. Expected total and differential settlement.
7. Deep foundation information in accordance with Section 1803*A*.5.5.
8. Special design and construction provisions for foundations of structures founded on expansive soils, as necessary.
9. Compacted fill material properties and testing in accordance with Section 1803*A*.5.8.
10. Controlled low-strength material properties and testing in accordance with Section 1803*A*.5.9.
11. *The report shall consider the effects of stepped footings addressed in Section 1809A.3.*
12. *The report shall consider the effects of seismic hazards in accordance with Section 1803A.6 and shall incorporate the findings of the associated geohazard report.*

...

1803A.8 Geotechnical peer review. [DSA-SS and DSA-SS/CC] *When alternate foundations designs or ground improvements are employed or where slope stabilization is required, a qualified peer review by a California-licensed geotechnical engineer, in accordance with Section 322 of Part 10, Title 24,*

C.C.R. ~~Section 3422~~, may be required by the enforcement agency. In Section 322 of Part 10, Title 24, C.C.R. ~~Section 3422~~, where reference is made to structural or seismic-resisting system, it shall be replaced with geotechnical, foundation, or ground improvement, as appropriate.

...

SECTION 1805*A*
DAMPPROOFING AND WATERPROOFING

1805*A*.1 General. Walls or portions thereof that retain earth and enclose interior spaces and floors below grade shall be waterproofed and damp proofed in accordance with this section, with the exception of those spaces containing groups other than residential and institutional where such omission is not detrimental
to the building or occupancy.

Ventilation for crawl spaces shall comply with Section 1203.4.

...

1805A.2 Dampproofing. Where hydrostatic pressure will not occur as determined by Section 1803*A*.5.4, floors and walls ~~for other than wood foundation systems~~ shall be dampproofed in accordance with this section. ~~Wood foundation systems shall be constructed in accordance with AF&PA PWF.~~

...

SECTION 1807*A*
FOUNDATION WALLS, RETAINING WALLS AND
EMBEDDED POSTS AND POLES

1807A.1 Foundation walls. Foundation walls shall be designed and constructed in accordance with Sections 1807*A*.1.1 through 1807*A*.1.6. Foundation walls shall be supported by foundations designed in accordance with Section 1808A.

1807*A*.1.1 Design lateral soil loads. Foundation walls shall be designed for the lateral soil loads ~~set~~

~~forth in Section 1610*A*.~~ *determined by a geotechnical investigation in accordance with Section 1803A.*

1807*A*.1.2 Unbalanced backfill height. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab on grade is provided and is in contact with the interior surface of the foundation wall, the unbalanced backfill height shall be permitted to be measured from the exterior finish ground level to the top of the interior concrete slab.

1807*A*.1.3 Rubble stone foundation walls. *Not permitted by DSA –SS, DSA –SS/CC.* ~~Foundation walls of rough or random rubble stone shall not be less than 16 inches (406 mm) thick. Rubble stone shall not be used for foundation walls of structures assigned to *Seismic Design Category* C, D, E or F.~~

1807*A*.1.4 Permanent wood foundation systems. *Not permitted by DSA –SS, DSA –SS/CC.* ~~Permanent wood foundation systems shall be designed and installed in accordance with AF&PAPWF. Lumber and plywood shall be treated in accordance with AWPA U1 (Commodity Specification A, Use Category 4B and Section 5.2) and shall be identified in accordance with Section 2303*A*.1.8.1.~~

1807*A*.1.5 Concrete and masonry foundation walls. Concrete and masonry foundation walls shall be designed in accordance with Chapter 19*A* or 21*A*, as applicable.

~~**Exception:** Concrete and masonry foundation walls shall be permitted to be designed and constructed in accordance with Section 1807.1.6.~~

~~**1807.1.6 Prescriptive design of concrete and masonry foundation walls.** Concrete and masonry foundation walls that are laterally supported at the top and bottom shall be permitted to be designed and constructed in accordance with this section.~~

~~**1807.1.6.1 Foundation wall thickness.** The thickness of prescriptively designed foundation walls shall not be less than the thickness of the wall supported, except that foundation walls of at least 8-inch (203 mm) nominal width shall be permitted to support brick-veneered frame walls and 10-inch-wide (254 mm) cavity walls provided the requirements of Section 1807.1.6.2 or 1807.1.6.3 are met.~~

~~**1807.1.6.2 Concrete foundation walls**. Concrete foundation walls shall comply with the following:~~

~~1. The thickness shall comply with the requirements of Table 1807.1.6.2.~~

~~2. The size and spacing of vertical reinforcement shown in Table 1807.1.6.2 are based on the use of reinforcement with a minimum yield strength of 60,000 psi (414 Mpa). Vertical reinforcement with a minimum yield strength of 40,000 psi (276 Mpa) or 50,000 psi (345 Mpa) shall be permitted, provided the same size bar is used and the spacing shown in the table is reduced by multiplying the spacing by 0.67 or 0.83, respectively.~~

~~**TABLE 1807.1.6.2**~~

~~**CONCRETE FOUNDATION WALLS**[b, c]~~

~~(Deleted Table not shown for clarity)~~

~~3. Vertical reinforcement, when required, shall be placed nearest the inside face of the wall a distance, *d*, from the outside face (soil face) of the wall. The distance, *d*, is equal to the wall thickness,*t*, minus 1.25 inches (32 mm) plus one-half the bar diameter, *db*, [$d = t - (1.25 + db / 2)$]. The reinforcement shall be placed within a tolerance of ± 3/8 inch (9.5 mm) where *d* is less than or equal to 8 inches (203 mm)or ± 1/2 inch (12.7 mm)where *d* is greater than 8 inches (203 mm).~~

~~4. In lieu of the reinforcement shown in Table 1807.1.6.2, smaller reinforcing bar sizes with closer spacings that provide an equivalent cross-sectional area of reinforcement per unit length shall be permitted.~~

~~5. Concrete cover for reinforcement measured from the inside face of the wall shall not be less than ¾ inch (19.1 mm). Concrete cover for reinforcement measured from the outside face of the wall shall not be less than 11/2 inches (38 mm) for No. 5 bars and smaller, and not less than 2 inches (51 mm) for larger bars.~~

~~6. Concrete shall have a specified compressive strength, *fc'*, of not less than 2,500 psi (17.2 MPa).~~

~~7. The unfactored axial load per linear foot of wall shall not exceed 1.2 *t fc'* where *t* is the specified wall thickness in inches.~~

~~**1807.1.6.2.1 Seismic requirements.** Based on the *seismic design category* assigned to the~~

~~structure in accordance with Section 1613, concrete foundation walls designed using Table 1905.1.7 shall be subject to the following limitations:~~

~~1. *Seismic Design Categories* A and B. No additional seismic requirements, except provide reinforcement around openings in accordance with Section 1909.6.3.~~

~~2. *Seismic Design Categories* C, D, E and F. Tables shall not be used except as allowed for plain concrete members in Section 1908.1.8.~~

~~**1807.1.6.3 Masonry foundation walls**. Masonry foundation walls shall comply with the following:~~

~~1. The thickness shall comply with the requirements of Table 1807.1.6.3(1) for plain masonry walls or Table 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4) for masonry walls with reinforcement.~~

~~2. Vertical reinforcement shall have a minimum yield strength of 60,000 psi (414 Mpa).~~

~~3. The specified location of the reinforcement shall equal or exceed the effective depth distance, *d*, noted in Tables 1807.1.6.3(2), 1807.1.6.3(3) and 1807.1.6.3(4) and shall be measured from the face of the exterior (soil) side of the wall to the center of the vertical reinforcement. The reinforcement shall be placed within the tolerances specified in TMS 602/ACI 530.1/ASCE 6, Article 3.3.B.11 of the specified location.~~

~~**TABLE 1807.1.6.3(1)**~~

~~**PLAIN MASONRY FOUNDATION WALLS**[a,b,c]~~

~~(Deleted Table not shown for clarity)~~

~~4. Grout shall comply with Section 2103.12.~~

~~5. Concrete masonry units shall comply with ASTM C 90.~~

~~6. Clay masonry units shall comply with ASTM C 652 for hollow brick, except compliance with ASTM C 62 or ASTM C 216 shall be permitted where solid masonry units are installed in accordance with Table 1807.1.6.3(1) for plain masonry.~~

~~7. Masonry units shall be laid in running bond and installed with Type M or S mortar in accordance with Section 2103.2.1.~~

~~8. The unfactored axial load per linear foot of wall shall not exceed 1.2 $t\,f'_m$ where t is the specified wall thickness in inches and f'_m is the specified compressive strength of masonry in~~

~~pounds per square inch.~~

~~9. At least 4 inches (102 mm) of solid masonry shall be provided at girder supports at the top of hollow masonry unit foundation walls.~~

~~10. Corbeling of masonry shall be in accordance with Section 2104.2. Where an 8-inch (203 mm) wall is corbeled, the top corbel shall not extend~~

~~TABLE 1807.1.6.3(2)~~

~~8-INCH MASONRY FOUNDATION WALLS WITH REINFORCEMENT WHERE d _ 5 INCHES~~[a,b,c]

~~(Deleted Table not shown for clarity)~~

~~higher than the bottom of the floor framing and shall be a full course of headers at least 6 inches (152 mm) in length or the top course bed joint shall be tied to the vertical wall projection. The tie shall be W2.8 (4.8 mm) and spaced at a maximum horizontal distance of 36 inches (914 mm). The hollow space behind the corbelled masonry shall be filled with mortar or grout.~~

~~1807.1.6.3.1 Alternative foundation wall reinforcement.~~ ~~In lieu of the reinforcement provisions for masonry foundation walls in Table 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4), alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per linear foot (mm) of wall shall be permitted to be used, provided the spacing of reinforcement does not exceed 72 inches (1829 mm) and reinforcing bar sizes do not exceed No. 11.~~

~~1807.1.6.3.2 Seismic requirements.~~ ~~Based on the *seismic design category* assigned to the structure in accordance with Section 1613, masonry foundation walls designed using Tables 1807.1.6.3(1) through 1807.1.6.3(4) shall be subject to the following limitations:~~

~~1. *Seismic Design Categories* A and B. No additional seismic requirements.~~

~~2. *Seismic Design Category C*. A design using Tables 1807.1.6.3(1) through 1807.1.6.3(4) is~~

~~TABLE 1807.1.6.3(3)~~

~~10-INCH MASONRY FOUNDATION WALLS WITH REINFORCEMENT WHERE d _ 6.75 INCHES~~ [a, b, c]

~~(Deleted Table not shown for clarity)~~

~~subject to the seismic requirements of Section 7.4.3 of TMS 402/ACI 530/ASCE 5.~~

~~3. *Seismic Design Category* D. A design using Tables 1807.1.6.3(2) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.4 of TMS 402/ACI 530/ASCE 5.~~

~~4. *Seismic Design Categories* E and F. A design using Tables 1807.1.6.3(2) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.5 of TMS 402/ACI 530/ASCE 5.~~

~~**TABLE 1807.1.6.3(4)**~~

~~**12-INCH MASONRY FOUNDATION WALLS WITH REINFORCEMENT WHERE d _ 8.75 INCHES**[a,b,c]~~

~~(Deleted Table not shown for clarity)~~

1807*A*.2 Retaining walls. Retaining walls shall be designed in accordance with Sections 1807*A*.2.1 through 1807*A*.2.3. *Freestanding cantilever walls shall be design in accordance with Section 1807A.2.4.*

1807*A*.2.1 General. Retaining walls shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Where a keyway is extended below the wall base with the intent to engage passive pressure and enhance sliding stability, lateral soil pressures on both sides of the keyway shall be considered in the sliding analysis.

1807*A*.2.2 Design lateral soil loads. Retaining walls shall be designed for the lateral soil loads ~~set forth in Section 1610.~~ *determined by a geotechnical investigation in accordance with Section 1803A and shall not be less than eighty percent of the lateral soil loads determined in accordance with Section 1610A. For use with the load combinations, lateral soil loads due to gravity loads surcharge shall be considered gravity loads and seismic earth pressure increases due to earthquake shall be considered as seismic loads.*

…

1807A.2.4 Freestanding Cantilever Walls. *A stability check against the possibility of overturning shall be performed for isolated spread footings which support freestanding cantilever walls. The stability check shall be made by dividing R_p used for the wall by 2.0. The allowable soil pressure may be doubled for this evaluation.*

Exception: *For overturning about the principal axis of rectangular footings with symmetrical vertical loading and the design lateral force applied, a triangular or trapezoidal soil pressure distribution which covers the full width of the footing will meet the stability requirement.*

...

SECTION 1808*A*
FOUNDATIONS

1808*A*.1 General. Foundations shall be designed and constructed in accordance with Sections 1808*A*.2 through 1808A.9. Shallow foundations shall also satisfy the requirements of Section 1809A. Deep foundations shall also satisfy the requirements of Section 1810*A*.

1808*A*.2 Design for capacity and settlement. Foundations shall be so designed that the allowable bearing capacity of the soil is not exceeded, and that differential settlement is minimized. Foundations in areas with expansive soils shall be designed in accordance with the provisions of Section 1808*A*.6.

The enforcing agency may require an analysis of foundation elements to determine subgrade deformations in order to evaluate their effect on the superstructure, including story drift.

...

1808*A*.8 Concrete foundations. The design, materials and construction of concrete foundations shall comply with Sections1808*A*.8.1 through 1808*A*.8.6 and the provisions of Chapter 19*A*.

~~Exception: Where concrete footings supporting walls of light-frame construction are designed in accordance with Table 1809.7, a specific design in accordance with Chapter 19 is not required.~~

...

TABLE 1808*A*.8.1

MINIMUM SPECIFIED COMPRESSIVE STRENGTH f'_c OF CONCRETE OR GROUT

FOUNDATION ELEMENT OR CONDITION	SPECIFIED COMPRESSIVE STRENGTH, f'_c
~~1. Foundations for structures assigned to Seismic Design Category A, B or C~~	~~2,500 psi~~
~~2a. Foundations for Group R or U occupancies of light-frame construction, two stories or less in height, assigned to Seismic Design Category D, E or F~~	~~2,500 psi~~
~~2b~~ *1.*Foundations for other structures assigned to Seismic Design Category D, E or F	3,000 psi
~~3~~ *2.* Precast nonprestressed driven piles	4,000 psi
~~4~~ *3.* Socketed drilled shafts	4,000 psi
~~5~~ *4.* Micropiles	4,000 psi
~~6~~ *5.* Precast prestressed driven piles	5,000 psi

For SI: 1 pound per square inch = 0.00689MPa.

...

1808*A*.8.6 Seismic requirements. See Section 1905*A* for additional requirements for foundations of structures assigned to *Seismic Design Category* ~~C,~~ D, E or F.

For structures assigned to *Seismic Design Category* D, E or F, provisions of Sections 18.13 of ACI 318 shall apply where not in conflict with the provisions of Sections 1808*A* through 1810*A*.

~~**Exceptions:**~~

~~1. Detached one- and two-family dwellings of light-frame construction and two stories or less above~~

~~*grade plane* are not required to comply with the provisions of Section 18.13 od ACI 318.~~

~~2. Section 18.13.4.3(a) of ACI 318 shall not apply.~~

...

SECTION 1809*A*

SHALLOW FOUNDATIONS

1809*A*.1 General. Shallow foundations shall be designed and constructed in accordance with Sections 1809*A*.2 through 1809*A*.13.

1809*A*.2 Supporting soils. Shallow foundations shall be built on undisturbed soil, compacted fill material or controlled low-strength material (CLSM). Compacted fill material shall be placed in accordance with Section 1804*A*.5. CLSM shall be placed in accordance with Section 1804*A*.6.

1809*A*.3 Stepped footings. The top surface of footings shall be level. The bottom surface of footings shall be permitted to have a slope not exceeding one unit vertical in 10 units horizontal (10-percent slope). Footings shall be stepped where it is necessary to change the elevation of the top surface of the footing or where the surface of the ground slopes more than one unit vertical in 10 units horizontal (10-percent slope).

Individual steps in continuous footings shall not exceed 18 inches (457 mm) in height and the slope of a series of such steps shall not exceed 1 unit vertical to 2 units horizontal (50% slope) unless otherwise recommended by a geotechnical report. The steps shall be detailed on the drawings. The local effects due to the discontinuity of the steps shall be considered in the design of the foundation.

...

1809*A*.7 Prescriptive footings for light-frame construction. *Not permitted by DSA-SS, DSA-SS/CC.* ~~Where a specific design is not provided, concrete or masonry-unit footings supporting walls of light-frame construction shall be permitted to be designed in accordance with Table 1809.7.~~

~~**TABLE 1809.7**~~

~~**PRESCRIPTIVE FOOTINGS SUPPORTING WALLS OFLIGHT-FRAME CONSTRUCTION**[a,b,c,d,e]~~

~~(Table not shown for clarity)~~

1809*A*.8 Plain concrete footings. *Not permitted by DSA-SS, DSA-SS/CC.* ~~The edge thickness of plain concrete footings supporting walls of other than light-frame construction shall not be less than 8 inches (203 mm) where placed on soil or rock.~~

~~**Exception:** For plain concrete footings supporting Group R-3 occupancies, the edge thickness is permitted to be 6 inches (152 mm), provided that the footing does not extend beyond a distance greater than the thickness of the footing on either side of the supported wall.~~

1809*A*.9 Masonry-unit footings. *Not permitted by DSA-SS, DSA-SS/CC.* ~~The design, materials and construction of masonry-unit footings shall comply with Sections 1809.9.1 and 1809.9.2, and the provisions of Chapter 21.~~

~~**Exception:** Where a specific design is not provided, masonry-unit footings supporting walls of light-frame construction shall be permitted to be designed in accordance with Table 1809.7.~~

~~**1809.9.1 Dimensions.** Mansonry-unit footings shall be laid in Type M or S mortar complying with Section 2103.8 and the depth shall not be less than twice the projection beyond the wall, pier or column. The width shall not be less than 8 inches (203 mm) wider than the wall supported thereon.~~

~~**1809.9.2 Offsets.** The maximum offset of each course in brick foundation walls stepped up from the footings shall be 11/2 inches (38 mm) where laid in single courses, and 3 inches (76 mm) where laid in double courses.~~

1809*A*.10 *Reserved.* ~~**Pier and curtain wall foundations.** Except in *Seismic Design Categories* D, E and F, pier and curtain wall foundations shall be permitted to be used to support light-frame construction not more than two *stories above grade plane*, provided the following requirements are met:~~

~~1. All load-bearing walls shall be placed on continuous concrete footings bonded integrally with the *exterior wall* footings.~~

~~2. The minimum actual thickness of a load-bearing masonry wall shall not be less than 4 inches (102 mm) nominal or 35/8 inches (92 mm) actual thickness, and shall be bonded integrally with piers spaced 6 feet (1829 mm) on center (o.c.).~~

~~3. Piers shall be constructed in accordance with Chapter 21 and the following:~~

~~3.1. The unsupported height of the masonry piers shall not exceed 10 times their least dimension.~~

~~3.2. Where structural clay tile or hollow concrete masonry units are used for piers supporting beams and girders, the cellular spaces shall be filled solidly with concrete or Type M or S mortar.~~

~~**Exception:** Unfilled hollow piers shall be permitted where the unsupported height of the pier is not more than four times its least dimension.~~

~~3.3. Hollow piers shall be capped with 4 inches (102 mm) of solid masonry or concrete or the cavities of the top course shall be filled with concrete or grout.~~

~~4. The maximum height of a 4-inch (102 mm) load-bearing masonry foundation wall supporting wood frame walls and floors shall not be more than 4 feet (1219 mm) in height.~~

~~5. The unbalanced fill for 4-inch (102 mm) foundation walls shall not exceed 24 inches (610 mm) for solid masonry, nor 12 inches (305 mm) for hollow masonry.~~

...

1809*A*.12 Timber footings. *Not permitted by DSA-SS, DSA-SS/CC.* ~~Timber footings shall be permitted for buildings of Type V construction and as otherwise *approved* by the *building official*. Such footings shall be treated in accordance with AWPA U1 (Commodity Specification A, Use Category 4B). Treated timbers are not required where placed entirely below permanent water level, or where used as capping for wood piles that project above the water level over submerged or marsh lands. The compressive stresses perpendicular to grain in untreated timber footings supported upon treated piles shall not exceed 70 percent of the allowable stresses for the species and grade of timber as specified in the AF&PA NDS.~~

...

1809A.14 Pipes and Trenches. *Unless otherwise recommended by the soils report, open or backfilled trenches parallel with a footing shall not be below a plane having a downward slope of 1 unit vertical to 2 units horizontal (50% slope) from a line 9 inches (229 mm) above the bottom edge of the footing, and not closer than 18 inches (457 mm) from the face of such footing.*

Where pipes cross under footings, the footings shall be specially designed. Pipe sleeves shall be

provided where pipes cross through footings or footing walls and sleeve clearances shall provide for possible footing settlement, but not less than 1 inch (25 mm) all around pipe.

> ***Exception:*** *Alternate trench locations and pipe clearances shall be permitted when approved by registered design professional in responsible charge and the enforcement agent.*

1809A.15 Grade beams: [DSA-SS, DSA-SS/CC] *For structures assigned to Seismic Design Category D, E or F, grade beams in shallow foundations shall comply with Section 1810A.3.12.*

SECTION 1810*A*
DEEP FOUNDATIONS

1810*A*.1 General. Deep foundations shall be analyzed, designed, detailed and installed in accordance with Sections 1810*A*.1 through 1810*A*.4.

…

> **1810*A*.3.1.5 Helical piles.** Helical piles shall be designed and manufactured in accordance with accepted engineering practice to resist all stresses induced by installation into the ground and service loads.
>
> > ***1810A.3.1.5.1 Helical Piles Seismic Requirements.*** *For structures assigned to Seismic Design Category D, E or F, capacities of helical piles shall be determined in accordance with Section 1810A.3.3 by at least two project specific pre-production tests for each soil profile, size and depth of helical pile. At least two percent of all production piles shall be proof tested to the load determined in accordance with Section 1616A.1.16.~~1615A.1.10.~~*
> >
> > *Helical piles shall satisfy corrosion resistance requirements of ICC-ES AC 358. In addition, all helical pile materials that are subject to corrosion shall include at least 1/16" corrosion allowance.*
> >
> > *Helical piles shall not be considered as carrying any horizontal loads.*

…

1810*A*.3.2 Materials. The materials used in deep foundation elements shall satisfy the requirements of Sections 1810*A*.3.2.1 through 1810*A*.3.2.8, as applicable.

...

~~**1810.3.2.1.2 ACI 318 Equation (25.8.3.3).** Where this chapter requires detailing of concrete deep foundation elements in accordance with Section 18.7.5.4 of ACI 318, compliance with Equation (25.8.3.3) of ACI 318 shall not be required.~~

...

1810*A*.3.2.4 Timber. *Not permitted by DSA-SS, DSASS/CC.* ~~Timber deep foundation elements shall be designed as piles or poles in accordance with AF&PA NDS. Round timber elements shall conform to ASTM D 25. Sawn timber elements shall conform to DOC PS-20.~~

~~**1810.3.2.4.1 Preservative treatment.** Timber deep foundation elements used to support permanent structures shall be treated in accordance with this section unless it is established that the tops of the untreated timber elements will be below the lowest ground-water level assumed to exist during the life of the structure. Preservative and minimum final retention shall be in accordance with AWPA U1 (Commodity Specification E, Use Category 4C) for round timber elements and AWPA U1 (Commodity Specification A, Use Category 4B) for sawn timber elements. Preservative-treated timber elements shall be subject to a quality control program administered by an *approved agency*. Element cutoffs shall be treated in accordance with AWPA M4.~~

...

1810A.3.3.1.2 Load tests. Where design compressive loads are greater than those determined using the allowable stresses specified in Section 1810A.3.2.6, where the design load for any deep foundation element is in doubt, *where driven deep foundation elements are installed by means other than a pile hammer,* or where cast-in-place deep foundation elements have an enlarged base formed either by compacting concrete or by driving a precast base, control test elements shall be tested in accordance with ASTM D 1143 *including Procedure G: Cyclic Loading Test* or ASTM D 4945. At least one element shall be load tested in each area of uniform subsoil conditions. Where required by the building official,

additional elements shall be load tested where necessary to establish the safe design capacity. The resulting allowable loads shall not be more than one-half of the ultimate axial load capacity of the test element as assessed by one of the published methods listed in Section 1810A.3.3.1.3 with consideration for the test type, duration and subsoil. The ultimate axial load capacity shall be determined by a registered design professional with consideration given to tolerable total and differential settlements at design load in accordance with Section 1810A.2.3. In subsequent installation of the balance of deep foundation elements, all elements shall be deemed to have a supporting capacity equal to that of the control element where such elements are of the same type, size and relative length as the test element; are installed using the same or comparable methods and equipment as the test element; are installed in similar subsoil conditions as the test element; and, for driven elements, where the rate of penetration (e.g., net displacement per blow) of such elements is equal to or less than that of the test element driven with the same hammer through a comparable driving distance, *or where the downward pressure and torque on such elements is greater than or equal to that applied to the test element that determined the ultimate axial load capacity at a comparable driving distance*.

...

1810A.3.3.1.5 Uplift capacity of a single deep foundation element. Where required by the design, the uplift capacity of a single deep foundation element shall be determined by an approved method of analysis based on a minimum factor of safety of three or by load tests conducted in accordance with ASTM D 3689. The maximum allowable uplift load shall not exceed the ultimate load capacity as determined in Section 1810A.3.3.1.2, using the results of load tests conducted in accordance with ASTM D3689 *including the Cyclic Loading Procedure*, divided by a factor of safety of two.

Exception: Where uplift is due to wind or seismic loading, the minimum factor of safety shall be two where capacity is determined by an analysis and one and a half where capacity is determined by load tests.

...

1810A.3.3.2 Allowable lateral load. Where required by the design, the lateral load capacity of a single deep foundation element or a group thereof shall be determined by an *approved* method of

analysis or by lateral load tests *in accordance with ASTM D3966, including the Cyclic Loading Procedure,* to at least twice the proposed design working load. The resulting allowable load shall not be more than one-half of the load that produces a gross lateral movement of 1 inch (25 mm) at the lower of the top of foundation element and the ground surface, unless it can be shown that the predicted lateral movement shall cause neither harmful distortion of, nor instability in, the structure, nor cause any element to be loaded beyond its capacity.

…

1810*A*.3.5.3.3 Structural Steel Sheet Piling. Individual sections of structural steel sheet piling shall conform to the profile indicated by the manufacturer, and shall conform to general requirements specified by ASTM A6.

Installation of sheet piling shall satisfy inspection, monitoring, and observation requirements in Sections 1812A.6 and 1812A.7.

…

1810*A*.3.8.3 Precast prestressed piles. Precast prestressed concrete piles shall comply with the requirements of Sections 1810*A*.3.8.3.1 through 1810*A*.3.8.3.3.

…

1810*A*.3.8.3.2 Seismic reinforcement in Seismic Design Category C. *Not permitted by DSA-SS, DSA-SS/CC.* ~~For structures assigned to *Seismic Design Category* C in accordance with Section 1613, precast prestressed piles shall have transverse reinforcement in accordance with this section. The volumetric ratio of spiral reinforcement shall not be less than the amount required by the following formula for the upper 20 feet (6096 mm) of the pile.~~

~~$\rho_s = 0.12 f'_c / f_{yh}$ **(Equation 18-5)**~~

~~where:~~

~~f'_c = Specified compressive strength of concrete, psi (MPa).~~

~~f_{yh} = Yield strength of spiral reinforcement ≤ 85,000 psi (586 MPa).~~

~~ρ_s = Spiral reinforcement index (vol. spiral/vol. core).~~

~~At least one-half the volumetric ratio required by Equation 18-5 shall be provided below the upper 20 feet (6096 mm) of the pile.~~

1810*A*.3.8.3.3 Seismic reinforcement in Seismic Design Categories D through F. For structures assigned to *Seismic Design Category* D, E or F, ~~*in accordance with Section 1613A,*~~ precast prestressed piles shall have transverse reinforcement in accordance with the following:

...

5. Where the transverse reinforcement consists of circular spirals, the volumetric ratio of spiral transverse reinforcement in the ductile region shall comply with the following:

...

~~This required amount of spiral reinforcement is permitted to be obtained by providing an inner and outer spiral.~~

...

1810*A*.3.9.4.2.1 Site Classes A through D. For Site Class A, B, C or D sites, transverse confinement reinforcement shall be provided in the element in accordance with Sections 18.7.5.2, 18.7.5.3 and 18.7.5.4 of ACI 318 within three times the least element dimension *at* ~~of~~ the bottom of the pile cap. A transverse spiral reinforcement ratio of not less than one-half of that required in Section 18.7.5.4 ~~(a)~~ of ACI 318 shall be permitted *for concrete deep foundation elements.*

1810*A*.3.9.4.2.2 Site Classes E and F. For Site Class E or F sites, transverse confinement reinforcement shall be provided in the element in accordance with Sections 18.7.5.2, 18.7.5.3 and 18.7.5.4 of ACI 318 within seven times the least element dimension *at* ~~of~~ the *bottom of the* pile cap and within seven times the least element dimension *at* ~~of~~ the interfaces of strata that are hard or stiff and strata that are liquefiable or are composed of soft- to medium-stiff clay.

...

1810*A*.3.10 Micropiles. Micropiles shall be designed and detailed in accordance with Sections 1810*A*.3.10.1 through 1810*A*.3.10.4.

…

~~**1810A.3.10.4 Seismic reinforcement.** For structures assigned to *Seismic Design Category* C, a permanent steel casing shall be provided from the top of the micropile down to the point of zero curvature. For structures assigned to *Seismic Design Category* D, E or F, the micropile shall be considered as an alternative system in accordance with Section 104.11. The alternative system design, supporting documentation and test data shall be submitted to the *building official* for review and approval.~~

1810A.3.10.4 Seismic requirements*. For structures assigned to Seismic Design Category D, E, or F, a permanent steel casing having a minimum thickness of 3/8" shall be provided from the top of the micropile down to a minimum of 120 percent of the point of zero curvature. Capacity of micropiles shall be determined in accordance with Section 1810A.3.3 by at least two project specific pre-production tests for each soil profile, size and depth of micropile. At least two percent of all production piles shall be proof tested to the load determined in accordance with Section 1616A.1.16.~~1615A.1.10.~~*

Steel casing length in soil shall be considered as unbonded and shall not be considered as contributing to friction. Casing shall provide confinement at least equivalent to hoop reinforcing required by ACI 318 Section 18.13.4. ~~*21.12.4*~~*.*

Reinforcement shall have Class 1 corrosion protection in accordance with PTI Recommendations for Prestressed Rock and Soil Anchors. Steel casing design shall include at least 1/16" corrosion allowance.

Micropiles shall not be considered as carrying any horizontal loads.

…

1810*A*.4 Installation. Deep foundations shall be installed in accordance with Section 1810*A*.4. Where a single deep foundation element comprises two or more sections of different materials or different types spliced together, each section shall satisfy the applicable conditions of installation.

1810*A*.4.1 Structural integrity. Deep foundation elements shall be installed in such a manner and sequence as to prevent distortion or damage that may adversely affect the structural integrity of adjacent structures or of foundation elements being installed or already in place and as to avoid compacting the surrounding soil to the extent that other foundation elements cannot be installed properly.

...

1810*A*.4.1.5 Defective timber piles. *Not permitted by DSA-SS, DSA-SS/CC.* ~~Any substantial sudden increase in rate of penetration of a timber pile shall be investigated for possible damage. If the sudden increase in rate of penetration cannot be correlated to soil strata, the pile shall be removed for inspection or rejected.~~

...

SECTION 1811A

PRESTRESSED ROCK AND SOIL FOUNDATION ANCHORS

1811A.1 General. *The requirements of this section address the use of vertical rock and soil anchors in resisting seismic or wind overturning forces resulting in tension on shallow foundations.*

1811A.2 Adoption. *Except for the modifications as set forth in Sections 1811A.3 and 1811A.4, all Prestressed Rock and Soil Foundation Anchors shall ~~be designed~~ comply with ~~in accordance with~~ PTI Recommendations for Prestressed Rock and Soil Anchors.*

1811A.3 Geotechnical Requirements*. Geotechnical report for the Prestressed Rock & Soil Foundation Anchors shall address the following:*

1. *Minimum diameter and minimum spacing for the anchors including consideration of group effects.*
2. *Maximum unbonded length and minimum bonded length of the tendon.*

3. *Maximum recommended anchor tension capacity based upon the soil or rock strength / grout bond and anchor depth / spacing.*

4. *Allowable bond stress at the ground / grout interface and applicable factor of safety for ultimate bond stress.*

5. *Anchor axial tension stiffness recommendations at the anticipated anchor axial tension displacements, when required for structural analysis.*

6. *Minimum grout pressure for installation and post-grout pressure.*

7. *Class I Corrosion Protection is required for all permanent anchors. Geotechnical report shall specify the corrosion protection recommendations for temporary anchors.*

8. *Performance test shall be at a minimum of 1.6 times the design loads. There shall be a minimum of two preproduction test anchors. Preproduction test anchors shall be tested to ultimate load or 0.80 times the specified minimum tensile strength of the tendon. A Creep test is required for all prestressed anchors with greater than 10 kips of lock-off prestressing load.*

9. *Lock-off prestressing load requirements.*

10. *Acceptable Drilling methods.*

11. *Geotechnical observation and monitoring requirements.*

1811A.4 Structural Requirements*.*

1. *Tendons shall be thread-bar anchors conforming to ASTM A722.*

2. *The anchors shall be placed vertical.*

3. *Design Loads shall be based upon the load combinations in Section 1605A.3.1 and shall not exceed 60 percent of the specified minimum tensile strength of the tendons.*

4. *Ultimate Load shall be based upon Section 1616A.1.16 ~~1615A.1.10~~ and shall not exceed 80 percent of the specified minimum tensile strength of the tendons.*

5. *The anchor shall be designed to fail in grout bond to the soil or rock before pullout of the soil wedge by group effect.*

6. *Foundation design shall incorporate the effect of lock-off loads.*

7. *Design shall account for as-built locations of soil anchors considering all the acceptable construction tolerances.*

8. *Design shall account for both short and long term deformation.*

9. *Enforcement agency may require consideration of anchor deformation in evaluating deformation compatibility or building drift where it may be significant.*

SECTION 1812A

EARTH RETAINING SHORING

(Relocated from Section J106.2) ~~***J106.2 Earth retaining shoring. [DSA-SS & DSA-SS/CC]***~~

1812A.1 ~~***J106.2.1***~~ **General.** *The requirements of this section shall apply to temporary and permanent earth retaining shoring using soldier piles and lagging with or without tie-back anchors in soil or rock, only when existing or new ~~DSA-SS & DSA-SS/CC~~ facilities are affected. Shoring used as construction means and methods only, which does not affect existing or new ~~DSA-SS & DSA-SS/CC~~ facilities, are not regulated by this section ~~DSA~~ and shall satisfy the requirements of the authorities having jurisdiction.*

Design, construction, testing, and inspection shall satisfy the requirements of this code except as modified in Sections 1812A.2 ~~J106.2.2~~ through ~~J106.2.8~~ 1812A.8.

1812A.2 ~~***J106.2.2***~~ **Duration.** *Shoring shall be considered temporary when elements of the shoring will be exposed to site conditions for a period of less than one (1) year, and shall be considered permanent otherwise. Permanent shoring shall account for the increase in lateral soil pressure due to earthquake. At the end of the construction period, the existing and new structures shall not rely on the temporary shoring for support in anyway. Wood components shall not be used for permanent shoring lasting more than two (2) years. Wood components of the temporary shoring that may affect the performance of permanent structure shall be removed after the shoring is no longer required.*

All components of the shoring shall have corrosion protection or preservative treatment for their expected duration. Wood components of the temporary shoring that will not be removed shall be treated in accordance with AWPA U1 (Commodity Specification A, Use Category 4B and Section 5.2), and shall be identified in accordance with Section 2303.1.9.1 ~~2303.1.8.1~~.

1812A.3 ~~***J106.2.3***~~ ***Surcharge.*** *Surcharge pressure due to footings, traffic, or other sources shall be considered in design. If the footing surcharge is located within the semi-circular distribution or bulb of earth pressure (when shoring is located close to a footings), lagging shall be designed for lateral earth pressure due to footing surcharge. Soil arching effects may be considered in the design of lagging. Underpinning of the footing may be used in lieu of designing the shoring and lagging for surcharge pressure. Alternatively, continuously contacting drilled pier shafts near the footings shall be permitted. The lateral surcharge design pressure shall be derived using Boussinesq equations modified for the distribution of stresses in an elastic medium due to a uniform, concentrated or line surface load as appropriate and soil arching effects.*

1812A.4 ~~***J106.2.4***~~ ***Design and testing.*** *Except for the modifications as set forth in Sections 1812A.4.1* ~~*J106.2.4.1 and J106.2.4.2*~~ *through 1812A.4.3 below, all Prestressed Rock and Soil Tie-back Anchors shall* ~~*be designed and tested in accordance*~~ *comply with PTI Recommendations for Prestressed Rock and Soil Anchors (PTI-2004).*

1812A.4.1 ~~***J106.2.4.1***~~ ***Geotechnical requirements.*** *The geotechnical report for the earth retaining shoring shall address the following:*

1. *Minimum diameter and minimum spacing for the anchors including consideration of group effects.*
2. *Maximum unbonded length and minimum bonded length of the tie-back anchors.*
3. *Maximum recommended anchor tension capacity based upon the soil or rock strength / grout bond and anchor depth / spacing.*
4. *Allowable bond stress at the ground / grout interface and applicable factor of safety for ultimate bond stress for the anchor. For permanent anchors, a minimum factor of safety of 2.0 shall be applied to ground soil interface as required by PTI-2004 Section 6.6.*
5. *Minimum grout pressure for installation and post-grout pressure for the anchor. The presumptive post grout pressure of 300 psi may be used for all soil type.*
6. *Class I Corrosion Protection is required for all permanent anchors. The geotechnical report shall specify the corrosion protection recommendations for temporary anchors.*
7. *Performance test for the anchors shall be at a minimum of two (2) times the design loads and shall not exceed 80% of the specified minimum tensile strength of the anchor rod. A creep test is required for all prestressed anchors that are*

performance tested. All production anchors shall be tested at 150% of design loads and shall not be greater than 70% of the specified minimum tensile strength of the anchor rod.

8. *Earth pressure, surcharge pressure, and the seismic increment of earth pressure loading, when applicable.*
9. *Maximum recommended lateral deformation at the top of the soldier pile, at the tie-back anchor locations, and the drilled pier concrete shafts at the lowest grade level.*
10. *Allowable vertical soil bearing pressure, friction resistance, and lateral passive soil resistance for the drilled pier concrete shafts and associated factors of safety for these allowable capacities.*
11. *Soil-pier shaft / pile interaction assumptions and lateral soil stiffness to be used in design for drilled pier concrete shaft or pile lateral loads.*
12. *Acceptable drilling methods.*
13. *Geotechnical observation and monitoring recommendations.*

***1812A.4.2 ~~J106.2.4.2~~ Structural requirements**:*

1. *Tendons shall be thread-bar anchors conforming to ASTM A 722.*
2. *Anchor design loads shall be based upon the load combinations in Section 1605A.3.1 and shall not exceed 60 percent of the specified minimum tensile strength of the tendons.*
3. *The anchor shall be designed to fail in grout bond to the soil or rock before pullout of the soil wedge.*
4. *Design of shoring system shall account for as-built locations of soil anchors considering all specified construction tolerances in Section 1812A.8 ~~J106.2.8~~.*
5. *Design of shoring system shall account for both short and long term deformation.*

***1812A.4.3 ~~J106.2.4.3~~ Testing of tie-back anchors**:*

1. *The geotechnical engineer shall keep a record at job site of all test loads, total anchor movement, and report their accuracy.*

2. *If a tie-back anchor initially fails the testing requirements, the anchor shall be permitted to be re-grouted and retested. If anchor continues to fail, the followings steps shall be taken:*

   a. *The contractor shall determine the cause of failure – variations of the soil conditions,*

installation methods, materials, etc.

b. Contractor shall propose a solution to remedy the problem. The proposed solution will need to be reviewed and approved by geotechnical engineer, shoring design engineer, and the building official.

3. After a satisfactory test, each anchor shall be locked-off in accordance with Section 8.4 of PTI 2004.

4. The shoring design engineer shall specify design loads for each anchor.

1812A.5 ***~~J106.2.5~~*** **Construction:** *The construction procedure shall address the following:*

1. Holes drilled for piles / tie-back anchors shall be done without detrimental loss of ground, sloughing or caving of materials and without endangering previously installed shoring members or existing foundations.
2. Drilling of earth anchor shafts for tie-backs shall occur when the drill bench reaches two to three feet below the level of the tie-back pockets.
3. Casing or other methods shall be used where necessary to prevent loss of ground and collapse of the hole.
4. The drill cuttings from earth anchor shaft shall be removed prior to anchor installation.
5. Unless tremie methods are used, all water and loose materials shall be removed from the holes prior to installing piles / tie-backs.
6. Tie-back anchor rods with attached centralizing devices shall be installed into the shaft or through the drill casing. Centralizing device shall not restrict movement of the grout.
7. After lagging installation, voids between lagging and soil shall be backfilled immediately to the full height of lagging.
8. The soldier piles shall be placed within specified tolerances in the drilled hole and braced against displacement during grouting. Fill shafts with concrete up to top of footing elevation, rest of the shaft can generally be filled with lean concrete. Excavation for lagging shall not be started until concrete has achieved sufficient strength for all anticipated loads as determined by the shoring design engineer.
9. Where boulders and / or cobbles have been identified in the geotechnical reports, contractor shall be prepared to address boulders and / or cobbles that may be encountered during the drilling of soldier piles and Tie-back anchors.
10. The grouting equipment shall produce grout free of lumps and indispensed cement. The grouting equipment shall be sized to enable the grout to be pumped in continuous operation.

The mixer shall be capable of continuously agitating the grout.

11. *The quantity of grout and grout pressure shall be recorded. The grout pressure shall be controlled to prevent excessive heave in soils or fracturing rock formations.*
12. *If post-grouting is required, post grouting operation shall be performed after initial grout has set for 24-hours in the bond length only. Tie-backs shall be grouted over a sufficient length (anchor bond length) to transfer the maximum anchor force to the anchor grout.*
13. *Testing of anchors may be performed after post-grouting operations provided grout has reached strength of 3,000 psi as required by PTI-2004 Section 6.11.*
14. *Anchor rods shall be tensioned straight and true. Excavation directly below the anchors shall not continue before those anchors are tested.*

1812A.6 ~~J106.2.6~~ Inspection, survey monitoring, and observation

1. *The shoring design engineer or his designee shall make periodic inspections of the job site for the purpose of observing the installation of shoring system, testing of tie-back anchors, and monitoring of survey.*

2. *Testing, inspection, and observation shall be in accordance with testing, inspection and observation requirements approved by the building official. The following activities and materials shall be tested, inspected, or observed by the special inspector and geotechnical engineer:*
   a. *Sampling and testing of concrete in soldier pile and tie-back anchor shafts.*
   b. *Fabrication of tie-back anchor pockets on soldier beams*
   c. *Installation and testing of tie-back anchors.*
   d. *Survey monitoring of soldier pile and tie-back load cells.*
   e. *Survey Monitoring of existing buildings.*

3. *A complete and accurate record of all soldier pile locations, depths, concrete strengths, tie-back locations and lengths, tie-back grout strength, quantity of concrete per pile, quantity of grout per tie-back and applied tie-back loads shall be maintained by the special inspector and geotechnical engineer. The shoring design engineer shall be notified of any unusual conditions encountered during installation.*

4. *Calibration data for each test jack, pressure gauge, and master pressure gauge shall be verified*

by the special inspector and geotechnical engineer. The calibration tests shall be performed by an independent testing laboratory and within 120 calender days of the data submitted.

5. *Monitoring points shall be established at the top and at the anchor heads of selected soldier piles and at intermediate intervals as considered appropriate by the geotechnical engineer.*

6. *Control points shall be established outside the area of influence of the shoring system to ensure the accuracy of the monitoring readings.*

7. *The periodic basis of shoring monitoring, as a minumum, shall be as follows:*

   a. *Intitial monitoring shall be performed prior to any excavation.*
   b. *Once excavation has begun, the periodic readings shall be taken weekly until excavation reaches the estimated subgrade elevation and the permanent foundation is complete.*
   c. *If performance of the shoring is within established guidelines, shoring design engineer may permit the periodic readings to be bi-weekly. Once initiated, bi-weekly readings shall continue until the building slab at ground floor level is completed and capable of transmitting lateral loads to the permanent structure. Thereafter, readings can be monthly.*
   d. *Where the building has been designed to resist lateral earth pressures, the periodic monitoring of the soldier piles and adjacent structure can be discontinued once the ground floor diaphragm and subterranean portion of the structure is capable of resisting lateral soil loads and approved by the shoring design engineer, geotechnical engineer, and the building official.*
   e. *Additional readings shall be taken when requested by special inspector, shoring design engineer, geotechnical engineer, or the building official.*

8. *Monitoring reading shall be submitted to shoring design engineer, engineer in responsible charge, and the building official within 3 working days after they are conducted. Monitoring readings shall be accurate to within 0.01 feet. Results are to be submitted in tabular form showing at least the intial date of monitoring and reading, current monitoring date and reading and difference between the two readings.*

9. *If the total cummulative horizontal or vertical movement (from start of construction) of the existing buildings reaches ½" or soldier piles reaches 1" all excavation activities shall be suspended. The geotechnical and shoring design engineer shall determine the cause of movement, if any,*

and recommend corrective measures, if necessary, before excavation continues.

10. *If the total cummulative horizontal or vertical movement (from start of construction) of the existing buildings reaches 3/4" or soldier piles reaches 1 ½" all excavation activities shall be suspended until the causes, if any, can be determined. Supplemental shoring shall be devised to eliminate further movement and the building official shall review and approve the supplemental shoring before excavation continues.*

11. *Monitoring of Tie-back Anchor Loads:*

    a. *Load cells shall be installed at the tie-back heads adjacent to buildings at maximum interval of 50', with a minimum of one load cells per wall.*
    b. *Load cell readings shall be taken once a day during excavation and once a week during the remainder of construction.*
    c. *Load cell readings shall be submitted to the geotechnical engineer, shoring design engineer, engineer in responsible charge, and the building official.*
    d. *Load cell readings can be terminated once the temporary shoring no longer provides support for the buildings.*

1812A.7 ***~~J106.2.7~~*** ***Monitoring of existing DSA-SS and DSA-SS/CC structures***

1. *The contractor shall complete a written and photographic log of all existing DSA-SS, DSA-SS/CC and structures within 100 ft or three times depth of shoring, prior to construction. A licensed surveyor shall document all existing substantial cracks in adjacent existing structures.*
2. *Contractor shall document existing condition of wall cracks adjacent to shoring walls prior to start of construction.*
3. *Contractor shall monitor existing walls for movement or cracking that may result from adjacent shoring.*
4. *If excessive movement or visible cracking occurs, contractor shall stop work and shore / reinforce excavation and contact shoring design engineer and the building official.*
5. *Monitoring of the existing structure shall be at reasonable intervals as required by the registered design professional subject to approval of the building official. Monitoring shall be performed by a licensed surveyor and shall consist of vertical and lateral movement of the*

existing structures. Prior to starting shoring installation a pre-construction meeting shall take place between the contractor, shoring design engineer, surveyor, geotechnical engineer, and the building official to identify monitoring locations on existing buildings.

6. *If in the opinion of the building official or shoring design engineer, monitoring data indicate excessive movement or other distress, all excavation shall cease until the geotechnical engineer and shoring design engineer investigates the situation and makes recommendations for remediation or continuing.*
7. *All reading and measurements shall be submitted to the building official and shoring design engineer.*

1812A.8 ***~~J106.2.8~~*** **Tolerances.** *Following tolerances shall be specified on the construction documents.*

1. *Soldier Piles:*

   i. *Horizontal and vertical construction tolerances for the soldier pile locations.*
   ii. *Soldier pile plumbness requirements (angle with vertical line).*

2. *Tie-back Anchors:*

   i. *Allowable deviation of anchor projected angle from specified vertical and horizontal design projected angle.*
   ii. *Anchor clearance to the existing/new utilities and structures.*

(Relocated from Section J112)

Section 1813A ~~J112~~

Vibro Stone Columns for Ground Improvement

1813A.1 ***~~J112.1~~*** **General.** ***~~[DSA-SS & DSA-SS/CC]~~*** *This section shall apply to Vibro Stone Columns (VSCs) for ground improvement using unbounded aggregate materials. Vibro stone column provisions in this section are intended to increase bearing capacity, reduce settlements, and mitigate liquefaction for shallow foundations. These requirements shall not be used for grouted or bonded stone columns, ground improvement for deep foundation elements, or changing site class. VSCs shall not be considered as a deep foundation element.*

Ground improvement shall be installed under the entire building/structure footprint and not under isolated foundation elements only.

Design, construction, testing, and inspection shall satisfy the requirements of this code except as modified in Sections 1813A.2 ~~J112.2~~ through ~~J112.5~~ 1813A.5.

1813A.2 ~~J112.2~~ Geotechnical Report. *The geotechnical report shall specify vibro stone column requirements to ensure uniformity in total and differential immediate settlement, long term settlement, and earthquake induced settlement.*

1. *Soil compaction shall be sufficient to mitigate potential for liquefaction as described in California Geological Survey (CGS) Special Publication 117A (SP-117A): Guidelines for Evaluating and Mitigating Seismic Hazard in California.*

2. *Area replacement ratio for the compaction elements and the basis of its determination shall be explained. Minimum factor of safety for soil compaction shall be in accordance with SP-117A.*

3. *Depth of soil compaction elements and extent beyond the footprint of structures/foundation shall be defined. Extent beyond the foundation shall be half the depth of the VSCs with a minimum of 10' or an approved alternative.*

4. *Minimum diameter and maximum spacing of soil compaction elements shall be specified. VSC's shall not be less than 2 feet in diameter and center to center spacing shall not exceed 8 feet.*

5. *The modulus of subgrade reactions for shallow foundations shall account for the presence of compaction elements.*

6. *The modulus of subgrade reactions, long-term settlement, and post-earthquake settlement shall be specified along with expected total and differential settlements for design.*

7. *The acceptance criteria for Friction Cone and Piezocone Penetration Testing ~~Cone Penetration Test (CPT)~~ in accordance with ASTM D 5778 ~~3441~~ complemented by Standard Penetration Test (SPT) in accordance with ASTM D 1586, if necessary, to verify soil improvement shall be specified*

8. *The requirements for special inspection and observation by the Geotechnical engineer shall be specified.*

9. *A Final Verified Report (FVR) documenting the installation of the ground improvement system and confirming that the ground improvement acceptance criteria have been met shall be prepared by the Geotechnical Engineer and submitted to the enforcement agency for review and approval.*

1813A.3 ~~***J112.3***~~ ***Shallow Foundations.*** *VSCs under the shallow foundation shall be located symmetrically around the centroid of the footing or load.*

1. *There shall be a minimum of four stone columns under each isolated or continuous/combined footing or approved equivalent.*

2. *The VSCs or deep foundation elements shall not be used to resist tension or overturning uplift from the shallow foundations.*

3. *The foundation design for the shallow foundation shall consider the increased vertical stiffness of the VSCs as point supports for analysis, unless it is substantiated that the installation of the VSCs result in improvement of the surrounding soils such that the modulus of subgrade reaction, long term settlement, and post-earthquake settlement can be considered uniform throughout.*

1813A.4 ~~***J112.4***~~ ***Installation.*** *VSCs shall be installed with vibratory probes. Vertical columns of compacted unbounded aggregate shall be formed through the soils to be improved by adding gravel near the tip of the vibrator and progressively raising and re-penetrating the vibrator which will results in the gravel being pushed into the surrounding soil.*

Gravel aggregate for VSCs shall be well graded with a maximum size of 6" and not more than 10% smaller than 3/8" after compaction.

1813A.5 ~~***J112.5***~~ ***Construction Documents.*** *Construction documents for VSCs, as a minimum, shall include the following:*

1. *Size, depth, and location of VSCs.*
2. *Extent of soil improvements along with building/structure foundation outlines.*
3. *Field verification requirements and acceptance criteria using CPT/SPT.*

4. *The locations where CPT/SPT shall be performed.*
5. *The Testing, Inspection and Observation (TIO) program shall indicate the inspection and observation required for the VSCs.*

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 19

CONCRETE

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	-	X	
Adopt only those sections listed below			
1901.1.1		X	
1901.1.2		X	
1901.1.3		X	
1901.1.4		X	
1909		X	
~~*1913.1.1*~~		~~X~~	
~~*1913.2*~~		~~X~~	
~~*1913.2.1*~~		~~X~~	
~~*1913.2.2*~~		~~X~~	
~~*1913.2.3*~~		~~X~~	

~~*1913.2.4*~~		~~X~~	
~~*1913.2.5*~~		~~X~~	
~~*1913.2.6*~~		~~X~~	
~~*1913.2.7*~~		~~X~~	
~~*1913.2.8*~~		~~X~~	
~~*1913.2.9*~~		~~X~~	
~~*1913.2.10*~~		~~X~~	
~~*1913.2.11*~~		~~X~~	
~~*1913.2.11.1*~~		~~X~~	
~~*1913.2.11.2*~~		~~X~~	
~~*1913.2.11.3*~~		~~X~~	
~~*1913.2.11.4*~~		~~X~~	
~~*1913.2.11.5*~~		~~X~~	
~~*1913.3.1*~~		~~X~~	
~~*1913.3.2*~~		~~X~~	
~~*1913.3.3*~~		~~X~~	
~~*1913.3.4*~~		~~X~~	
~~*1913.3.5*~~		~~X~~	
~~*1913.3.6*~~		~~X~~	
~~*1913.3.7*~~		~~X~~	
~~*1913.3.8*~~		~~X~~	
~~*1913.4.1*~~		~~X~~	
~~*1913.4.2*~~		~~X~~	
~~*1913.4.3*~~		~~X~~	
~~*1913.4.4*~~		~~X~~	
~~*1913.4.5*~~		~~X~~	
~~*1913.5*~~		~~X~~	

(All existing California amendments that are not revised below shall continue without change)

Italics are used for text within Sections 1903 through 1905 of this code to indicate provisions that differ from ACI 318.

SECTION 1901

GENERAL

1901.1 Scope. *The provisions of this chapter shall govern the materials, quality control, design and construction of concrete used in structures.*

1901.1.1 Application. *The scope of application of Chapter 19 is as follows:*

Community college buildings regulated by the Division of the State Architect—Structural Safety/Community Colleges (DSA-SS/CC), as listed in Section 1.9.2.2.

1901.1.2 Amendments in this chapter. *DSA-SS/CC adopts this chapter and all amendments.*

Exceptions: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

Division of the State Architect—Structural Safety/Community Colleges:

[DSA-SS/CC] *For applications listed in Section 1.9.2.2.*

1901.1.3 Reference to other chapters. [DSA-SS/CC] *Where reference within this chapter is made to sections in Chapters 17 and 18, the provisions in Chapters 17A, and 18A respectively shall apply instead.*

1901.1.4 Amendments. [DSA-SS/CC] *See Section 1909 ~~1913~~ for additional requirements applicable to community colleges.*

…

SECTION 1909 ~~1913~~

ADDITIONAL REQUIREMENTS FOR COMMUNITY COLLEGES [DSA-SS/CC]

1909.1 ~~1913.1~~ General.

1909.1.1 ~~1913.1.1~~ Construction documents. *Openings larger than 12 inches (305 mm) in any dimension shall be detailed on the structural drawings.*

1909.2 ~~1913.2~~ Tests and materials. *Where required, special inspections and tests shall be in accordance with Chapter 17A and this section.*

~~***1913.2.1 Glass fiber reinforced concrete.*** *Glass fiber reinforced concrete (GFRC) and the materials used in such concrete shall be in accordance with the PCI MNL 128 standard.*~~

~~***1913.2.2 Fly ash.*** *Replace ACI 318 Section 3.2.2 as follows: Fly ash or other pozzolan can be used as a partial substitute for ASTM C 150 portland cement, as follows:*~~

~~*1. Fly ash or other pozzolan shall conform to ASTM C 618 for Class N or Class F materials (Class C is not permitted), and*~~

~~*2. More than 15 percent by weight of fly ash or other pozzolans shall be permitted to be substituted for ASTM C 150 portland cement if the mix design is proportioned per ACI 318 Section 5.3. See Section 1904 for durability requirements.*~~

~~*3. More than 40 percent by weight of ground-granulated blast-furnace slag conforming to ASTM C 989 shall be permitted to be substituted for ASTM C 150 portland cement if the mix design is proportioned per ACI 318 Section 5.3. See Section 1904 for durability requirements.*~~

1909.2.1 ~~***1913.2.3***~~ ***Aggregates*** - ~~*ACI 318, Section 3.3.2.*~~ *Modify ACI 318 Section 26.4.1.2.1(a).(1)* ~~*3.3.2*~~ *as follows:* ~~*by adding the following:*~~

~~*Aggregate size limitations waiver shall be approved by the enforcement agency.*~~

~~*Evidence that the aggregate used is not reactive in the presence of cement alkalis may be required by the enforcement agency. If new aggregate sources are to be used or if past experience indicates problems with existing aggregate sources, test the aggregate for potential reactivity according to ASTM C 289 to determine potential reactivity in the presence of cement.*~~

~~*If the results of the test are other than innocuous, selected concrete proportions using the aggregate (see Section 1905.2) shall be tested in accordance with ASTM C 1567. If the results of this test indicate an expansion greater than 0.10 percent at 16-days age, provide mitigation with one of the cementitious material systems noted below such that an expansion of less than 0.10 percent at 16-days age is obtained:*~~

~~*1. Low-alkali portland cement containing not more than 0.6 percent total alkali when calculated as sodium oxide, as determined by the method given in ASTM C 114.*~~

~~*2. Blended hydraulic cement, Type IS or IP, conforming to ASTM C 595, except that Type IS cement shall not contain less than 40 percent slag constituent.*~~

~~*3. Replacement of not less than 15 percent by weight of the portland cement used by a mineral admixture conforming to ASTM C 618 for Class N or F materials (Class C is not permitted).*~~

~~*4. Replacement of not less than 40 percent by weight of the portland cement used by a ground granulated blast-furnace slag conforming to ASTM C 989.*~~

(1) ***Normal weight aggregate:****:: Aggregate shall be non-reactive as determined by one of the methods in ASTM C33 Appendix XI Methods for Evaluating Potential for Deleterious Expansion Due to Alkali Reactivity of an Aggregate. Aggregates deemed to be deleterious or potentially deleterious may be used with the addition of a material that has been shown to prevent harmful expansion in accordance with Appendix XI of ASTM C33, when approved by the building official.*

1909.2.2 ~~***1913.2.4***~~ ~~***Discontinuous***~~ ***Steel fibers*** ~~***reinforcement***~~ – *Not permitted.* ~~*Modify ACI 318 Section 3.5.1 by adding the following:*~~

~~*Discontinuous steel fibers shall not be permitted*~~

1909.2.3 ***~~1913.2.5~~*** ***Cementitious material.*** *The concrete supplier shall furnish to the enforcement agency certification that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ASTM C 150 for portland cement and ASTM C 595 or ASTM C 1157 for blended hydraulic cement, whichever is applicable. When a mineral admixture or ground granulated blast-furnace slag is proposed for use, the concrete supplier shall furnish to the enforcement agency certification that they have been manufactured and tested in compliance with ASTM C 618 or ASTM C 989, whichever is applicable. The concrete producer shall provide copies of the cementitious material supplier's certificate of compliance that represents the materials used by date of shipment for concrete. Cementitious materials without certification of compliance shall not be used.*

1909.2.4 ***~~1913.2.6~~*** ***Tests of reinforcing bars.*** *~~Where~~ ~~s~~Samples shall be ~~are~~ taken from bundles as delivered from the mill, with the bundles identified as to heat number and ~~provided~~ the accompanying mill certificate. ~~analyses accompany the report, o~~ One tensile test and one bend test shall be made from a sample ~~specimen~~ from each 10 tons (9080 kg) or fraction thereof of each size of reinforcing steel.*

Where positive identification of the heat number cannot be made or where random samples are to be taken, one series of tests shall be made from each 2 1/2 tons (2270 kg) or fraction thereof of each size of reinforcing steel.

Tests of reinforcing bars may be waived by the structural engineer with the approval of the Building Official for one-story buildings or non-building structures provided they are identified in the construction documents and certified mill test reports are provided to the inspector of record for each shipment of such reinforcement.

1909.2.5 ***~~1913.2.7~~*** ***Tests for prestressing steel and anchorage****. All wires or bars of each size from each mill heat and all strands from each manufactured reel to be shipped to the site shall be assigned an individual lot number and shall be tagged in such a manner that each lot can be accurately identified at the job site. Each lot of tendon and anchorage assemblies and bar couplers to be installed shall be likewise identified.*

The following samples of materials and tendons selected by the engineer or the designated testing laboratory from the prestressing steel at the plant or job site shall be furnished by the contractor and tested by an approved independent testing agency:

1. For wire, strand or bars, 7-foot-long (2134 mm) samples shall be taken of the coil of wire or strand reel or rods. A minimum of one random sample per 5,000 pounds (2270 kg) of each heat or lot used on the job shall be selected.

2. For prefabricated prestressing tendons other than bars, one completely fabricated tendon 10 feet (3048 mm) in length between grips with anchorage assembly at one end shall be furnished for each size and type of tendon and anchorage assembly.

Variations of the bearing plate size need not be considered.

The anchorages of unbonded tendons shall develop at least 95 percent of the minimum specified ultimate strength of the prestressing steel. The total elongation of the tendon under ultimate load shall not be less than 2 percent measured in a minimum gage length of 10 feet (3048 mm).

Anchorages of bonded tendons shall develop at least 90 percent of the minimum specified strength of the prestressing steel tested in an unbonded state. All couplings shall develop at least 95 percent of the minimum specified strength of the prestressing steel and shall not reduce the elongation at rupture below the requirements of the tendon itself.

3. If the prestressing tendon is a bar, one 7-foot (2134 mm) length complete with one end anchorage shall be furnished and, in addition, if couplers are to be used with the bar, two 4-foot (1219 mm) lengths of bar fabricated to fit and equipped with one coupler shall be furnished.

4. Mill tests of materials used for end anchorages shall be furnished. In addition, at least one Brinnell hardness test shall be made of each thickness of bearing plate.

1909.2.6 ***~~1913.2.8~~*** ***Composite construction cores.*** *Cores of the completed composite concrete construction shall be taken to demonstrate the shear strength along the contact surfaces. The cores shall be tested when the cast-in-place concrete is approximately 28 days old and shall be tested by a shear loading parallel to the joint between the precast concrete and the cast-in-place concrete. The minimum unit shear strength of the contact surface area of the core shall not be less than 100 psi (689 kPa).*

At least one core shall be taken from each building for each 5,000 square feet (465 m2) of area of composite concrete construction and not less than three cores shall be taken from each project. The architect or structural engineer in responsible charge of the project or his or her representative shall designate the location for sampling.

~~1913.2.9 Tests of shotcrete.~~ *~~Testing of shotcrete shall follow the provisions of Sections 1910, 1909.4, and the general requirements of ACI 318 Section 5.6.~~*

~~1913.2.10 Gypsum field tests.~~ *~~Field tests shall be made during construction to verify gypsum strength. One sample consisting of three specimens shall be made for each 5,000 square feet (465 m2) or fraction thereof of all gypsum poured, but not less than one sample shall be taken from each half-day's pour.~~*

1909.2.7 ***~~1913.2.11~~*** ***Tests for post-installed anchors in concrete.*** *When post-installed anchors are used in lieu of cast-in place bolts, the installation verification test loads frequency and acceptance criteria shall be in accordance with this section.*

1909.2.7.1 ***~~1913.2.11.1~~*** ***General.*** *Test loads or torques and acceptance criteria shall be shown on the construction documents.*

If any anchor fails testing, all anchors of the same type shall be tested, which are installed by the same trade, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency.

1909.2.7.2 ***~~1913.2.11.5~~*** ***Testing procedure.*** *The test procedure shall be as permitted by an approved test report using criteria adopted in this code. All ~~other~~ post-installed anchors shall be tension tested.*

***Exception**: Torque controlled post installed anchors and screw type anchors shall be permitted to be tested using torque based on an approved test report using criteria adopted in this code.*

Alternatively, the ~~M~~manufacturer's recommendation for testing may be approved by the enforcement agency based on approved test report using criteria adopted in this code.

***1909.2.7.3 ~~1913.2.11.3~~ Test frequency.** When post-installed anchors are used for sill plate bolting applications, 10 percent of the anchors shall be tested.*

When post-installed anchors are used for other structural applications, all such anchors shall be tested.

When post-installed anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group, including at least one-half the anchors in each group, shall be tested.

The testing of the post-installed anchors shall be done in the presence of the special inspector and a report of the test results shall be submitted to the enforcement agency.

Exceptions:

1. Undercut anchors that allow visual confirmation of full set shall not require testing.

2. Where the factored design tension on anchors is less than 100 lb and those anchors are clearly noted on the approved construction documents, only 10 percent of those anchors shall be tested.

3. Where adhesive anchor systems are used to install reinforcing dowel bars in hardened concrete, only 25 percent of the dowels shall be tested if all the following conditions are met:

a. The dowels are used exclusively to transmit shear forces across joints between existing and new concrete.

b. The number of dowels in any one member equals or exceeds 12.

c. The dowels are uniformly distributed across seismic force resisting members (such as shear walls, collectors and diaphragms).

Anchors to be tested shall be selected at random by the special inspector/inspector of record (IOR).

4. Testing of shear dowels across cold joints in slabs on grade, where the slab is not part of the lateral force-resisting system shall not be required.

5. Testing is not required for power actuated fasteners used to attach tracks of interior nonshear wall partitions for shear only, where there are at least three fasteners per segment of track.

1909.2.7.4 ***~~1913.2.11.2~~*** ***Test loads.*** *Required test loads shall be determined by one of the following methods:*

1. Twice the maximum allowable tension load or one and a quarter (11/4) times the maximum design strength of anchors as provided in an approved test report using criteria adopted in this code or determined in accordance with Chapter 17 ~~Appendix D~~ of ACI 318.

Tension test load need not exceed 80 percent of the nominal yield strength of the anchor element (= 0.8 Ase fya).

2. The manufacturer's recommended installation torque based on an approved test report using criteria adopted in this code.

1909.2.7.5 ***~~1913.2.11.4~~*** ***Test acceptance criteria.*** *Acceptance criteria for post-installed anchors shall be based on an approved test report using criteria adopted in this code ~~or manufacturer's written instruction, acceptable to the enforcement agency~~. Field tests shall satisfy the following minimum requirements.*

1. Hydraulic ram method:

Anchors tested with a hydraulic jack or spring loaded ~~devices~~ apparatus shall maintain the test load for a minimum of 15 seconds and shall exhibit no discernible movement during the tension test, e.g., as evidenced by loosening of the washer under the nut.

For adhesive anchors, where other than bond is being tested, the testing apparatus support ~~device~~ shall not be located within 1.5 times the anchor's embedment depth to avoid restricting the concrete shear cone type failure mechanism from occurring.

.

2. Torque wrench method:

Torque controlled post installed ~~A~~ anchors tested with a calibrated torque wrench shall ~~must~~ attain the specified torque within ½ turn of the nut; or one-quarter (1/4) turn of the nut for a 3/8 in. sleeve anchor only.

~~Exceptions:~~

~~1. Wedge or sleeve type: One-quarter (1/4) turn of the nut for a 3/8 in. sleeve anchor only.~~

~~2.~~ Screw~~Threaded~~ ~~T~~type: anchors tested with a calibrated torque wrench shall attain the specified torque within ~~O~~one-quarter (1/4) turn of the screw after initial seating of the screw head.

1909.3 ***~~1913.3~~*** ***Modifications to ACI 318***

1909.3.1 ***~~1913.3.2~~*** ***ACI 318, Section 11.9*** ***~~14.9~~****. Modify ACI 318 by adding Section 14.9 as follows:*

*11.9 ~~14.9~~ - **Foundation walls**. Horizontal reinforcing of concrete foundation walls for wood-frame or light-steel buildings shall consist of the equivalent of not less than one No. 5 bar located at the top and bottom of the wall. Where such walls exceed 3 feet (914 mm) in height, intermediate horizontal reinforcing shall be provided at spacing not to exceed 2 feet (610 mm) on center. Minimum vertical reinforcing shall consist of No. 3 bars at 24 inches (610 mm) on center.*

Where concrete foundation walls or curbs extend above the floor line and support wood-frame or light steel exterior, bearing or shear walls, they shall be doweled to the foundation wall below with a minimum of No. 3 bars at 24 inches (610 mm) on center. Where the height of the wall above the floor line exceeds 18inches (457 mm), the wall above and below the floor line shall meet the requirements of ACI 318 Section 11.6 and 11.7 ~~14.3~~.

1909.3.2 ***~~1913.3.6~~*** ***ACI 318, Section 12.7.3.*** *Add Section 12.7.3.4 to ACI 318 as follows:* ***~~ACI 318, Section 21.11.7.~~*** *~~Modify ACI 318 Section 21.11.7 by adding Section 21.11.7.7 as follows:~~*

~~21.11.7.7 - Where boundary members are not required by ACI 318 Section 21.11.7.5, minimum reinforcement parallel to the edges of all diaphragms and the boundaries of all openings shall consist of twice the cross sectional area of the minimum shear reinforcement required per linear foot of diaphragm.~~

12.7.3.4 *– At least two No. 5 bars in diaphragms having two layers of reinforcement in both directions and one No. 5 bar in diaphragms having a single layer of reinforcement in both directions shall be provided around openings larger than 12 inches in any dimension in addition to the minimum reinforcement required by Section 12.6.*

1909.3.3 ***~~1913.3.7~~*** ***ACI 318, Chapter 14*** ***~~22~~****. Plain concrete is not permitted.*

1909.3.4 ***~~1913.3.3~~*** ***ACI 318, Section 18.10.6.5*** ***~~21.9.2.2~~****. Modify ACI 318, Section 18.10.6.5 ~~21.9.2.2~~ by adding the following:*

Where boundary members are not required by ACI 318 Section 18.10.6.2 or 18.10.6.3 ~~21.9.6~~, minimum reinforcement parallel to the edges of all structural walls and the boundaries of all openings shall consist of twice the cross-sectional area of the minimum shear reinforcement required per lineal foot of wall. Horizontal extent of boundary element shall be per ACI 318 Section 18.10.6.4 (a), (b) and (c) ~~21.9.6.4 (a) and (b)~~.

~~1913.3.4 ACI 318, Section 21.9.4~~ *~~Modify ACI 318 by adding Section 21.9.4.6 as follows:~~*

~~21.9.4.6 - Walls and portions of walls with Pu > 0.35Po shall not be considered to contribute to the calculated strength of the structure for resisting earthquake induced forces. Such walls shall conform to the requirements of ACI 318 Section 21.13.~~

1909.3.5 ~~***1913.3.5***~~ ***ACI 318, Section 18.12.6*** ~~***21.11.4***~~***.*** *Add Section 18.12.6.2 to ACI 318 as follows:* ~~*Modify ACI 318 Section 21.11.4 by adding the following:*~~

Collector and boundary elements in topping slabs placed over precast floor and roof elements shall not be less than 3 inches (76 mm) or 6 db thick, where db is the diameter of the largest reinforcement in the topping slab.

1909.3.6 ACI 318, Table 21.2.2. *Replace Table 21.2.2 as follows.:*

Table 21.2.2 – Strength reduction factor φ for moment, axial force, or combined moment and axial force

Net tensile strain ε_t	Classification	φ			
		Type of transverse reinforcement			
		Spirals conforming to 25.7.3		Other	
$\varepsilon_t \le \varepsilon_{ty}$	Compression-controlled	0.75	(a)	0.65	(b)
$\varepsilon_{ty} < \varepsilon_t < 0.005$	Transition[1][2]	$0.75 + 0.15\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^{*}\cancel{0.005} - \varepsilon_{ty}}$	(c)	$0.65 + 0.25\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^{*}\cancel{0.005} - \varepsilon_{ty}}$	(d)
$\varepsilon_t \ge 0.005$	Tension-controlled[3]	0.9	(e)	0.9	(f)

[1]For sections classified as transition, it shall be permitted to use φ corresponding to compression-controlled sections.

[2] *ε_t^{*} is the greater of net tensile strain calculated for $P_n = 0.1A_g f'_c$ and 0.005.*

[3] *For sections with factored axial compression force Pu ≥ $0.1A_g f'_c$, **φ** shall be calculated using equation (c) or (d) for sections classified as transition, as applicable,*

1909.3.7 ~~***1913.3.1***~~ ***ACI 318, Section*** ~~***5.6.2.1***~~ ***26.12.2.1(a).*** *Replace ACI 318 Section 26.12.2.1(a)* ~~*5.6.2.1*~~ *by the following:*

26.12.2.1(a) ~~*5.6.2.1*~~ *- Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards (38.2 m3) of concrete, or not less than once for each 2,000 square feet (186 m2) of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.*

~~***1913.3.8 ACI 318, Section D.3.3.*** *Replace the requirements of Section 1905.1.9 with the following. Modify ACI 318, Sections D.3.3.4.2, D.3.3.4.3(d), and D.3.3.5.2 to read as follows:*~~

~~*D.3.3.4.2 - Where the tensile component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor tensile force associated with the same load combination, anchors and their attachments shall be designed in accordance with Section D.3.3.4.3. The anchor design tensile strength shall be determined in accordance with Section D.3.3.4.4.*~~

~~***Exception:***~~

~~*Anchors designed to resist wall out-of-plane forces with design strengths equal to or greater than the force determined in accordance with ASCE 7 Equation 12.11-1 or 12.14-10 and Section 1604.8.2 of this code shall be deemed to satisfy Section D.3.3.4.3(d).*~~

~~*D.3.3.4.3(d) - The anchor or group of anchors shall be designed for the maximum tension obtained from design load combinations that include E, with E increased by Ω 0. The anchor design tensile strength shall be calculated from Section D.3.3.4.4.*~~

~~*D.3.3.5.2 - Where the shear component of the strength level earthquake force applied to anchors exceeds 20 percent of the total factored anchor shear force associated with the same load combination, anchors and their attachments shall be designed in accordance with Section D.3.3.5.3. The anchor design shear strength for resisting earthquake forces shall be determined in accordance with Section D.6.*~~

~~***Exceptions:***~~

~~*1. For the calculation of the in-plane shear strength of anchor bolts attaching wood sill plates of bearing or nonbearing walls of lightframe wood structures to foundations or foundation stem walls, the in-plane design shear strength in accordance with Sections D.6.2 and D.6.3 need not be computed and Section D.3.3.5.3 shall be deemed to be satisfied, provided all of the following are met:*~~

~~*1.1. The allowable in-plane shear strength of the anchor is determined in accordance with AF&PA NDS Table 11E for lateral design values parallel to grain.*~~

~~*1.2. The maximum anchor nominal diameter is 5/8 inches (16 mm).*~~

~~*1.3. Anchor bolts are embedded into concrete a minimum of 7 inches (178 mm).*~~

~~*1.4. Anchor bolts are located a minimum of 13/4 inches (45 mm) from the edge of the concrete parallel to the length of the wood sill plate.*~~

~~*1.5. Anchor bolts are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the wood sill plate.*~~

~~*1.6. The sill plate is 2-inch or 3-inch nominal thickness.*~~

~~*2. For the calculation of the in-plane shear strength of anchor bolts attaching cold formed steel track of bearing or nonbearing walls of anchor bolts attaching cold-formed steel track of bearing or nonbearing walls of light-frame construction to foundations or foundation stem walls the in-plane design shear strength in accordance with Sections D.6.2 and D.6.3 need not be computed and Section D.3.3.5.3 shall be deemed to be satisfied provided all of the following are met:*~~

~~*2.1. The maximum anchor nominal diameter is 5/8 inches (16 mm).*~~

~~*2.2. Anchors are embedded into concrete a minimum of 7 inches (178 mm).*~~

~~*2.3. Anchors are located a minimum of 13/4 inches (45 mm) from the edge of the concrete parallel to the length of the track.*~~

~~*2.4. Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.*~~

~~*2.5. The track is 33 to 68 mil designation thickness.*~~

~~*Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete shall be permitted to be determined in accordance with AISI S100, Section E3.3.1.*~~

~~*3. In light-frame construction, bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 5/8 inch (16 mm) in diameter of sill plate or track to foundation or foundation stem wall need not satisfy Section D.3.3.5.3 (a) through (c) when the design strength of the anchors is determined in accordance with Section D.6.2.1(c).*~~

1909.4 ~~***1913.4***~~ ***Shotcrete.***

1909.4.1 ~~***1913.4.1***~~ ***Preconstruction tests.*** *A test panel prepared in accordance with Section 1908.5 is required. Approval from the enforcement agency must be obtained prior to performing test panels.*

1909.4.2 ~~***1913.4.2***~~ ***Surface preparation.*** *Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by sand blasting, and just prior to receiving shotcrete, shall be thoroughly cleaned of all debris, dirt and dust. Concrete and masonry shall be wetted before shotcrete is deposited, but not so wet as to overcome suction.*

1909.4.3 ~~***1913.4.3***~~ ***Joints.*** *The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or sand blasting. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.*

1909.4.4 ~~***1913.4.4***~~ ***Forms and ground wires for shotcrete.*** *Forms for shotcrete shall be substantial and rigid. Forms shall be built and placed so as to permit the escape of air and rebound.*

Adequate ground wires, which are to be used as screeds, shall be placed to establish the thickness, surface planes and form of the shotcrete work. All surfaces shall be rodded to these wires.

1909.4.5 ~~***1913.4.5***~~ ***Placing.*** *Shotcrete shall be placed in accordance with ACI 506.*

1909.5 ~~***1913.5***~~ ***Existing concrete structures.*** *The structural use of existing concrete with a core strength less than 1,500 psi (10.3MPa) is not permitted in rehabilitation work.*

For existing concrete structures, sufficient cores shall be taken at representative locations throughout the structure, as designated by the architect or structural engineer, so that knowledge will be had of the in-place strength of the concrete. At least three cores shall be taken from each building for each 4,000 square feet (372 m2) of floor area, or fraction thereof. Cores shall be at least 4 inches (102 mm) in diameter. Cores as small as 2.75 inches (70 mm) in diameter may be allowed by the enforcement agency when reinforcement is closely spaced and the coarse aggregate does not exceed 3/4 inch (19 mm).

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 19A

CONCRETE

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter			
Adopt entire chapter as amended (amended sections listed below)	**X**	**-**	
Adopt only those sections listed below			

(All existing California amendments that are not revised below shall continue without change)

Italics are used for text within Sections 1903A through 1905A of this code to indicate provisions that differ from ACI 318. State of California amendments in these sections are shown in italics and underlined.

…

SECTION 1901A

GENERAL

1901*A*.1 Scope. The provisions of this chapter shall govern the materials, quality control, design and construction of concrete used in structures.

1901A.1.1 Application. *The scope of application of Chapter 19A is as follows:*

1. Structures regulated by the Division of the State Architect-Structural Safety (DSA-SS), which include those applications listed in Section 1.9.2.1. These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.

2. (Reserved for OSHPD)

1901A.1.2 Amendments in this chapter. *DSA adopts this chapter and all amendments.*

Exception: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. Division of the State Architect-Structural Safety: ***[DSA-SS]*** *For applications listed in Section 1.9.2.1*

2. ***[Reserved for OSHPD]***

…

1901*A*.5 Construction documents. The *construction documents* for structural concrete construction shall include:

1. The specified compressive strength of concrete at the stated ages or stages of construction for which each concrete element is designed.
2. The specified strength or grade of reinforcement.
3. The size and location of structural elements, reinforcement and anchors.
4. Provision for dimensional changes resulting from creep, shrinkage and temperature.
5. The magnitude and location of prestressing forces.
6. Anchorage length of reinforcement and location and length of lap splices.
7. Type and location of mechanical and welded splices of reinforcement.
8. Details and location of contraction or isolation joints specified for plain concrete.
9. Minimum concrete compressive strength at time of posttensioning.
10. Stressing sequence for post-tensioning tendons.
11. For structures assigned to *Seismic Design Category* D, E or F, a statement if slab on grade is designed as a structural diaphragm.
12. *Openings larger than 12 inches (305 mm) in any dimension shall be detailed on the structural drawings.*

1901A.6 Special inspections and tests. Special inspections and tests of concrete elements of buildings and structures and concreting operations shall be as required by Chapter *17A and Section 1910A.*

…

SECTION 1903A

SPECIFICATIONS FOR TESTS AND MATERIALS

1903A.1 General. Materials used to produce concrete, concrete itself and testing thereof shall comply with the applicable standards listed in ACI 318.

…

1903A.2 Special Inspections. *Where required, special inspections and tests shall be in accordance with Chapter 17A and Section 1910A.~~1913A.~~*

…

1903A.4 Flat wall insulating concrete form (ICF) systems. *Insulating concrete form material used for forming flat concrete walls shall conform to ASTM E 2634.*

~~***1903A.4 Reporting Requirements*** *– Modify ACI 318 Section 3.2.1 by adding the following:*~~

~~*Each component (a) through (g), when present, as a percentage of total cementitiious materials shall be reported for each mix design.*~~

1903A.5 ~~***1903A.6***~~ ***Aggregates*** *- Modify ACI 318 Section ~~3.3.2~~ 26.4.1.2.1(a).(1) as follows: ~~by adding the following:~~*

~~*Aggregate size limitations waiver shall be approved by the enforcement agency.*~~

~~*Evidence that the aggregate used is not reactive in the presence of alkalis may be required by the enforcement agency. If new aggregate sources are to be used or if past experience indicates problems with existing aggregate sources, test the aggregate for potential alkali-silica reactivity in accordance with to ASTM C 1260 or C 1293 to determine the potential alkali-silica reactivity of the aggregate. If the results indicate an expansion greater than 0.10 percent at 16-days age with ASTM C 1260, or an expansion greater than 0.04 percent at 12 months age with ASTM C 1293, provide mitigation with one of the cementitious material systems noted below such that an expansion of less than 0.10 percent at 16-days age is obtained with ASTM C 1567:*~~

~~*1. Low-alkali portland cement containing not more than 0.6 percent total alkali when calculated as sodium oxide, as determined by the method given in ASTM C 114.*~~

~~*2. Blended hydraulic cement, Type IS or IP, conforming to ASTM C 595, except that Type IS cement shall not contain less than 40 percent slag cement.*~~

~~*3. Replacement of not less than 15 percent by weight of the portland cement with a pozzolan conforming to ASTM C 618 for Class N or F materials (Class C is not permitted).*~~

~~*4. Replacement of not less than 40 percent by weight of the portland cement with slag cement conforming to ASTM C 989.*~~

~~*5. Replacement of not less than 5 percent nor more than 10 percent by weight of Portland cement with silica fume conforming to ASTM C 1240.*~~

~~*6. Replacement of portland cement with a ternary blend of portland cement, slag cement and pozzolan such that the resulting blend contains not more than 70 percent portland cement.*~~

~~ASTM C 1567 test shall be performed separately on the fine and coarse aggregate with one requiring the higher percentage of supplementary cementitious materials dictating the required replacement.~~

~~ASTM C 1260, ASTM C 1293 and ASTM C 1567 tests must have been performed within the past three years.~~

*(1) **Normal weight aggregate:**: Aggregate shall be non-reactive as determined by one of the methods in ASTM C33 Appendix XI Methods for Evaluating Potential for Deleterious Expansion Due to Alkali Reactivity of an Aggregate. Aggregates deemed to be deleterious or potentially deleterious may be used with the addition of a material that has been shown to prevent harmful expansion in accordance with Appendix XI of ASTM C33, when approved by the building official.*

1903A.6 [Reserved for OSHPD] ~~1903A.5 Fly Ash~~ *~~- Add ACI 318 Section 3.2.3 as follows:~~*

~~Fly ash or other pozzolan can be used as a partial substitute for ASTM C 150 portland cement, as follows:~~

~~1. Fly ash or other pozzolan shall conform to ASTM C 618 for Class N or Class F materials (Class C is not permitted), and~~

~~2. More than 15 percent by weight of fly ash or other pozzolans shall be permitted to be substituted for ASTM C 150 portland cement if the mix design is proportioned per ACI 318 Section 5.3. See Section 1904A for durability requirements.~~

~~3. More than 40 percent by weight of ground-granulated blast-furnace slag conforming to ASTM C 989 shall be permitted to be substituted for ASTM C 150 portland cement if the mix design is proportioned per ACI 318 Section 5.3. See Section 1904A for durability requirements.~~

1903A.7 ~~1903A.7~~ ~~Discontinuous~~ Steel ~~Fibers~~ fiber reinforcement *- Not permitted. ~~- Modify ACI 318 Section 3.5.1 by adding the following:~~*

~~Discontinuous steel fibers are not permitted.~~

1903A.8 ~~1903A.8~~ Welding of reinforcing bars *- Modify ACI 318 Section ~~3.5.2~~ 26.6.4.1(b) by adding the following:*

~~If mill test reports are not available, chemical analysis shall be made of bars representative of the bars to be welded. Bars with a carbon equivalent (C.E.) above 0.75 shall not be welded. Welding shall not be done on or within two bar diameters of any bent portion of a bar that has been bent cold. Welding of crossing bars shall not be permitted for assembly of reinforcement unless authorized by the structural engineer and approved by the enforcement agency per approved procedures.~~

Shop fusion welded stirrup/tie cage (or spiral assemblies) consisting of low-alloy steel reinforcing stirrups/ties conforming to ASTM A706 and longitudinal holding wires, conforming to ASTM A1064 shall be permitted. The fusion welds shall be made by machines using electric resistance welds. Tack welding of primary reinforcing bars together or to stirrups/ties is not permitted. Fusion welding of holding wires is not permitted on any portion of a reinforcing bar that is or will be bent in accordance with ACI 318 Section 25.3.

SECTION 1904A

DURABILITY REQUIREMENTS

…

1904*A*.1 Structural concrete. Structural concrete shall conform to the durability requirements of ACI 318.

~~***Exception:*** *For Group R-2 and R-3 occupancies not more than three stories above grade plane, the specified compressive strength, f □c, for concrete in basement walls, foundation walls, exterior walls and other vertical surfaces exposed to the weather shall be not less than 3,000 psi (20.7 MPa).*~~

…

SECTION 1905A

MODIFICATIONS TO ACI 318

1905*A*.1 General. The text of ACI 318 shall be modified as indicated in Sections 1905*A*.1.1 through ~~1905.1.21~~ *1905A.1.16*.

~~**1905*A*.1.1 ACI 318, Section 2.3.** Modify existing definitions and add the following definitions to ACI 318, Section 2.3.~~

~~**DESIGN DISPLACEMENT.** Total lateral displacement expected for the design-basis earthquake, as *specified by Section 12.8.6 of ASCE 7.*~~

~~**DETAILED PLAIN CONCRETE STRUCTURAL WALL.** A wall complying with the requirements of Chapter 14, including 14.6.2.~~

~~**ORDINARY PRECAST STRUCTURAL WALL.** A precast wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.~~

~~**ORDINARY REINFORCED CONCRETE STRUCTURAL WALL.** A *cast-in-place* wall complying with the requirements of Chapter 14, excluding 14.6.2.~~

~~**ORDINARY STRUCTURAL PLAIN CONCRETE WALL.** A wall complying with the requirements of Chapter 22, *excluding 22.6.7.*~~

~~**SPECIAL STRUCTURAL WALL**. A cast-in-place or precast wall complying with the requirements of 18.2.4 through 18.2.8, 18.10 and 18.11, as applicable, in addition to the requirements for ordinary reinforced concrete structural walls *or ordinary precast structural walls, as applicable. Where ASCE 7 refers to a "special reinforced concrete structural wall," it shall be deemed to mean a "special structural wall."*~~

1905A.1.1 ~~***1905A.1.14***~~ ***ACI 318 Section 4.12.2.2*** ~~***18.2.4.***~~ *Modify ACI 318 Section* ~~*4.12.2.2 18.2.4*~~ *by adding the following:*

Where prestressed concrete elements are restrained from movement, an analysis of the stresses in the prestressed elements and loads in the adjoining structural system induced by the above-described effects shall be made in accordance with PCI Design Handbook. ~~*, 7TH Edition.*~~

1905A.1.2 ~~***1905A.1.13***~~ ***ACI 318, Section 4.12.2.3*** ~~***18.2.3***~~*. Modify ACI 318 Section 4.12.2.3* ~~*18.2.3*~~ *by adding the following:*

For prestressed concrete members with recessed or dapped ends, an analysis of the connections shall be made in accordance with procedures given in PCI Design Handbook. ~~*, 7TH Edition.*~~

1905A.1.3 ~~***1905A.1.6***~~ ***ACI 318, Section*** *9.6.1.3.* ~~***10.5.3***~~*. Modify ACI 318 Section 9.6.1.3.* ~~*10.5.3*~~ *by adding the following:*

This section shall not be used for members that resist seismic loads, except that reinforcement provided for foundation elements for one-story wood-frame or one-story light steel buildings need not be more than one-third greater than that required by analysis for all loading conditions.

1905A.1.4 ~~***1905A.1.8***~~ ***ACI 318, Section 11.2.4.1*** ~~***14.2.6.***~~ *Replace ACI 318 Section 11.2.4.1* ~~*14.2.6*~~ *as follows:*

> ***11.2.4.1*** ~~*14.2.6*~~ *- Walls shall be anchored to intersecting elements such as floors or roofs; or to columns, pilasters, buttresses, of intersecting walls; and footings with reinforcement at least equivalent to No. 4 bars at 12 inches (305 mm) on center for each layer of reinforcement.*

1905A.1.5 ~~***1905A.1.11***~~ ***ACI 318 Section*** ~~***16***~~ ***11.7.*** *Add Section* ***11.7.6*** ~~*16.11*~~ *to ACI 318 as follows:*

11.7.6 ~~16.11~~ - Reinforcement. Perimeters of precast walls shall be reinforced continuously with a minimum of one No. 5 bar extending the full height and width of the wall panel. ~~Bars shall be continuous around corners.~~ Where wall panels do not connect to ~~abut~~ columns or other wall panels to develop at least 75 percent of the horizontal wall steel as noted below, vertical perimeter bars shall be retained by hooked wall bars. ~~Edges of openings in precast walls shall be reinforced with a minimum of one No. 5 bar continuous past corners sufficient to develop the bar.~~

A continuous tie or bond beam shall be provided at the roof line either as a part of the roof structure or part of the wall panels as described in the next paragraph below. This tie may be designed as the edge member of the roof diaphragm but, in any case, shall not be less than equivalent to two No. 6 bars continuous. A continuous tie equivalent to two No. 5 bars minimum shall also be provided either in the footing or with an enlarged section of the floor slab.

Wall panels of shear wall buildings shall be connected to columns or to each other in such a manner as to develop at least 75 percent of the horizontal wall steel. No more than ~~H~~ half of this continuous horizontal reinforcing shall ~~may~~ be concentrated in bond or tie beams at the top and bottom of the walls and at points of intermediate lateral support. If possible, cast in-place joints with reinforcing bars extending from the panels into the joint a sufficient distance to meet the splice requirements of ACI 318 Section 25.5.2 ~~12.15~~ for Class A shall be used. The reinforcing bars or welded tie details shall not be spaced over eight times the wall thickness vertically nor fewer than four used in the wall panel height. Where wall panels are designed for their respective overturning forces, the panel connections need not comply with the requirements of this paragraph.

~~Where splicing of reinforcement must be made at points of maximum stress or at closer spacing than permitted by ACI 318 Section 7.6, welding may be used when the entire procedure is suitable for the particular quality of steel used and the ambient conditions. Unless the welds develop 125 percent of the specified yield strength of the steel used, reinforcement in the form of continuous bars or fully anchored dowels shall be added to provide 25 percent excess steel area and the welds shall develop not less than the specified yield strength of the steel.~~

Exception: *Nonbearing, nonshear panels such as nonstructural architectural cladding panels or column covers are not required to meet the provisions of this Section.*

1905A.1.6 ~~1905A.1.10~~ ACI 318, Section 11.9. ~~14.9.~~ *Modify ACI 318 by adding Section 11.9 ~~14.9~~ as follows:*

11.9 ~~14.9~~ - Foundation Walls. *Horizontal reinforcing of concrete foundation walls for wood-frame or light-steel buildings shall consist of the equivalent of not less than one No. 5 bar located at the top and bottom of the wall. Where such walls exceed 3 feet (914 mm) in height, intermediate horizontal reinforcing shall be provided at spacing not to exceed 2 feet (610 mm) on center. Minimum vertical reinforcing shall consist of No. 3 bars at 24 inches (610 mm) on center.*

Where concrete foundation walls or curbs extend above the floor line and support wood-frame or light-steel exterior, bearing or shear walls, they shall be doweled to the foundation wall below with a minimum of No. 3 bars at 24 inches (610 mm) on center. Where the height of the wall above the floor line exceeds 18 inches (457 mm), the wall above and below the floor line shall meet the requirements of ACI 318 Section 11.6 and 11.7. ~~14.3.~~

1905A.1.7 ACI 318, Section 12.7.3. *Add Section 12.7.3.4 to ACI 318 as follows:*

~~1905A.1.20 ACI 318, Section 21.11.7.~~ *~~Modify ACI 318 Section 21.11.7 by adding Section 21.11.7.7 as follows:~~*

~~21.11.7.7 - Where boundary members are not required by ACI 318 Section 21.11.7.5, minimum reinforcement parallel to the edges of all diaphragms and the boundaries of all openings shall consist of twice the cross-sectional area of the minimum shear reinforcement required per linear foot of diaphragm.~~

12.7.3.4 *– At least two No. 5 bars in diaphragms having two layers of reinforcement in both directions and one No. 5 bar in diaphragms having a single layer of reinforcement in both directions shall be provided around openings larger than 12 inches in any dimension in addition to the minimum reinforcement required by Section 12.6.*

1905A.1.8 ~~1905A.1.21~~ *(Chapter 19, Section 1905.1.8)* **ACI 318, Section 17.2.3.** Modify ACI 318 Sections 17.2.3.4.2, 17.2.3.4.3(d) and 17.2.3.5.2 to read as follows:

17.2.3.4.2 - Where the tensile component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor tensile force associated with the same

load combination, anchors and their attachments shall be designed in accordance with 17.2.3.4.3. The anchor design tensile strength shall be determined in accordance with 17.2.3.4.4.

> ***Exception:*** *Anchors designed to resist wall out-of-plane forces with design strengths equal to or greater than the force determined in accordance with ASCE 7 Equation 12.11-1 or 12.14-10 and Section 1604A.8.2 of this code shall be deemed to satisfy Section 17.2.3.4.3(d).*

17.2.3.4.3(d) - The anchor or group of anchors shall be designed for the maximum tension obtained from design load combinations that include **E**, with **E** increased by Ω_0. The anchor design tensile strength shall *be calculated from* 17.2.3.4.4.

17.2.3.5.2 – Where the shear component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor shear force associated with the same load combination, anchors and their attachments shall be designed in accordance with 17.2.3.5.3. The anchor design shear strength for resisting earthquake forces shall be determined in accordance with 17.5.

Exceptions:

1. For the calculation of the in-plane shear strength of anchor bolts attaching wood sill plates of bearing or non-bearing walls of light-frame wood structures to foundations or foundation stem walls, the in-plane design shear strength in accordance with 17.5.2 and 17.5.3 need not be computed and 17.2.3.5.3 shall be deemed to be satisfied provided all of the following are met:

1.1. The allowable in-plane shear strength of the anchor is determined in accordance with AWC NDS Table 11E for lateral design values parallel to grain.

1.2. The maximum anchor nominal diameter is $^5/_8$ inches (16 mm).

1.3. Anchor bolts are embedded into concrete a minimum of 7 inches (178 mm).

1.4. Anchor bolts are located a minimum of $1^3/_4$ inches (45 mm) from the edge of the concrete parallel to the length of the wood sill plate.

1.5. Anchor bolts are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the wood sill plate.

1.6. The sill plate is 2-inch or 3-inch nominal thickness.

2. For the calculation of the in-plane shear strength of anchor bolts attaching cold-formed steel track of bearing or non-bearing walls of anchor bolts attaching cold-formed steel track of bearing or non-bearing walls of light-frame construction to foundations or foundation stem walls the in-plane design shear strength in accordance with 17.5.2 and 17.5.3 need not be computed and 17.2.3.5.3 shall be deemed to be satisfied provided all of the following are met:

2.1. The maximum anchor nominal diameter is $^{5}/_{8}$ inches (16 mm).

2.2. Anchors are embedded into concrete a minimum of 7 inches (178 mm).

2.3. Anchors are located a minimum of $1^{3}/_{4}$ inches (45 mm) from the edge of the concrete parallel to the length of the track.

2.4. Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.

2.5. The track is 33 to 68 mil designation thickness.

Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete shall be permitted to be determined in accordance with AISI S100 Section E3.3.1.

3. In light-frame construction, bearing or nonbearing walls, shear strength of concrete anchors less than or equal to ~~5/8~~ 1" inch [16mm] in diameter attaching sill plate or track to foundation or foundation stem wall need not satisfy 17.2.3.5.3(a) through (c) when the design strength of the anchors is determined in accordance with 17.5.2.1(c).

1905A.1.9 ~~1905A.1.1~~ ACI 318, Table 19.2.1.1 ~~Section 5.1.1.~~ *Modify ACI 318 Table 19.2.1.1 ~~Section 5.1.1~~ as follows.*

For concrete designed and constructed in accordance with this chapter, f'_c, shall not be less than 3,000 psi (20.7 MPa). Reinforced normal weight concrete with specified compressive strength higher than 8,000 psi (55 MPa) shall require prior approval of structural design method and acceptance criteria by the enforcement agency.

1905A.1.3 ACI 318, Section 8.13.5. *Replace ACI 318 Section 8.13.5 as follows:*

8.13.5 - Permanent burned clay or concrete tile fillers shall be considered only as forms and shall not be included in the calculations involving shear or bending moments.

The thickness of the concrete slab on the permanent fillers shall be designed as described in ACI 318 Section 8.13.6 as modified in Section 1905A.1.4.

1905A.1.4 ACI 318, Section 8.13.6. *Replace ACI 318 Section 8.13.6 as follows:*

8.13.6 - Where removable forms or fillers are used, the thickness of the concrete slab shall not be less than 1/12 of the clear distance between joists and in no case less than 2 1/2 inches (64 mm). Such slab shall be reinforced at right angles to the joists with at least the amount of reinforcement required for flexure, considering load concentrations, if any, but in no case shall the reinforcement be less than that required by ACI 318 Section 7.12.

1905A.1.5 ACI 318, Section 8.13. *Add Section 8.13.9 to ACI 318 as follows:*

8.13.9 Concrete bridging. Concrete bridging shall be provided as follows: one near the center of spans for 20 to 30 feet (6096 mm to 9144 mm) spans and two near the third points of spans over 30 feet (9144 mm). Such bridging shall be either:

(a) A continuous concrete web having a depth equal to the joist and a width not less than 3 1/2 inches (89 mm) reinforced with a minimum of one No. 4 bar in the top and bottom; or

(b) Any other concrete element capable of transferring a concentrated load of 1,000 pounds (4.5 kN) from any joist to the two adjacent joists.

Such bridging shall not be required in roof framing if an individual member is capable of carrying dead load plus a concentrated load of 1,500 pounds (6.7 kN) at any point.

1905A.1.7 ACI 318, Section 12.14.3. *Add Section 12.14.3.6 to ACI 318 as follows:*

12.14.3.6 - Welded splices and mechanical connections shall maintain the clearance and coverage requirements of ACI Sections 7.6 and 7.7.

1905A.1.9 ACI 318, Section 14.5 - Empirical design method. *Not permitted by DSA.*

1905A.1.12 ACI 318, Section 17.5.1. *Modify ACI 318 Section 17.5.1 by adding Sections 17.5.1.1 and 17.5.1.2 as follows:*

17.5.1.1 - Full transfer of horizontal shear forces may be assumed when all of the following are satisfied:

1. Contact surfaces are clean, free of laitance, and intentionally roughened to full amplitude of approximately 1/4 inch (6.4 mm),

2. Minimum ties are provided in accordance with ACI 318 Section 17.6,

3. Web members are designed to resist total vertical shear, and

4. All shear reinforcement is fully anchored into all interconnected elements.

17.5.1.2 - If any of the requirements of ACI 318 Section 17.5.1.1 is not satisfied, horizontal shear shall be investigated in accordance with ACI 318 Section 17.5.3 or 17.5.4.

1905.1.2 ACI 318, Section 18.2.1. Modify ACI 318 Sections 18.2.1.2 and 18.2.1.6 to read as follows:

18.2.1.2 – Structures assigned to Seismic Design Category A shall satisfy requirements of Chapters 1 through 17 and 19 through 26; Chapter 18 does not apply. Structures assigned to *Seismic Design Category* B, C, D, E or F also shall satisfy 18.2.1.3 through 18.2.1.7, as applicable. *Except for structural elements of plain concrete complying with Section 1905.1.7 of the International*

~~*Building Code, structural elements of plain concrete are prohibited in structures assigned to Seismic Design Category C, D, E or F.*~~

~~18.2.1.6 – Structural systems designated as part of the seismic-force-resisting system shall be restricted to those *permitted by ASCE 7*. Except for *Seismic Design Category* A, for which Chapter 18 does not apply, the following provisions shall be satisfied for each structural system designated as part of the seismic-force-resisting system, regardless of the *Seismic Design Category*:~~

~~(a) Ordinary moment frames shall satisfy 18.3.~~
~~(b) Ordinary reinforced concrete structural walls *and ordinary precast structural walls* need not satisfy any provisions in Chapter 18.~~
~~(c) Intermediate moment frames shall satisfy 18.4.~~
~~(d) Intermediate precast *structural* walls shall satisfy 18.5.~~
~~(e) Special moment frames shall satisfy 18.6 through 18.9.~~
~~(f) Special structural walls shall satisfy 18.10.~~
~~((g) Special structural walls constructed using precast concrete shall satisfy 18.11.~~

~~All special moment frames and special structural walls shall also satisfy 18.2.4 through 18.2.8.~~

1905A.1.18 ACI 318, Section 21.9.4. *Modify ACI 318 by adding Section 21.9.4.6 as follows:*

21.9.4.6 - Walls and portions of walls with $P_u > 0.35P_o$ shall not be considered to contribute to the calculated strength of the structure for resisting earthquake-induced forces. Such walls shall conform to the requirements of ACI 318 Section 21.13.

1905A.1.10 1905A.1.16 (*Chapter 19, Section 1905.1.3)* **ACI 318, Section 18.5. *[DSA-SS]*** Modify ACI 318, Section 18.5, by *replacing Section 18.5.2.1*, adding new Section 18.5.2.2 and renumbering existing Sections 18.5.2.2 and 18.5.2.3 to become 18.5.2.3 and 18.5.2.4, respectively:

18.5.2.1 – In connections between wall panels, yielding shall be restricted to steel elements or reinforcement. In connections between wall panels and the foundation, they shall be designed per Section 1616A.1.16.

18.5.2.2 – Connections that are designed to yield shall be capable of maintaining 80 percent of their design strength at deformation induced by the design displacement or shall use type 2 mechanical splices.

18.5.2.3 – Elements of the connection that are not designed to yield shall develop at least 1.5 S_y.

18.5.2.4 – In structures assigned to SDC D, E or F, Wall piers shall be designed in accordance with 18.10.8 or 18.14 in ACI 318.

1905A.1.11 ***~~1905A.1.17~~*** ***ACI 318, Section*** ***18.10.6.5*** ***~~21.9.2.2.~~*** *Modify ACI 318, Section 18.10.6.5 ~~21.9.2.2~~ by adding the following:*

(c) Where boundary members are not required by ACI 318 Section 18.10.6.2 or 18.10.6.3 ~~21.9.6,~~ minimum reinforcement parallel to the edges of all structural walls and the boundaries of all openings shall consist of twice the cross-sectional area of the minimum shear reinforcement required per lineal foot of wall. Horizontal extent of boundary element shall be ~~per~~ in accordance with ACI 318 Section 18.10.6.4 (a), (b) and (c). ~~21.9.6.4 (a) & (b).~~

~~**1908.1.4 ACI 318, Section 18.11.** Modify ACI 318, Section 18.11.2.1, to read as follows:~~

~~18.11.2.1 – Special structural walls constructed using precast concrete shall satisfy all the requirements of 18.10 for cast-in-place special structural walls in addition to Section 18.5.2.~~

1905A.1.12 ***~~1905A.1.19~~*** ***ACI 318, Section*** ***18.12.6*** ***~~21.11.4.~~*** *Add Section 18.12.6.2 to ACI 318 as follows: ~~Modify ACI 318 Section 21.11.4 by adding the following:~~*

18.12.6.2 *Collector and boundary elements in topping slabs placed over precast floor and roof elements shall not be less than 3 inches (76 mm) or 6 d_b thick, where d_b is the diameter of the largest reinforcement in the topping slab.*

1905A.1.13 *(Chapter 19, Section 1905.1.5)* ***~~1905.1.5~~*** **ACI 318, Section 18.13.1.1.** Modify ACI 318, Section 18.13.1.1, to read as follows:

18.13.1.1 – Foundations resisting earthquake-induced forces or transferring earthquake-induced forces between a structure and ground shall comply with the requirements of Section 18.13 and other applicable provisions of ACI 318 *unless modified by Chapter 18A of the California Building Code.*

~~**1905.1.6 ACI 318, Section 14.6.** Modify ACI 318, Section 14.6, by adding new Section 14.6.2 to read as follows:~~

~~*14.6.2.1 – Detailed plain concrete structural walls.*~~
~~*14.6.2.1 – Detailed plain concrete structural walls are walls conforming to the requirements of ordinary structural plain concrete walls and 14.6.2.2.*~~
~~*14.6.2.2 – Reinforcement shall be provided as follows:*~~
~~*(a) Vertical reinforcement of at least 0.20 square inch (129 mm2) in cross-sectional area shall be provided continuously from support to support at each corner, at each side of each opening and at the ends of walls. The continuous vertical bar required beside an opening is permitted to substitute for one of the two No. 5 bars required by 14.6.1.*~~
~~*(b) Horizontal reinforcement at least 0.20 square inch (129 mm2) in cross-sectional area shall be provided:*~~

~~*1. Continuously at structurally connected roof and floor levels and at the top of walls;*~~
~~*2. At the bottom of load-bearing walls or in the top of foundations where doweled to the wall; and*~~
~~*3. At a maximum spacing of 120 inches (3048 mm).*~~

~~*Reinforcement at the top and bottom of openings, where used in determining the maximum spacing specified in Item 3 above, shall be continuous in the wall.*~~

.

~~**1905.1.7 ACI 318, Section 14.1.4.** Delete ACI 318, Section 14.1.4, and replace with the following:~~
~~*14.1.4 – Plain concrete in structures assigned to Seismic Design Category C, D, E or F.*~~
~~*14.1.4.1 – Structures assigned to Seismic Design Category C, D, E or F shall not have elements of structural plain concrete, except as follows:*~~

~~*(a) Structural plain concrete basement, foundation or other walls below the base are permitted in detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls. In dwellings assigned to Seismic Design Category D or E, the height of the wall*~~

~~*shall not exceed 8 feet (2438 mm), the thickness shall not be less than 71/2 inches (190 mm), and the wall shall retain no more than 4 feet (1219 mm) of unbalanced fill. Walls shall have reinforcement in accordance with 14.6.1.*~~

~~*(b) Isolated footings of plain concrete supporting pedestals or columns are permitted, provided the projection of the footing beyond the face of the supported member does not exceed the footing thickness.*~~

~~***Exception:*** *In detached one- and two-family dwellings three stories or less in height, the projection of the footing beyond the face of the supported member is permitted to exceed the footing thickness.*~~

~~*(c) Plain concrete footings supporting walls are permitted, provided the footings have at least two continuous longitudinal reinforcing bars. Bars shall not be smaller than No. 4 and shall have a total area of not less than 0.002 times the gross cross-sectional area of the footing. For footings that exceed 8 inches (203 mm) in thickness, a minimum of one bar shall be provided at the top and bottom of the footing. Continuity of reinforcement shall be provided at corners and intersections.*~~

~~***Exceptions:***~~

~~*1. In Seismic Design Category A, B, and C, detached one- and two-family dwellings three stories or less in height and constructed with stud-bearing walls, plain concrete footings without longitudinal reinforcement supporting walls are permitted.*~~

~~*2. For foundation systems consisting of a plain concrete footing and a plain concrete stemwall, a minimum of one bar shall be provided at the top of the stemwall and at the bottom of the footing.*~~

~~*3. Where a slab on ground is cast monolithically with the footing, one No. 5 bar is permitted to be located at either the top of the slab or bottom of the footing.*~~

1905A.1.14 ACI 318, Table 21.2.2. *Replace Table 21.2.2 as follows.:*

Table 21.2.2 – Strength reduction factor φ for moment, axial force, or combined moment and axial force

Net tensile	Classification	φ

strain ε_t		Type of transverse reinforcement			
		Spirals conforming to 25.7.3		Other	
$\varepsilon_t \le \varepsilon_{ty}$	Compression-controlled	0.75	(a)	0.65	(b)
$\varepsilon_{ty} < \varepsilon_t < 0.005$	Transition[1][2]	$0.75 + 0.15\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^{*}\cancel{0.005} - \varepsilon_{ty}}$	(c)	$0.65 + 0.25\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^{*}\cancel{0.005} - \varepsilon_{ty}}$	(d)
$\varepsilon_t \ge 0.005$	Tension-controlled[3]	0.9	(e)	0.9	(f)

[1]For sections classified as transition, it shall be permitted to use φ corresponding to compression-controlled sections.

[2] ε_t^{*} is the greater of net tensile strain calculated for $P_n = 0.1A_g f'_c$ and 0.005.

*[3] For sections with factored axial compression force $P_u \ge 0.1A_g f'_c$, **φ** shall be calculated using equation (c) or (d) for sections classified as transition, as applicable,*

1905A.1.15 ~~1905A.1.15~~ ACI 318, Section 24.2.1 ~~18.2.~~ *Add Section 24.2.1.1 ~~18.2.7~~ to ACI 318 as follows:*

24.2.1.1 *~~18.2.7~~ - Span to Depth Ratio. Prestressed Beam and Slab Span to depth ratios for continuous prestressed concrete members shall not exceed the following, except when calculations of deflections and vibration effects prove that greater values may be used without adverse effects:*

Beams ……30
One-way Slabs ……40
Two-way Floor Slabs…… 40
Two-way Roof Slabs ……44

These ratios should be decreased for special conditions such as heavy loads and simple spans.

Maximum deflection criteria shall be in accordance with ACI 318 Sections 24.2.2 ~~9.5~~

1905A.1.16 ~~1905A.1.2~~ ACI 318, Section ~~5.6.2.1~~ 26.12.2.1(a). *Replace ACI 318 Section ~~5.6.2.1~~ 26.12.2.1(a) by the following.*

26.12.2.1(a) ~~5.6.2.1~~ *Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards (345m^3) of concrete, or not less than once for each 2,000 square feet (186 m^2) of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.*

SECTION 1906A
STRUCTURAL PLAIN CONCRETE

Not permitted by DSA-SS.

~~**1906.1 Scope.** The design and construction of structural plain concrete, both cast-in-place and precast, shall comply with the minimum requirements of ACI 318, as modified in Section 1905.~~

~~**Exception:** For Group R-3 occupancies and buildings of other occupancies less than two stories above grade plane of light-frame construction, the required footing thickness of ACI 318 is permitted to be reduced to 6 inches (152 mm), provided that the footing does not extend more than 4 inches (102 mm) on either side of the supported wall.~~

…

SECTION 1908A
SHOTCRETE

1908*A*.1 General. Shotcrete is mortar or concrete that is pneumatically projected at high velocity onto a surface. Except as specified in this section, shotcrete shall conform to the requirements of this chapter for ~~plain or~~ reinforced concrete *and the provisions of ACI 506. The specified compressive strength of shotcrete shall not be less than 3,000 psi (20.69 MPa).*

Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by sand blasting, and just prior to receiving shotcrete, shall be thoroughly cleaned of all debris, dirt and dust. Concrete and masonry shall be wetted before shotcrete is deposited, but not so wet as to overcome suction. Sand for sand blasting shall be clean, sharp and uniform in size, with no particles that will pass a 50-mesh screen.

…

1908*A*.3 Aggregate. Coarse aggregate, if used, shall not exceed $^3/_4$ inch (19.1 mm).

For shear walls, when total rebar in any direction is more than 0.31 in^2 / ft. or rebar size is larger than # 5, shotcrete shall conform to course aggregate grading No. 2 per Table 1.1 of ACI 506.

…

1908*A*.5 Preconstruction tests. ~~Where preconstruction test are required by Section 1908.4, a~~ *A* test panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. The sample panel shall be representative of the project and simulate job conditions as closely as possible. The panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same nozzleman and with

the same concrete mix design that will be used on the project. The equipment used in preconstruction testing shall be the same equipment used in the work requiring such testing, unless substitute equipment is *approved* by the *building official*. Reports of preconstruction tests shall be submitted to the *building official* as specified in Section 1704A.5.

…

1908*A*.7 Joints. Except where permitted herein, unfinished work shall not be allowed to stand for more than 30 minutes unless edges are sloped to a thin edge. For structural elements that will be under compression and for construction joints shown on the approved construction documents, square joints are permitted. Before placing additional material adjacent to previously applied work, sloping and square edges shall be cleaned and wetted.

The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or sand blasting. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.

…

1908*A*.10 Strength tests. Strength tests for shotcrete shall be made *in accordance with ASTM C1604* ~~*standards*~~ by an approved agency on specimens that are representative of the work and which have been water soaked for at least 24 hours prior to testing. When the maximum-size aggregate is larger than $^3/_8$ inch (9.5 mm), specimens shall consist of not less than three 3-inch-diameter (76 mm) cores or 3-inch (76 mm) cubes. When the maximum-size aggregate is $^3/_8$ inch (9.5 mm) or smaller, specimens shall consist of not less than 2-inch-diameter (51 mm) cores or 2-inch (51 mm) cubes.

1908*A*.10.1 Sampling. Specimens shall be taken from the in-place work or from test panels, and shall be taken at least once each shift, but not less than one for each 50 cubic yards (38.2 m^3) of shotcrete.

1908*A*.10.2 Panel criteria. When the maximum-size aggregate is larger than $^3/_8$ inch (9.5 mm), the test panels shall have minimum dimensions of 18 inches by 18 inches (457 mm by 457 mm). When the maximum-size aggregate is $^3/_8$ inch (9.5 mm) or smaller, the test panels shall have minimum dimensions of 12 inches by 12 inches (305 mm by 305 mm). Panels shall be shot in the same position as the work, during the course of the work and by the nozzlemen doing the work. The conditions under which the panels are cured shall be the same as the work. *Approval from the enforcement agency shall be obtained prior to performing the test panel method.*

…

1908A.11 ~~***1910A.11***~~ ***Forms and Ground Wires for Shotcrete.*** *Forms for shotcrete shall be substantial and rigid. Forms shall be built and placed so as to permit the escape of air and rebound.*

Adequate ground wires, which are to be used as screeds, shall be placed to establish the thickness, surface planes and form of the shotcrete work. All surfaces shall be rodded to these wires.

1908A.12 ~~***1910A.12***~~ ***Placing.*** *Shotcrete shall be placed in accordance with ACI 506.*

(Relocated to Section 2514) ~~**SECTION 1911A**~~
~~**REINFORCED GYPSUM CONCRETE**~~

~~**1911*A*.1 General.** Reinforced gypsum concrete shall comply with the requirements of ASTM C 317 and ASTM C 956. *Reinforced gypsum concrete shall be considered as an alternative system.*~~

...

(Amendments in the CBC 2013 Sections 1908A and 1909A are deleted except those relocated as noted below, since model code deleted those sections)

(Relocated to Section 1616A.1.20) ~~***1908A.1.1 Power actuated fasteners.*** *Power actuated fasteners qualified in accordance with ICC-ES AC 70 shall be deemed to satisfy the requirements of this section.*~~

~~*Power actuated fasteners shall be permitted in seismic shear for components exempt from permit requirements by Section 1616A.1.18 of this code and for interior nonbearing non-shear wall partitions. Power actuated fastener shall not be used to anchor exterior cladding or curtain wall systems.*~~

...

(Relocated to Section 1616A.1.19) ~~***1909A.1.1 Specialty inserts.*** *Specialty inserts, including cast-in-place specialty inserts, tested in accordance with ICC-ES AC 193 shall be deemed to satisfy the requirements of this section.*~~

...

...

SECTION 1909A

RESERVED

...

SECTION 1910A 1913A

CONCRETE, REINFORCEMENT AND ANCHOR TESTING

1910A.1 ~~***1913A.1***~~ ***Cementitious material.*** *The concrete supplier shall furnish to the enforcement agency certification that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ASTM C 150 for portland cement and ASTM C 595 or ASTM C 1157*

for blended hydraulic cement, whichever is applicable. When a mineral admixture or ground granulated blast-furnace slag is proposed for use, the concrete supplier shall furnish to the enforcement agency certification that they have been manufactured and tested in compliance with ASTM C 618 or ASTM C 989, whichever is applicable. The concrete producer shall provide copies of the cementitious material supplier's Certificate of Compliance that represents the materials used by date of shipment for concrete. Cementitious materials without Certification of Compliance shall not be used.

1910A.2 ***~~1913A.2~~*** ***Tests of reinforcing bars****. ~~Where~~ ~~s~~Samples shall be ~~are~~ taken from bundles as delivered from the mill, with the bundles identified as to heat number and ~~provided~~ the accompanying mill certificate. ~~analyses accompany the report, o~~ One tensile test and one bend test shall be made from a sample ~~specimen~~ from each 10 tons (9080 kg) or fraction thereof of each size of reinforcing steel.*

Where positive identification of the heat number cannot be made or where random samples are to be taken, one series of tests shall be made from each 2 1/2 tons (2270 kg) or fraction thereof of each size of reinforcing steel.

Tests of reinforcing bars may be waived by the structural engineer with the approval of the Building Official for one-story buildings or non-building structures provided they are identified in the construction documents and certified mill test reports are provided to the inspector of record for each shipment of such reinforcement.

1910A.3 ***~~1913A.3~~*** ***Tests for prestressing steel and anchorage****. All wires or bars of each size from each mill heat and all strands from each manufactured reel to be shipped to the site shall be assigned an individual lot number and shall be tagged in such a manner that each lot can be accurately identified at the jobsite. Each lot of tendon and anchorage assemblies and bar couplers to be installed shall be likewise identified.*

The following samples of materials and tendons selected by the engineer or the designated testing laboratory from the prestressing steel at the plant or jobsite shall be furnished by the contractor and tested by an approved independent testing agency:

1. *For wire, strand or bars, 7-foot-long (2134 mm) samples shall be taken of the coil of wire or strand reel or rods. A minimum of one random sample per 5,000 pounds (2270 kg) of each heat or lot used on the job shall be selected.*

2. *For prefabricated prestressing tendons other than bars, one completely fabricated tendon 10 feet (3048 mm) in length between grips with anchorage assembly at one end shall be furnished for each size and type of tendon and anchorage assembly.*

   Variations of the bearing plate size need not be considered.

   The anchorages of unbonded tendons shall develop at least 95 percent of the minimum specified ultimate strength of the pre-stressing steel. The total elongation of the tendon under ultimate load shall not be less than 2 percent measured in a minimum gage length of 10 feet (3048 mm).

   Anchorages of bonded tendons shall develop at least 90 percent of the minimum specified strength of the prestressing steel tested in an unbonded state. All couplings shall develop at least 95 percent of the minimum specified strength of the prestressing steel and shall not reduce the elongation at rupture below the requirements of the tendon itself.

3. If the prestressing tendon is a bar, one 7-foot (2134 mm) length complete with one end anchorage shall be furnished and, in addition, if couplers are to be used with the bar, two 4-foot (1219 mm) lengths of bar fabricated to fit and equipped with one coupler shall be furnished.

4. Mill tests of materials used for end anchorages shall be furnished. In addition, at least one Brinnell hardness test shall be made of each thickness of bearing plate.

1910A.4 ***~~1913A.4~~*** ***Composite construction cores****. Cores of the completed composite concrete construction shall be taken to demonstrate the shear strength along the contact surfaces. The cores shall be tested when the cast-in-place concrete is approximately 28 days old and shall be tested by a shear loading parallel to the joint between the precast concrete and the cast-in-place concrete. The minimum unit shear strength of the contact surface area of the core shall not be less than 100 psi (689 kPa).*

At least one core shall be taken from each building for each 5,000 square feet (465m2) of area of composite concrete construction and not less than three cores shall be taken from each project. The architect or structural engineer in responsible charge of the project or his or her representative shall designate the location for sampling.

~~***1913A.5 Tests of shotcrete.*** *Testing of shotcrete shall follow the provisions of Section 1910A and the general requirements of ACI 318 Section 5.6.*~~

~~***1913A.6 Gypsum field tests.*** *Field tests shall be made during construction to verify gypsum strength. One sample consisting of three specimens shall be made for each 5,000 square feet (465 m^2) or fraction thereof of all gypsum poured, but not less than one sample shall be taken from each half day's pour.*~~

1910A.5 ***~~1913A.7~~*** ***Tests for Post-Installed Anchors in Concrete.*** *When post-installed anchors are used in lieu of cast-in place bolts, the installation verification test loads, frequency, and acceptance criteria shall be in accordance with this section.*

1910A.5.1 ***~~1913A.7.1~~*** ***General.*** *Test loads or torques and acceptance criteria shall be shown on the construction documents.*

If any anchor fails testing, all anchors of the same type shall be tested, which are installed by the same trade, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency.

1910A.5.2 ***~~1913A.7.5~~*** ***Testing Procedure.*** *The test procedure shall be as permitted by an approved test report using criteria adopted in this code. All ~~other~~ post-installed anchors shall be tension tested.*

> ***Exception [DSA-SS]****: Torque controlled post installed anchors and screw type anchors shall be permitted to be tested using torque based on an approved test report using criteria adopted in this code.*

Alternatively, the ~~M~~manufacturer's recommendation for testing may be approved by the enforcement agency based on an approved test report using criteria adopted in this code.

1910A.5.3 ***~~1913A.7.3~~*** ***Test Frequency.*** *When post-installed anchors are used for sill plate bolting applications, 10 percent of the anchors shall be tested.*

When post-installed anchors are used for other structural applications, all such anchors shall be tested.

When post-installed anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group, including at least one-half the anchors in each group, shall be tested.

The testing of the post-installed anchors shall be done in the presence of the special inspector and a report of the test results shall be submitted to the enforcement agency.

Exceptions:

1. *Undercut anchors that allow visual confirmation of full set shall not require testing.*

2. *Where the factored design tension on anchors is less than 100 lbs. and those anchors are clearly noted on the approved construction documents, only 10 percent of those anchors shall be tested.*

3. *Where adhesive anchor systems are used to install reinforcing dowel bars in hardened concrete, only 25% of the dowels shall be tested if all of the following conditions are met:*

   a. *The dowels are used exclusively to transmit shear forces across joints between existing and new concrete.*
   b. *The number of dowels in any one member equals or exceeds 12.*
   c. *The dowels are uniformly distributed across seismic force resisting members (such as shear walls, collectors and diaphragms).*

   Anchors to be tested shall be selected at random by the special inspector/Inspector Of Record (IOR).

4. *Testing of shear dowels across cold joints in slabs on grade, where the slab is not part of the lateral force-resisting system shall not be required.*

5. *Testing is not required for power actuated fasteners used to attach tracks of interior non-shear wall partitions for shear only, where there are at least three fasteners per segment of track.*

1910A.5.4 ***~~1913A.7.2~~*** ***Test Loads.*** *Required test loads shall be determined by one of the following methods:*

1. Twice the maximum allowable tension load or one and a quarter (1- 1/4) times the maximum design strength of anchors as provided in an approved test report using criteria adopted in this code or determined in accordance with Chapter 17 ~~Appendix D~~ of ACI 318.

Tension test load need not exceed 80% of the nominal yield strength of the anchor element (= 0.8 A_{se} f_{ya}).

2. The manufacturer's recommended installation torque based on an approved test report using criteria adopted in this code.

1910A.5.5 ***~~1913A.7.4~~*** ***Test Acceptance Criteria.*** *Acceptance criteria for post-installed anchors shall be based on an approved test report using criteria adopted in this code. Field tests shall satisfy the following minimum requirements.*

1. Hydraulic Ram Method:

Anchors tested with a hydraulic jack or spring loaded ~~devices~~ apparatus shall maintain the test load for a minimum of 15 seconds and shall exhibit no discernable movement during the tension test, e.g., as evidenced by loosening of the washer under the nut.

For adhesive anchors, where other than bond is being tested, the testing apparatus support ~~device~~ shall not be located within 1.5 times the anchor's embedment depth to avoid restricting the concrete shear cone type failure mechanism from occurring.

2. Torque Wrench Method:

Torque controlled post installed ~~A~~ anchors tested with a calibrated torque wrench shall ~~must~~ attain the specified torque within ½ turn of the nut; or one-quarter (1/4) turn of the nut for a 3/8 in. sleeve anchor only.

.

~~Exceptions:~~

~~a. Wedge or Sleeve type:~~
~~One-quarter (1/4) turn of the nut for a 3/8 in. sleeve anchor only.~~

*~~b.~~ **[DSA-SS]** Screw~~Threaded~~ ~~T~~type~~:~~ anchors tested with a calibrated torque wrench shall attain the specified torque within ~~O~~one-quarter (1/4) turn of the screw after initial seating of the screw head.*

SECTION 1911A ~~1914A~~

EXISTING CONCRETE STRUCTURES

1911A.1 ~~1914A.1~~ Existing Concrete Structures.

The structural use of existing concrete with a core strength less than 1,500 psi (10.3MPa) is not permitted in rehabilitation work.

For existing concrete structures, sufficient cores shall be taken at representative locations throughout the structure, as designated by the architect or structural engineer, so that knowledge will be had of the in-place strength of the concrete. At least three cores shall be taken from each building for each 4,000 square feet (372 m2) of floor area, or fraction thereof. Cores shall be at least 4 inches (102 mm) in diameter. Cores as small as 2.75 inches (70 mm) in diameter may be allowed by the enforcement agency when reinforcement is closely spaced and the coarse aggregate does not exceed 3/4 inch (19 mm).

1911A.2 ~~1914A.2~~ Crack Repair by Epoxy Injection. *Crack Repair of concrete and masonry member by epoxy injection shall conform to all requirements of ACI 503.7.*

1911A.3 ~~1914A.3~~ Concrete Strengthening by Externally Bonded Fiber Reinforced Polymer (FRP).
Design and construction of externally bonded FRP systems for strengthening concrete structures shall be in accordance with ACI 440.2R.

Exceptions: 1) Near-Surface Mounted (NSM) FRP bars shall not be permitted.

2) Strengthening of shear walls and diaphragms (including chords and collectors) shall be considered as an alternative system.

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter			
Adopt entire chapter as amended	**X**	**X**	
Adopt only those sections listed below			
PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments

Design capacities, reliability, serviceability of FRP materials shall be permitted to be established in accordance with ICC-ES AC 125. Minimum inspection requirements of FRP composite systems shall be in accordance with ICC-ES AC 178.

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

CHAPTER 20

ALUMINUM

Adopt and/or codify chapter as amended below:

Adopt entire chapter			
Adopt entire chapter as amended	**X**	**X**	
Adopt only those sections listed below			

(All existing California amendments that are not revised below shall continue without change)

SECTION 2001

GENERAL

2001.1 Scope. This chapter shall govern the quality, design, fabrication and erection of aluminum.

SECTION 2002

MATERIALS

2002.1 General. Aluminum used for structural purposes in buildings and structures shall comply with AA ASM 35 and AA ADM 1. The nominal loads shall be the minimum design loads required by Chapter 16.

SECTION 2003 - INSPECTION

2003.1 Inspection. [DSA –SS & DSA –SS/CC] *Inspection of Aluminum shall be required in accordance with the requirements for steel in Chapter 17A.*

(All existing amendments are continued without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 21

MASONRY

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	-	X	
Adopt only those sections listed below			
2101.1.1		X	
2101.1.2		X	
2101.1.3		X	
2101.1.4		X	
2114		X	
~~*2114.1*~~		~~X~~	
~~*2114.2*~~		~~X~~	
~~*2114.3*~~		~~X~~	
~~*2114.4*~~		~~X~~	
~~*2114.5*~~		~~X~~	
~~*2114.6.1*~~		~~X~~	
~~*2114.7*~~		~~X~~	
~~*2114.8*~~		~~X~~	
~~*2114.9.1*~~		~~X~~	
~~*2114.9.2.1*~~		~~X~~	
~~*2114.9.3*~~		~~X~~	
~~*2114.10*~~		~~X~~	
~~*2114.11.1*~~		~~X~~	
~~*2114.11.2*~~		~~X~~	
~~*2114.12*~~		~~X~~	
~~*2114.13*~~		~~X~~	
~~*2114.14*~~		~~X~~	

(All existing California amendments that are not revised below shall continue without change)

SECTION 2101

GENERAL

2101.1 Scope. This chapter shall govern the materials, design, construction and quality of masonry.

2101.1.1 Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC)

Community college buildings regulated by the Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC) as listed in Section 1.9.2.2.

2101.1.2 Amendments in this chapter. *DSA-SS/CC adopts this chapter and all amendments.*

Exception: *Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC) amendments appear in this chapter preceded with the appropriate acronym, as follows:*

[DSA-SS/CC] *- For community college buildings listed in Section 1.9.2.2.*

2101.1.3 Reference to other chapters. [DSA-SS/CC] *Where reference within this chapter is made to sections in Chapters 17 and 18, the provisions in Chapters 17A and 18A respectively shall apply instead.*

2101.1.4 Amendments. [DSA-SS/CC] *See Section 2114 for additional requirements.*

…

SECTION 2114

ADDITIONAL REQUIREMENTS FOR COMMUNITY COLLEGES [DSA-SS/CC]

2114.1 General. *In addition to the provisions of this chapter, the following requirements shall apply to community college buildings regulated by the Division of the State Architect- Structural Safety/Community Colleges (DSA-SS/CC).*

2114.1.1 Prohibitions. *The following design, systems and materials are not permitted by DSA:*

1. Unreinforced masonry

2. Autoclaved aerated concrete (AAC) masonry

3. Empirical design of masonry

4. Ordinary reinforced masonry shear walls

5. Intermediate reinforced masonry shear walls

6. Prestressed masonry shear walls

7. Direct design of masonry

~~***2114.2 Mortar.*** *Type S mortar conforming to ASTM C 270 shall be used for glass unit masonry.*~~

~~***2114.3 Additives and Admixtures.***~~

~~***2114.3.1 General.*** *Additives and admixtures to mortar or grout shall not be used unless approved*~~

~~by the enforcement agency.~~

~~2114.3.2 Antifreeze compounds.~~ *~~Antifreeze liquids, chloride salts or other such substances shall not be used in mortar or grout.~~*

2114.2 ***~~2114.3.3~~*** ***Air entrainment.*** *Air-entraining substances shall not be used in ~~mortar or~~ grout unless tests are conducted to determine compliance with the requirements of this code.*

~~2114.4 Tolerances.~~ *~~The maximum thickness of the initial bed joint in fully grouted masonry walls shall not exceed 11/4 in. (31.7 mm).~~*

~~2114.5 Glass unit masonry~~ *~~All mortar for glass unit masonry contact surfaces shall be treated to ensure adhesion between mortar and glass.~~*

2114.3 ***~~2114.6~~*** ***Grouted masonry.***

2114.3.1 ***~~2114.6.1~~*** ***General conditions.*** *Prior to grouting, the grout space shall be clean so that all spaces to be filled with grout do not contain mortar projections greater than ¼ inch (6.4 mm), mortar droppings and other foreign material.*

All cells shall be solidly filled with grout~~, except as provided in Section 2114.14~~.

Exception: (Relocated from 2013 CBC 2114.13) Reinforced hollow-unit masonry laid in running bond used for freestanding site walls ~~fences and~~ or interior nonbearing non-shear wall partitions may be ~~of hollow-unit masonry construction~~ grouted only in cells containing vertical and horizontal reinforcement.

Reinforcement and embedded items shall be clean, properly positioned and securely anchored against moving prior to grouting. Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent dislocation during grouting. Reinforcement, embedded items and bolts shall be solidly embedded in grout. Anchor bolts in the face shells of hollow masonry units shall be positioned to maintain a minimum of 1/2 inch of grout between the bolt and the face shell.

The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour. At the time of laying, all masonry units shall be free of dust and dirt.

Grout pours greater than 12 inches (300 mm) in height shall be consolidated by mechanical vibration during placement to fill the grout space before loss of plasticity, and reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours less than 12 inches in height may be puddled.

Between grout pours or where grouting has been stopped more than an hour, a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with the grout stopping a minimum of 11/2 inches (38 mm) below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of 1/2 inch (12.7 mm) below the top of the masonry.

The construction documents shall completely describe grouting procedures, subject to approval of DSA.

2114.4 ***~~2114.7~~*** ***Aluminum equipment.*** *Grout shall not be handled nor pumped utilizing aluminum*

equipment unless it can be demonstrated with the materials and equipment to be used that there will be no deleterious effect on the strength of the grout.

2114.5 ***~~2114.8~~*** ***Specified compressive strength.*** *The specified compressive strength, f 'm , assumed in design shall be not less than 2,000 ~~1,500~~ psi (10.34 MPa) for all masonry construction using materials and details of construction required herein. Testing of the constructed masonry shall be provided in accordance with Section 2114.6.2 ~~2114.9.3~~.*

In no case shall the f 'm assumed in design exceed 3,000 psi (20.68 MPa).

2114.6 ***~~2114.9~~*** ***Additional testing requirements.***

2114.6.1 ***~~2114.9.1~~*** ***Mortar and grout tests.*** *At the beginning of all masonry work, at least one test sample of the mortar ~~and grout~~ shall be taken on three successive working days and at least at one-week intervals thereafter. Where mortar is based on a proportion specification, mortar shall be sampled and tested during construction in accordance with ASTM C780 Annex 4 and 5 to verify the proportions specified in ASTM C270, Table 2. Where mortar is based on a property specification, mortar shall be laboratory prepared and tested prior to construction in accordance with ASTM C780 to verify the properties specified in ASTM C270, Table 1 and field sampled and tested during construction in accordance with ASTM C780 to verify the proportions with the laboratory tests. Mortar sampling and testing is not required for approved preblended mortars in conformance with ASTM C270.*

Samples of grout shall be taken for each mix design, each day grout is placed, and not less than every 5,000 square feet of masonry wall area. The grout *~~They~~ shall meet the minimum strength requirement given in ASTM C476/TMS 602 Section 2.2. ~~Sections 2103A.9 and 2103A.13~~ for mortar and grout. ~~respectively.~~ Test specimens for ~~mortar and~~ grout shall be made as set forth in ~~ASTM C 1586 and~~ ASTM C 1019.*

Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official. ~~or whenever in the judgment of the architect, structural engineer or the enforcement agency such tests are necessary to determine the quality of the material.~~ When the prism test method ~~of Section 2105A.2.2.2~~ is used during construction, the tests in this section are not required.

Exception: *For non-bearing non-shear masonry walls not exceeding total wall height of 12' above wall base, mortar test shall be permitted to be limited to those at the beginning of masonry work for each mix design.*

~~2114.9.2 Prism test method.~~

~~***2114.9.2.1 Number of prisms per test.*** *Prior to the start of construction, three prisms shall be constructed and tested in accordance with ASTM C 1314. A set of three masonry prisms shall be built during construction in accordance with ASTM C 1314 for each 5,000 square feet (465 m2) of wall area, but not less than one set of three prisms for the project. Each set of prisms shall equal or exceed f 'm.*~~

2114.6.2 ~~***2114.9.3***~~ ***Masonry core testing.*** *Not less than two cores shall be taken from each building for each 5,000 square feet (465 m^2)* ~~*of the greater*~~ *of the masonry wall area* ~~*or the floor area*~~ *or fraction thereof.* ~~*The architect or structural engineer in responsible charge of the project or his/her representative or the inspector of record shall select the areas for sampling.*~~ *The* ~~*inspector of record*~~ *approved agency shall perform or observe the coring of the masonry walls and sample locations shall be subject to approval of the registered design professional.*

Core~~s~~ samples shall comply with the following:

1. *Cored no sooner than 7 days after grouting of the selected area;*
2. *~~b~~ Be a minimum of 3-3/4" in nominal diameter; and*
3. *Sampled ~~shall be taken~~ in such a manner as to exclude any masonry unit webs, mortar joint, or ~~and~~ reinforcing steel. If all cells contain reinforcement, alternate core locations or means to detect void or delamination shall be selected by the registered design professional and approved by the building official.*

~~*If vertical reinforcing steel is placed such that cores will include reinforcing steel, core testing may be waived by the design professional in responsible charge, as approved by the enforcement agency.*~~

Visual examination of all cores shall be made by an approved agency ~~a laboratory acceptable to the building official~~ and the condition of the cores reported as required by the California Administrative Code. ~~The~~ S~~s~~hear test shall test both joints between the grout core and the outside wythes or face shell of the masonry.~~All cores taken shall be tested in shear~~ 28 days after grouting of the sample area using a shear test apparatus acceptable to the enforcement agency. ~~Shear testing apparatus shall be of a design approved by the enforcement agency.~~ Core samples shall not be soaked before testing. Core samples to be tested shall be stored in sealed plastic bags or non-absorbent containers immediately after coring and for at least 5 days prior to testing. The average unit shear value for each pair of cores (4 shear tests) from each 5,000 square feet of wall area (or less) on the cross section of ~~all~~ the core~~s~~ shall not be less than 2.5 √f 'm psi.

All cores shall be submitted to an approved agency ~~the laboratory, acceptable to the building official,~~ for examination, ~~regardless of whether~~ even where the core specimens failed ~~outside wythe or face shells separated~~ during the cutting operation. The approved agency ~~laboratory~~ shall report the location where each core was taken, the findings of their visual examination of each core, identify which cores were selected for shear testing, and the results of the shear tests.

Exceptions:

1. *Core sampling and testing is not required for non-bearing non-shear masonry walls, not exceeding total wall height of 12' above wall base, built with single-wythe hollow unit concrete masonry that attaches opposite face shells using webs*

cast as single unit, when designed using an f'_m not exceeding 2,000 psi (13.79 MPa)..

2. An infrared thermographic survey or other nondestructive test procedures, shall be permitted to be approved as an alternative system to detect voids or delamination in grouted masonry in-lieu of core sampling and testing.

2114.7 ~~2114.10~~ Modifications to TMS 402/ACI 530/ASCE 5.

2114.7.1 ~~2114.10.1~~ *Modify TMS 402/ACI 530/ASCE 5, Section 7.4.4 ~~1.18~~ as follows:*

*1. **Minimum reinforcement requirements for masonry walls.** The total area of reinforcement in reinforced masonry walls shall not be less than 0.003 times the sectional area of the wall. Neither the horizontal nor the vertical reinforcement shall be less than one third of the total. Horizontal and vertical reinforcement shall be spaced at not more than 24 inches (610 mm) center to center. The minimum reinforcing shall be No. 4, except that No. 3 bars may be used for ties and stirrups. Vertical wall reinforcement shall have dowels of equal size and equal matched spacing in all footings. Reinforcement shall be continuous around wall corners and through intersections. Only reinforcement which is continuous in the wall shall be considered in computing the minimum area of reinforcement. Reinforcement with splices conforming to TMS 402/ACI 530/ASCE 5 ~~as modified by Sections 2107 and 2108~~ shall be considered as continuous reinforcement.*

Horizontal reinforcing ~~ement~~ bars in bond beams shall be provided in the top of footings, at the top of wall openings, at roof and floor levels, and at the top of parapet walls. For walls 12 inches (nominal) (305 mm) or more in thickness, horizontal and vertical reinforcement shall be equally divided into two layers, except where designed as retaining walls. Where reinforcement is added above the minimum requirements, such additional reinforcement need not be so divided.

In bearing walls of every type of reinforced masonry, there shall be trim reinforcement of not less than one No. 5 bar or two No. 4 bars on all sides of, and adjacent to, every opening which exceeds 16 inches (406 mm) in either direction, and such bars shall extend not less than 48 diameters, but in no case less than 24 inches (610 mm) beyond the corners of the opening. The bars required by this paragraph shall be in addition to the minimum reinforcement elsewhere required.

When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be as for columns.

Joint reinforcement shall not be used as principal reinforcement in masonry ~~designed by the strength design method~~.

*2. **Minimum reinforcement for masonry columns.** The spacing of column ties shall be as follows: not greater than 8 bar diameters, 24 tie diameters, or one half the least dimension of the column for the full column height. Ties shall be at least 3/8 inch (10 mm) in diameter and shall be embedded in grout. Top tie shall be within 2 inches (51 mm) of*

the top of the column or of the bottom of the horizontal bar in the supported beam.

3. ***Anchor bolts.*** *Bent bar anchor bolts shall not be allowed. The maximum size anchor shall be 1/2-inch (13 mm) diameter for 6-inch (152 mm) nominal masonry, 3/4-inch (19 mm) diameter for 8-inch (203 mm) nominal masonry, 7/8-inch (22 mm) diameter for 10-inch (254 mm) nominal masonry, and 1-inch (25mm) diameter for 12-inch (304.8 mm) nominal masonry.*

2114.8 ~~2114.11~~ Additional requirements for allowable stress design.

2114.8.1 ~~2114.11.1~~ TMS 402/ACI 530/ASCE 5 ~~[DSA-SS/CC]~~ *Modify by adding Section 8.1.7 ~~2.1.8~~ as follows:*

8.1.7 ~~2.1.8~~ – Walls and piers.

Thickness of walls. *For thickness limitations of walls as specified in this chapter, nominal thickness shall be used. Stresses shall be determined on the basis of the net thickness of the masonry, with consideration for reduction, such as raked joints.*

The thickness of masonry walls shall be designed so that allowable maximum stresses specified in this chapter are not exceeded. Also, no masonry wall shall exceed the height or length-to-thickness ratio or the minimum thickness as specified in this chapter and as set forth in Table 2114.8.1 ~~2114.11.1~~.

Piers. *Every pier or wall section which width is less than three times its thickness shall be designed and constructed as required for columns if such pier is a structural member. Every pier or wall section which width is between three and five times its thickness or less than one half the height of adjacent openings shall have all horizontal steel in the form of ties except that in walls 12 inches (305 mm) or less in thickness such steel may be in the form of hair-pins.*

2114.8.2 ~~2114.11.2~~ TMS 402/ACI 530/ASCE 5, Section 2.1.7.7.1.1, lap splices. *Modify the requirements of Section 2107.2.1 by adding the following:*

Lap splices need not be greater than 72 bar diameters.

TABLE 2114.8.1 ~~2114.11.1~~

MINIMUM THICKNESS OF MASONRY WALLS[1, 2] ~~[DSA-SS/CC]~~

TYPE OF MASONRY	*MAXIMUM RATIO UNSUPPORTED HEIGHT OR LENGTH TO THICKNESS[2,3]*	*NOMINAL MINIMUM THICKNESS (inches)*
BEARING OR SHEAR WALLS:		
1. Stone masonry	14	16
2. Reinforced grouted masonry	25	6

3. Reinforced hollow-unit masonry	25	6
NONBEARING WALLS: *4. Exterior reinforced walls* *5. Interior partitions reinforced*	 30 36	 6 4

1. For walls of varying thickness, use the least thickness when determining the height or length to thickness ratio.

2. In determining the height or length-to-thickness ratio of a cantilevered wall, the dimension to be used shall be twice the dimension of the end of the wall from the lateral support.

3. Cantilevered walls not part of a building and not carrying applied vertical loads need not meet these minimum requirements but their design must comply with stress and overturning requirements

2114.9 ***~~2114.12~~*** **Glass unit masonry construction.** *Masonry ~~of~~ glass block~~s~~ walls or panels shall be designed for seismic forces. ~~permitted in non-load-bearing exterior or interior walls and shall conform to the requirements of Section 2115A.~~ Stresses in glass block shall not be utilized. ~~Glass block may be solid or hollow and may contain inserts.~~*

~~2114.13 Nonbearing walls.~~ *~~All nonbearing masonry walls shall be reinforced as specified in Section 2114.10.1.1. Fences and interior nonbearing nonshear walls may be of hollow-unit masonry construction grouted in cells containing vertical and horizontal reinforcement. Nonbearing walls maybe used to carry a superimposed load of not more than 200 pounds per linear foot (2.92 kN/m).~~*

*~~1. **Thickness.** Every nonbearing masonry wall shall be so constructed and have a sufficient thickness to withstand all vertical loads and horizontal loads, but in no case shall the thickness of such walls be less than the values set forth in Table 2114.11.1. Plaster shall not be considered as contributing to the thickness of a wall in computing the height-to-thickness ratio.~~*

*~~2. **Anchorage.** All nonbearing walls shall be anchored as required by Section 1604.8.2 and ASCE 7 Chapter 13. Suspended ceilings or other nonstructural elements shall not be used to provide anchorage for masonry walls.~~*

~~2114.14 Masonry screen walls.~~ *~~Masonry units may be used in nonbearing decorative screen walls. Units may be laid up in panels with units on edge with the open pattern of the unit exposed in the completed wall.~~*

*~~1. **Horizontal forces.** The panels shall be capable of spanning between supports to resist the horizontal forces specified in Chapter 16. Wind loads shall be based on gross projected area of the block.~~*

*~~2. **Mortar joints.** Horizontal and vertical joints shall not be less than 1/4 inch (6 mm) thick. All joints shall be completely filled with mortar and shall be "shoved joint" work. The units of a panel shall be so arranged that either the horizontal or the vertical joint containing reinforcing is continuous without offset. This continuous joint shall be reinforced with a minimum of 0.03 square inch (19 mm2) of reinforcing steel and maximum spacing of 16 in. on center. Reinforcement may be embedded in mortar.~~*

~~*3. **Reinforcement.** Joint reinforcement may be composed of two wires made with welded ladder or trussed wire cross ties. In calculating the resisting capacity of the system, compression and tension in the spaced wires may be utilized. Ladder wire reinforcement shall not be spliced and shall be the widest that the mortar joint will accommodate, allowing 1/2 inch (13 mm) of mortar cover.*~~

~~*4. **Size of panels.** The maximum size of panels shall be 144 square feet (13.4 m2), with the maximum dimension in either direction of 15 feet (4572 mm). The specified thickness of the units for exterior applications shall not be less than 37/8 in.*~~

~~*5. **Panel support.** Each panel shall be supported on all edges by a structural member of concrete, masonry or steel. Supports at the top and ends of the panel shall be by means of confinement of the masonry by at least 1 inch (25 mm) into and between the flanges of a steel channel. The space between the end of the panel and the web of the channel shall be filled with resilient material. The use of equivalent configuration in other steel section or in masonry or concrete is acceptable.*~~

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 21*A*

MASONRY

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter			
Adopt entire chapter as amended	**X**	**-**	
Adopt only those sections listed below			

(All existing California amendments that are not revised below shall continue without change)

SECTION 2101*A*

GENERAL

2101*A*.1 Scope. This chapter shall govern the materials, design, construction and quality of masonry.

2101A.1.1 Application. *The scope of application of Chapter 21A is as follows:*

1. *Applications listed in Section 1.9.2.1 regulated by the Division of the State Architect-Structural Safety (DSASS). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*

2. *(Reserved for OSHPD)*

2101A.1.2 Amendments in this chapter. *DSA-SS adopt this chapter and all amendments.*

Exception: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. *Division of the State Architect-Structural Safety:*
[DSA-SS] For applications listed in Section 1.9.2.1.

2. [Reserved for OSHPD]

2101A.1.3 Prohibition: *The following design methods, systems, and materials are not permitted by DSA-SS:*

1. *Unreinforced Masonry.*
2. *Autoclaved Aerated Concrete (AAC) Masonry.*
3. *Empirical Design of Masonry.*
4. *Adobe Construction.*
5. *Ordinary Reinforced Masonry Shear Walls.*
6. *Intermediate Reinforced Masonry Shear Walls.*
7. *Prestressed Masonry Shear Walls.*
8. *Direct Design of Masonry.*

...

2101*A*.2 Design methods. Masonry shall comply with the provisions of TMS402/ACI 530/ASCE 5 ~~or TMS 403~~ as well as applicable requirements of this chapter.

...

SECTION 2102*A*
DEFINITIONS AND NOTATIONS

2102A.1 General. The following terms are defined in Chapter 2, *except those defined below which shall, for the purposes of this chapter, have the meanings shown herein:*

...

WALL. ...

. . . .

Hollow-unit Masonry Wall*. Type of construction made with hollow masonry units in which the units are laid and set in mortar, reinforced, and grouted*. ~~*solid. except as provided in Section 2114A.*~~

...

SECTION 2103*A*
MASONRY CONSTRUCTION MATERIALS

2103*A*.1 Masonry units. Concrete masonry units, clay or shale masonry units~~,~~ *and* glass unit masonry ~~and AAC masonry units~~ shall comply with Article 2.3 of TMS 602/ACI530.1/ASCE 6. Architectural cast stone shall conform to ASTM C 1364.

...

2103A.3 Grout. Grout shall comply with Article 2.2 of TMS 602/ACI 530.1/ASCE 6.

~~***2103A.13.1 Water.*** *Water content shall be adjusted to provide proper workability and to enable proper placement under existing field conditions, without segregation.*~~

~~***2103A.13.2 Selecting Proportions.*** *Proportions of ingredients and any additives shall be based on laboratory or field experience with the grout ingredients and the masonry units to be used. Coarse grout proportioned by weight shall contain not less than 564 pounds of cementitious material per cubic yard (335 kg / m^3).*~~

2103A.3.1 ~~***2103A.13.3***~~ ***Aggregate.*** *Coarse grout shall be used in grout spaces between wythes of 2 inches (51 mm) or more in width as determined in accordance with TMS 602 Table 7, footnote 3, and in all grouted* ~~*filled*~~ *cells of hollow unit masonry construction.*

…

~~***2103A.15 Additives and Admixtures.***~~

~~***2103A.15.1 General.*** *Additives and admixtures to mortar or grout shall not be used unless approved by the enforcement agency.*~~

~~***2103A.15.2 Antifreeze compounds****. Antifreeze liquids, chloride salts or other such substances shall not be used in mortar or grout.*~~

2103A.5 ~~***2103A.15.3***~~ ***Air entrainment.*** *Air-entraining substances shall not be used in* ~~*mortar or*~~ *grout unless tests are conducted to determine compliance with the requirements of this code.*

SECTION 2104*A*
CONSTRUCTION

2104*A*.1 Masonry construction. Masonry construction shall comply with the requirements of Sections 2104*A*.1.1 ~~and 2104A.1.2~~ *through 2104A.1.3* and with TMS 602/ACI 530.1/ASCE 6.

…

2104A.1.3 ~~***2104A.5***~~ ***Grouted Masonry.***

2104A.1.3.1 ~~***2104A.5.1***~~ ***General conditions.*** *Grouted masonry shall be constructed in such a manner that all elements of the masonry act together as a structural element. At the time of laying, all masonry units shall be free of dust and dirt. Prior to grouting, the grout space shall be clean so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch (6.4 mm), mortar droppings and other foreign material. Grout shall be placed so that all spaces to be grouted do not contain voids.*

Grout materials and water content shall be controlled to provide adequate fluidity for placement without segregation of the constituents, and shall be mixed thoroughly. Segregation of the grout materials and damage to the masonry shall be avoided during the grouting process.

Reinforcement and embedded items shall be clean, properly positioned and securely anchored against movement prior to grouting. Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent dislocation during grouting. Reinforcement, embedded items and bolts shall be solidly embedded in grout. Anchor bolts in the face shells of hollow masonry units shall be positioned to maintain a minimum of ½ in. of grout between the bolt and the face shell.

The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

Grout pours greater than 12 inches (300 mm) in height shall be consolidated by mechanical vibration during placement before loss of plasticity in a manner to fill the grout space, and reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours less than 12 inches in height may be puddled.

Between grout pours or where grouting has been stopped more than an hour, a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with the grout stopping a minimum of 1 1/2 inches (38 mm) below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of 1/2 inch (12.7 mm) below the top of the masonry.

Grout shall not be handled nor pumped utilizing aluminum equipment unless it can be demonstrated with the materials and equipment to be used that there will be no deleterious effect on the strength of the grout.

2104A.1.3.1.1 ~~2104A.5.1.1~~ Reinforced grouted masonry.

2104A.1.3.1.1.1 ~~2104A.5.1.1.1~~ General. *Reinforced grouted masonry is that form of construction made with clay or shale brick or made with solid concrete building brick in which interior joints of masonry are filled by pouring grout around reinforcement therein as the work progresses.*

2104A.1.3.1.1.1.1 ~~***2104A.5.1.1.1.1***~~ ***Low-lift grouted construction****. Requirements for construction shall be as follows:*

1. *All units in the two outer wythes shall be laid with full-shoved head joint and bed mortar joints. Masonry headers shall not project into the grout space.*

2. *The minimum grout space for low-lift grout masonry shall be 2 1/2 inches (64 mm). All reinforcement and wire ties shall be embedded in the grout. The thickness of the grout between masonry units and reinforcement shall be a minimum of one bar diameter.*

3. *One tier of a grouted reinforced masonry wall may be carried up 12 inches (305 mm) before grouting, but the other tier shall be laid up and grouted in lifts not to exceed one masonry unit in height. All grout shall be puddled with a mechanical vibrator or wood stick immediately after placing so as to completely fill all voids and to consolidate the grout. All vertical and horizontal steel shall be held firmly in place by a frame or suitable devices.*

4. *Toothing of masonry walls is prohibited. Racking is to be held to a minimum.*

2104A.1.3.1.1.1.2 ~~***2104A.5.1.1.1.2***~~ ***High-lift grouted construction****. Where high-lift grouting is used, the method shall be subject to the approval of the enforcement agency. Requirements for construction shall be as follows:*

1. *All units in the two wythes shall be laid with full head and bed mortar joints.*

2. *The two wythes shall be bonded together with wall ties. Ties shall not be less than No. 9 wire in the form of rectangles 4 inches (102 mm) wide and 2 inches (51 mm) in length less than the overall wall thickness. Kinks, water drips, or deformations shall not be permitted in the ties. One tier of the wall shall be built up not more than 16 inches (406 mm) ahead of the other tier. Ties shall be laid not to exceed 24 inches (610 mm) on center horizontally and 16 inches (406 mm) on center*

vertically for running bond, and not more than 24 inches (610 mm) on center horizontally and 12 inches (305 mm) on center vertically for stack bond.

3. *Cleanouts shall be provided for each pour by leaving out every other unit in the bottom tier of the section being poured or by cleanout openings in the foundation. The foundation or other horizontal construction joints shall be cleaned of all loose material and mortar droppings before each pour. The cleanouts shall be sealed after inspection and before grouting.*

4. *The grout space in high-lift grouted masonry shall be a minimum of 3 1/2 inches (89 mm). All reinforcement and wire ties shall be embedded in the grout. The thickness of the grout between masonry units and reinforcement shall be a minimum of one bar diameter.*

5. *Vertical grout barriers or dams of solid masonry shall be built across the grout space the entire height of the wall to control the flow of the grout horizontally. Grout barriers shall not more than 30 feet (9144 mm) apart.*

6. *An approved admixture of a type that reduces early water loss and produces an expansive action shall be used in high-lift grout.*

7. *Grouting shall be done in a continuous pour in lifts not exceeding 4 feet (1219 mm).Grout shall be consolidated by mechanical vibration only, and shall be reconsolidated after excess moisture has been absorbed, but before plasticity is lost. The grouting of any section of a wall between control barriers shall be completed in one day, with no interruptions greater than one hour.*

2104A.1.3.1.2 ***~~2104A.5.1.2~~*** ***Reinforced hollow-unit masonry.***

2104A.1.3.1.2.1 ***~~2104A.5.1.2.1~~*** ***General.*** *Reinforced hollow-unit masonry is that type of construction made with hollow-masonry units in which cells are continuously filled with grout, and in which reinforcement is embedded. All cells shall be solidly filled with grout in reinforced hollow-unit masonry. ~~, except as provided in Section 2114A.1.~~*

Exception: *(Relocated from 2013 CBC 2114A.1) Reinforced hollow-unit masonry laid in running bond used for freestanding site walls ~~fences and~~ or interior nonbearing non-shear wall partitions may be ~~of hollow-unit masonry construction~~ grouted only in cells containing vertical and horizontal reinforcement.*

Construction shall be one of the two following methods: The low-lift method where the maximum height of construction laid before grouting is 4 feet (1220 mm), or the high-lift method where the full height of construction between horizontal cold joints is grouted in one operation. General requirements for construction shall be as follows:

1. *Bond shall be provided by lapping units in successive vertical courses. Where stack bond is used in reinforced hollow-unit masonry, the open-end type of unit shall be used with vertical reinforcement spaced a maximum of 16 inches (406 mm) on center.*

2. *Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear grout space dimension ~~unobstructed, continuous vertical cell measuring~~ of not less than 2 inches by 3 inches (51 mm by 76 mm), except the minimum cell dimension for high-lift grout shall be 3 inches (76 mm), as determined in accordance with TMS 602 Table 7, footnote 3.*

3. *Grout shall be a workable mix suitable for placing without segregation and shall be thoroughly mixed. Grout shall be placed by pumping or an approved alternate method and shall be placed before initial set or hardening occurs. Grout shall be consolidated by mechanical vibration during placing and reconsolidated after excess moisture has been absorbed, but before workability is lost.*

4. *All reinforcement and wire ties shall be embedded in the grout. The space between masonry unit surfaces and reinforcement shall be a minimum of one bar diameter.*

5. *Horizontal reinforcement shall be placed in bond beam units with a minimum grout cover of 1 inch (25 mm) above steel for each grout pour. The depth of the bond beam channel below the top of the unit shall be a minimum of 1 1/2 inches (38 mm) and the width shall be 3 inches (76 mm) minimum.*

2104A.1.3.1.2.2 ~~***2104A.5.1.2.2***~~ ***Low-lift grouted construction****. Units shall be laid a maximum of 4 feet (1220 mm) before grouting. Grouting shall follow each 4 feet (1220 mm) of construction laid and shall be consolidated so as to completely fill all voids and embed all reinforcing steel. Horizontal reinforcement shall be fully embedded in grout in an uninterrupted pour.*

2104A.1.3.1.2.3 ~~***2104A.5.1.2.3***~~ ***High-lift grouted construction****. Where high-lift grouting is used, the method shall be approved by the enforcement agency. Cleanout openings shall be provided in every cell at the bottom of each pour of grout. Alternatively, if the course at the bottom of the pour is constructed entirely of inverted double open-end bond beam units, cleanout openings need only be provided for access to every reinforced cell at the bottom of each pour of grout. The cleanouts shall be sealed before grouting. An approved admixture that reduces early water loss and produces an expansive action shall be used in the grout.*

SECTION 2105A
QUALITY ASSURANCE

…

2105*A*.2 Compressive Strength, *f '$_m$*. *The specified compressive strength, f '$_m$, assumed in design shall be 2,000 psi (13.79MPa)* ~~*1,500 psi (10.34 MPa)*~~ *for all masonry construction using materials and details of construction required herein. Testing of the constructed masonry shall be provided in accordance with Section 2105A.4* ~~*2105A.5*~~ ~~***[DSA-SS]***~~***.***

Exception: ~~***[DSA-SS]***~~ *Subject to the approval of the enforcement agency, higher values of f'$_m$ may be used in the design of reinforced grouted masonry and reinforced hollow-unit masonry. The approval shall be based on prism test results submitted by the architect or engineer which demonstrate the ability of the proposed construction to meet prescribed performance criteria for strength and stiffness. The design shall take into account the mortar joint depth. In no case shall the f'$_m$ assumed in design exceed 3,000 psi (20.7 MPa).*
Where an f'$_m$ greater than 2,000 psi (13.79 MPa) ~~*1,500 psi (10.34 MPa)*~~ *is approved, the architect or structural engineer shall establish a method of quality control of the masonry construction acceptable to the enforcement agency which shall be described in the contract specifications. Compliance with the requirements for the specified* ~~*compressive*~~ *strength of constructed masonry* ~~*f'$_m$*~~ *shall be provided using prism test method* ~~*in accordance with Section 2105A.2.2.1 or 2105A.2.2.2*~~ *and core shear testing in accordance with Section 2105A.4. Substantiation for the specified compressive strength*

prior to the start of construction shall be obtained by using prism test method ~~in accordance with Section 2105A.2.2.2.2.~~ and Section 2105A.3. ~~Testing of the constructed masonry shall be provided in accordance with Section 2105A.5.~~

2105A.3 ~~2105A.2.2.1.4~~ Mortar and grout tests. *These tests are to establish whether the masonry components meet the specified component strengths.*

At the beginning of all masonry work, at least one test sample of the mortar ~~and grout~~ shall be taken on three successive working days and at least at one-week intervals thereafter. Samples of grout shall be taken for each mix design, each day grout is placed, and not less than every 5,000 square feet of masonry wall area. They shall meet the minimum strength requirement given in ASTM C270 Table 1 and ASTM C476/TMS 602 Section 2.2 ~~Sections 2103A.9 and 2103A.13~~ for mortar and grout respectively. Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official. ~~or whenever in the judgment of the architect, structural engineer or the enforcement agency such tests are necessary to determine the quality of the material.~~ When the prism test method ~~of Section 2105A.2.2.2~~ is used during construction, the tests in this section are not required.

Test specimens for mortar and grout shall be made as set forth in ASTM C 1586 and ASTM C 1019.

Exceptions:

1. *For non-bearing non-shear masonry walls not exceeding total wall height of 12' above wall base, mortar test shall be permitted to be limited to those at the beginning of masonry work for each mix design.*

2. [DSA-SS] *Mortar sampling and testing shall be as follows: At the beginning of all masonry work, mortar test samples shall be taken on three successive working days and at least at one-week intervals thereafter. Where mortar is based on a proportion specification, mortar shall be sampled and tested during construction in accordance with ASTM C780 Annex 4 and 5 to verify the proportions specified in ASTM C270, Table 2. Where mortar is based on a property specification, mortar shall be laboratory prepared and tested prior to construction in accordance with ASTM C780 to verify the properties specified in ASTM C270, Table 1 and field sampled and tested during construction in accordance with ASTM C780 to verify the proportions with the laboratory tests. Mortar sampling and testing is not required for approved preblended mortars in conformance with ASTM C270.*

2105A.4 Masonry core testing*.* ***~~[OSHPD 1 & 4]~~*** *Not less than two cores shall be taken from each building for each 5,000 square feet (465 m^2) ~~of the greater~~ of the masonry wall area ~~or the floor area~~ or fraction thereof. ~~The architect or structural engineer in responsible charge of the project or his/her representative or the inspector of record shall select the areas for sampling.~~ The ~~inspector of record~~ approved agency shall perform or observe the coring of the masonry walls and sample locations shall be subject to approval of the registered design professional.*

Core~~s~~ samples shall comply with the following:

1. *Cored no sooner than 7 days after grouting of the selected area;*
2. *~~b~~ Be a minimum of 3-3/4" in nominal diameter; and*
3. *Sampled ~~shall be taken~~ in such a manner as to exclude any masonry unit webs, mortar joint, or ~~and~~ reinforcing steel. If all cells contain reinforcement, alternate core locations or means to detect void or delamination shall be selected by the registered design professional and approved by the building official.*

Visual examination of all cores shall be made by an approved agency ~~a laboratory acceptable to the building official~~ and the condition of the cores reported as required by the California Administrative Code. ~~The~~ ~~s~~Shear test ~~shall test~~ both joints between the grout core and the outside wythes or face shell of the masonry ~~One half of the number of cores taken shall be tested in shear~~ 28 days after grouting of the sample area using a shear test apparatus acceptable to the enforcement agency. ~~Shear testing apparatus shall be of a design approved by the enforcement agency.~~ Core samples shall not be soaked before testing. Core samples to be tested shall be stored in sealed plastic bags or non-absorbent containers immediately after coring and for at least 5 days prior to testing. The average unit shear value

for each pair of cores (4 shear tests) from each 5,000 square feet of wall area (or less) on the cross section of ~~the~~ core shall not be less than 2.5 $\sqrt{f'_m}$ psi.

All cores shall be submitted to an approved agency ~~the laboratory, acceptable to the building official,~~ for examination, ~~regardless of whether~~ even where the core specimens failed during the cutting operation. The approved agency ~~laboratory~~ shall report the location where each core was taken, the findings of their visual examination of each core, identify which cores were selected for shear testing, and the results of the shear tests.

Exceptions:

1. *Core sampling and testing is not required for non-bearing non-shear masonry walls, not exceeding total wall height of 12' above wall base, built with single-wythe hollow unit concrete masonry that attaches opposite face shells using webs cast as single unit, when designed using an f'_m not exceeding 2,000 psi (13.79 MPa).*
2. *An infrared thermographic survey or other nondestructive test procedures, shall be permitted to be approved as an alternative system to detect voids or delamination in grouted masonry in-lieu of core sampling and testing.*

~~2105A.5 Masonry core testing. [DSA-SS]~~ *~~Not less than two cores shall be taken from each building for each 5,000 square feet (465 m2) of the greater of the masonry wall area or the floor area or fraction thereof. The architect or structural engineer in responsible charge of the project or his/her representative or the inspector of record shall select the areas for sampling. Cores shall be a minimum of 33/4 inches (76mm) in diameter and shall be taken in such a manner as to exclude masonry unit webs and reinforcing steel. If vertical reinforcing steel is placed such that cores will include reinforcing steel, core testing may be waived by the design professional in responsible charge, as approved by the enforcement agency. The inspector of record shall observe the coring of the masonry walls.~~*

~~Visual examination of all cores shall be made by a laboratory acceptable to the building official and the condition of the cores reported as required by the California Administrative Code. All cores taken shall be tested in shear. The shear test shall test both joints between the grout core and the outside wythes or face shell of the masonry. Shear testing apparatus shall be of a design approved by the enforcement agency. Core samples shall not be soaked before testing. The average unit shear on the cross section of all the cores shall not be less than 2.5 √f 'm psi.~~

~~All cores shall be submitted to the laboratory, acceptable to the building official, for examination, regardless of whether the outside wythe or face shells separated during the cutting operation. The~~

~~*laboratory shall report the location where each core was taken, the findings of their visual examination of each core, and the results of the shear tests.*~~

SECTION 2106*A*

SEISMIC DESIGN

2106*A*.1 Seismic design requirements for masonry. Masonry structures and components shall comply with the requirements in Chapter 7 of TMS 402/ACI 530/ASCE 5 depending on the structure's *Seismic Design Category.*

2106A.1.1 Modifications to TMS 402 / ACI 530 / ASCE 5. *Modify TMS 402 / ACI 530 / ASCE 5 Section 7.4.4 ~~1.18~~ as follows:*

1. - Minimum reinforcement requirements for Masonry Walls *The total area of reinforcement in reinforced masonry walls shall not be less than 0.003 times the sectional area of the wall. Neither the horizontal nor the vertical reinforcement shall be less than one third of the total. Horizontal and vertical reinforcement shall be spaced at not more than 24 inches (610 mm) center to center. The minimum reinforcing shall be No. 4, except that No. 3 bars may be used for ties and stirrups. Vertical wall reinforcement shall have dowels of equal size and equal matched spacing in all footings. Reinforcement shall be continuous around wall corners and through intersections. Only reinforcement which is continuous in the wall shall be considered in computing the minimum area of reinforcement. Reinforcement with splices conforming to TMS 402 / ACI 530 / ASCE 5 ~~as modified by Section 2107A and 2108A~~ shall be considered as continuous reinforcement.*

Horizontal reinforcing ~~ement~~ bars in bond beams shall be provided in the top of footings, at the top of wall openings, at roof and floor levels, and at the top of parapet walls. For walls 12 inches (nominal) (305 mm) or more in thickness, horizontal and vertical reinforcement shall be equally divided into two layers, except where designed as retaining walls. Where reinforcement is added above the minimum requirements, such additional reinforcement need not be so divided.

In bearing walls of every type of reinforced masonry, there shall be trim reinforcement of not less than one No. 5 bar or two No. 4 bars on all sides of, and adjacent to, every opening which exceeds 16 inches (406 mm) in either direction, and such bars shall extend not less than 48 diameters, but in no case less than 24 inches (610 mm) beyond the corners of the opening. The

bars required by this paragraph shall be in addition to the minimum reinforcement elsewhere required.

When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be as for columns.

Joint reinforcement shall not be used as principal reinforcement in masonry. ~~designed by the strength design method.~~

***2. - Minimum reinforcement for masonry columns**. The spacing of column ties shall be as follows: not greater than 8 bar diameters, 24 tie diameters, or one half the least dimension of the column for the full column height. Ties shall be at least 3/8" in diameter and shall be embedded in grout. Top tie shall be within 2 inches (51 mm) of the top of the column or of the bottom of the horizontal bar in the supported beam.*

***3. Lateral support.** Lateral support of masonry may be provided by cross walls, columns, pilasters, counterforts or buttresses where spanning horizontally or by floors, beams, girts or roofs where spanning vertically. Where walls are supported laterally by vertical elements, the stiffness of each vertical element shall exceed that of the tributary area of the wall.*

***4. Anchor Bolts.** Bent bar anchor bolts shall not be allowed. The maximum size anchor shall be 1/2-inch (13 mm) diameter for 6-inch (152 mm) nominal masonry, 3/4-inch (19 mm) diameter for 8-inch (203 mm) nominal masonry, 7/8-inch (22 mm) diameter for 10-inch (254 mm) nominal masonry, and 1-inch (25mm) diameter for 12-inch (304.8 mm) nominal masonry.*

SECTION 2107A
ALLOWABLE STRESS DESIGN

2107*A*.1 General. The design of masonry structures using *allowable stress design* shall comply with Section 2106*A* and the requirements of Chapters 1 through 8 of TMS 402/ACI 530/ASCE 5 except as modified by Sections 2107*A*.2 through ~~2107A.4~~ *2107A.6*.

…

2107*A*.2 TMS 402/ACI 530/ASCE 5, Section 8.1.6.7.1.1, lap splices. In lieu of Section 8.1.6.7.1.1, it shall be permitted to design lap splices in accordance with Section 2107*A*.2.1.

2107*A*.2.1 Lap splices. The minimum length of lap splices for reinforcing bars in tension or compression, l_d, shall be

$l_d=0.002d_bf_s$ (Equation 21A-1)

For SI: $l_d=0.29d_bf_s$

but not less than 12 inches (305) mm). In no case shall the length of the lapped splice be less than 40 bar diameters*, and need not be greater than 72 bar diameters*.

where:

...

2107A.5 Modify TMS 402 / ACI 530/ASCE 5 by adding Section 8.1.7 ~~2.1.8~~ as follows:

8.1.7 ~~2.1.8~~ - Walls and Piers.

Thickness of Walls. *For thickness limitations of walls as specified in this chapter, nominal thickness shall be used. Stresses shall be determined on the basis of the net thickness of the masonry, with consideration for reduction, such as raked joints.*

The thickness of masonry walls shall be designed so that allowable maximum stresses specified in this chapter are not exceeded. Also, no masonry wall shall exceed the height or length-to-thickness ratio or the minimum thickness as specified in this chapter and as set forth in Table 2107A.5. ~~below.~~

Piers. *Every pier or wall section which width is less than three times its thickness shall be designed and constructed as required for columns if such pier is a structural member. Every pier or wall section which width is between three and five times its thickness or less than one half the height of adjacent openings shall have all horizontal steel in the form of ties except that in walls 12 inches (305 mm) or less in thickness such steel may be in the form of hair-pins.*

TABLE 2107A.5 - MINIMUM THICKNESS OF MASONRY WALLS[1, 2]

TYPE OF MASONRY	*MAXIMUM RATIO UNSUPPORTED HEIGHT OR LENGTH TO THICKNESS*[2,3]	*NOMINAL MINIMUM THICKNESS (inches)*
BEARING OR SHEAR WALLS:		
1. Stone masonry	*14*	*16*
2. Reinforced grouted masonry	*25*	*6*
3. Reinforced hollow-unit masonry	*25*	*6*
NONBEARING WALLS:		
4. Exterior reinforced walls	*30*	*6*
5. Interior partitions reinforced	*36*	*4*

[1]*For walls of varying thickness, use the least thickness when determining the height or length to thickness ratio.*

[2]*In determining the height or length-to-thickness ratio of a cantilevered wall, the dimension to be used shall be twice the dimension of the end of the wall from the lateral support.*

[3]*Cantilevered walls not part of a building and not carrying applied vertical loads need not meet these minimum requirements but their design must comply with stress and overturning requirements.*

2107A.6 (reserved for OSHPD)

SECTION 2108A

STRENGTH DESIGN OF MASONRY

2108.1 General. The design of masonry structures using strength design shall comply with Section 2106 and the requirements of Chapters 1 through 7 and Chapter 9 of TMS 402/ACI 530/ASCE 5, except as modified by Sections 2108.2 through 2108.3.

~~**Exception:** AAC masonry shall comply with the requirements of Chapters 1 and 8 of TMS 402/ACI 530/ASCE 5.~~

...

SECTION 2109A
EMPIRICAL DESIGN OF MASONRY

***Not permitted by DSA*.**

(Existing amendment deleting Section 2109 of IBC is retained and deleted Section 2109 is not shown here for clarity)

SECTION 2110A
GLASS UNIT MASONRY

2110*A*.1 General. Glass unit masonry construction shall comply with Chapter 13 of TMS402/ACI 530/ASCE 5 and this section.

Masonry ~~of~~ glass block~~s~~ walls or panels shall be designed for seismic forces. ~~permitted in non-load-bearing exterior or interior walls and shall conform to the requirements of Section 2115A.~~ Stresses in glass block shall not be utilized. ~~Glass block may be solid or hollow and may contain inserts.~~

…

~~*SECTION 2114A*~~
~~*NONBEARING WALLS*~~

~~***2114A.1 General.*** *All nonbearing masonry walls shall be reinforced as specified in Section 2106A.1.1. Fences and interior nonbearing nonshear walls may be of hollow-unit masonry construction grouted in cells containing vertical and horizontal reinforcement. Nonbearing walls may be used to carry a superimposed load of not more than 200 pounds per linear foot (2.92 kN/m).*~~

~~***1. Thickness.*** *Every nonbearing masonry wall shall be so constructed and have a sufficient thickness to withstand all vertical loads and horizontal loads, but in no case shall the thickness of such walls be less than the values set forth in Table 2107A.5.*~~
~~*Plaster shall not be considered as contributing to the thickness of a wall in computing the height-to-thickness ratio.*~~

~~***2. Anchorage.*** *All nonbearing walls shall be anchored as required by Sections 1604A.8.2 and ASCE 7 Chapter 13. Suspended ceilings or other nonstructural elements shall not be used to provide anchorage for masonry walls.*~~

~~***SECTION 2115A***~~
~~***MASONRY SCREEN WALLS***~~

~~***2115A.1 General.*** *Masonry units may be used in nonbearing decorative screen walls. Units may be laid up in panels with units on edge with the open pattern of the unit exposed in the completed wall.*~~

~~***1. Horizontal Forces.*** *The panels shall be capable of spanning between supports to resist the horizontal forces specified in Chapter 16A. Wind loads shall be based on gross projected area of the block.*~~

~~***2. Mortar Joints.*** *Horizontal and vertical joints shall not be less than 1/4 inch (6 mm) thick. All joints shall be completely filled with mortar and shall be "shoved joint" work. The units of a panel shall be so arranged that either the horizontal or the vertical joint containing reinforcing is continuous without offset. This continuous joint shall be reinforced with a minimum of 0.03 square inch (19 mm^2) of reinforcing steel and maximum spacing of 16 inches on center. Reinforcement may be embedded in mortar.*~~

~~***3. Reinforcement.*** *Joint reinforcement may be composed of two wires made with welded ladder or trussed wire cross ties. In calculating the resisting capacity of the system, compression and tension in the spaced wires may be utilized. Ladder wire reinforcement shall not be spliced and shall be the widest that the mortar joint will accommodate, allowing 1/2 inch (13 mm) of mortar cover.*~~

~~***4. Size of Panels.*** *The maximum size of panels shall be 144 square feet (13.4 m^2), with the maximum dimension in either direction of 15 feet (4572 mm). The specified thickness of the units for exterior applications shall not be less than 3 7/8 inches.*~~

~~***5. Panel Support.*** *Each panel shall be supported on all edges by a structural member of concrete, masonry or steel. Supports at the top and ends of the panel shall be by means of confinement of the masonry by at least 1 inch (25 mm) into and between the flanges of a steel channel. The space between the end of the panel and the web of the channel shall be filled with resilient material. The use of equivalent configuration in other steel section or in masonry or concrete is acceptable.*~~

(All existing amendments, except where section is deleted in the model code, that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

CHAPTER 22

STEEL

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	-	X	
Adopt only those sections listed below			
2201.1.1		X	
2201.1.2		X	
2201.1.3		X	
2201.1.4		X	
2212		X	
~~*2212.1*~~		~~X~~	
~~*2212.1.1*~~		~~X~~	
~~*2212.2*~~		~~X~~	
~~*2212.3*~~		~~X~~	
~~*2212.4*~~		~~X~~	
~~*2212.5*~~		~~X~~	
~~*2212.6*~~		~~X~~	

(All existing California amendments that are not revised below shall continue without change)

SECTION 2201

GENERAL

2201.1 Scope. *The provisions of this chapter govern the quality, design, fabrication and erection of steel used structurally in buildings or structures.*

2201.1.1 Application. [DSA-SS/CC] *The scope of application of Chapter 22 is as follows:*

Community college buildings regulated by the Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC), as listed in Section 1.9.2.2.

2201.1.2 Identification of amendments. [DSA-SS/CC]

Division of the State Architect-Structural Safety/Community Colleges amendments appear in this chapter preceded with the appropriate acronym, as follows:

[DSA-SS/CC] *- For community college buildings listed in Section 1.9.2.2*

2201.1.3 Reference to other chapters. [DSA-SS/CC] *Where reference within this chapter is made to sections in Chapter 17 the provisions in Chapter 17A, shall apply instead.*

2201.1.4 Amendments. [DSA-SS/CC] *See Section 2212 for additional requirements.*

…

SECTION 2212

ADDITIONAL REQUIREMENTS FOR COMMUNITY COLLEGES [DSA-SS/CC]

2212.1 Connections.

2212.1.1 Column base plate. *When shear and/or tensile forces are intended to be transferred between column base plates and anchor bolts, provision shall be made in the design to eliminate the effects of oversized holes permitted in base plates by AISC 360 by use of shear lugs and/or welded shear transfer plates or other means acceptable to the enforcement agency, when the oversized holes are larger than the anchor bolt by more than 1/8 inch (3.2 mm). When welded shear transfer plates and shear lugs or other means acceptable to the enforcement agency are not used, the anchor bolts shall be checked for the induced bending stresses in combination with the shear stresses.*

2212.2 Modifications to AISC 341.

2212.2.1 Section A4. *Replace Section A4.1 item (3) as follows:*

(3) *Locations and dimensions of protected zones, including provision by the owner or owner's' designated representative for construction to permanently mark and maintain the protection.*

2212.2.2 ~~***2212.2.1***~~ ***Section D1.*** *Add Section D1.6 as follows:*

6. Diaphragm bracing systems. *The required strength of diagonal bracing members used as the diaphragm shall be determined from either of the following:*

(1) The load effect resulting from the diaphragm analysis per the applicable building code provided the members satisfy all of the following requirements:

1. Diagonal bracing members comply with Section D1.1 for moderately ductile members.

2. Each diagonal bracing member resists no more than 30 percent of the diaphragm shear at each line of resistance.

3. Diagonal bracing members shall not support gravity loads other than self-weight.

4. The slenderness ratio (KL/r) of diagonal bracing members shall not exceed $4\sqrt{E/Fy}$*, except tension-only bracing.*

(2) The load effect required for collectors using the load combinations stipulated in the applicable building code.

2212.2.3 ~~***2212.2.2***~~ ***Section D2.*** *Modify Section D2.6c(b)(ii) as follows:*

(ii) the moment calculated using the load combinations of the applicable building code, including the amplified seismic load, provided the connection or other mechanism within the column base is designed to have the ductility necessary to accommodate the column base rotation resulting from the design story drift.

2212.2.4 ~~***2212.2.3***~~ ***Section D2****. Add Section D2.9 as follows:*

9. Diaphragm bracing systems. *The required strength of the connections of diagonal bracing members used as the diaphragm shall be the load effect required for collectors using the load combinations stipulated in the applicable building code.*

2212.2.5 ~~***2212.2.4***~~ ***Section F2.*** *Modify Section F2.3 Exception (2)(a) as follows:*

(a) The maximum of the forces determined using load combination stipulated by the applicable building code including the amplified seismic load, applied to the building frame model in which all compression braces have been removed and those determined with no compression braces removed per D1.4a(2).

2212.2.6 Section F1. *Add Section F1.4c as follows:*

4c. Multi-tiered Braced Frames*: Braced-frames configured with two or more tiers of bracing between diaphragm levels or locations of out-of-plane support shall comply with the additional requirements of section F2.4e.*

2212.2.7 ~~***2212.2.5***~~ ***Section F2.*** *Modify Section F2.4a by adding the following:*

Where each framing bay on a line of resistance does not have opposing diagonal braces within the same column bay, then the collector forces along that line shall be designed considering the redistribution of seismic forces to other bays as a result of the post buckled redistribution of loads using the analysis requirements of Section F2.3. The collector shall not be designed for a load less than that stipulated by the applicable building code:

The required strength of the collector need not exceed the forces determined using load combination stipulated by the applicable building code including the amplified seismic load, applied to the building model in which all compression braces have been removed.

2212.2.8 Section F2. *Add Section F2.4e as follows:*

4c. Multi-tiered Braced Frames*: Braced-frames configured with two or more tiers of bracing between diaphragm levels or locations of out-of-plane support shall comply with the additional requirements of this section:*

(1) Braces shall be used in symmetrical pairs at every tier level.

(2) Horizontal beams at intermediate tier levels for V- and inverted V-brace configurations shall have out-of-plane strength, stiffness, and beam-to-column connections adequate to resist torsional moments arising from brace buckling when braces are designed to buckle out-of-plane.

(3) Columns shall be restrained against rotation about their longitudinal axis at each intermediate tier level and shall resist out-of-plane bending moments due to second-order effects, geometric imperfections, and out-of-plane brace buckling.

2212.3 Seismic requirements for composite structural steel and concrete construction. *In addition to the requirements of Section 2206.2, steel and concrete composite special moment frame with the approved moment connections in accordance with AISC 358 Chapter 10 shall be permitted provided:*

1. Beams are provided with reduced beam sections (RBS),

~~*2. Columns shall be hollow structural sections (HSS) and completely filled with structural concrete having unit weight not less than 110 pounds per cubic foot (17 kN/ m3). Concrete shall have 28-day compressive strength not less than 4,000 psi (28 MPa).*~~

2. ~~3.~~Web extension to beam web two sided fillet weld welds are sized to develop expected strength of the beam web and shall not be less than a ¼ inch fillet weld, and

~~*4. The high strength bolt design shall consider interaction between shear and tension as required by AISC 360, and*~~

3. ~~5.~~ The built-up box column wall thickness shall not be less than 1.25" and ~~T~~ the HSS column wall thickness shall not be less than 1/2 inch.

2212.4 Steel joists.

2212.4.1 Design approval. *Joist and joist girder design calculations and profiles with member sizes and connection details, and joist placement plans shall be provided to the enforcement agency and approved prior to joist fabrication, in accordance with Title 24, Part 1. Joist and joist girder design calculations and profiles with member sizes and connection details shall bear the signature and stamp or seal of the registered engineer or licensed architect responsible for the joist design. Alterations to the approved joist and joist girder design calculations and profiles with member sizes and connection details, or to fabricated joists are subject to the approval of the enforcement agency.*

2212.4.2 Joist chord bracing. *The chords of all joists shall be laterally supported at all points where the chords change direction.*

2212.5 Cold-formed steel light-frame construction.

2212.5.1 Trusses.

2212.5.1.1 Analysis submittals. *Complete engineering analysis and truss design drawings shall accompany the construction documents submitted to the enforcement agency for approval. When load testing is required the test report shall be submitted with the truss design drawings and engineering analysis to the enforcement agency.*

2212.5.1.2 Deferred submittals*. AISI S214 Section B4.2 shall not be deleted.*

2212.5.2 Anchorage for shear. *Cold formed steel stud foundation plates or sills shall be bolted or fastened to the foundation or foundation wall in accordance with Section 2304.3.4, Item 2.*

2212.5.3 Limitations on shear wall assemblies. *Shear wall assemblies in accordance with ~~per~~ Section C2.2.3 of AISI- S213 are not permitted within the seismic force-resisting system of buildings or structures assigned to Occupancy Category II, III, IV., or buildings designed to be relocatable.*

2212.6 Testing.

2212.6.1 Tests of high-strength bolts, nuts and washers. *High-strength bolts, nuts and washers shall be sampled and tested by an approved independent testing laboratory for conformance with the requirements of Section 2205.*

2212.6.2 Tests of end-welded studs. *End-welded studs shall be sampled and tested in accordance with ~~per~~ the requirements of the AWS D1.1.*

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 22A

STEEL

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter as amended	**X**	**-**	
Adopt only those sections listed below			

(All existing amendments that are not revised below shall continue without any change)

...

SECTION 2201*A*

GENERAL

2201*A*.1 Scope. The provisions of this chapter govern the quality, design, fabrication and erection of steel construction.

2201A.1.1 Application. *The scope of application of Chapter 22A is as follows:*

1. *Structures regulated by the Division of the State Architect-Structural Safety (DSA-SS), which include those applications listed in Section 1.9.2.1. These applications include public elementary and secondary schools, community colleges and state- owned or state-leased essential services buildings.*
2. *(Reserved for OSHPD)*

Exception: [Reserved for OSHPD]

2201A.1.2 Identification of amendments. *DSA-SS adopts this chapter and all amendments.*

Exception: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. *Division of the State Architect-Structural Safety:* ***[DSA-SS]*** *For applications listed in Section 1.9.2.1.*

2. *(Reserved for OSHPD)*

SECTION 2202A
DEFINITIONS

2202A.1 Definitions. The following terms *are defined in Chapter 2.*

…

SECTION 2204*A*
CONNECTIONS

2204*A*.1 Welding. The details of design, workmanship and technique for welding and qualification of welding personnel shall be in accordance with the specifications listed in Sections 2205*A*, 2206*A*, 2207*A*, 2208*A*, 2210*A* and 2211*A*. For *Special inspection* of welding, see Section 1705*A*.2.

…

2204A.4 ~~***2204A.2.2***~~ ***Column base plate.*** *When shear and / or tensile forces are intended to be transferred between column base plates and anchor bolts, provision shall be made in the design to eliminate the effects of oversized holes permitted in base plates by AISC 360 by use of shear lugs and / or welded shear transfer plates or other means acceptable to the enforcement agency, when the oversized holes are larger than the anchor bolt by more than 1/8 inch (3.2 mm). When welded shear transfer plates and shear lugs or other means acceptable to the enforcement agency are not used, the anchor bolts shall be checked for the induced bending stresses in combination with the shear stresses.*

SECTION 2205A
STRUCTURAL STEEL

2205*A*.1 General. The design, fabrication and erection of structural steel elements in buildings, structures and portions thereof shall be in accordance with AISC 360.

Exception: [Reserved for OSHPD]

2205*A*.2 Seismic Design. Where required, the seismic design, fabrication and erection of buildings, structures and portions thereof shall be in accordance with Section 2205A.2.1 or 2205A.2.2.

~~**2205*A*.2.1 Seismic Design Category A, B or C.** *Not permittedby DSA-SS.*~~

2205*A*.2.1 Structural steel seismic force-resisting system. The design, detailing, fabrication and erection of structural steel seismic force-resisting systems shall be in accordance with the provisions of Section 2205A.2.1.1 or 2205A.2.1.2, as applicable.

2205*A*.2.1.1 Seismic Design Category B or C. *Not permitted by DSA.* ~~Structures assigned to Seismic Design Category B or C shall be of any construction permitted in Section 2205. Where a response modification coefficient, R, in accordance with ASCE 7, Table 12.2-1 is used for the design of structural steel structures assigned to Seismic Design Category B or C, the structures shall be designed and detailed in accordance with the requirements of AISC 341.~~

~~**Exception:** The response modification coefficient, R, designated for "Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems" in ASCE 7, Table 12.2-1 shall be permitted for systems designed and detailed in accordance with AISC 360, and need not be designed and detailed in accordance with AISC 341.~~

2205*A*.2.1.2 Seismic Design Category D, E or F. Structures assigned to *Seismic Design Category* D, E or F shall be designed and detailed in accordance with AISC 341. ~~, except as permitted in ASCE 7, Table 15.4-1.~~

2205*A*.2.2 Structural steel elements. The design, detailing, fabrication and erection of structural steel elements in seismic force-resisting system other than those covered in Section 2205A.2.1, including struts, collectors, chords and foundation elements shall be in accordance with AISC 341.~~, where either of following applies:~~

~~1. The structure is assigned to seismic design category D, E or F, except as permitted in ASCE 7, Table 15.4-1.~~

~~2. A response modification coefficient, R, greater than 3 in accordance with ASCE 7, Table 12.2-1, is used for the design of structure assigned to seismic design category B or C.~~

2205A.3 Modifications to AISC 341. [DSA-SS]

2205A.3.1 Section A4. *Replace Section A4.1 item (3) as follows:*

(3) *Locations and dimensions of protected zones, including provision by the owner or owner's' designated representative for construction to permanently mark and maintain the protection.*

2205A.3.2 ***~~2205A.3.1~~*** ***Section D1.*** *Add Section D1.6 as follows:*

6. Diaphragm bracing systems. *The required strength of diagonal bracing members used as the diaphragm shall be determined from either of the following:*

(1) The load effect resulting from the diaphragm analysis per the applicable building code provided the members satisfy all of the following requirements:

1. Diagonal bracing members comply with Section D1.1 for moderately ductile members.

2. Each diagonal bracing member resists no more than 30 percent of the diaphragm shear at each line of resistance.

3. Diagonal bracing members shall not support gravity loads other than self-weight.

4. The slenderness ratio (KL/r) of diagonal bracing members shall not exceed 4$\sqrt{E/Fy}$, except tension-only bracing.

(2) The load effect required for collectors using the load combinations stipulated in the applicable building code.

2205A.3.3 ***~~2205A.3.2~~*** ***Section D2.*** *Modify Section D2.6c(b)(ii) as follows:*

(ii) the moment calculated using the load combinations of the applicable building code, including the amplified seismic load, provided the connection or other mechanism within the column base is designed to have the ductility necessary to accommodate the column base rotation resulting from the design story drift.

2205A.3.4 ***~~2205A.3.3~~*** ***Section D2.*** *Add Section D2.9 as follows:*

9. Diaphragm bracing systems*. The required strength of the connections of diagonal bracing members used as the diaphragm shall be the load effect required for collectors using the load combinations stipulated in the applicable building code.*

2205A.3.5 Section F1. *Add Section F1.4c as follows:*

***4c. Multi-tiered Braced Frames**: Braced-frames configured with two or more tiers of bracing between diaphragm levels or locations of out-of-plane support shall comply with the additional requirements of section F2.4e.*

***2205A.3.6 ~~2205A.3.4~~ Section F2.** Modify Section F2.3 Exception (2)(a) as follows:*

(a) The maximum of the forces determined using load combination stipulated by the applicable building code including the amplified seismic load, applied to the building frame model in which all compression braces have been removed and those determined with no compression braces removed per D1.4a(2).

***2205A.3.7 ~~2205A.3.5~~ Section F2.** Modify Section F2.4a by adding the following:*

Where each framing bay on a line of resistance does not have opposing diagonal braces within the same column bay, then the collector forces along that line shall be designed considering the redistribution of seismic forces to other bays as a result of the post-buckled redistribution of loads using the analysis requirements of Section F2.3. The collector shall not be designed for a load less than that stipulated by the applicable building code.

The required strength of the collector need not exceed the forces determined using load combination stipulated by the applicable building code including the amplified seismic load, applied to the building model in which all compression braces have been removed.

***2205A.3.8 Section F2.** Add Section F2.4e as follows:*

***4c. Multi-tiered Braced Frames**: Braced-frames configured with two or more tiers of bracing between diaphragm levels or locations of out-of-plane support shall comply with the additional requirements of this section:*

(1) Braces shall be used in symmetrical pairs at every tier level.

(2) Horizontal beams at intermediate tier levels for V- and inverted V-brace configurations shall have out-of-plane strength, stiffness, and beam-to-column connections adequate to resist torsional moments arising from brace buckling when braces are designed to buckle out-of-plane.

(3) Columns shall be restrained against rotation about their longitudinal axis at each intermediate tier level and shall resist out-of-plane bending moments due to second-order effects, geometric imperfections, and out-of-plane brace buckling.

2205A.4 MODIFICATIONS TO AISC 341. [Reserved for OSHPD]

2205A.5 MODIFICATIONS TO AISC 358. [Reserved for OSHPD]

SECTION 2206*A*
COMPOSITE STRUCTURAL STEEL AND
CONCRETE STRUCTURES

2206*A*.1 General. Systems of structural steel elements acting compositely with reinforced concrete shall be designed in accordance with AISC 360 and ACI 318, excluding ACI 318 Chapter 14.

2206*A*.2 Seismic Design. Where required, the seismic design, fabrication and erection of composite steel and concrete systems shall be in accordance with the additional provisions of Section 2206*A*.2.1.

2206*A*.2.1 Seismic requirements for composite structural steel and concrete construction. Where a response modification coefficient, *R*, in accordance with ASCE 7, Table 12.2-1 is used for the design of systems of structural steel acting compositely with reinforced concrete, the structures shall be designed and detailed in accordance with the requirements of AISC 341 *and shall be considered as an alternative system*.

Exception: *Steel and concrete composite special moment frame with the approved moment connection~~s~~ in accordance with AISC 358 Chapter 10 shall be permitted provided:*

1. Beams are provided with Reduced Beam Sections (RBS),

~~2. Columns shall be Hollow Structural Sections (HSS) and completely filled with structural concrete having unit weight not less than 110 pounds per cubic foot (17 kN/m^3). Concrete shall have 28-day compressive strength not less than 4,000 psi (28 MPa).~~

2. ~~3.~~Web extension to beam web two sided fillet weld welds are sized to develop expected strength of the beam web and shall not be less than a ¼ inch fillet weld, and

~~4. The high strength bolt design shall consider interaction between shear and tension as required by AISC 360, and~~

3. ~~5.~~ The built-up box column wall thickness shall not be less than 1.25" and ~~T~~ the HSS column wall thickness shall not be less than ½ inch.

…

SECTION 2207A
STEEL JOISTS

…

2207*A*.4 Steel joist drawings. Steel joist placement plans shall be provided to show the steel joist products as specified on the *approved construction documents* and are to be utilized for field installation in accordance with specific project requirements as stated in Section 2207*A*.2. Steel joist placement plans shall include, at a minimum, the following:

…

~~Steel joist placement plans do not require the seal and signature of the joist manufacturer's registered design professional.~~

…

2207A.4.1 Design approval. [DSA-SS] *Joist and joist girder design calculations and profiles with member sizes and connection details, and joist placement plans shall be provided to the enforcement agency and approved prior to joist fabrication, in accordance with the California Administrative Code (Title 24, Part 1). Joist and joist girder design calculations and profiles with member sizes and connection details shall bear the signature and stamp or seal of the registered engineer or licensed architect responsible for the joist design. Alterations to the approved joist and joist girder design calculations and profiles with member sizes and connection details, or to fabricated joists are subject to the approval of the enforcement agency.*

…

2207A.6 Joist Chord Bracing. *The chords of all joists shall be laterally supported at all points where the chords change direction.*

…

SECTION 2208*A*

STEEL CABLE STRUCTURES

2208*A*.1 General. The design, fabrication and erection including related connections, and protective coatings of steel cables for buildings shall be in accordance with ASCE 19.

~~**2208.2 Seismic requirements for steel cable.** The design strength of steel cables shall be determined by the provisions of ASCE 19 except as modified by these provisions.~~

~~1. A load factor of 1.1 shall be applied to the prestress force included in T_3 and T_4 as defined in Section 3.12.~~

~~2. In Section 3.2.1, Item (c) shall be replaced with "1.5 T_3" and Item (d) shall be replaced with "1.5 T_4."~~

…

SECTION 2210*A*
COLD-FORMED STEEL

2210*A*.1 General. The design of cold-formed carbon and low alloy steel structural members shall be in accordance with AISI S100. The design of cold-formed stainless-steel structural members shall be in accordance with ASCE 8. Cold formed steel light-frame construction shall also comply with Section 2211*A*. Where required, the seismic design of cold formed steel structures shall be in accordance with the additional provisions of Section 2210*A*.2.

2210*A*.1.1 Steel decks. The design and construction of cold formed steel decks shall be in accordance with this section.

2210*A*.1.1.1 Noncomposite steel floor decks. Noncomposite steel floor decks shall be permitted to be designed and constructed in accordance with ANSI/SDI-NC1.0.

2210*A*.1.1.2 Steel roof deck. Steel roof decks shall be permitted to be designed and constructed in accordance with ANSI/SDI-RD1.0. *The base material thickness of steel deck shall not be less than 0.0359 inch (0.9 mm) (20 gage).*

Exception: [DSA-SS] *For single-story open structures, the minimum deck thickness may be waived if the steel roof deck need not be used as the diaphragm and there are no suspended hangers or bracing for nonstructural components attached to the deck.*

~~***2210A.1.1.3 Composite slabs on steel decks.*** *Composite slabs of concrete and steel deck shall be permitted to be designed and constructed in accordance with ANSI/SDI-C.*~~

2210A.1.1.3 Composite slabs on steel decks. Composite slabs of concrete and steel deck shall be permitted to be designed and constructed in accordance with SDI-C.

2210*A*.2 Seismic requirements for cold-formed steel structures. Where a response modification coefficient, *R*, in accordance with ASCE 7, Table 12.2-1 is used for the design of cold-formed steel structures, the structures shall be designed and detailed in accordance with the requirements of AISI S100~~,~~ *and* ASCE 8. ~~, or, for cold-formed steel special-bolted moment frames, AISI S110.~~

SECTION 2211*A*
COLD-FORMED STEEL LIGHT-FRAME CONSTRUCTION

2211*A*.1 General. The design and installation of structural and nonstructural members utilized in cold-formed steel light-frame construction where the specified minimum base steel thickness is not greater than 0.1180 inches (2.997 mm) shall be in accordance with AISI S200 and Sections 2211*A*.2 through 2211*A*.7, or AISI S220, as applicable.

…

2211*A*.3 Truss design. Cold-formed steel trusses shall be designed in accordance with AISI S214, Sections 2211*A*.3.1 through 2211*A*.3.4 and accepted engineering practice.

Complete engineering analysis and truss design drawings shall accompany the construction documents submitted to the enforcement agency for approval. When load testing is required, the test report shall be submitted with the truss design drawings and engineering analysis to the enforcement agency.

2211*A*.3.1 Truss design drawings. The truss design drawings shall conform to the requirements of Section B2.3 of AISI S214 and shall be provided with the shipment of trusses delivered to the job site. The truss design drawings shall include the details of permanent individual truss member

restraint/bracing in accordance with Section B ~~6(a) or B 6(c)~~ of AISI S214 where these methods are utilized to provide restraint/bracing.

2211*A*.3.2 Deferred submittals. ~~AISI S214 Section B4.2 shall be deleted.~~ *Not permitted by DSA-SS.*

…

2211*A*.4 Structural wall stud design. Structural wall studs shall be designed in accordance with either AISI S211 or AISI S100.

Cold formed steel stud foundation plates or sills shall be bolted or fastened to the foundation or foundation wall in accordance with Section 2304.3.4, Item 2.

…

2211*A*.6 Lateral design. Light-frame shear walls, diagonal strap bracing that is part of a structural wall and diaphragms used to resist wind, seismic and other in-plane lateral loads shall be designed in accordance with AISI S213.

Shear wall assemblies in accordance with ~~per~~ Section C2.2.3 of AISI S213 are not permitted within the seismic force-resisting system of buildings.

2211*A*.7 Prescriptive framing. *Not permitted by DSA-SS.* ~~Detached one- and two-family *dwellings* and *townhouses*, less than or equal to three *stories above grade plane*, shall be permitted to be constructed in accordance with AISI S230 subject to the limitations therein.~~

SECTION 2212A [DSA-SS]
LIGHT MODULAR STEEL MOMENT FRAMES FOR
PUBLIC ELEMENTARY AND SECONDARY
SCHOOLS, AND COMMUNITY COLLEGES

2212A.1 General.

2212A.1.1 Configuration. *Light modular steel moment frame buildings shall be constructed of factory-assembled modules comprising a single-story moment-resisting space frame supporting a floor and roof. Individual modules shall not exceed a width of 14 feet (4.25 m) nor a length of 72*

feet (22 m). All connections of beams to corner columns shall be designed as moment-resisting in accordance with the criteria of Section 2212A.2. Modules may be stacked to form multistory structures not exceeding 35 feet or two stories in height. When stacked modules are evaluated separately, seismic forces on each module shall be distributed in accordance with Section 12.8.3 of ASCE 7, considering the modules in the stacked condition. See Section 2212A.2.5 of this code.

2212A.1.2 Design, fabrication and erection. *The design, fabrication and erection of light modular steel moment frame buildings shall be in accordance with the AISC Specification for Structural Steel Buildings (ANSI/AISC 360) and the AISI North American Specification for the Design of Cold Formed Structural Members (AISI/COS/ NASPEC), as applicable, and the requirements of this section. The maximum dead load of the roof and elevated floor shall not exceed 25 psf and 50 psf (1197 Pa and 2394 Pa), respectively. The maximum dead load of the exterior walls shall not exceed 45 psf (2155 Pa).*

2212A.2 Seismic requirements. *In addition to the other requirements of this code, the design, materials and workmanship of light modular steel moment frames shall comply with the requirements of this section. The response modification coefficient R shall be equal to 31/2. Cd and Ω0 shall be equal to 3.0.*

2212A.2.1 Base materials. *Beams, columns and connection materials shall be limited to those materials permitted under the AISC Specification for Structural Members (ANSI/AISC 360) and the AISI North American Specification for the Design of Cold Formed Structural Members (AISI/COS/NASPEC).*

2212A.2.2 Beam-to-column strength ratio. *At each moment-resisting connection the following shall apply:*

$$\frac{\sum S_{bi}F_{ybi}}{\sum S_{cj}F_{ycj}} \geq 1.4 \qquad \textbf{(Equation 22A-1)}$$

where:

F_{ybi} *= The specified yield stress of beam "i."*

F_{ycj} *= The specified yield stress of column "j."*

S_{bi} *= The flexural section modulus of each beam "i" that is moment connected to the column "j" at*

the connection.

S_{cj} = The flexural section modulus of each column "j" that is moment connected to the beam "i" at the connection.

Exceptions:

1. *Beam-to-column connections at the floor level beams of first or second-story modules need not comply with this requirement.*
2. *Beam-to-column strength ratios less than 1.4 are allowed if proven to be acceptable by analysis or testing.*

2212A.2.3 Welding. *Weld filler metals shall be capable of producing weld metal with a minimum Charpy V-Notch toughness of 20 ft-lb at 0°F. Where beam bottom flanges attach to columns with complete joint penetration groove welds and weld backing is used at the bottom surface of the beam flange, such backing shall be removed and the root pass back-gouged, repaired and reinforced with a minimum 3/16 inch (5 mm) fillet weld.*

2212A.2.4 Connection design. *Connections of beams to columns shall have the design strength to resist the maximum seismic load effect, E_m , calculated in accordance with Section 12.4.3 of ASCE 7.*

2212A.2.5 Multistory assemblies. *Analysis of multistory assemblies shall be permitted to consider the stacked modules as a single assembly, with restraint conditions between the stacked units that represent the actual method of attachment. Alternatively, it shall be permitted to analyze the individual modules of stacked assemblies independently, with lateral and vertical reactions from modules above applied as concentrated loads at the top of the supporting module.*

SECTION 2213A
TESTING AND FIELD VERIFICATION

2213A.1 Tests of High-strength Bolts, Nuts and Washers*. High-strength bolts, nuts and washers shall be sampled and tested by an approved independent testing laboratory for conformance with the requirements of applicable ASTM standards.*

2213A.2 Tests of End-welded Studs. *End-welded studs shall be tested in accordance with ~~per~~ the requirements of the AWS D1.1, Sections 7.7 and 7.8.*

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

CHAPTER 23

WOOD

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	X	X	
Adopt only those sections listed below			
2301.1.1	X	X	
2301.1.2	X	X	
2301.1.3	X	X	
2301.1.3.1	X	-	
2301.1.3.2	-	X	
2301.1.4	X	X	
~~*2301.2, Item 4, Exception*~~	~~X~~	~~X~~	
2303.1.3.1	X	X	
2303.1.4.1	X	X	
2303.4.1.4.1, Exception 3	X	X	
2303.4.3.1	X	X	
2304.3.4	X	X	
2304.4.1	X	X	
~~*2304.5*~~	~~X~~	~~X~~	
~~*2304.6.1, Exception*~~	~~X~~	-	

2304.10.1.1 ~~2304.9.1.1~~	X	-	
2304.12.1.2 ~~2304.11.2.2~~, Exception	X	~~X~~ -	
2304.12.1.4.1 ~~2304.11.2.4.1~~	X	-	
2305.1.2	X	X	
~~2305.2, Exception~~	~~X~~	-	
~~2305.3, Exception~~	~~X~~	~~X~~	
~~2306.2, Exception~~	~~X~~	~~X~~	
~~2306.3, Exception~~	~~X~~	~~X~~	
2308.2.7 ~~2308.2, Item 8~~	X	X	
2309.1.1	X	X	

(All existing California amendments that are not revised below shall continue without change)

SECTION 2301
GENERAL

2301.1 Scope. The provisions of this chapter shall govern the materials, design, construction and quality of wood members and their fasteners.

2301.1.1 Application. [DSA-SS & DSA-SS/CC] *The scope of application of Chapter 23 is as follows:*

1. *Applications listed in Sections 1.9.2.1 and 1.9.2.2, regulated by the Division of the State Architect-Structural Safety (DSA-SS, and DSA-SS/CC). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*

2. *(Reserved for OSHPD)*

2301.1.2 Identification of amendments. [DSA-SS & DSA-SS/CC] *Amendments appear in this chapter preceded with the appropriate acronym, as follows:*

1. *Division of the State Architect - Structural Safety:*

[DSA-SS] *- For applications listed in Section 1.9.2.1.*

[DSA-SS/CC] *- For applications listed in Section 1.9.2.2*

2. (Reserved for OSHPD)

2301.1.3 Reference to other chapters.

2301.1.3.1 [DSA-SS] *Where reference within this chapter is made to sections in Chapters 16, 17, 18, 19, 21, and 22~~, and 34~~, the provisions in Chapters 16A, 17A, 18A, 19A, 21A, and 22A~~, and 34A~~ respectively shall apply instead.*

> ~~***Exception****: For DSA-SS, the requirements of Chapter 34 shall apply instead of Chapter 34A*~~

2301.1.3.2 [DSA-SS/CC] *Where reference within this chapter is made to sections in Chapters 17 and 18, the provisions in Chapters 17A and 18A respectively shall apply instead.*

2301.1.4 Prohibition. *(Relocated from 2013 CBC, Section 2305.1.2)* ***[DSA-SS & DSA-SS/CC]*** *The following design methods, systems, and materials are not permitted by DSA:*

1. *Straight-sheathed horizontal lumber diaphragms~~ are not permitted~~.*
2. *Gypsum-based sheathing shear walls and portland cement plaster shear walls.~~ are not permitted~~.*
3. *Shear wall foundation anchor bolt washers ~~shall be provided~~ in accordance with ~~AF & PA SDPWS Section 4.3.6.4.3. The~~ exception to ~~AF & PA~~ AWC SDPWS Section 4.3.6.4.3. ~~shall not apply.~~*
4. *Wood structural panel shear walls and diaphragms using staples as fasteners.~~ are not permitted.~~*
5. *Unblocked shear walls.~~ are not permitted.~~*
6. *Any wood structural panel sheathing used for diaphragms and shear walls that are part of the seismic force-resisting system, ~~shall be~~ not applied directly to framing members.*
7. *Single and double diagonally sheathed lumber walls ~~shall not be~~ used to resist seismic forces.*
8. *(Relocated from 2013 CBC, 2301.2 item 4) Log structures in accordance with ICC 400.~~are not permitted by DSA~~.*
9. *Cross-laminated timber used as part of the seismic force resisting system, unless approved as*

an alternative system in accordance with Section 104.11.

2301.2 General design requirements. The design of structural elements or systems, constructed partially or wholly of wood or wood-based products, shall be in accordance with one of the following methods:

...

5. The design and construction of log structures shall be in accordance with the provisions of ICC 400.

   (Relocated to 2301.1.4 item 8) ***~~Exception: [DSA-SS & DSA-SS/CC]~~*** *~~Log structures are not permitted by DSA.~~*

…

SECTION 2302
DEFINITIONS

2302.1 Definitions. The following terms are defined in Chapter 2:

...

NATURALLY DURABLE WOOD.

Decay resistant.

Termite resistant.

...

SECTION 2303
MINIMUM STANDARDS AND QUALITY

2303.1 General. Structural sawn lumber; end-jointed lumber; prefabricated wood I-joists; structural glued-

laminated timber; wood structural panels, fiberboard sheathing (when used structurally); hardboard siding (when used structurally); particleboard; preservative-treated wood; structural log members; structural composite lumber; round timber poles and piles; fire-retardant-treated wood; hardwood plywood; wood trusses; joist hangers; nails; and staples shall conform to the applicable provisions of this section.

...

2303.1.3 Structural glued-laminated timber. Glued-laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1 and ASTM D 3737.

2303.1.3.1 Additional requirements. [DSA-SS & DSA-SS/CC] *The construction documents shall indicate the following:*

1. *Dry or wet service conditions.*
2. *Laminating combinations and stress requirements.*
3. *Species group.*
4. *Preservative material and retention, when preservative treatment is required.*
5. *Provisions for protection during shipping and field handling, such as sealing and wrapping in accordance with AITC 111.*

When mechanical reinforcement such as radial tension reinforcement is required, such reinforcement shall comply with AITC 404 and shall be detailed accordingly in the construction documents. Construction documents shall specify that the moisture content of laminations at the time of manufacture shall not exceed 12% for dry conditions of use.

The design of fasteners and connections shall comply with AITC 117, Section I, Item 6 (Connection Design), and NDS Appendix E.

~~*Refer to Section 1705A.5.4 for special inspection requirements during fabrication of structural glued laminated timbers.*~~

2303.1.4 Structural glued cross-laminated timber. Cross-laminated timbers shall be manufactured and identified as required in ANSI/APA PRG 320.

2303.1.4.1 Additional requirements. [DSA-SS & DSA-SS/CC] *Requirements in Section 2303.1.3.1 shall apply to glued cross-laminated timber.*

...

2303.4.1.4.1 Truss design drawings. Where required by the *registered design professional*, the *building official*, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions:

1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.
2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.

*3. [**DSA-SS, DSA-SS/CC**] Exceptions 1 and 2 are not permitted by DSA.*

2303.4.2 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams that serve only as a guide for installation and do not deviate from the *permit* submittal drawings shall not be required to bear the seal or signature of the truss designer.

2303.4.3 Truss submittal package. The truss submittal package provided by the truss manufacturer shall consist of each individual truss design drawing, the truss placement diagram, the permanent individual truss member restraint/bracing method and details and any other structural details germane to the trusses; as applicable, the cover/truss index sheet.

2303.4.3.1 Additional Requirements. [DSA-SS, DSA-SS/CC] *In addition to Sections 2303.4.1 and 2303.4.2, the following requirements apply:*

*1. **Construction Documents.** The construction documents prepared by the registered engineer or licensed architect for the project shall indicate all requirements for the truss design, including:*

1.1 Deflection criteria.

1.2 Connection details to structural and non-structural elements (e.g. non-bearing partitions).

2. ***Requirements for Approval.*** *The truss design drawings and engineering analysis shall be provided to the enforcement agency and approved prior to truss fabrication, in accordance with the California Administrative Code. Alterations to the approved truss design drawings or manufactured trusses are subject to the approval of the enforcement agency.*

~~3. ***Special inspection during truss manufacture.*** *Refer to Section 1705A.5.5 for special inspection requirements during the manufacture of open web trusses.*~~

2303.4.4 Anchorage. The design for the transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the *registered design professional*.

2303.4.5 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a *registered design professional*. Alterations resulting in the addition of loads to any member (e.g., HVAC equipment, piping, additional roofing or insulation, etc.) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2303.4.6 TPI 1 Specifications. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 110.4, as applicable.

2303.4.7 Truss quality assurance. Trusses not part of a manufacturing process in accordance with either Section 2303.4.6 or a standard listed in Chapter 35, which provides requirements for quality control done under the supervision of a third-party quality control agency, shall be manufactured in compliance with Sections 1704.2 and 1704.6, as applicable.

...

SECTION 2304
GENERAL CONSTRUCTION REQUIREMENTS

2304.1 General. The provisions of this section apply to design methods specified in Section 2301.2.

2304.2 Size of structural members. Computations to determine the required sizes of members shall be based on the net dimensions (actual sizes) and not nominal sizes.

2304.3 Wall framing. The framing of exterior and interior walls shall be in accordance with the provisions

specified in Section 2308 unless a specific design is furnished.

2304.3.1 Bottom plates. Studs shall have full bearing on a 2-inch-thick (actual $1^1/_2$-inch, 38 mm) or larger plate or sill having a width at least equal to the width of the studs.

2304.3.2 Framing over openings. Headers, double joists, trusses or other approved assemblies that are of adequate size to transfer loads to the vertical members shall be provided over window and door openings in load-bearing walls and partitions.

2304.3.3 Shrinkage. Wood walls and bearing partitions shall not support more than two floors and a roof unless an analysis satisfactory to the building official shows that shrinkage of the wood framing will not have adverse effects on the structure or any plumbing, electrical or mechanical systems, or other equipment installed therein due to excessive shrinkage or differential movements caused by shrinkage. The analysis shall also show that the roof drainage system and the foregoing systems or equipment will not be adversely affected or, as an alternate, such systems shall be designed to accommodate the differential shrinkage or movements.

2304.3.4 Additional requirements. [DSA-SS, DSA-SS/CC] *The following additional requirements apply:*

1. *Engineering analysis shall be furnished that demonstrates compliance of wall framing elements and connections with Section 2301.2, Item 1 or 2.*

2. *Construction documents shall include detailing of sill plate anchorage to supporting masonry or concrete for all exterior and interior bearing, non-bearing and shear walls. Unless specifically designed in accordance with item 1 above, sills under exterior walls, bearing walls and shear walls shall be bolted to masonry or concrete with 5/8" diameter by 12 inch (16 mm by 305 mm) bolts spaced not more than four (4) feet (1219 mm) on center, with a minimum of two (2) bolts for each piece of sill plate. Anchor bolts shall have a 4 inch minimum and a 12 inch maximum clearance to the end of the sill plate, and 7 inch minimum embedment into concrete or masonry.*

   Unless specifically designed in accordance with item 1 above, sill plates under non-bearing interior partitions on concrete floor slabs shall be anchored at not more than four (4) feet (1219 mm) on center to resist a minimum allowable stress shear of 100 pounds per linear foot (1.4 kN/m) acting either parallel or perpendicular to the wall.

3. *Construction documents shall include detailing and limitations for notches and bored holes in wall studs, plates and sills.*

2304.4 Floor and roof framing. The framing of wood-joisted floors and wood framed roofs shall be in accordance with the provisions specified in Section 2308 unless a specific design is furnished.

2304.4.1 Additional requirements. [DSA-SS, DSA-SS/CC] *The following additional requirements apply:*

1. *Engineering analysis shall be furnished that demonstrates compliance of floor, roof and ceiling framing elements and connections with Section 2301.2, Items 1 or 2.*
2. *Construction documents shall include detailing and limitations for notches and bored holes in floor and roof framing members.*

…

2304.6.1 Wood structural panel sheathing.

…

~~***Exception: [DSA-SS]*** *Wind pressure shall be calculated in accordance with Section 1609A.*~~

…

2304.10 Connections and fasteners.

…

2304.10.1 Fastener requirements. Connections for wood members shall be designed in accordance with the appropriate methodology in Section 2301.2. The number and size of fasteners connecting wood members shall not be less than that set forth in Table 2304.10.1.

2304.10.1.1 ~~***2304.9.1.1***~~ ***Additional requirements. [DSA-SS]*** *Fasteners used for the attachment of exterior wall coverings shall be of hot-dipped zinc-coated galvanized steel, mechanically deposited zinc-coated steel, stainless steel, silicon bronze or copper. The coating weights for hot-dipped zinc-coated fasteners shall be in accordance with ASTM A 153. The coating weights for mechanically deposited zinc coated fasteners shall be in accordance with ASTM B 695, Class 55 minimum.*

…

2304.12.1.2 Wood supported by exterior foundation walls. Wood framing members, including wood sheathing, that rest on exterior foundation walls and are less than 8 inches (203 mm) from exposed earth shall be of naturally durable or preservative-treated wood.

Exception: [DSA-SS] *At exterior walls where the earth is paved with an asphalt or concrete slab at least 18 inches (457 mm) wide and draining away from the building, the bottom of sills are permitted to be 6 inches (152 mm) above the top of such slab. Other equivalent means of termite and decay protection may be accepted by the enforcement agency.*

…

2304.12.1.4 Sleepers and sills. Sleepers and sills on a concrete or masonry slab that is in direct contact with earth shall be of naturally durable or preservative-treated wood.

2304.12.1.4.1 ***~~2304.11.2.4.1~~*** ***Additional Requirements. [DSA-SS]*** *Stud walls or partitions at shower or toilet rooms with more than two plumbing fixtures, excluding floor drains, and stud walls adjacent to unroofed paved areas shall rest on a concrete curb extending at least 6 inches (152 mm) above finished floor or pavement level.*

…

SECTION 2305

GENERAL DESIGN REQUIREMENTS FOR LATERAL-FORCE-RESISTING SYSTEMS

…

2305.1.1 Openings in shear panels. Openings in shear panels that materially affect their strength shall be detailed on the plans, and shall have their edges adequately reinforced to transfer all shearing stresses.

2305.1.2 Additional Requirements. [DSA-SS, DSA-SS/CC] *See Section 2301.1.4 for modifications to AWC SDPWS.* ~~*The following limitations shall apply:*~~

(Relocated to Section 2301.1.4)

~~*1. Straight-sheathed horizontal lumber diaphragms are not permitted.*~~

~~*2. Gypsum-based sheathing shear walls and portland cement plaster shear walls are not*~~

~~*permitted.*~~

~~*3. Shear wall foundation anchor bolt washers shall be provided in accordance with AF & PA SDPWS Section 4.3.6.4.3. The exception to AF & PA SDPSWS Section 4.3.6.4.3 shall not apply.*~~

~~*4. Wood structural panel shear walls and diaphragms using staples as fasteners are not permitted.*~~

~~*5. Unblocked shear walls are not permitted.*~~

~~*6. Any wood structural panel sheathing used for diaphragms and shear walls that are part of the seismic force-resisting system shall be applied directly to framing members.*~~

~~*7. Single and double diagonally sheathed lumber walls shall not be used to resist seismic forces.*~~

2305.2 Diaphragm deflection.

…

~~***Exception: [DSA-SS, DSA-SS/CC]*** *Section 2305.2 is not permitted by DSA*~~

…

2305.3 Shear wall deflection

…

~~***Exception: [DSA-SS, DSA-SS/CC]*** *Section 2305.3 is not permitted by DSA*~~.

…

SECTION 2306
ALLOWABLE STRESS DESIGN

2306.1 Allowable stress design. The structural analysis and construction of wood elements in structures using *allowable stress design* shall be in accordance with the following applicable standards:

…

2306.2 Wood-frame diaphragms. Wood-frame diaphragms shall be designed and constructed in accordance with AWC SDPWS. Where panels are fastened to framing members with staples,

requirements and limitations of AWC SDPWS shall be met and the allowable shear values set forth in Table 2306.2(1) or 2306.2(2) shall be permitted. The allowable shear values in Tables 2306.2(1) and 2306.2(2) are permitted to be increased 40 percent for wind design.

> ~~***Exception: [DSA-SS, DSA-SS/CC]*** *Wood structural panel diaphragms using staples as fasteners are not permitted by DSA.*~~

…

2306.3 Wood-frame shear walls. Wood-frame shear walls shall be designed and constructed in accordance with AWC SDPWS. Where panels are fastened to framing members with staples, requirements and limitations of AWC SDPWS shall be met and the allowable shear values set forth in Table 2306.3(1), 2306.3(2) or 2306.3(3) shall be permitted. The allowable shear values in Tables 2306.3(1) and 2306.3(2) are permitted to be increased 40 percent for wind design. Panels complying with ANSI/APA PRP-210 shall be permitted to use design values for Plywood Siding in the AWC SDPWS.

> ~~***Exception: [DSA-SS, DSA-SS/CC]*** *Wood structural panel shear walls using staples as fasteners are not permitted by DSA.*~~

…

SECTION 2308
CONVENTIONAL LIGHT-FRAME CONSTRUCTION

…

2308.2.7 ~~*8.*~~ ***Additional requirements*** ***[DSA-SS & DSA-SS/CC]*** *The use of conventional light-frame construction provisions in this section is permitted, subject to the following conditions:*

1. ~~*8.1.*~~ *The design and construction shall also comply with Section 2304 and Section 2305.*
2. ~~*8.2.*~~ *In conjunction with the use of provisions in Section 2308.6* ~~*2308.3*~~ *(*~~*Braced*~~ *Wall* ~~*Lines*~~ *bracing), engineering analysis shall be furnished that demonstrates compliance of lateral-force-resisting systems with Section 2305.*

3. ~~8.3.~~ *In addition to the use of provisions in Section 2308.4 ~~2308.8~~ (Floor framing ~~Joists~~), engineering analysis shall be furnished that demonstrates compliance of floor framing elements and connections with Section 2301.2, Item 1 or 2.*
4. ~~8.4.~~ *In addition to the use of provisions in Section 2308.5 ~~2308.9~~ (Wall construction ~~Framing~~), engineering analysis shall be furnished that demonstrates compliance of wall framing elements and connections with Section 2301.2, Item 1 or 2.*
5. ~~8.5.~~ *In addition to the use of provisions in Section 2308.7 ~~2308.10~~ (Roof and Ceiling Framing), engineering analysis shall be furnished demonstrating compliance of roof and ceiling framing elements and connections with Section 2301.2, Item 1 or 2.*

…

SECTION 2309
WOOD FRAME CONSTRUCTION MANUAL

2309.1 Wood Frame Construction Manual. Structural design in accordance with AWC WFCM shall be permitted for buildings assigned to Risk Category I or II subject to the limitations of Section 1.1.3 of the AWC WFCM and the load assumption contained therein. Structural elements beyond these limitations shall be designed in accordance with accepted engineering practice.

2309.1.1 Additional requirements [DSA-SS & DSA-SS/CC] *The use of the AWC WFCM is permitted provided the design and construction also comply with Sections 2304, 2305, and 2301.2, Item 1 or 2 and engineering analysis is furnished demonstrating compliance.*

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 24
GLASS AND GLAZING

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	*DSA-SS*	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	***X***	**X**	
Adopt only those sections listed below			
2403.2.1	*X*	X	
Table 2403.2.1	*X*	X	
2410	*X*	X	

(All existing amendments that are not revised below shall continue without any change)

...

SECTION 2401

GENERAL

2401.1 Scope. The provisions of this chapter shall govern the materials, design, construction and quality of glass, light- transmitting ceramic and light-transmitting plastic panels for exterior and interior use in both vertical and sloped applications in buildings and structures.

...

SECTION 2403

GENERAL REQUIREMENTS FOR GLASS

2403.1 Identification. Each pane shall bear the manufacturer's mark designating the type and thickness of the glass or glazing material. The identification shall not be omitted unless approved and an affidavit is furnished by the glazing contractor certifying that each light is glazed in accordance with approved construction documents that comply with the provisions of this chapter. Safety glazing shall be identified in accordance with Section 2406.2.

...

2403.2 Glass supports. Where one or more sides of any pane of glass are not firmly supported, or are subjected to unusual load conditions, detailed construction documents, detailed shop drawings and analysis or test data ensuring safe performance for the specific installation shall be prepared by a registered design professional.

2403.2.1 Additional Requirements. [DSA-SS, DSA-SS/CC] *In addition to the requirements of Section 2403.2, glass supports shall comply with the following:*

1. *The construction documents and analysis or test data required per Section 2403.2 shall be submitted to the enforcement agency for approval.*

2. *Glass firmly supported on all four edges shall be glazed with minimum laps and edge clearances set forth in Table 2403.2.1.*

TABLE 2403.2.1
MINIMUM GLAZING REQUIREMENTS

Fixed Windows and Openable Windows Other Than Horizontal Siding					
GLASS AREA	***UP TO 6 SQ. FT.***	***6 TO 14 SQ. FT.***	***14 TO 32 SQ. FT.***	***32 TO 50 SQ. FT.***	***OVER 50 SQ. FT.***
× 0.0929 for m^2, × 25.4 for mm					
1.Minimum Frame Lap	*1/4"*	*1/4"*	*5/16"*	*3/8"*	*1/2"*
2.Minimum Glass Edge Clearance	*1/8"[1,2]*	*1/8"[1,2]*	*3/16"[1]*	*1/4"*	*1/4"[1]*
3. Continuous Glazing Rabbet and Glass Retainer[3]	*Required*				
4. Resilient Setting Material[4]	*Not Required*	*Required*			
Sliding Doors and Horizontal Sliding Windows					
GLASS AREA		*UP TO 14 SQ. FT.*	*14 TO 32 SQ. FT.*	*32 TO 50 SQ. FT.*	*OVER 50 SQ. FT.*
× 0.0929 for m^2, × 25.4 for mm					
5.Minimum Glass Frame Lap		*1/4"*	*5/16"*	*3/8"*	*1/2"*

6.Minimum Glass Edge Clearance	*1/8"[2]*	*3/16"*	*1/4"*	*1/4"*
7. Continuous Glazing Rabbet and Glass Retainer[3]	*Required above third story*	*Required*		
8. Resilient Setting Material[4]	*Not Required*		*Required*	

[1] Glass edge clearance in fixed openings shall not be less than required to provide for wind and earthquake drift.

[2] Glass edge clearance at all sides of pane shall be a minimum of 3/16 inch (4.8 mm) where height of glass exceeds 3 feet (914 mm).

[3] Glass retainers such as metal, wood or vinyl face stops, glazing beads, gaskets, glazing clips and glazing channels shall be of sufficient strength and fixation to serve this purpose.

[4] Resilient setting material shall include preformed rubber or vinyl plastic gaskets or other materials which are proved to the satisfaction of the building official to remain resilient.

...

Section 2410 [DSA-SS, DSA-SS/CC]
Structural Sealant Glazing (SSG)

2410.1 General. *The requirements of this section address the use of Structural Sealant Glazing (SSG). These requirements shall not be used for butt joint glazing, point supported glass, and glass fins.*

Design, construction, testing, and inspection shall satisfy the requirements of this code except as modified in Sections 2410.1.1 through 2410.1.4.

2410.1.1 Design. *Design of Structural Sealant Glazing (SSG) shall satisfy the following requirements:*

1. *SSG shall be weather tight and serviceable, as defined in AAMA 501.4, under design story drifts associated with the Design Earthquake and no glass fallout shall occur at the drifts determined by ASCE 7 Section 13.5.9.*

2. *The sealant utilized in the insulated glass units used in SSG shall be designed in accordance with ASTM C 1249. The insulated glass unit design shall be in accordance with ASTM C 1249 Section 6.7.2.*

3. *Allowable stress for SSG shall not exceed 20 psi and shall have a minimum factor of safety of 5 in accordance with ASTM C 1401.*

4. *Design methodology shall address seismic movement in accordance with ASTM C 1401 Section 30.3.4.*

5. *SSG systems shall be supported for self-weight and lateral loading at each floor level of the building.*

6. *Unitized SSG framing shall be anchored to the building floor bearing plate by screws or bolts and shall not rely upon gravity or frictional forces for attachment.*

7. *Framing shall satisfy the out-of-plane deflection requirements of this code.*

2410.1.2 Testing and Inspection. *Testing and inspection of Structural Sealant Glazing (SSG) shall satisfy the following requirements:*

a. *The seismic drift capability of structural sealant glazing shall be determined by tests in accordance with AAMA 501.6, AAMA 501.4 and ASCE 7 Section 13.5.9.2.*

b. *The applicability of the specific AAMA 501.6 and AAMA 501.4 testing shall be subject to approval by the building official.*

c. *The panel test specimens used in the AAMA 501.6 and AAMA 501.4 testing shall include all glass types (annealed, heat strengthened, laminated, tempered) and insulated glass units that comprise more than 5% of the total glass curtain wall area used in the building.*

d. *AAMA 501.4 test specimen shall include the same materials, sections, connections, and attachment details to the test apparatus as used in the building.*

e. Serviceability tests of SSG test specimen shall be performed in accordance with AAMA 501.4 after seismic displacement tests to the design story drift.

f. The window wall system using structural sealant by different manufacturer/product category shall be qualified in accordance with AAMA 501.6 and AAMA 501.4 testing for the seismic drift required. Analysis as an alternative to testing is not acceptable for the purposes of satisfying the seismic drift requirements of the SSG system.

g. Where unitized SSG is used with horizontal stack joints at each floor level and split vertical mullions that can move independently, only a story height single unit need to be tested under AAMA 501.6. Where continuous horizontal bands of SSG are used in the building, either two or four sided, the aspect ratio (height-to-length) of the test specimen shall be less than 1.0, contain not less than two interior vertical joints and all joints (vertical in the case of two sided), including the perimeter of the glass, shall be glazed with SSG.

h. Where SSG continues around corners, the AAMA 501.4 test specimen shall include one corner panel to verify the kinematics of the corner condition under seismic drift.

~~i.~~ Quality assurance and inspection requirements shall include formalized post-installation tests using the Point Load Testing procedure in accordance with ASTM C 1392. The Point Load Tests shall be done after the initial installation. ~~, then once every year for 3 years, not less than one test per elevation each time.~~

> ~~***Exception: [DSA-SS, DSA-SS/CC]*** *For two sided SSG systems where the horizontal edges are mechanically attached to mullions, the yearly point load test for 3 years is not required.*~~

j. Where the SSG is field assembled, hand pull tab tests in accordance with ASTM C1401 Section X2.1, one test every 100 linear feet, but not less than one test for each building elevation view shall be required.

Existing AAMA 501.4 and 501.6 test results satisfying the requirements of this section shall be permitted, in lieu of project specific tests, when approved by the building official.

2410.1.3 Monitoring. *Short and Long term periodic performance monitoring shall be provided in accordance with ASTM C 1401, C 1392, and C 1394. Inspection frequencies recommended in ASTM C 1392 Section 5.1 shall be followed.*

After every significant seismic event, where the Peak ~~g~~ Ground ~~shaking~~ ~~a~~ Acceleration (PGA) at the site exceeds 0.3g, or the acceleration at any monitored building level (if any) exceeds 0.8g, as measured by the seismic monitoring system in the building, the owner shall retain a structural engineer to make an inspection of the SSG system. The inspection shall include viewing the performance of the panel, structural sealant, glass, reviewing the strong motion records, and a visual examination of the overall performance for deterioration, offset or physical damage. A report for each inspection, including conclusions on the continuing adequacy of the SSG system, shall be submitted to the enforcement agency.

> ***Exception: [DSA-SS, DSA-SS/CC]*** *The inspection requirements triggered by specific ground shaking acceleration or measured building acceleration is not required.*

2410.1.4 Construction Documents. *Complete design of the SSG system for gravity, wind, and seismic forces shall be subject to review by the enforcement agency. Construction documents shall show structural details of glass and curtain wall system including:*

1. *A design narrative explaining how the SSG is supported by the building and the mechanism used to accommodate seismic racking.*
2. *Type of SSG and whether field or shop built.*
3. *The means of supporting the glass during structural sealant curing time shall be shown in the construction documents.*
4. *Typical curtain wall panel elevation, plan view, and sections.*
5. *Details of building corner joint to verify how the corner vertical mullion will move to accommodate the seismic drift.*
6. *Joints between panel and floors at top and bottom.*
7. *Joint between panels – including vertical & horizontal stack joints at intermediate and edge mullion.*
8. *Member sizes for curtain wall panels.*
9. *Glass pane sizes, thickness and type of glass.*
10. *Contact width and thickness of structural sealant and sealant materials for shop and field installation/re-glazing.*

11. *Glass to aluminum joints (including primers, if any).*
12. *Maximum roof/floor dead and live load deflection of the roof/floor framing members supporting the exterior curtain wall system.*
13. *Required seismic separation or gap distance between the structural sealant glazing curtain wall and other adjacent cladding units.*
14. *Mitigation of galvanic reactions between the roof/floor slab anchors, steel screw connections of aluminum sections and the aluminum anchorage components, if any.*

(All existing amendments that are not revised above shall continue without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 25

GYPSUM BOARD, GYPSUM PANEL PRODUCTS AND PLASTER

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below	**X**	**X**	
Adopt only those sections listed below			
2501.1.1 ~~*2501.2*~~	X	X	
2503.2	X	X	
2504.2	X	X	
2504.2.1	X	X	
2505.3	X	X	
2507.3	X	X	

2508.5.6	X	X	
2514.1 Exception	X	-	

(All existing California amendments that are not revised below shall continue without change)

…

SECTION 2501
GENERAL

2501.1 Scope. Provisions of this chapter shall govern the materials, design, construction and quality of gypsum board, gypsum panel products, lath, gypsum plaster, cement plaster and reinforced gypsum concrete.

…

2501.1.1 ~~2501.2~~ Additional Requirements. [DSA-SS, DSA-SS/CC] *Details of attachment for wall and ceiling coverings which are not provided for in this code ~~these regulations~~ shall be detailed in the approved construction documents.*

…

SECTION 2503
INSPECTION

2503.1 Inspection. Lath, gypsum board and gypsum panel products shall be inspected in accordance with Section 110.3.5.

2503.2 Additional requirements for inspection and testing. [DSA-SS, DSA-SS/CC]

1. *Lath, ~~and~~ gypsum board and gypsum panel products shall be inspected in accordance with Chapter 17A and the California Administrative Code.*

2. *No lath, gypsum board and gypsum panel products ~~or gypsum wallboard~~ or their attachments shall be covered or finished until it has been inspected and approved by the inspector of record and/or special inspector.*

3. The enforcement agency may require tests in accordance with Table 2506.2 to determine compliance with the provisions of this code. ~~these regulations~~.

4. The testing of gypsum board and gypsum panel ~~and gypsum~~ products shall conform with standards listed in Table 2506.2.

…

SECTION 2504

VERTICAL AND HORIZONTAL ASSEMBLIES

2504.1 Scope. The following requirements shall be met where construction involves gypsum board, gypsum panel products or lath and plaster in vertical and horizontal assemblies.

…

2504.2 Additional Requirements. [DSA-SS, DSA-SS/CC] *In addition to the requirements of this section, the horizontal and vertical assemblies of plaster, ~~or~~ gypsum board or gypsum panel products shall be designed to resist the loads specified in this code. ~~For suspended acoustical ceiling systems, see Section 2506. For gypsum construction, see Section 2508.~~*

2504.2.1 Wood Furring Strips. *Wood furring strips for ceilings fastened to floor or ceiling joist shall be nailed at each bearing with two common wire nails, one of which shall be a slant nail and the other a face nail, or by one nail having spirally grooved or annular grooved shanks approved by the enforcement agency for this purpose. All stripping nails shall penetrate not less than 1 3/4 inches (44.5 mm) into the member receiving the point. Holes in stripping at joints shall be subdrilled to prevent splitting.*

Where common wire nails are used to support horizontal wood stripping for plaster ceilings, such stripping shall be wire tied to the joists 4 feet (1219 mm) on center with two strands of No. 18 W&M gage galvanized annealed wire to an 8d common wire nail driven into each side of the joist 2 inches (51 mm) above the bottom of the joist or to each end of a 16d common wire nail driven horizontally through the joist 2 inches (51 mm) above the bottom of the joist, and the ends of the wire secured together with three twists of the wire.

SECTION 2505
SHEAR WALL CONSTRUCTION

…

2505.3 [DSA-SS, DSA-SS/CC] *Section 2505.1 and 2505.2 are not permitted.*

…

SECTION 2507
LATHING AND PLASTERING

2507.1 General. Lathing and plastering materials and accessories shall be marked by the manufacturer's designation to indicate compliance with the appropriate standards referenced in this section and stored in such a manner to protect them from the weather.

2507.2 Standards. Lathing and plastering materials shall conform to the standards listed in Table 2507.2 and Chapter 35 and, where required for fire protection, shall also conform to the provisions of Chapter 7.

2507.3 Lath attachment to horizontal wood supports. [DSA-SS, DSA-SS/CC] *Where interior or exterior lath is attached to horizontal wood supports, either of the following attachments shall be used in addition to the methods of attachment described in referenced standards listed in Table 2507.2.*

1. *Secure lath to alternate supports with ties consisting of a double strand of No. 18 W & M gage galvanized annealed wire at one edge of each sheet of lath. Wire ties shall be installed not less than 3 inches (76 mm) back from the edge of each sheet and shall be looped around stripping, or attached to an 8d common wire nail driven into each side of the joist 2 inches (51 mm) above the bottom of the joist or to each end of a 16d common wire nail driven horizontally through the joist 2 inches (51 mm) above the bottom of the joist and the ends of the wire secured together with three twists of the wire.*

2. *Secure lath to each support with 1/2-inch-wide (12.7 mm), 1 1/2-inch-long (38mm) No. 9 W & M gage, ring shank, hook staple placed around a 10d common nail laid flat under the surface of the lath not more than 3 inches (76 mm) from edge of each sheet. Such staples may be placed over*

ribs of 3/8-inch (9.5 mm) rib lath or over back wire of welded wire fabric or other approved lath, omitting the 10d nails.

SECTION 2508
GYPSUM CONSTRUCTION

2508.1 General.

…

2508.5.6 Diaphragm ceiling connection to partitions. [DSA-SS, DSA-SS/CC] *Gypsum board shall not be used in diaphragm ceilings to resist lateral forces imposed by partitions. Connection of diaphragm ceiling to the vertical lateral force resisting elements shall be designed and detailed to transfer lateral forces.*

…

SECTION 2514
REINFORCED GYPSUM CONCRETE

2514.1 General. Reinforced gypsum concrete shall comply with the requirements of ASTM C 317 and ASTM C 956.

Exception: *(Relocated from Section 1911A)* ***[DSA-SS]*** *Reinforced gypsum concrete shall be considered as an alternative system.*

…

(All existing amendments are continued without any change)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 26
PLASTIC

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			
2603.11.1	X	X	
2603.12.3	X	X	

…

SECTION 2603
FOAM PLASTIC INSULATION

…

2603.11 Cladding attachment over foam sheathing to masonry or concrete wall construction. Cladding shall be specified and installed in accordance with Chapter 14 and the cladding manufacturer's installation instructions or an approved design. Foam sheathing shall be attached to masonry or concrete construction in accordance with the insulation manufacturer's installation instructions or an approved design. Furring and furring attachments through foam sheathing shall be designed to resist design loads determined in accordance with Chapter 16, including support of cladding weight as applicable. Fasteners used to attach cladding or furring through foam sheathing to masonry or concrete substrates shall be approved for application into masonry or concrete material and shall be installed in accordance with the fastener manufacturer's installation instructions.

Exceptions:

1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing and connection to a masonry or concrete substrate, those requirements

shall apply.

2. For exterior insulation and finish systems, refer to Section 1408.

3. For anchored masonry or stone veneer installed over foam sheathing, refer to Section 1405.

2603.11.1 Additional Requirements. [DSA-SS, DSA-SS/CC] *In addition to the requirements of Section 2603.11, cladding and foam sheathing supports and attachments shall be designed and submitted to the enforcement agency for approval.*

2603.12 Cladding attachment over foam sheathing to cold-formed steel framing. Cladding shall be specified and installed in accordance with Chapter 14 and the cladding manufacturer's approved installation instructions, including any limitations for use over foam plastic sheathing, or an approved design. Where used, furring and furring attachments shall be designed to resist design loads determined in accordance with Chapter 16. In addition, the cladding or furring attachments through foam sheathing to framing shall meet or exceed the minimum fastening requirements of Sections 2603.12.1 and 2603.12.2, or an approved design for support of cladding weight.

Exceptions:

1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing, those requirements shall apply.

2. For exterior insulation and finish systems, refer to Section 1408. 3. For anchored masonry or stone veneer installed over foam sheathing, refer to Section 1405.

2603.12.1 Direct attachment. Where cladding is installed directly over foam sheathing without the use of furring, cladding minimum fastening requirements to support the cladding weight shall be as specified in Table 2603.12.1.

2603.12.2 Furred cladding attachment. Where steel or wood furring is used to attach cladding over foam sheathing, furring minimum fastening requirements to support the cladding weight shall be as specified in Table 2603.12.2. Where placed horizontally, wood furring shall be preservative-treated wood in accordance with Section 2303.1.9 or naturally durable wood and fasteners shall be corrosion resistant in accordance Section 2304.10.5. Steel furring shall have a minimum G60 galvanized coating.

2603.12.3 Additional Requirements. [DSA-SS, DSA-SS/CC] *In addition to the requirements of Section 2603.12, 2603.12.1, and 2603.12.2, cladding and foam sheathing supports and attachments shall be*

designed and submitted to the enforcement agency for approval.

…

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 30
ELEVATORS AND CONVEYING SYSTEMS

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 31
SPECIAL CONSTRUCTION

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with			

amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 32
ENCROACHMENTS INTO THE PUBIC RIGHT-OF-WAY

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

CHAPTER 33
SAFEGUARDS DURING CONSTRUCTION

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	**X**	**X**	

Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.
Reference: Education Code §§ 81052, 81053, and 81130 through 81147.

~~CHAPTER 34~~

~~EXISTING STRUCTURES~~

~~SECTION 3401~~

~~GENERAL~~

. . .

(Relocated to Section 301.1, Part 10, Title 24, C.C.R)

~~3401.1.1 Existing state-owned structures.~~ *~~The provisions of Sections 3417 through 3422 establish minimum standards for earthquake evaluation and design for retrofit of existing state-owned structures, including buildings owned by the University of California and the California State University.~~*

~~The provisions of Sections 3417 through 3422 may be adopted by a local jurisdiction for earthquake evaluation and design for retrofit of existing buildings.~~

~~3401.1.2 Public school buildings. [DSA-SS]~~ *~~The provisions of Sections 3417 through 3423 establish minimum standards for earthquake evaluation and design for the rehabilitation of existing buildings for use as public school buildings under the jurisdiction of the Division of the State Architect-Structural Safety (DSA-SS, refer to Section 1.9.2.1) where required by Sections 4-307 and 4-309(c) of the California Administrative Code.~~*

~~The provisions of Section 3417 through 3423 also establish minimum standards for earthquake evaluation and design for rehabilitation of existing public school buildings currently under the jurisdiction of DSA-SS.~~

~~3401.1.3 Community college buildings. [DSA-SS/CC]~~ *~~The provisions of Sections 3417 through 3423 establish minimum standards for earthquake evaluation and design for the rehabilitation of existing buildings for use as community college buildings under the jurisdiction of the Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC, refer to Section 1.9.2.2) where required by Sections 4-307 and 4-309(c) of the California Administrative Code.~~*

~~The provisions of~~ ~~Section~~ *~~3417 through 3423 also establish minimum standards for earthquake~~*

evaluation and design for rehabilitation of existing community college buildings currently under the jurisdiction of DSA-SS/CC.

. . .

(Relocated to Sections 317 through 323, Part 10, Title 24, C.C.R.)

SECTION 3417
EARTHQUAKE EVALUATION AND DESIGN FOR RETROFIT OF EXISTING BUILDINGS

3417.1 Purpose.

….

3417.1.2 Public school buildings. *The provisions of Sections 3417 through 3423 establish minimum standards for earthquake evaluation and design for the rehabilitation of existing buildings for use as public school buildings under the jurisdiction of the Division of the State Architect-Structural Safety (DSA-SS), refer to Section 1.9.2.1.*

The provisions of Section 3417 through 3423 also establish minimum standards for earthquake evaluation and design for rehabilitation of existing public buildings currently under the jurisdiction of DSA-SS.

3417.1.2.1 Reference to other chapters. *For public schools, where reference within this chapter is made to sections in Chapters 16, 17, 18, 19, 21 or 22, the provisions in Chapters 16A, 17A, 18A, 19A, 21A and 22A respectively shall apply instead.*

3417.1.3 Community college buildings. *The provisions of Sections 3417 through 3423 establish minimum standards for earthquake evaluation and design for the rehabilitation of existing buildings for use as community college buildings under the jurisdiction of the Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC), refer to Section 1.9.2.2.*

The provisions of Section 3417 through 3423 also establish minimum standards for earthquake evaluation and design for rehabilitation of existing community college buildings currently under the jurisdiction of DSA-SS/CC.

3417.1.3.1 Reference to other chapters. *For community colleges, where reference within this chapter is made to sections in Chapters 17 or 18, the provisions in Chapters 17A and 18A respectively shall apply instead.*

3417.2 Scope. *All modifications, structurally connected additions and/or repairs to existing structures or portions thereof shall, at a minimum, be designed and constructed to resist the effects of seismic ground motions as provided in this section. The structural system shall be evaluated by a registered design professional and, if not meeting or exceeding the minimum seismic design performance requirements of this section, shall be retrofitted in compliance with these requirements.*

Exception: *Those structures for which Section 3417.3 determines that assessment is not required, or for which Section 3417.4 determines that retrofit is not needed, then only the requirements of Section 3417.11 apply.*

3417.3 Applicability.

. . .

3417.3.2 Public school buildings. *For public schools, the provisions of Section 3417 apply when required in accordance with Sections 4-307 and 4-309(c), Title 24, Part 1.*

3417.3.3 Community college buildings. *For community colleges, the provisions of Section 3417 apply when required in accordance with Sections 4-307 and 4-309(c), Title 24, Part 1.*

3417.4 Evaluation required. *If the criteria in Section 3417.3 apply to the project under consideration, the design professional of record shall provide an evaluation in accordance with Section 3417 to determine the seismic performance of the building in its current configuration and condition. If the structure's seismic performance as required by Section 3417.5 is evaluated as satisfactory and the peer reviewer(s), when Method B of Section 3421 is used, concur, then no structural retrofit is required.*

3417.5 Minimum seismic design performance levels for structural and nonstructural components. *Following the notations of ASCE 41, the seismic requirements for design and assessment are based upon a prescribed Earthquake Hazard Level (BSE-1, BSE-2, BSE-R or BSE-C), a specified structural performance level (S-1 through S-5) and a non-structural performance level (N-A through N-E). The minimum seismic performance criteria are given in Table 3417.5 according to the Building Regulatory Authority and the Risk Category as determined in Chapter 16, or by the regulatory authority. The building shall be evaluated at both the Level 1 and Level 2 performance levels, and the more restrictive requirements shall apply.*

Basic Safety Earthquake 2 (BSE-2) in ASCE 41 shall be same as Risk-Targeted Maximum Considered Earthquake (MCE_R) in ASCE 7. Probabilistic response spectra defining other Earthquake Hazard Levels shall be developed using site-specific ground motions in accordance with ASCE 7 Section 21.2 utilizing the Next Generation Attenuation (NGA) relations used for the 2008 USGS seismic hazards maps for Western United States (WUS). When supported by data and analysis, other NGA relations, that were not used for the 2008 USGS maps, shall be permitted as additions or substitutions. No fewer than three NGA relations shall be utilized. Response spectra shall incorporate the risk coefficient C_R per ASCE 7 Section 21.2.1.1

Ground-motion response history analysis shall be as set forth in ASCE 7 Chapter 16, Section 17.3 or Section 18.2.3.

Exception: *If the floor area of an addition is greater than the larger of 50 per cent of the floor area of the original building or 1,000 square feet (93 m^2), then the Table 3417.5 entries for BSE-R and BSE-C are replaced by BSE-1 and BSE-2, respectively.*

3417.6 Retrofit required. *Where the evaluation indicates the building does not meet the required performance objectives of this section, the owner shall take appropriate steps to ensure that the building's structural system is retrofitted in accordance with the provisions of Section 3417. Appropriate steps are either: 1) undertake the seismic retrofit as part of the additions, modifications and/or repairs of the structure; or 2) provide a plan, acceptable to the building official, to complete the seismic retrofit in a timely manner. The relocation or moving of an existing building is considered to be an alteration requiring filing of the plans and specifications approved by the building official.*

3417.7 *The additions, modification or repair to any existing building are permitted to be prepared in accordance with the requirements for a new building, Chapter 16, Part 2, Title 24, C.C.R., 2007 edition, applied to the entire building.*

3417.8 *The requirements of ASCE 41 Chapter 9 are to apply to the use of seismic isolation or passive energy systems for the repair, modification or retrofit of an existing structure. When seismic isolation or passive energy dissipation is used, the project must have project peer review as prescribed in Section 3422.*

3417.9 *Any construction required by this chapter shall include structural observation by the registered design professional who is responsible for the structural design in accordance with Section 3419.10.*

3417.10 *Where Method B of Section 3421 is used or is required by Section 3419.7, the proposed method of building evaluation and design procedures must be accepted by the building official prior to the commencement of the work.*

3417.11 Voluntary lateral-force-resisting system modifications. *Where the exception of Section 3417.2 applies, modifications of existing structural components and additions of new structural components that are initiated for the purpose of improving the seismic performance of an existing structure and that are not required by other portions of this chapter are permitted under the requirements of Section 3419.12.*

SECTION 3418
DEFINITIONS

3418.1. *In addition to the definitions given in Section 3402, for the purposes of Sections 3417 through 3423, certain terms are defined as follows:*
ADDITION *means any work that increases the floor or roof area or the volume of enclosed space of an existing building, and is structurally attached to the existing building by connections that are required for transmitting vertical or horizontal loads between the addition and the existing structure.*

ALTERATION *means any change within or to an existing building, which does not increase and may decrease the floor or roof area or the volume of enclosed space.*
BSE-C RESPONSE ACCELERATION PARAMETERS *are the parameters (S_{XS} and S_{X1} taken from 5-percent /50-year maximum direction spectral response acceleration curves or by a Site Specific Response Spectrum developed in accordance with Section 3417.5. Values for BSE-C need not be greater than those for BSE-2.*
BSE-R RESPONSE ACCELERATION PARAMETERS *are the parameters (S_{XS} and S_{X1}) taken from 20-percent /50-year maximum direction spectral response acceleration curves or by a Site Specific Response Spectrum developed in accordance with Section 3417.5. Values for BSE-R need not be greater than those for BSE-1.*

BUILDING OFFICIAL *is that individual within the agency or organization charged with responsibility for compliance with the requirements of this code. For some agencies this person is termed the "enforcement agent."*

DESIGN *is the procedure that includes both the evaluation and retrofit design of an existing component, element or structural system, and design of a new component, element or structural system.*

ENFORCEMENT AGENCY (Authority Having Jurisdiction in ASCE 41) *is the agency or organization charged with responsibility for agency or organization compliance with the requirements of this code.*

METHOD A *refers to the procedures prescribed in Section 3420.*

METHOD B *refers to the procedures allowed in Section 3421.*

MODIFICATIONS. *For this chapter, modification is taken to include repairs to structures that have been damaged.*

N-A, N-B, N-C, N-D, N-E *are seismic nonstructural component performance measures as defined in ASCE 41. N-A corresponds to the highest performance level, and N-D the lowest, while N-E is not considered.*

PEER REVIEW *refers to the procedures contained in Section 3422.*

REPAIR *as used in this chapter means the design and construction work undertaken to restore or enhance the structural and nonstructural load-resisting system participating in the lateral response and stability of a structure that has experienced damage from earthquakes or other destructive events.*

S-1, S-2, S-3, S-4, S-5, S-6 *are seismic structural performance measures as defined in ASCE 41. S-1 corresponds to the highest performance level, and S-5 the lowest, while S-6 is not considered.*

SPECIFIC PROCEDURES *are the procedures listed in Section 3419.1.1.*

STRUCTURAL REPAIRS *are any changes affecting existing or requiring new structural components primarily intended to correct the effects of damage, deterioration or impending or actual failure, regardless of cause.*

TABLE 3417.5 SEISMIC PERFORMANCE REQUIREMENTS BY BUILDING REGULATORY AUTHORITY AND RISK CATEGORY. ALL BUILDINGS NOT REGULATED BY DSA ARE ASSIGNED AS "STATE-OWNED."

-		***PERFORMANCE CRITERIA***	
Building Regulatory Authority	***Risk Category***	***Level 1***	***Level 2***
State-Owned	*I, II, III*	*BSE-R, S-3, N-D*	*BSE-C, S-5, N-E*
State-Owned	*IV*	*BSE-R, S-2, N-B*	*BSE-C, S-4, N-C*
Division of the State Architect - Public schools	*I*	*BSE-1,S-3,N-C*	*BSE-2,S-5, N-E*
Division of the State Architect - Public schools	*II, III*	*BSE-1, S-2, N-C*	*BSE-2, S-4, N-D*
Division of the State Architect - Public schools	*IV*	*BSE-1, S-2, N-C*	*BSE-2, S-4,N-C*
Division of the State Architect - Community college	*I, II, III*	*BSE-R, S-3, N-D*	*BSE-2, S-5, N-E*
Division of the State Architect - Community college	*IV*	*BSE-R, S-2, N-B*	*BSE-2, S-4, N-C*

1. *ASCE 41 provides acceptance criteria (e.g. m, rotation) for Immediate Occupancy (S1), Life Safety (S3), and Collapse Prevention (S5), and specifies that values for S-2 and S-4 are to be determined by interpolation between the adjacent performance level values.*

   The required method of interpolation is as follows:

   For level S-2, the acceptance value is $^{1}/_{3}$ of the sum of the tabulated value for Immediate Occupancy (IO level) and twice the tabulated value for the Life Safety (LS level).

   For level S-4, the acceptance value is one-half the sum of the value for the LS level and the value for the Collapse Prevention (CP) level.

   For nonstructural components, N-A corresponds to the IO level, N-C to the LS level, and N-D to the Hazards Reduced (HR level).

   For evaluation procedures, N-B shall be the same as for N-A. Where numerical values are used, the values for N-B are one half the sum of the appropriate IO and LS values. Where IO or CP values are not given by ASCE 41, then the LS values are permitted to be substituted.

2. *Buildings evaluated and retrofitted to meet the requirements for a new building, Chapter 16, Part 2, Title 24, in accordance with the exception in Section 3419.1, are deemed to meet the seismic performance requirements of this section.*

~~SECTION 3419~~
~~SEISMIC CRITERIA SELECTION FOR EXISTING BUILDINGS~~

~~**3419.1 Basis for evaluation and design.** This section determines what technical approach is to be used for the seismic evaluation and design for existing buildings. For those buildings or portions of buildings for which Section 3417 requires action, the procedures and limitations for the evaluation of existing buildings and design of retrofit systems and/or repair thereof shall be implemented in accordance with this section.~~

~~One of the following approaches must be used:~~

~~1. Method A of Section 3420;~~

~~2. Method B of Section 3421, with independent review of a peer reviewer as required in Section 3422; or~~

~~3. For state-owned buildings only, the use of one of the specific procedures listed in Section 3419.1.1.~~

~~When Method B is chosen it must be approved by the building official, and, where applicable, by the peer reviewer. All referenced standards in ASCE 41 shall be replaced by referenced standards listed in Chapter 35 of this code.~~

~~**Exceptions:**~~

~~1. Reserved for BSC~~

~~2. **[DSA-SS & DSA-SS/CC]** For public schools and community colleges constructed to the requirements of California Building Code, 2007 or later edition, that code is permitted to be used in place of those specified in Section 3419.1 provided the building complies with Seismic Design Category D or higher.~~

~~**3419.1.1 Specific procedures.** For state-owned buildings, the following specific procedures taken from the International Existing Building Code (IEBC) Appendix A may be used, without peer review, for their respective types of construction to comply with the seismic performance requirements for Risk Category I, II or III buildings:~~

~~1. Seismic Strengthening Provisions for Unreinforced Masonry Bearing Wall Buildings (Chapter A1 of the IEBC).~~

~~2. Prescriptive Provisions for Seismic Strengthening of Cripple Walls and Sill Plate Anchorage of Light Wood-Frame, Residential Buildings (Chapter A3 of the IEBC).~~

~~3. Earthquake Hazard Reduction in Existing Reinforced Concrete and Reinforced Masonry Wall Buildings with Flexible Diaphragms (Chapter A2 of the IEBC).~~

~~**3419.1.2** When a design project is begun under Method B the selection of the peer reviewer is subject to the approval of the building official. Following approval by the peer reviewer, the seismic criteria for the project and the planned evaluation provisions must be approved by the building official. The approved seismic criteria and evaluation provisions shall apply. Upon approval of the building official these are permitted to be modified.~~

~~**3419.1.3** For state-owned and community college buildings, where unreinforced masonry is not bearing, it may be used only to resist applied lateral loads. Where unreinforced masonry walls are part of the structure they must be assessed for stability under the applicable nonstructural evaluation procedure.~~

3419.1.4 Public schools. *For public schools, unreinforced masonry shall not be used to resist in-plane or out-of-plane seismic forces or superimposed gravity loads.*

3419.1.5 Public schools. *For public schools of light-frame construction, horizontal diaphragms and vertical shear walls shall consist of either diagonal lumber sheathing or structural panel sheathing. Braced horizontal diaphragms may be acceptable when approved by DSA. Straight lumber sheathing may be used in combination with diagonal or structural panel sheathing as diaphragms or shear walls. Let-in bracing, plaster (stucco), hollow clay tile, gypsum wallboard and particleboard sheathing shall not be assumed to resist seismic forces.*

3419.2 Existing conditions. *The existing condition and properties of the entire structure must be determined and documented by thorough inspection of the structure and site, review of all available related construction documents, review of geotechnical and engineering geologic reports, and performance of necessary testing and investigation. Where samples from the existing structure are taken or in situ tests are performed, they shall be selected and interpreted in a statistically appropriate manner to ensure that the properties determined and used in the evaluation or design are representative of the conditions and structural circumstances likely to be encountered in the structure as a whole. Adjacent structures or site features that may affect the retrofit design shall be identified.*

The entire load path of the seismic-force-resisting system shall be determined, documented and evaluated. The load path includes all the horizontal and vertical elements participating in the structural response: such as diaphragms, diaphragm chords, diaphragm collectors, vertical elements such as walls frames, braces; foundations and the connections between the components and elements of the load path. Repaired or retrofitted elements and the standards under which the work was constructed shall be identified.

Data collection in accordance with ASCE 41 Section 2.2 shall meet the following minimum levels:

1. For state-owned buildings, the requirements shall be met following the data collection requirements of ASCE 41, Section 2.2.

2. For public schools and community college buildings constructed in conformance with the Field Act, the "Usual" level as defined in ASCE 41, Section 2.2.6.2.

3. For public schools and community college buildings not constructed in conformance with the Field Act, the "Comprehensive" level as defined in ASCE 41, Section 2.2.6.3.

Concrete material requirements and testing for public school and community college buildings shall also comply with Sections 1914A and 1913.5, respectively.

Qualified test data from the original construction may be accepted, in part or in whole, by the enforcement agency to fulfill the data collection requirements.

Exceptions:

1. The number of samples for data collection may be adjusted with approval of the enforcement agency when it has been determined that adequate information has been obtained or additional information is required.

2. Welded steel moment frame connections of buildings that may have experienced potentially damaging ground motions shall be inspected in accordance with Chapters 3 and 4, FEMA 352, Recommended Post Earthquake Evaluation and Repair Criteria for Welded Moment-Frame Construction for Seismic Applications (July 2000).

Where original building plans and specifications are not available, "as-built" plans shall be prepared that depict the existing vertical and lateral structural systems, exterior elements, foundations and nonstructural systems in sufficient detail to complete the design.

~~*Data collection shall be directed and observed by the project structural engineer or design professional in charge of the design.*~~

~~***3419.3 Site geology and soil characteristics.*** *Soil profile shall be assigned in accordance with the requirements of Chapter 18.*~~

~~***3419.4 Risk categories.*** *For purposes of earthquake-resistant design, each structure shall be placed in one of the risk categories in accordance with the requirements of this code.*~~

~~***3419.5 Configuration requirements.*** *Each structure shall be designated structurally regular or irregular in accordance with the requirements of ASCE 41, Sections 2.4.1.1.1. to 2.4.1.1.4.*~~

~~***3419.6 General selection of the design method.*** *The requirements of Method B (Section 3421) may be used for any existing building.*~~

~~***3419.7 Prescriptive selection of the design method.*** *The requirements of Method A (Section 3420) or the specific procedures for applicable building types given in Section 3419.1.1 are permitted to be used except under the following conditions, where the requirements of Method B (Section 3421) must be used.*~~

~~***3419.7.1*** *When the building contains prestressed or post- tensioned structural components (beams, columns, walls or slabs) or contains precast structural components (beams, columns, walls or flooring systems).*~~

~~***3419.7.2*** *When the building is classified as irregular in vertical or horizontal plan by application of ASCE/SEI 7 Section 12.3 and/or ASCE 41, Sections 2.4.1.1.1 to 2.4.1.1.4, unless the irregularity is demonstrated not to affect the seismic performance of the building.*~~

~~***Exception:*** *If the retrofit design removes the configurational attributes that caused the building to be classified as irregular, then Section 3419.7.2 does not apply and Method A may be used.*~~

~~***3419.7.3*** *For any building that is assigned to Risk Category IV.*~~

~~***3419.7.4*** *For any building using undefined or hybrid structural systems.*~~

~~***3419.7.5*** *When seismic isolation or energy dissipation systems are used in the retrofit or repair, either as part of the existing structure or as part of the modifications.*~~

~~***3419.7.6*** *When the height of the structure exceeds 240 feet (73 152 mm).*~~

~~***3419.8 Strength requirements.*** *All components of the lateral-force-resisting system must have the strength to meet the acceptance criteria prescribed in ASCE 41, Chapter 3, or as prescribed in the applicable Appendix A chapter of the IEBC if a specific procedure in Section 3419.1.1 is used. Any component not having this strength shall have its capacity increased by modifying or supplementing its strength so that it exceeds the demand, or the demand is reduced to less than the existing strength by making other modifications to the structural system.*~~

~~***Exception:*** *A component's strength is permitted to be less than that required by the specified seismic load combinations if it can be demonstrated that the associated reduction in seismic performance of the component or its removal due to the failure does not result in a structural system that does not comply with the required performance objectives of Section 3417. If this exception is taken for a component, then it cannot be considered part of the primary lateral-load- resisting system.*~~

~~***3419.9 Nonstructural component requirements.*** *Where the nonstructural performance levels required by Section 3417, Table 3417.5 are N-D or higher, mechanical, electrical and plumbing components shall comply with the provisions of ASCE 41, Chapter 11, Section 11.2.*~~

Exception: *Modifications to the procedures and criteria may be made subject to approval by the building official, and concurrence of the peer reviewer if applicable. All reports and correspondence shall also be forwarded to the building official.*

3419.10 Structural observation, testing and inspection. *Structural, geotechnical and construction observation, testing and inspection as used in this section shall mean meeting the requirements of Chapter 17, with a minimum allowable level of investigation corresponding to seismic design category (SDC) D. At a minimum the project site will be visited by the responsible design professional to observe existing conditions and to review the construction work for general compliance with approved plans, specifications and applicable structural regulations. Such visits shall occur at significant construction stages and at the completion of the structural retrofit. Structural observation shall be provided for all structures. The plan for testing and inspection shall be submitted to the building official for review and approval with the application for permit.*

Additional requirements: *For public schools and community colleges, construction material testing, inspection and observation during construction shall also comply with Section 4-333, Part 1, Title 24.*

3419.10.1 *The registered design professional, or their designee, responsible for the structural design shall be retained to perform structural observation and independently report to the owner of observations and findings as they relate to adherence to the permitted plans and good workmanship.*

3419.10.2 *At the conclusion of construction, the structural observer shall submit to the enforcement agency and the owner a final written statement that the required site visits have been made, that the work, to the best of the structural observers knowledge and belief, is or is not in general conformity to the approved plans and that the observed structural deficiencies have been resolved and/or listing those that, to the best of the structural observers knowledge and belief, have not been satisfactorily corrected.*

3419.10.2.1 *The requirement for structural observation shall be noted and prominently displayed on the front sheet of the approved plans and incorporated into the general notes on the approved plans.*

3419.10.2.2 Preconstruction meeting. *A preconstruction meeting is mandatory for all projects which require structural observation. The meeting shall include, but is not limited to, the registered design professional, structural observer, general constructor, affected subcontractors, the project inspector and a representative of the enforcement agency (designated alternates may attend if approved by the structural observer). The structural observer shall schedule and coordinate this meeting. The purpose of the meeting is to identify and clarify all essential structural components and connections that affect the lateral and vertical load systems and to review scheduling of the required observations for the project's structural system retrofit.*

3419.11 Temporary actions. *When compatible with the building use, and the time phasing for both use and the retrofit program, temporary shoring or other structural support is permitted to be considered. Temporary bracing, shoring and prevention of falling hazards are permitted to be used to qualify for Exception 1 in Section 3419.12 that allows inadequate capability in some existing components, as long as the required performance levels given in Section 3417 can be provided by the permanent structure. The consideration for such temporary actions shall be noted in the design documents.*

3419.12 Voluntary modifications to the lateral-force resisting system. *Where modifications of existing structural components and additions of new structural components are initiated for the purpose of improving the lateral-force resisting strength or stiffness of an existing structure and they are not required by other sections of this code, then they are permitted to be designed to meet an approved seismic performance criteria provided that an engineering analysis is submitted that follows:*

1. The capacity of existing structural components required to resist forces is not reduced, unless it can be demonstrated that reduced capacity meets the requirements of Section 3419.8.

2. The lateral loading to or strength requirement of existing structural components is not increased beyond their capacity.

3. New structural components are detailed and connected to the existing structural components as required by this code for new construction.

4. New or relocated nonstructural components are detailed and connected to existing or new structural components as required by this code for new construction.

5. A dangerous condition is not created.

3419.12.1 State-owned buildings. *Voluntary modifications to lateral-force-resisting systems conducted in accordance with Appendix A of the IEBC and the referenced standards of this code shall be permitted.*

3419.12.1.1 Design documents. *When Section 3419.12 is the basis for structural modifications, the approved design documents must clearly state the scope of the seismic modifications and the accepted criteria for the design. The approved design documents must clearly have the phrase "The seismic requirements of Chapter 34 for existing buildings have not been checked to determine if these structural modifications meet CBC requirements: the modifications proposed are to a different seismic performance standard than would be required in Section 3419 if they were not voluntary as allowed in Section 3419.12."*

3419.12.2 Public schools and community colleges. *When Section 3419.12 is the basis for structural modifications, the approved design documents must clearly indicate the scope of modifications and the acceptance criteria for the design.*

SECTION 3420
METHOD A

3420.1 General. *The retrofit design shall employ the Linear Static or Linear Dynamic Procedures of ASCE 41, Section 3.3.1 or 3.3.2, and comply with the applicable general requirements of ASCE 41, Chapters 2 and 3. The earthquake hazard level and performance level given specified in Section 3417.5 for the building's risk category shall be used. Structures shall be designed for seismic forces coming from any horizontal direction.*

Exception: *The ASCE 41 Simplified Rehabilitation Method of Chapter 10 may be used if the Level 1 seismic performance level is S-3 or lower, the building's structural system is one of the primary building types described in ASCE 41, Table 10-2, and ASCE 41, Table 10-1 permits it use for the building height.*

SECTION 3421
METHOD B

3421.1 *The existing or retrofitted structure shall be demonstrated to have the capability to sustain the deformation response due to the specified earthquake ground motions and meet the seismic performance requirements of Section 3417. The registered design professional shall provide an evaluation of the response of the existing structure in its modified configuration and condition to the ground motions specified. If the building's seismic performance is evaluated as satisfactory and the peer reviewer(s,) and the enforcement agency concurs, then no further structural modifications of the lateral-load-resisting system are required.*

When the evaluation indicates the building does not meet the required performance levels given in Table 3417.5 for the risk category, then a retrofit and/or repair design shall be prepared that provides a structure that meets these performance objectives and reflects the appropriate consideration of existing conditions. Any approach to analysis and design is permitted to be used, provided that the approach shall be rational,

shall be consistent with the established principals of mechanics and shall use the known performance characteristics of materials and assemblages under reversing loads typical of severe earthquake ground motions.

Exception: *Further consideration of the structure's seismic performance may be waived by the enforcement agency if both the registered design professional and peer reviewer(s) conclude that the structural system can be expected to perform at least as well as required by the provisions of this section without completing an analysis of the structure's compliance with these requirements. A detailed report shall be submitted to the responsible building official that presents the reasons and basis for this conclusion. This report shall be prepared by the registered design professional. The peer reviewer(s) shall concur in this conclusion and affirm to it in writing. The building official shall either approve this decision or require completion of the indicated work specified in this section prior to approval.*

3421.2 *The approach, models, analysis procedures, assumptions on material and system behavior and conclusions shall be peer reviewed in accordance with the requirements of Section 3422 and accepted by the peer reviewer(s).*

Exceptions:

1. *The enforcement agency may perform the work of peer review when qualified staff is available within the jurisdiction.*
2. *The enforcement agency may modify or waive the requirements for peer review when appropriate.*

3421.2.1 *The approach used in the development of the design shall be acceptable to the peer reviewer and the enforcement agency and shall be the same method as used in the evaluation of the building. Approaches that are specifically tailored to the type of building, construction materials and specific building characteristics may be used, if they are acceptable to the independent peer reviewer. The use of Method A allowed procedures may also be used under Method B.*

3421.2.2 *Any method of analysis may be used, subject to acceptance by the peer reviewer(s) and the building official. The general requirements given in ASCE 41, Chapter 2, shall be complied with unless exceptions are accepted by the peer reviewer(s) and building official. Use of other than ASCE 41 procedures in Method B requires building official concurrence before implementation.*

3421.2.3 *Prior to implementation, the procedures, methods, material assumptions and acceptance/rejection criteria proposed by the registered design professional will be peer reviewed as provided in Section 3422. Where nonlinear procedures are used, prior to any analysis, the representation of the seismic ground motion shall be reviewed and approved by the peer reviewer(s) and the building official.*

3421.2.4 *The conclusions and design decisions shall be reviewed and accepted by the peer reviewer(s) and the building official.*

SECTION 3422
PEER REVIEW REQUIREMENTS

3422.1 General. *Independent peer review is an objective, technical review by knowledgeable reviewer(s) experienced in the structural design, analysis and performance issues involved. The reviewer(s) shall examine the available information on the condition of the building, the basic engineering concepts employed and the recommendations for action.*

3422.3 Qualifications and terms of employment. *The reviewer(s) shall be independent from the design and construction team.*

3422.3.1 *The reviewer(s) shall have no other involvement in the project before, during or after the review, except in a review capacity.*

3422.3.2 *The reviewer(s) shall be selected and paid by the owner and shall have technical expertise in the evaluation and retrofit of buildings similar to the one being reviewed, as determined by the enforcement agency.*

3422.3.3 *The reviewer (or in the case of review teams, the chair) shall be a California-licensed structural engineer who is familiar with the technical issues and regulations governing the work to be reviewed.*

Exception: *Other individuals with acceptable qualifications and experience may be a peer reviewer(s) with the approval of the building official.*

3422.3.4 *The reviewer shall serve through completion of the project and shall not be terminated except for failure to perform the duties specified herein. Such termination shall be in writing with copies to the enforcement agency, owner and the registered design professional. When a reviewer is terminated or resigns, a qualified replacement shall be appointed within 10 working days, and the reviewer shall submit copies of all reports, notes and correspondence to the responsible building official, the owner and the registered design professional within 10 working days of such termination.*

3422.3.5 *The peer reviewer shall have access in a timely manner to all documents, materials and information deemed necessary by the peer reviewer to complete the peer review.*

3422.4 Scope of review. *Review activities shall include, where appropriate, available construction documents, design criteria and representative observations of the condition of the structure, all inspection and testing reports, including methods of sampling, analytical models and analyses prepared by the registered design professional and consultants, and the retrofit or repair design. Review shall include consideration of the proposed design approach, methods, materials, details and constructability. Changes observed during construction that affect the seismic-resisting system shall be reported to the reviewer in writing for review and recommendation.*

3422.5 Reports. *The reviewer(s) shall prepare a written report to the owner and building official that covers all aspects of the review performed, including conclusions reached by the reviewer(s). Reports shall be issued after the schematic phase, during design development, and at the completion of construction documents but prior to submittal of the project plans to the enforcement agency for plan review. When acceptable to the building official, the requirement for a report during a specific phase of the project development may be waived.*

Such reports should include, at the minimum, statements of the following:

1. Scope of engineering design peer review with limitations defined.

2. The status of the project documents at each review stage.

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

4. Degree of structural system redundancy and the deformation compatibility among structural and nonstructural components.

5. Basic constructability of the retrofit or repair system.

6. Other recommendations that would be appropriate to the specific project.

7. Presentation of the conclusions of the reviewer identifying any areas that need further review, investigation and/or clarification.

8. Recommendations.

The last report prepared prior to submittal of permit documents to the enforcement agency shall include a statement indicating that the design is in conformance with the approved evaluation and design criteria

3422.6 Response and resolutions. *The registered design professional shall review the report from the reviewer(s) and shall develop corrective actions and responses as appropriate. Changes observed during construction that affect the seismic-resisting system shall be reported to the reviewer in writing for review and recommendations. All reports, responses and resolutions prepared pursuant to this section shall be submitted to the responsible enforcement agency and the owner along with other plans, specifications and calculations required. If the reviewer resigns or is terminated prior to completion of the project, then the reviewer shall submit copies of all reports, notes and correspondence to the responsible building official, the owner and the registered design professional within 10 working days of such termination.*

3422.7 Resolution of conflicts. *When the conclusions and recommendations of the peer reviewer conflict with the registered design professional's proposed design, the enforcement agency shall make the final determination of the requirement for the design.*

SECTION 3423
ADDITIONAL REQUIREMENTS FOR PUBLIC SCHOOLS AND COMMUNITY COLLEGES

The requirements of Section 3423 apply only to public schools under the jurisdiction of the Division of the State Architect-Structural Safety (DSA-SS, refer to Section 1.9.2.1) and community colleges under the jurisdiction of the Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC). Refer to Section 1.9.2.2.

3423.1 Evaluation and design criteria report. *During the schematic phase of the project, the owner or the registered design professional in charge of the design shall prepare and sign an Evaluation and Design Criteria Report in accordance with Part 1, Title 24, C. C. R., Section 4-306 or 4-307(a). The report shall be submitted to the DSA for review and approval prior to proceeding with design development of the rehabilitation.*

The Evaluation and Design Criteria Report shall:

1. Identify the building(s) structural and nonstructural systems, potential deficiencies in the elements or systems and the proposed method for retrofit.

2. Identify geological and site-related hazards.

3. Propose the methodology for evaluation and retrofit design.

4. Propose the complete program for data collection (Section 3419.2).

5. Include existing or "as-built" building plans, reports and associated documents of the existing construction.

3423.2 Rehabilitation involving only portions of structures. *Where only a portion(s) of a structure is to be rehabilitated, the public school or community college portion of the structure shall:*

1. Be seismically separated from the unrehabilitated portion in accordance with Chapter 16 of Part 2, Title 24, or the entire structure shall be rehabilitated in accordance with this Section. For structures in which the unrehabilitated portion is above or below the school or community college portion, the entire structure shall be rehabilitated in accordance with this division.

2. Be retrofitted as necessary to protect the occupants from falling hazards of the unrehabilitated portion of the building, and;

~~*3. Be retrofitted as necessary to protect required exitways being blocked by collapse or falling hazards of the unrehabilitated portion.*~~

~~. . .~~

~~**Notation for [DSA-SS]**~~
~~**Authority:** Education Code § 17310 and 81142, and H&S Code §16022.~~
~~**Reference:** Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.~~

~~**Notation for [DSA-SS/CC]**~~
~~**Authority:** Education Code § 81053.~~
~~**Reference:** Education Code §§ 81052, 81053, and 81130 through 81147.~~

CHAPTER 35

REFERENCED STANDARDS

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter	X	X	
Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below			

(All existing California amendments that are not revised below shall continue without change)

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.4.

[DSA-SS, DSA-SS-CC] Reference to other chapters. *In addition to the code sections referenced, the standards listed in this chapter are applicable to the respective code sections in Chapters 16A, 17A, 18A, 19A, 21A~~,~~ and 22A. ~~, and 34A.~~*

. . .

AAMA	American Architectural Manufacturing Association 1827 Waldon Office Square, Suite 550 Schaumburg, IL 60173	
Standard reference number	Title	Referenced in code section number
. . .		
501.4-09	*Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts*	*2410.1*
501.6-09	*Recommended Dynamic Test Method For Determining The Seismic Drift Causing Glass Fallout From A Wall*	*2410.1*

ACI	American Concrete Institute 38800 Country Club Drive Farmington Hills, MI 48333-9094	
Standard reference number	Title	Referenced in code section number
. . .		
318-14	Building Code Requirements for Structural Concrete	*Table 1705A.2.1, Table 1705A.3, ~~1705A.2.2.1.2,~~ 1810A.3.10.4, 1903A, 1904A, 1905A, 1910A.5.4, 1909.2, 1909.3 ~~1913A.5, 1913A.7.2, 1913.2, 1913.3~~*
355.2-07	*Qualification of Post-Installed Mechanical Anchors in Concrete*	*1616A.1.19*
355.4-11	*Qualification of Post-Installed Adhesive*	*1616A.1.19*

	Anchors in Concrete	
440.2R-08	*Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures*	*1911A.3 ~~1914A.3~~*
. . .		
503.7-07	*Specification for Crack Repair by Epoxy Injection.*	*1911A.2 ~~1914A.2~~*
506-05	*Guide to Shotcrete*	*~~1913.4.5,~~ 1908A.1 ~~1910A.1~~, 1908A.3 ~~1910A.3,~~ 1908A.12 ~~1910A.12,~~ 1911A.2, ~~1914A.2~~*
530-13	Building Code Requirements for Masonry Structures	*~~2114.10,~~ 2114.7, ~~2114.11,~~ 2114.8, 2107A.5, 2107A.6*
. . .		

. . .

AISC	American Institute of Steel Construction Construction One East Wacker Drive, Suite 700 Chicago, IL 60601-2001	
Standard reference number	Title	Referenced in code section number
341-10	Seismic Provisions for Structural Steel Buildings	*1705A.2.1, 2212.2, 2205A, 2206A*
358- 10	*Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications including Supplements No. 1 & 2*	*2212.3, 2205A, 2206A.2*

360-10	Specifications for Structural Steel Buildings	*1705A.2.1, Table 1705A.2.1, ~~2206A.2~~, 2212.1.1, 2204A.4 ~~2204A.2.2~~, 2212A.1.2. 2212A.2.1*

AISI	American Iron and Steel Institute 1140 Connecticut Avenue, 705 Suite 705 Washington. DC 20036	
Standard reference number	Title	Referenced in code section number
S214-12	North American Standard for Cold-formed Steel Framing- Truss Design, 2012	*2211A.3, 2212.5.1.2*

. . .

ANSI	American National Standards Institute 25 West 43rd Street, Fourth Floor New York, NY 10036	
Standard reference number	Title	Referenced in code section number
A 190.1-12	Structural Glued Laminated Timber	*1705A.5.4*

. . .

APA	APA - Engineered Wood Association 7011 South 19th Tacoma, WA 98466	
Standard	Title	Referenced

reference number		in code section number
A 190.1-12	Structural Glued Laminated Timber	*1705A.5.4*

. . .

ASCE/SEI	American Society of Civil Engineers Structural Engineering Institute 1801 Alexander Bell Drive Reston, VA 20191-4400	
Standard reference number	Title	Referenced in code section number
5-13	Building Code Requirements for Masonry Structures	*~~2114.10,~~ 2114.7, ~~2114.11,~~ 2114.8, ~~-~~ 2107A.5, 2107A.6*
. . .		
7-10	Minimum Design Loads for Buildings and Other Structures including Supplement No. 1	*104.11, ~~202~~, ~~1509.7.1~~, 1510.7.1, 1616.2,1616.9, 1616.10,1603A.2 1613A, 1616A, 1803A.6, ~~1905A.1.21,~~ ~~1913.3.8~~, ~~2114A.1,~~ ~~2114.13~~, ~~2210A.2~~, ~~2212A.2.4~~, 2410.1.1, 2410.1.2,*
. . .		
19- ~~09~~*10*	Structural Application of Steel Cables for Buildings	*2208A.1, ~~2207.1, 2207.2~~*
. . .		
24 - ~~13~~ *14*	Flood Resistant Design and Construction	1203.4.2,1612.4, 1612.4, 1612.5, 1612A.5, 2702.1.7, 3001.2
. . .		
41- ~~06~~ 13	*Seismic Evaluation and Retrofit ~~Rehabilitation~~ of Existing Buildings ~~including Supplement No. 1~~*	*1603A.2, 1616A.1.30,*

49- *12* ~~07~~	Wind Tunnel Testing for Buildings and Other Structures	1609.1.1

. . .

ASTM	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2959	
Standard reference number	Title	Referenced in code section number
. . .		
A 153/A 153M-09	Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware	*2304.10.1.1* ~~*2304.9.1.1*~~
. . .		
A 722/A722M-12	Specifications for Uncoated High-strength Steel Bar for Prestressing Concrete	*1812A.4.2* ~~*J106.2.4.2*~~*, 1811A.4*
. . .		
A1064-13	*Standard Specification for Carbon steel wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete*	*1903A.8*
. . .		
B 695-04 *(2009)*	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel Strip for Building Construction	*2304.10.1.1*~~*2304.9.1.1*~~
. . .		

C90-14~~13~~	Standard Specification for Load Bearing Concrete Masonry Units	*2105A.2*
...		
C 94/C94M-*14a* ~~13~~	Specifications for Ready Mix Concrete	*1705A.3.3.1* ~~*1705A.3.3*~~
. . .		
C 150-12	Specification for Portland Cement	~~*1903A*~~, *1910A* ~~*1913A*~~, ~~*1916.1.2*~~ ~~*1913.2*~~ *1909.2.4*
. . .		
C 270-*14a* ~~12a~~	Specifications for Mortar for Unit Masonry	~~*2114.2*~~ *2105A.3*
~~*C 289-07*~~	~~*Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates*~~	~~*1903A.3, 1913.2.3*~~
. . .		
C 595-13	Specification for Blended Hydraulic Cement	~~*1903A.6,*~~ *1910A.1* ~~*1913A.1*~~, ~~*1913.2,*~~*1909.2.4*
. . .		
C 618 – 12a ~~*08a*~~	*Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*	~~*1903A.3,*~~*1910A.1* ~~*1913A.1*~~, ~~*1913.2,*~~*1909.2.4*
. . .		
C 635/C 635M-13*a*	Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel ceilings	*1616.10.16, 1616A.1.21* ~~*1616A.1.20*~~
C 636/C 636M - *13* ~~08~~	Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels	*1616.10.16,1616A.1.21* ~~*1616A.1.20*~~
. . .		

C 780-14	*Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry*	*2105A.3*
. . .		
C 989-13 ~~09~~	*Standard Specification for Slag Cement for Use in Concrete and Mortars*	*~~1903A.5~~, ~~1903A.6,~~ 1910A.1 ~~1913A.1~~, ~~1913.2,~~1909.2.4*
. . .		
C 1019-*13* ~~11~~	Test Method of Sampling and Testing Grout	*2105A.3 ~~2105A.2.2.1.4~~, 2114.6.1, ~~2114.9.1~~*
. . .		
C 1157/C 1157M-11	*ASTM Standard Performance Specification for Hydraulic Cement*	*1910A.1 ~~1913A.1~~, ~~1913.2.5,~~1909.2.4*
. . .		
~~C 1240-14 11~~	*~~Standard Specification for Silica Fume Used in Cementitious Mixtures~~*	*~~1903A.6~~*
C 1249-06a(2010)	*Standard Guide for Secondary Seal for Sealed Insulated Glass Units for Structural Sealant Glazing Applications*	*~~1903A.6,~~ 2410.1*
. . .		
~~C 1260-07~~	*~~Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)~~*	*~~1903A.6~~, ~~2410.1.1~~*
. . .		
~~C 1293-08b~~	*~~Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction~~*	*~~1903A.6,~~ ~~1913.2.3~~*
. . .		

~~C 1314-07~~	~~Test Method for Compressive Strength of Masonry Prisms~~	~~2114.9.2.1~~
. . .		
C 1392-00(2014 ~~2009~~)	Standard Guide for Evaluating Failure of Structural Sealant Glazing	2410.1.3
C 1394-03 (2012 ~~2008~~)	Standard Guide for In-Situ Structural Silicone Glazing Evaluation	2410.1.3
. . .		
C 1401-14~~09a~~	Standard Guide for Structural Sealant Glazing	2410.1
. . .		
~~C1567- 08~~	~~Standard Test Method for Determining the Potential Alkali-Silica Reactivity of the Combinations of Cementicious Materials and Aggregate (Accelerated Mortar-Bar Method)~~	~~1903A.6, 1913.2.3~~,
C1586-05(2011)	Standard Guide for Quality Assurance of Mortars	~~2114.9.1~~,2105A.3 ~~2105A.2.2.1.4~~
. . .		
D 1586 –11	Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils	~~J112.2~~ 1813A
. . .		
~~D 3441-05~~	~~Standard Test Method for Mechanical Cone Penetration Tests of Soil~~	~~J112.2~~
D 5778-12	Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils	1813A
. . .		

D 3966-07 (2013)	*Standard Test Method for Piles Under Lateral Loads*	*1810A.3.3.2*
. . .		
E 580- 14 ~~11b~~	*Standard Practice for Installation of Ceiling Suspension Systems of Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions*	*1616.10.16, 1616A.1.21 ~~1616A.1.20~~*
. . .		
F 606-14	*Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets*	*2213A.1*
. . .		

. . .

AWC	American Wood Council 222 Catoctin SE, Suite 201 Leesburg, VA 20175	
Standard reference number	Title	Referenced in code section number
. . .		
ANSI/AWC NDS-2015	National Design Specifications (NDS) for Wood Construction with 2012 Supplement *and addendum*	*1905A.1.8 ~~1905A.1.21~~…*

. . .

AWPA	American Wood Products Association P.O. Box 361784 Birmingham. AL 35236-1784	
. . .		
U1-14	USE CATEGORY SYSTEM: User Specification for Treated Wood Except Section 6, Commodity Specification H	*1812A.2 ~~...J106.2.2~~*

. . .

AWS	American Welding Society 550 N.W. LeJeune Road Miami, FL 33126	
Standard reference number	Title	Referenced in code section number
D1.1- 10	*Structural Welding Code-Steel*	*Table 1705A.2.1, 1705A.2.5 ~~1705A.2.2.5~~, 2212.6.2, 2213A.2*
D1.3-08	*Structural Welding Code-Sheet Steel*	*Table 1705A.2.1, 1705A.2.5 ~~1705A.2.2.1.1~~*
D1.4-11	Structural Welding Code – Reinforcing Steel	*Table 1705A.2.1, ~~1705.2.2.1.2~~, ~~2107A.3~~, ~~2107A.4~~*
D1.8-09	*Structural Welding Code – Seismic Supplement*	*1705A.2.5 ~~1705A.2.2.5~~*

QC1-07 ~~06~~	*Standard for AWS Certification of Welding Inspectors*	*1705A.2.5 ~~1705A.2.2.5~~*

. . .

FM	Factory Mutual Global Research Standards Laboratories Department 1301 Atwood Avenue, P.O. Box 7500 Johnston, RI 02919	
Standard reference number	Title	Referenced in code section number
ANSI/FM 1950-15 ~~10~~	*Approval Standard for Seismic Sway Braces for ~~Automatic Sprinkler Systems~~ Pipe, Tubing and Conduit*	*1705A.13.2 ~~1705A.12.3~~*
. . .		

. . .

ICC	International Code Council, Inc. 500 New Jersey Ave, NW 6th Floor Washington, DC 20001	
Standard reference number	Title	Referenced in code section number
. . .		
*ICC-ES AC 01-~~12~~ 15**	*Acceptance criteria for expansion anchors in Masonry elements*	*1616A.1.19*
*ICC-ES AC 58-~~12~~ 15**	*Acceptance criteria for Adhesive anchors in Masonry elements*	*1616A.1.19*
*ICC-ES AC 70-~~12~~ 15**	*Acceptance criteria for fasteners power-driven into Concrete, Steel and Masonry elements*	*1616A.1.20 ~~1908A.1.1~~*

*ICC-ES AC 106- ~~12~~ 15**	*Acceptance criteria for predrilled fasteners (screw anchors) in Masonry*	*1616A.1.19*
*ICC-ES AC 125- ~~12~~ 15**	*Acceptance criteria for Concrete, and Reinforced and Unreinforced Masonry strengthening using externally bonded Fiber-Reinforced Polymer (FRP) composite systems.*	*1911A.3 ~~1914.3~~*
*ICC-ES AC 156-~~12~~ 15**	*Acceptance criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components*	*1705A.13.3 ~~1705A.12.4~~*
*ICC-ES AC 178- ~~12~~ 15**	*Acceptance criteria for inspection and verification of Concrete, and Reinforced and Unreinforced Masonry strengthening using Fiber-Reinforced Polymer (FRP) composite systems.*	*1911A.3 ~~1914A.3~~*
*ICC-ES AC 193- ~~12~~ 15**	*Acceptance criteria for mechanical anchors in Concrete elements*	*1616A.1.19, ~~1909A.11~~*
*ICC-ES AC 232- 15**	*Acceptance criteria for anchor channels in Concrete elements*	*1616A.1.19*
*ICC-ES AC 308- ~~12~~ 15**	*Acceptance criteria for post-installed adhesive anchors in Concrete elements*	*1616A.1.19*
*ICC-ES AC 358- ~~12~~ 15**	*Acceptance criteria for Helical foundation systems and devices*	*1810A.3.1.5.1*
*ICC-ES AC 446- 15**	*Acceptance criteria for headed cast-in specialty inserts in Concrete*	*1616A.1.19*

** Refers to International Building Code, ~~2012~~ 2015 as a reference standard.*

. . .

ISO	International Organization for Standardization ISO Central Secretariat 1 ch, de la Voie-Creuse, Case Postale 56 CH-1211 Geneva 20, Switzerland	

Standard reference number	Title	Referenced in code section number
. . .		
ISO 9001-08	*Quality management systems - Requirements*	*1705A.13.3* ~~*1705A.12.4*~~
. . .		

. . .

NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169-7471	
Standard reference number	Title	Referenced in code section number
. . .		
13-*16*~~13~~	Installation of Sprinkler Systems	~~*1616.9.5, 1616.10.17*~~

. . .

PCI	Precast Prestressed Concrete Institute 200 West Adams Street, Suite 2100 Chicago, IL 60606-5230	
Standard reference number	Title	Referenced in code section number
. . .		
MLN 128-01	Recommended Practice for Glass Fiber Reinforcement	~~*1913.2.1*~~
. . .		

PCI 120-10	*PCI Design Handbook, 7th Edition*	*1905A.1.1, 1905A.1.2 ~~1905A.1~~*

PTI	Post-Tensioning Institute 8601 North Black Canyon Highway, Suite 103 Phoenix, AZ 85021	
Standard reference number	Title	Referenced in code section number
. . .		
PTI-2004	*Recommendations for Prestressed Rock and Soil Anchors (4th Edition)*	*1810A.3.10.4, 1811A.2, 1812A.4, 1812A.5,1813A.2 ~~J106.2.4~~, ~~J106.2.5~~*
. . .		

. . .

TMS	The Masonry Society 3970 Broadway, Unit 201-D Boulder, CO 80304-1135	
Standard reference number	Title	Referenced in code section number
. . .		
402— 13	Building Code Requirements for Masonry Structures	*~~1410.2.1~~,1411.2.1, 2107A.5, ~~2114.10, 2114.11~~ 2114.7, 2114.8*
. . .		

. . .

WCLIB	West Coast Lumber Inspection Bureau P. O. Box 23145 Portland, OR 97281	
Standard reference number	Title	Referenced in code section number
. . .		
AITC 111-05	*Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection*	*2303.1.3.1*
. . .		
AITC 117-10	Standard Specifications for Structural Glued Laminated Timber of Softwood Species	*2303.1.3.1*
. . .		
AITC 404-05	*Standard for Radially Reinforcing Curved Glued Laminated Timber Members to Resist Radial Tension*	*2303.1.3.1*

. . .

(All existing amendments that are not revised above shall continue without any change)

APPENDIX J
GRADING

(This Appendix is not adopted by DSA)

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments

Adopt entire chapter without amendments			
Adopt entire chapter with amendments listed below			
Adopt only those sections listed below	~~X~~	~~X~~	
~~J101~~	~~X~~	~~X~~	
~~J102~~	~~X~~	~~X~~	
~~J105~~	~~X~~	~~X~~	
~~*J106.2*~~	~~X~~	~~X~~	
~~J107~~	~~X~~	~~X~~	
~~J107.5~~	~~X~~	~~X~~	
~~J108~~	~~X~~	~~X~~	
~~J109~~	~~X~~	~~X~~	
~~J110~~	~~X~~	~~X~~	
~~J111~~	~~X~~	~~X~~	
~~*J112*~~	~~X~~	~~X~~	

(All existing DSA amendments that are not revised below shall continue without change)

…

SECTION J106
EXCAVATIONS

…

(Relocated to Chapter 18A) ~~***J106.2 Earth retaining shoring. [DSA-SS & DSA-SS/CC]***~~

~~***J106.2.1 General.*** *The requirements of this section shall apply to temporary and permanent earth retaining shoring using soldier piles and lagging with or without tie-back anchors in soil or rock, only when existing or new DSASS, DSA-SS/CC facilities are affected. Shoring used as construction means and methods only, which does not affect existing or new DSASS, DSA-SS/CC facilities, are not regulated by DSA and shall satisfy the requirements of the authorities having jurisdiction.*~~

~~*Design, construction, testing, and inspection shall satisfy the requirements of this code except as modified in Sections J106.2.2 through J106.2.8.*~~

~~***J106.2.2 Duration.*** *Shoring shall be considered temporary when elements of the shoring will be exposed to site conditions for a period of less than one (1) year, and shall be considered permanent otherwise. Permanent shoring shall account for the increase in lateral soil pressure due to*~~

~~*earthquake. At the end of the construction period, the existing and new structures shall not rely on the temporary shoring for support in anyway. Wood components shall not be used for permanent shoring lasting more than two (2) years. Wood components of the temporary shoring that may affect the performance of permanent structure shall be removed after the shoring is no longer required.*~~

~~*All components of the shoring shall have corrosion protection or preservative treatment for their expected duration. Wood components of the temporary shoring that will not be removed shall be treated in accordance with AWPA U1 (Commodity Specification A, Use Category 4B and Section 5.2), and shall be identified in accordance with Section 2303.1.8.1.*~~

~~***J106.2.3 Surcharge:*** *Surcharge pressure due to footings, traffic, or other sources shall be considered in design. If the footing surcharge is located within the semi-circular distribution or bulb of earth pressure (when shoring is located close to a footings), lagging shall be designed for lateral earth pressure due to footing surcharge. Soil arching effects may be considered in the design of lagging. Underpinning of the footing may be used in lieu of designing the shoring and lagging for surcharge pressure. Alternatively, continuously contacting drilled pier shafts near the footings shall be permitted. The lateral surcharge design pressure shall be derived using Boussinesq equations modified for the distribution of stresses in an elastic medium due to a uniform, concentrated or line surface load as appropriate and soil arching effects.*~~

~~***J106.2.4 Design and testing:*** *Except for the modifications as set forth in Sections J106.2.4.1 and J106.2.4.2 below, all Prestressed Rock and Soil Tie-back Anchors shall be designed and tested in accordance with PTI Recommendations for Prestressed Rock and Soil Anchors (PTI-2004).*~~

~~***J106.2.4.1 Geotechnical requirements****: The geotechnical report for the earth retaining shoring shall address the following:*~~

~~*12. Minimum diameter and minimum spacing for the anchors including consideration of group effects.*~~

~~*13. Maximum unbonded length and minimum bonded length of the tie-back anchors.*~~

~~*14. Maximum recommended anchor tension capacity based upon the soil or rock strength / grout bond and anchor depth / spacing.*~~

~~*15. Allowable bond stress at the ground / grout interface and applicable factor of safety for ultimate bond stress for the anchor. For permanent anchors, a minimum factor of safety of 2.0 shall be applied to ground soil interface as required by PTI-2004 Section 6.6.*~~

~~*16. Minimum grout pressure for installation and post-grout pressure for the anchor. The presumptive post grout pressure of 300 psi may be used for all soil type.*~~

~~*17. Class I Corrosion Protection is required for all permanent anchors. The geotechnical report shall specify the corrosion protection recommendations for temporary anchors.*~~

~~*18. Performance test for the anchors shall be at a minimum of two (2) times the design loads and shall not exceed 80% of the specified minimum tensile strength of the anchor rod. A creep test is required for all prestressed anchors that are performance tested. All production anchors shall be tested at 150% of design loads and shall not be greater than 70% of the specified minimum tensile strength of the anchor rod.*~~

19. ~~*Earth pressure, surcharge pressure, and the seismic increment of earth pressure loading, when applicable.*~~

20. ~~*Maximum recommended lateral deformation at the top of the soldier pile, at the tie-back anchor locations, and the drilled pier concrete shafts at the lowest grade level.*~~

21. ~~*Allowable vertical soil bearing pressure, friction resistance, and lateral passive soil resistance for the drilled pier concrete shafts and associated factors of safety for these allowable capacities.*~~

22. ~~*Soil-pier shaft / pile interaction assumptions and lateral soil stiffness to be used in design for drilled pier concrete shaft or pile lateral loads.*~~

23. ~~*Acceptable drilling methods.*~~

24. ~~*Geotechnical observation and monitoring recommendations.*~~

~~***J106.2.4.2 Structural requirements****:*~~

10. ~~*Tendons shall be thread-bar anchors conforming to ASTM A 722.*~~

11. ~~*Anchor design loads shall be based upon the load combinations in Section 1605A.3.1 and shall not exceed 60 percent of the specified minimum tensile strength of the tendons.*~~

12. ~~*The anchor shall be designed to fail in grout bond to the soil or rock before pullout of the soil wedge.*~~

13. ~~*Design of shoring system shall account for as-built locations of soil anchors considering all specified construction tolerances in Section J106.2.8.*~~

14. ~~*Design of shoring system shall account for both short and long term deformation.*~~

~~***J106.2.4.3 Testing of tie-back anchors****:*~~

5. ~~*The geotechnical engineer shall keep a record at job site of all test loads, total anchor movement, and report their accuracy.*~~

6. ~~*If a tie-back anchor initially fails the testing requirements, the anchor shall be permitted to be re-grouted and retested. If anchor continues to fail, the followings steps shall be taken:*~~

    a. ~~*The contractor shall determine the cause of failure – variations of the soil conditions, installation methods, materials, etc.*~~
    b. ~~*Contractor shall propose a solution to remedy the problem. The proposed solution will need to be reviewed and approved by geotechnical engineer, shoring design engineer, and the building official.*~~

7. ~~*After a satisfactory test, each anchor shall be locked-off in accordance with Section 8.4 of PTI 2004.*~~

8. ~~*The shoring design engineer shall specify design loads for each anchor.*~~

~~***J106.2.5 Construction:*** *The construction procedure shall address the following:*~~

15. ~~*Holes drilled for piles / tie-back anchors shall be done without detrimental loss of ground, sloughing or caving of materials and without endangering previously installed shoring members or existing foundations.*~~
16. ~~*Drilling of earth anchor shafts for tie-backs shall occur when the drill bench reaches two to three feet below the level of the tie-back pockets.*~~
17. ~~*Casing or other methods shall be used where necessary to prevent loss of ground and collapse of the hole.*~~
18. ~~*The drill cuttings from earth anchor shaft shall be removed prior to anchor installation.*~~
19. ~~*Unless tremie methods are used, all water and loose materials shall be removed from the holes prior to installing piles / tie-backs.*~~
20. ~~*Tie-back anchor rods with attached centralizing devices shall be installed into the shaft or through the drill casing. Centralizing device shall not restrict movement of the grout.*~~
21. ~~*After lagging installation, voids between lagging and soil shall be backfilled immediately to the full height of lagging.*~~
22. ~~*The soldier piles shall be placed within specified tolerances in the drilled hole and braced against displacement during grouting. Fill shafts with concrete up to top of footing elevation, rest of the shaft can generally be filled with lean concrete. Excavation for lagging shall not be started until concrete has achieved sufficient strength for all anticipated loads as determined by the shoring design engineer.*~~
23. ~~*Where boulders and / or cobbles have been identified in the geotechnical reports, contractor shall be prepared to address boulders and / or cobbles that may be encountered during the drilling of soldier piles and Tie-back anchors.*~~
24. ~~*The grouting equipment shall produce grout free of lumps and indispensed cement. The grouting equipment shall be sized to enable the grout to be pumped in continuous operation. The mixer shall be capable of continuously agitating the grout.*~~
25. ~~*The quantity of grout and grout pressure shall be recorded. The grout pressure shall be controlled to prevent excessive heave in soils or fracturing rock formations.*~~
26. ~~*If post-grouting is required, post grouting operation shall be performed after initial grout has set for 24-hours in the bond length only. Tie-backs shall be grouted over a sufficient length (anchor bond length) to transfer the maximum anchor force to the anchor grout.*~~
27. ~~*Testing of anchors may be performed after post-grouting operations provided grout has reached strength of 3,000 psi as required by PTI-2004 Section 6.11.*~~
28. ~~*Anchor rods shall be tensioned straight and true. Excavation directly below the anchors shall not continue before those anchors are tested.*~~

~~*J106.2.6 Inspection, survey monitoring, and observation*~~

12. ~~*The shoring design engineer or his designee shall make periodic inspections of the job site for the purpose of observing the installation of shoring system, testing of tie-back anchors, and monitoring of survey.*~~

13. ~~*Testing, inspection, and observation shall be in accordance with testing, inspection and observation requirements approved by the building official. The following activities and materials shall be tested, inspected, or observed by the special inspector and geotechnical engineer:*~~
    a. ~~*Sampling and testing of concrete in soldier pile and tie-back anchor shafts.*~~
    b. ~~*Fabrication of tie-back anchor pockets on soldier beams*~~
    c. ~~*Installation and testing of tie-back anchors.*~~
    d. ~~*Survey monitoring of soldier pile and tie-back load cells.*~~
    e. ~~*Survey Monitoring of existing buildings.*~~

14. ~~A complete and accurate record of all soldier pile locations, depths, concrete strengths, tie-back locations and lengths, tie-back grout strength, quantity of concrete per pile, quantity of grout per tie-back and applied tie-back loads shall be maintained by the special inspector and geotechnical engineer. The shoring design engineer shall be notified of any unusual conditions encountered during installation.~~

15. ~~Calibration data for each test jack, pressure gauge, and master pressure gauge shall be verified by the special inspector and geotechnical engineer. The calibration tests shall be performed by an independent testing laboratory and within 120 calender days of the data submitted.~~

16. ~~Monitoring points shall be established at the top and at the anchor heads of selected soldier piles and at intermediate intervals as considered appropriate by the geotechnical engineer.~~

17. ~~Control points shall be established outside the area of influence of the shoring system to ensure the accuracy of the monitoring readings.~~

18. ~~The periodic basis of shoring monitoring, as a minumum, shall be as follows:~~

    a. ~~Intitial monitoring shall be performed prior to any excavation.~~
    b. ~~Once excavation has begun, the periodic readings shall be taken weekly until excavation reaches the estimated subgrade elevation and the permanent foundation is complete.~~
    c. ~~If performance of the shoring is within established guidelines, shoring design engineer may permit the periodic readings to be bi-weekly. Once initiated, bi-weekly readings shall continue until the building slab at ground floor level is completed and capable of transmitting lateral loads to the permanent structure. Thereafter, readings can be monthly.~~
    d. ~~Where the building has been designed to resist lateral earth pressures, the periodic monitoring of the soldier piles and adjacent structure can be discontinued once the ground floor diaphragm and subterranean portion of the structure is capable of resisting lateral soil loads and approved by the shoring design engineer, geotechnical engineer, and the building official.~~
    e. ~~Additional readings shall be taken when requested by special inspector, shoring design engineer, geotechnical engineer, or the building official.~~

19. ~~Monitoring reading shall be submitted to shoring design engineer, engineer in responsible charge, and the building official within 3 working days after they are conducted. Monitoring readings shall be accurate to within 0.01 feet. Results are to be submitted in tabular form showing at least the intial date of monitoring and reading, current monitoring date and reading and difference between the two readings.~~

20. ~~If the total cummulative horizontal or vertical movement (from start of construction) of the existing buildings reaches ½" or soldier piles reaches 1" all excavation activities shall be suspended. The geotechnical and shoring design engineer shall determine the cause of movement, if any, and recommend corrective measures, if necessary, before excavation continues.~~

21. ~~If the total cummulative horizontal or vertical movement (from start of construction) of the existing buildings reaches 3/4" or soldier piles reaches 1 ½" all excavation activities shall be suspended until the causes, if any, can be determined. Supplemental shoring shall be devised to eliminate further movement and the building official shall review and approve the supplemental shoring before excavation continues.~~

~~22. Monitoring of Tie-back Anchor Loads:~~

~~e. Load cells shall be installed at the tie-back heads adjacent to buildings at maximum interval of 50', with a minimum of one load cells per wall.~~
~~f. Load cell readings shall be taken once a day during excavation and once a week during the remainder of construction.~~
~~g. Load cell readings shall be submitted to the geotechnical engineer, shoring design engineer, engineer in responsible charge, and the building official.~~
~~h. Load cell readings can be terminated once the temporary shoring no longer provides support for the buildings.~~

~~***J106.2.7 Monitoring of existing DSASS, DSA-SS/CC structures***~~

~~8. The contractor shall complete a written and photographic log of all existing OSHPD 1 & 4 structures within 100 ft or three times depth of shoring, prior to construction. A licensed surveyor shall document all existing substantial cracks in adjacent existing structures.~~
~~9. Contractor shall document existing condition of wall cracks adjacent to shoring walls prior to start of construction.~~
~~10. Contractor shall monitor existing walls for movement or cracking that may result from adjacent shoring.~~
~~11. If excessive movement or visible cracking occurs, contractor shall stop work and shore / reinforce excavation and contact shoring design engineer and the building official.~~
~~12. Monitoring of the existing structure shall be at reasonable intervals as required by the registered design professional subject to approval of the building official. Monitoring shall be performed by a licensed surveyor and shall consist of vertical and lateral movement of the existing structures. Prior to starting shoring installation a pre-construction meeting shall take place between the contractor, shoring design engineer, surveyor, geotechnical engineer, and the building official to identify monitoring locations on existing buildings.~~
~~13. If in the opinion of the building official or shoring design engineer, monitoring data indicate excessive movement or other distress, all excavation shall cease until the geotechnical engineer and shoring design engineer investigates the situation and makes recommendations for remediation or continuing.~~
~~14. All reading and measurements shall be submitted to the building official and shoring design engineer.~~

~~***J106.2.8 Tolerances.*** Following tolerances shall be specified on the construction documents.~~

~~3. Soldier Piles:~~

~~i. Horizontal and vertical construction tolerances for the soldier pile locations.~~
~~ii. Soldier pile plumbness requirements (angle with vertical line).~~

~~4. Tie-back Anchors:~~

~~i. Allowable deviation of anchor projected angle from specified vertical and horizontal design projected angle.~~
~~ii. Anchor clearance to the existing/new utilities and structures.~~

SECTION J107
FILLS

J107.1 General. Unless otherwise recommended in the soils report, fills shall conform to provisions of this section.

…

J107.5 Compaction. All fill material shall be compacted to 90 percent of maximum density as determined by ASTM D 1557, Modified Proctor, in lifts not exceeding 12 inches (305 mm) in depth.

~~***[DSA-SS, DSA-SS/CC]*** *This section establishes minimum requirements only.*~~

…

(Relocated to Chapter 18A) ~~***Section J112***~~
~~***Vibro Stone Columns for Ground Improvement***~~

~~***J112.1 General. [OSHPD 1, 2, & 4]*** *This section shall apply to Vibro Stone Columns (VSCs) for ground improvement using unbounded aggregate materials. Vibro stone column provisions in this section are intended to increase bearing capacity, reduce settlements, and mitigate liquefaction for shallow foundations. These requirements shall not be used for grouted or bonded stone columns, ground improvement for deep foundation elements, or changing site class. VSCs shall not be considered as a deep foundation element.~~

~~*Ground improvement shall be installed under the entire building/structure footprint and not under isolated foundation elements only.*~~

~~*Design, construction, testing, and inspection shall satisfy the requirements of this code except as modified in Sections J112.2 through J112.5.*~~

~~***J112.2 Geotechnical Report.*** *Geotechnical report shall specify vibro stone column requirements to ensure uniformity in total and differential immediate settlement, long term settlement, and earthquake induced settlement.*~~

~~*10. Soil compaction shall be sufficient to mitigate potential for liquefaction as described in California Geological Survey (CGS) Special Publication 117A (SP-117A): Guidelines for Evaluating and Mitigating Seismic Hazard in California.*~~

~~*11. Area replacement ratio for the compaction elements and the basis of its determination shall be explained. Minimum factor of safety for soil compaction shall be in accordance with SP-117A.*~~

~~*12. Depth of soil compaction elements and extent beyond the footprint of structures/foundation shall be defined. Extent beyond the foundation shall be half the depth of the VSCs with a minimum of 10' or an approved alternative.*~~

~~*13. Minimum diameter and maximum spacing of soil compaction elements shall be specified. VSC's shall not be less than 2 feet in diameter and center to center spacing shall not exceed 8 feet.*~~

~~*14. The modulus of subgrade reactions for shallow foundations shall account for the presence of compaction elements.*~~

~~*15. The modulus of subgrade reactions, long-term settlement, and post-earthquake settlement shall be specified along with expected total and differential settlements for design.*~~

16. ~~*The acceptance criteria for Cone Penetration Test (CPT) in accordance with ASTM D 3441 complemented by Standard Penetration Test (SPT) in accordance with ASTM D 1586, if necessary, to verify soil improvement shall be specified*~~

17. ~~*The requirements for special inspection and observation by the Geotechnical engineer shall be specified.*~~

18. ~~*A Final Verified Report (FVR) documenting the installation of the ground improvement system and confirming that the ground improvement acceptance criteria have been met shall be prepared by the Geotechnical Engineer and submitted to the enforcement agency for review and approval.*~~

~~***J112.3 Shallow Foundations.*** *VSCs under the shallow foundation shall be located symmetrically around the centroid of the footing or load.*~~

4. ~~*There shall be a minimum of four stone columns under each isolated or continuous/combined footing or approved equivalent.*~~

5. ~~*The VSCs or deep foundation elements shall not be used to resist tension or overturning uplift from the shallow foundations.*~~

6. ~~*The foundation design for the shallow foundation shall consider the increased vertical stiffness of the VSCs as point supports for analysis, unless it is substantiated that the installation of the VSCs result in improvement of the surrounding soils such that the modulus of subgrade reaction, long term settlement, and post-earthquake settlement can be considered uniform throughout.*~~

~~***J112.4 Installation.*** *VSCs shall be installed with vibratory probes. Vertical columns of compacted unbounded aggregate shall be formed through the soils to be improved by adding gravel near the tip of the vibrator and progressively raising and re-penetrating the vibrator which will results in the gravel being pushed into the surrounding soil.*~~

~~*Gravel aggregate for VSCs shall be well graded with a maximum size of 6" and not more than 10% smaller than 3/8" after compaction.*~~

~~***J112.5 Construction Documents.*** *Construction documents for VSCs, as a minimum, shall include the following:*~~

6. ~~*Size, depth, and location of VSCs.*~~
7. ~~*Extent of soil improvements along with building/structure foundation outlines.*~~
8. ~~*Field verification requirements and acceptance criteria using CPT/SPT.*~~
9. ~~*The locations where CPT/SPT shall be performed.*~~
10. ~~*The Testing, Inspection and Observation (TIO) program shall indicate the inspection and observation required for the VSCs.*~~

(DSA is not adopting Appendix J, since requirements are now covered in Chapter 18A)

Notation for [DSA-SS]
Authority: Education Code § 17310 and 81142, and H&S Code §16022.
Reference: Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]
Authority: Education Code § 81053.

Reference: Education Code §§ 81052, 81053, and 81130 through 81147.