INITIAL EXPRESS TERMS
FOR
PROPOSED BUILDING STANDARDS
OF THE
OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT

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

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 or code language being modified are in italics when they appear in the model code text: All such language appears in *italics*, modified language is underlined.
3. New California amendments: All such language appears *underlined and in italics*.
4. Repealed text: All such language appears in ~~strikeout~~.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. Amendments to ACI 318 in Chapter 19 and Chapter 19A: Model code contains some amendments to ACI 318 in Sections 1903 through 1905; this amendment language appears in *italics* in these sections. Therefore, OSHPD amendment language in Sections 1903A through 1905A appears in *italics and underline.*
7. Existing amendments in Chapter 19A: Deletion of existing OSHPD amendment language in Sections 1903A through 1905A appears in ~~*italics, underline and strikeout.*~~ OSHPD amendment language in Sections 1903A through 1905A that was included in the previous Code Adoption Cycles is shown for clarity only. This language appears in *italics, underline and highlight*.
8. Instructions/Notations regarding relocation of language will appear highlighted.

INITIAL EXPRESS TERMS

CHAPTER 16
STRUCTURAL DESIGN

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. ***[OSHPD]*** *The scope of application of Chapter 16 is as follows:*

1. (Reserved for DSA)

2. Hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings and acute psychiatric hospital buildings regulated by the Office of Statewide Health Planning and Development [OSHPD] as listed in Sections 1.10.1, 1.10.2 and 1.10.5.

1601.1.2 ~~Identification of a~~Amendments in this chapter. *DSA-SS/CC and OSHPD 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. (Reserved for DSA)

2. OSHPD amendments (OSHPD) appear in this chapter preceded with the appropriate acronym, as follows:

[OSHPD 1R] *- For applications listed in Section 1.10.1.*
[OSHPD 2] *- For applications listed in Section 1.10.2.*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

…

1601.1.3 (Reserved for DSA)

1601.1.4 Amendments.

1. ***[OSHPD 1R, 2 & 5]*** *In addition to the amendments in this Chapter, these buildings shall comply with the requirements of Sections 1617A.1.1, 1617A.1.4, 1617A.1.18 – 1617A.1.20, 1617A.1.27, 1617A.1.39 and 1617A.1.41.*
2. (Reserved for DSA)

1601.2 Enforcement Agency Approval. [DSA-SS/CC, OSHPD 1R, 2 & 5] *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 Design Professional (RDP), are also subject to approval by the enforcement agency.*
…

SECTION 1603
CONSTRUCTION DOCUMENTS

1603.1 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 1603.1.1 through 1603.1.9 shall be indicated on the construction documents.

…

[OSHPD 1R, 2 & 5] *Additional requirements are included in Section 7-115 and 7-125 of the California Administration Code (Part 1, Title 24, C.C.R).*
…

TABLE 1604.5
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.
	Buildings and other structures that represent a substantial hazard to human life in the event of failure,

III	including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing Group E occupancies with an occupant load greater than 250. • Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500. • Group I-2, Condition 1 occupancies with 50 or more care recipients. • Group I-2, Condition 2 occupancies not having emergency surgery or emergency treatment facilities. • ***[OSHPD 2]*** *Skilled Nursing Facilities, Intermediate Care Facilities, Group I-2 Occupancy with 50 or more care recipients.* • ***[OSHPD 5]*** *Acute Psychiatric Hospitals, Group I-2 Occupancy with 50 or more care recipients.* • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000.[a] • Power-generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and are sufficient to pose a threat to the public if released.[b]
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2, Condition 2 occupancies having emergency surgery or emergency treatment facilities. • Ambulatory care facilities having emergency surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and are sufficient to pose a threat to the public if released.[b] • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

…

SECTION 1607
LIVE LOADS

1607.1 General. Live loads are those loads defined in Chapter 2 of this code.

TABLE 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_0, AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
…	…	…
36. [OSHPD 1R, 2 & 5] Storage racks and wall-hung cabinets.	*Total Loads[ap]*	

...

~~n~~p. *[OSHPD 1R, 2 & 5] 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/m3) or 20 pounds per square foot (958 Pa), whichever is less, but not less than actual loads.

...

SECTION 1612
FLOOD LOADS

1612.3 Establishment of flood hazard areas. To establish flood hazard areas, the governing body 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], 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.

Exception: [OSHPD 1R, 2 & 5] *The flood hazard map 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.*

...

SECTION 1613
EARTHQUAKE LOADS

1613.1 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 Chapters 11, 12, 13, 15, 17 and 18 of ASCE 7, as applicable. The *seismic design category* for a structure is permitted to be determined in accordance with Section 1613 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, S_S, 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. *[OSHPD 1R, 2 & 5] Not permitted by OSHPD, see Section 2308.*
3. Agricultural storage structures intended only for incidental human occupancy.
4. 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.

5. References within ASCE 7 to Chapter 14 shall not apply, except as specifically required herein.

~~5~~6. [OSHPD 1R, 2 & 5] Seismic Design Category shall be in accordance with exception to Section 1613.~~3~~2.5.

…

1613.2.1 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 1613.2.1(1) through 1613.2.1(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.

***Exception:** [OSHPD 1R, 2 & 5] Seismic Design Category shall be in accordance with exception to Section 1613.~~3~~2.5.*

…

1613.2.5 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_1, 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 a *seismic design category* based on their *risk category* and the design spectral response acceleration parameters, S_{DS} and S_{D1}, determined in accordance with Section 1613.2.4 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 1613.2.5(1) or 1613.2.5(2), irrespective of the fundamental period of vibration of the structure, T.

***Exception: [OSHPD 1R, 2 & 5]** Structures not assigned to seismic design category E or F above shall be assigned to seismic design category D.*

1613.2.5.1 Alternative seismic design category determination.

…

***Exception: [OSHPD 1R, 2 & 5]** Seismic design category shall be determined in accordance with exception to Section 1613.~~3~~2.5.*

1613.2.5.2 Simplified design procedure. Where the alternate simplified design procedure of ASCE 7 is used, the seismic design category shall be determined in accordance with ASCE 7.

***Exception: [OSHPD 1R, 2 & 5]** Seismic design category shall be determined in accordance with exception to Section 1613.~~3~~2.5.*

…

1613.3 Ballasted photovoltaic panel systems. Ballasted, roof-mounted *photovoltaic panel systems* need not be rigidly attached to the roof or supporting structure. …

***[OSHPD 1R, 2 & 5]** Ballasted photovoltaic panel systems shall be considered as an alternative system.*

***1613.4 Component Importance Factors. [OSHPD 1R, 2 & 5]** Nonstructural components designated below shall have a component importance factor, I_p, equal to 1.5:*

1. For components that are required for life-safety purposes after an earthquake, including emergency and standby power systems, mechanical smoke removal systems, fire protection sprinkler systems and fire alarm control panels.

2. For medical equipment, mechanical and electrical components and components required for life support for patients.

…

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

NOTATION:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 1298

CHAPTER 16*A*
STRUCTURAL DESIGN

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. *(Reserved for DSA).*
2. *Applications listed in Section 1.10.1, and 1.10.4, regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals~~, skilled nursing facilities, intermediate care facilities,~~ and correctional treatment centers.*

   ~~Exception: [OSHPD 2]~~ *~~Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 16 and any applicable amendments therein.~~*

1601A.1.2 Amendments in this chapter. *OSHPD 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. *(Reserved for DSA).*

2. *Office of Statewide Health Planning and Development:*
   [OSHPD 1] *- For applications listed in Section 1.10.1.*
   [OSHPD 4] *- For applications listed in Section 1.10.4.*

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 Design Professional (RDP), are also subject to approval by the enforcement agency.*

…

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 ~~1603.1.9~~ *1603A.1.~~9~~10* shall be indicated on the *construction documents*.

...

[OSHPD 1] *Additional requirements are included in Section 7-115 and 7-125 of the California Administrative Code.*

...

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 structure:

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 ASCE 7 Section ~~1613A.2~~11.2.*

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

...

1603A.1.~~9~~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, 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, 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, the extent of construction such as incidental, minor, major, and/or voluntary seismic improvements as defined in Section~~s~~ 202 and California Existing Building Code Section 202A~~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 as indicated in Table 1604*A*.3. Drift limits applicable to earthquake loading shall be in accordance with ASCE 7 Chapter 12, 13, 15 or 16, as applicable.

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 ~~1604.3.5~~*1604A.3.9* 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*, *E* or *W*[f]	*D* + (*L* or *Lr*) [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~~8 Horizontal diaphragms. *The maximum span- depth ratio for any roof or floor diaphragm consisting of steel and composite steel slab decking shall not exceed those given in Table 1604A.4, unless test data and design calculations acceptable to the enforcement agency are submitted and approved for the use of other 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~~9~~ 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 effects of added deformations 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 that 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.* 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.

...

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*A*.5 shall be used in lieu of ASCE 7, Table 1.5-1.

Exception: The assignment of buildings and structures to Tsunami Risk Categories III and IV is permitted to be in accordance with Section 6.4 of ASCE 7.

...

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, Condition 1 occupancies with an occupant load of 50 or more resident care recipients. • Group I-2, Condition 2 occupancies not having emergency surgery or emergency treatment facilities. **...**

IV	Buildings and other structures designated as essential facilities, including but not limited to: • ~~Group I-2 occupancies having emergency surgery or emergency treatment facilities.~~ • ***[OSHPD 1 & 4]*** *General Acute-care Hospital Buildings, General Acute-care Hospital Buildings providing only acute medical rehabilitation center services. ~~as defined in the California Administrative Code, Section 7-111~~ and Correctional Treatment Center Buildings 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 all of the following:

…

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. Strength design for foundation geotechnical capacity shall be in accordance with ASCE 7 Section 12.13.5 for all strength design load combinations, except that Resistance Factor (Ø) shall be permitted to be 1.0 for load combinations with overstrength factor. Allowable stress design for foundation geotechnical capacity shall be in accordance with ASCE 7 Section 12.13.6 for all allowable stress design load combinations, and shall be established to be consistent with requirements for strength design requirements in ASCE 7 Section 12.13.5.*

…

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.

…

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.)
…	…	…
17. Hospitals *[OSHPD 1 & 4]*		
Corridors above first floor	80	1,000
Operating rooms, laboratories	60	1,000
		1,000
Patient rooms	40	—
Mechanical and electrical equipment areas including open areas around equipment	*50*	—
		—
Storage:		
Light	*125*	
Heavy	*250*	
Dining Area (Not		

used for assembly)	*100*	*1000*
Kitchen and serving areas	*50*	*1000*
...	...	...
36. Storage racks and wall-hung cabinets.	*Total Loads[~~n~~p]*	

...

~~n~~p. 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.

...

1607A.~~12~~13.6 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~~5~~ 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) 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)

SECTION 1609A
WIND LOADS

...

1609A.1.~~3~~2 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: [OSHPD 1 & 4] *This story drift limit need not be applied for single-story open structures.*

...

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 Chapters 11, 12, 13, 15, 17 and 18 of ASCE 7, as applicable, *with all the modifications incorporated herein.* 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.

(Relocated to Chapter 2) ~~**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 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.*** *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.*~~

~~***IRREGULAR STRUCTURE.*** *A structure designed as having one or more plan or vertical irregularities per*~~

~~*ASCE 7 Section 12.3.*~~

…

1613*A*.2 Seismic ground motion values. Seismic ground motion values shall be determined in accordance with this section.

1613A.*2*.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.~~

1613A.2.2 Site class definitions. Based on the site soil properties, the site shall be classified as Site Class A, B, C, D, E or F in accordance with Chapter 20 of ASCE 7.

Where the soil properties are not known in sufficient detail to determine the site class, Site Class D, subject to the requirements of Section 1613*A*.2.3, shall be used unless the building official or geotechnical data determines that Site Class E or F soils are present at the site.

Where site investigations that are performed in accordance with Chapter 20 of ASCE 7 reveal rock conditions consistent with Site Class B, but site-specific velocity measurements are not made, the site coefficients *Fa* and *Fv* shall be taken at unity (1.0).

1613A.2.3 Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. The maximum considered earthquake spectral response acceleration for short periods, S_{MS}, and at 1- second period, S_{M1}, adjusted for *site class* effects shall be determined by Equations 16-36 and 16-37, respectively:

$S_{MS} = F_a S_s$ **(Equation 16A-36)**

$S_{M1} = F_v S_1$ **(Equation 16A-37)**

but S_{MS} shall not be taken less than S_{M1} except when determining the seismic design category in accordance with Section 1613A.2.5.
where:

F_a = Site coefficient defined in Table 1613A.2.3(1).
F_v = Site coefficient defined in Table 1613A.2.3(2).
S_S = The mapped spectral accelerations for short periods as determined in Section 1613A.2.1.
S_1 = The mapped spectral accelerations for a 1-second period as determined in Section 1613A.2.1.

Where Site Class D is selected as the default site class per Section 1613A.2.2, the value of *Fa* shall be not less than 1.2. ~~Where the simplified design procedure of ASCE 7 Section 12.14 is used, the value of F_a shall be determined in accordance with ASCE 7 Section 12.14.8.1, and the values of F_v, S_{MS} and S_{M1} need not be determined~~.

…

1613A.2.4 Design spectral response acceleration parameters. Five-percent damped design spectral response acceleration at short periods, *SDS,* and at 1-second period, S_{D1}, shall be determined from Equations 16A-<u>38</u>~~39~~ and 16A-<u>39</u>~~40~~, respectively:

$S_{DS} = 2/3 S_{MS}$ **(Equation 16A-38)**

$S_{D1} = 2/3\ S_{M1}$ **(Equation 16A-39)**

where:

S_{MS} = The maximum considered earthquake spectral response accelerations for short period as determined in Section 1613A.2.3.
S_{M1} = The maximum considered earthquake spectral response accelerations for 1-second period as determined in Section 1613A.2.3.

(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)

...

1613A.2.5 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_1, 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. Other structures shall be assigned to *Seismic Design Category D.* ~~a seismic design category based on their risk category and the design spectral response acceleration coefficients, S_{DS} and S_{D1}, determined in accordance with Section 1613.2.4 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 1613.2.5(1) or 1613.2.5(2), irrespective of the fundamental period of vibration of the structure, T.~~

~~**TABLE 1613.2.5(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 ≤ S_{DS} < 0.33g~~	~~B~~	~~B~~	~~C~~
~~0.33g ≤ S_{DS} < 0.50g~~	~~C~~	~~C~~	~~D~~
~~0.50g ≤ S_{DS}~~	~~D~~	~~D~~	~~D~~

~~**TABLE 1613.2.5(2) - SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION**~~

~~VALUE OF S_{D1}~~	~~RISK CATEGORY~~		
	~~I or II~~	~~III~~	~~IV~~
~~S_{D1} < 0.067g~~	~~A~~	~~A~~	~~A~~
~~0.067g ≤ S_{D1} < 0.133g~~	~~B~~	~~B~~	~~C~~
~~0.133g ≤ S_{D1} < 0.20g~~	~~C~~	~~C~~	~~D~~
~~0.20g ≤ S_{D1}~~	~~D~~	~~D~~	~~D~~

1613A.2.5.1 Alternative seismic design category determination. *Not permitted by OSHPD.* ~~Where S_1 is less than 0.75, the seismic design category is permitted to be determined from Table 1613.2.5(1) alone where 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 11.8.6 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*.2.5.2 Simplified design procedure. *Not permitted by OSHPD.* 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.

…

1613*A*.*3* Ballasted photovoltaic panel systems. Ballasted, roof-mounted photovoltaic panel systems need not be rigidly attached to the roof or supporting structure. Ballasted non-penetrating systems shall be designed and installed only on roofs with slopes not more than one unit vertical in 12 units horizontal. Ballasted nonpenetrating systems shall be design to resist sliding and uplift resulting from lateral and vertical forces as required by Section 1605*A*, using a coefficient of friction determined by acceptable engineering principles. In structures assigned to Seismic Design Category C, D, E or F, ballasted nonpenetrating systems shall be designed to accommodate seismic displacement determined by nonlinear response history analysis or other approved analysis or shake-table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for nonstructural components on roofs.

[OSHPD 1 & 4] *Ballasted photovoltaic panel systems shall be considered as an alternative system.*

…

SECTION 1616*A*
STRUCTURAL INTEGRITY

1616*A*.1 General. High-rise buildings that are assigned to Risk Category III or IV shall comply with the requirements of Section 1616*A*.2 if they are framed structures, or Section 1616*A*.3 if they are bearing wall structures.

1616*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 1617~~6~~A
MODIFICATIONS TO ASCE 7

1617~~6~~A.1 General. *The text of ASCE 7 shall be modified as indicated in Sections 1616A.1.1 through 1616A.1.40.*

1617~~6~~A.1.1 ASCE 7, Section 1.3. *Modify ASCE 7 Section 1.3 by adding Section 1.3.8 ~~1.3.6~~ as follows:*

1.3.8 ~~1.3.6~~ Structural Design Criteria. *Where design is based on ASCE 7 Chapters 16, 17, or 18, the ground motion, 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.*

[OSHPD 1 & 4] *Peer review requirements in Section ~~3414A~~1617A.1.41 of this code shall apply to design reviews required by ASCE 7 Chapters 17 and 18.*

1617~~6~~A.1.2 ASCE 7, Section 11.1.3. *Replace last paragraph of ASCE 7 Section 11.1.3 by the following:*

Non-b~~B~~uildings~~s~~ structures similar to buildings shall be designed and detailed in accordance with Chapter 12.

1617~~6~~A.1.3 *Reserved.* ~~***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.*~~

1617~~6~~A.1.4 ASCE 7, Table 12.2 -1. *Modify ASCE 7 Table 12.2-1 as follows:*

A. BEARING WALL SYSTEMS

5. Intermediate Precast Shear Walls – Not permitted by OSHPD.

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

B. BUILDING FRAME SYSTEMS

3. Steel ordinary concentrically braced frames – Not permitted by OSHPD.

8. Intermediate Precast Shear Walls – Not permitted by OSHPD.

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

26. Special steel plate shear wall – Not permitted by OSHPD.

C. MOMENT RESISTING FRAME SYSTEMS

2. Steel special truss moment frames – Not permitted by OSHPD.

3. Steel intermediate moment frames – Not permitted by OSHPD.

4. Steel ordinary moment frames – Not permitted by OSHPD.

12. Cold-formed steel –special bolted moment frame - Not permitted by OSHPD.

G. CANTILEVER COLUMN SYSTEMS DETAILED TO CONFORM WITH THE REQUIREMENTS FOR:

1. Steel special cantilever column systems – Not permitted by OSHPD.

3. Special reinforced concrete moment frames – Not permitted by OSHPD.

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 ASCE 7 Section 17.2.5.~~41613A.4.1~~.

1617~~6~~A.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.

1617~~6~~A.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 vertical 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.

1617~~6~~A.1.7 [Reserved for DSA-SS].

1617~~6~~A.1.8 [Reserved for DSA-SS].

1617~~6~~A.1.9 [Reserved for DSA-SS].

1617~~6~~A.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.*

Exception: *Structures with reinforced concrete or reinforced masonry shear wall systems and rigid diaphragms having a horizontal structural irregularity Type 1b of Table 12.3-1 are permitted, provided the maximum story drift in the direction of the irregularity, computed including the torsional amplification factor from Section 12.8.4.3, is less than 10% of the allowable story drift in ASCE 7 Table 12.12-1.*

1617~~6~~A.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.

1617~~6~~A.1.12 *Reserved.* ~~***ASCE 7, Section 12.8.1.3.*** *Replace ASCE 7 Section 12.8.1.3 by the following:~~*

~~***12.8.1.3 Maximum S_{DS} Value in Determination of C_s and E_v***~~
~~*The value of C_s 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. ~~*[Reserved for DSA-SS]*~~
7. ~~***[OSHPD 1 & 4]*** *The structure is a nonconforming building not supporting SPC-3 or higher buildings.*~~

1617~~6~~A.1.13 *Reserved.* ~~***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.*~~

1617~~6~~A.1.14 *Reserved.* ~~***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.*~~

1617~~6~~A.1.15 ASCE 7, Section 12.12.3. [OSHPD 1 & 4] *Replace ASCE 7 Equation 12.12-1 by the following:*

$\delta_M = C_d\delta_{max}$ (Equation 12.12-1)

1617~~6~~A.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 can be delivered to the foundation in 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 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.

1617~~6~~A.1.17 ASCE 7, Section 13.1.3. [OSHPD 1 & 4] *Modify ASCE 7 Section 13.1.3 by the following:*

All nonstructural components shall have a component importance factor, I_p, equal to 1.5.

Exception: *~~Freestanding skilled nursing or acute psychiatric buildings,~~ Hospital buildings rated SPC-1 and SPC-2 not providing services/systems, utilities, or access/egress to general acute care buildings designated as SPC 3 or higher in accordance with Chapter 6 of the California Administrative Code, shall be permitted to use component importance factor, I_p, as ~~shown~~given in ASCE 7 Section 13.3.1 ~~Table 1616A.1.17~~.*

~~TABLE 1616A.1.17~~
~~COMPONENT IMPORTANCE FACTOR (I_p)[1] FOR~~

~~***FREESTANDING SKILLED NURSING AND ACUTE PSYCHIATRIC BUILDINGS***~~

~~**Description**~~	~~**Importance Factor (I_p)[1]**~~
~~Architectural components~~	~~1.0~~
~~Mechanical and electrical components~~	~~1.5~~
~~Medical devices~~	~~1.5~~
~~Piping, including in-line components~~	~~1.5~~
~~HVAC ducts, including in-line components~~	~~1.0~~
~~Electrical raceways~~	~~1.0~~

~~[1]*Components required for life-safety purposes after an earthquake, including emergency and standby power systems, mechanical smoke removal systems, fire protection sprinkler systems, fire alarm control panels, and egress stairways shall have a component importance factor (I_p) of 1.5.*~~

…

1617~~6~~A.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 or ~~(~~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~~ 110/220 volt receptacles having a flexible cable.

b) (Reserved for DSA)

*c) **[OSHPD 1 & 4]** Movable equipment shall be anchored by detachable anchors or restraints in a manner approved by the enforcement agency, when utilities and services at the equipment have flexible connections to allow for necessary movement.*

*d) **[OSHPD 1 & 4]** Mobile equipment heavier than 400 pounds that has a center of mass located 4 feet (1.22 m) or more above the adjacent floor or roof level that directly support the equipment shall be restrained in a manner approved by the enforcement agency when not in use and is stored, unless the equipment is stored in an equipment storage room.*

3. Discrete ~~A~~architectural, mechanical and electrical components and fixed equipment in Seismic Design Categories D, E, or F, that are positively attached to the structure and anchorage is detailed on the plans, provided that either: ~~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:~~

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

the component, and flexible connections are provided between the component and associated ductwork, piping and conduit;

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

or

b. 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.*

1617~~6~~A.1.19 ASCE 7, Section 13.4. *Replace ASCE 7 Section 13.4.2.3 with the following:*

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

Post-installed anchors and specialty inserts in concrete that are pre-qualified for seismic applications in accordance with ACI 355.2, ACI 355.4, ICC-ES AC193, ICC-ES AC232, ICC-ES AC308 or ICC-ES AC446 shall be permitted. Post-installed anchors in masonry 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 enclosures. Re-use of screw anchors or screw anchor holes shall not be permitted.

1617~~6~~A.1.20 ASCE 7, Section 13.4.5 *Modify ASCE 7 Section 13.4.5 by adding Section 13.4.5.1 as follows:*

13.4.5.1 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.*

Power actuated fasteners shall be permitted in seismic shear for components exempt from permit requirements by Section 1616~~7~~A.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.*

1617~~6~~A.1.21 ASCE 7, Section 13.5.6.2. *Modify ~~Replace~~ ASCE 7, Section 13.5.6.2.2 with the following and by adding Section 13.5.6.2.3 as follows:*

~~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.

13.5.6.2.3 ~~***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 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 E580 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. 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.*

1617~~6~~A.1.22 ASCE 7, Section 13.5.7. [OSHPD 1 & 4] *Modify ASCE 7 Section 13.5.7 by the following:*

All access floors shall be special access floors in accordance with Section 13.5.7.2, except for raised roof or exterior floor paver systems.

1617~~6~~A.1.23 ASCE 7 Section 13.6.2.1 and ASCE 7 Tables 13.5-1 and 13.6-1. *Modify Section 13.6.2.1 by adding the following to the end of the section:*

[OSHPD 1 & 4] *Use of this section shall be considered as an alternative system. Alternatively, HVACR systems shall require special seismic certification in accordance with Section 1705A.13.3.*

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.*~~ *Where Ip =1.5, overstrength factor (Ω_0) need not exceed the values of R_0 for design of anchorage to concrete.*

1617~~6~~A.1.24 ASCE 7, Section 13.6.5. ~~*Modify*~~ *Replace 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.*~~

13.6.5 Distribution Systems: Conduit, Cable Tray, and Raceways. *Cable trays and raceways shall be designed for seismic forces and seismic relative displacements as required in Section 13.3. Conduit equal to or greater than 2.5 in. (64 mm) trade size and attached to panels, cabinets, or other equipment subject to seismic relative displacement, D_{pl}, shall be provided with flexible connections or designed for seismic forces and seismic relative displacements as required in Section 13.3.*

EXCEPTIONS:

1. Design for the seismic forces and relative displacements of Section 13.3 shall not be required for raceways where flexible connections or other assemblies are provided between the cable tray or raceway and associated components to accommodate the relative displacement, where the cable tray or raceway is positively attached to the structure, and where one of the following apply:

a. Trapeze assemblies with 3/8 in. (10-mm) or 1/2 in.(13-mm) diameter rod hangers not exceeding 12 in. (305 mm) in length from the conduit, cable tray, or raceway support point to the

connection at the supporting structure are used to support the cable tray or raceway, and the total weight supported by any single trapeze is 100 lb (445 N) or less, or

b. The conduit, cable tray, or raceway is supported by individual rod hangers 3/8 in. (10 mm) or 1/2 in. (13 mm) in diameter, and each hanger in the raceway run is 12 in. (305 mm) or less in length from the conduit, cable tray, or raceway support point connection to the supporting structure, and the total weight supported by any single rod is 50 lb (220 N) or less.

2. Design for the seismic forces and relative displacements 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.

Design for the displacements across seismic joints shall be required for conduit, cable trays, and raceways with I_p = 1.5 without consideration of conduit size.

1617~~6~~A.1.25 ASCE 7, Section 13.6.6~~7~~. *Replace ASCE 7, Section 13.6.6~~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.~~

13.6.6 Distribution Systems: Duct Systems. *HVACR and other duct systems shall be designed for seismic forces and seismic relative displacements as required in Section 13.3.*

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

1. Design for the seismic forces and relative displacements of Section 13.3 shall not be required for duct systems where flexible connections or other assemblies are provided to accommodate the relative displacement between the duct system and associated components, the duct system is positively attached to the structure, and where one of the following apply:

a. Trapeze assemblies with 3/8 in. (10 mm) or 1/2 in. (13-mm) diameter rod hangers not exceeding 12 in. (305 mm) in length from the duct support point to the connection at the supporting structure are used to support duct, and the total weight supported by any single trapeze is less than 10 lb/ft (146 N/m) and 100 lb or less; or

b. The duct is supported by individual rod hangers 3/8 in. (10 mm) or 1/2 in. (13 mm) in diameter, and each hanger in the duct run is 12 in. (305 mm) or less in length from the duct support point to the connection at the supporting structure, and the total weight supported by any single rod is 50

lb (220 N) or less.

2. Design for the seismic forces and relative displacements of Section 13.3 shall not be required where provisions are made to avoid impact with other ducts or mechanical components or to protect the ducts in the event of such impact, the distribution system is positively attached to the structure; and HVACR ducts have a cross-sectional area of less than 6 ft^2 (0.557 m^2) and weigh 20 lb/ft (292 N/m) or less.

Components that are installed in line with the duct system and have an operating weight greater than 75 lb (334 N), such as fans, terminal units, heat exchangers, and humidifiers, shall be sup- ported and laterally braced independent of the duct system, and such braces shall meet the force requirements of Section 13.3.1. Components that are installed in line with the duct system, have an operating weight of 75 lb (334 N) or less, such as small terminal units, dampers, louvers, and diffusers, and are otherwise not independently braced shall be positively attached with mechanical fasteners to the rigid duct on both sides. Piping and conduit attached to in-line equipment shall be provided with adequate flexibility to accommodate the seismic relative displacements of Section 13.3.2.

1617~~6~~A.1.26 ASCE 7, Section 13.6.~~7~~.~~8~~.3. *Replace ASCE 7, Section 13.6.~~7~~.~~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.~~

13.6.7.3 Additional Provisions for Piping and Tubing Systems.

A) Design for the seismic forces of Section 13.3 shall not be required for piping systems where flexible connections, expansion loops, or other assemblies are provided to accommodate the relative displacement between component and piping, where the piping system is positively attached to the structure, and where any of the following conditions apply:

1. Trapeze assemblies are supported by 3/8 in. (10-mm) or 1/2-in. (13-mm) diameter rod hangers not exceeding 12 in. (305 mm) in length from the pipe support point to the connection at the

supporting structure, do not support piping with I_p greater than 1.0, and no single pipe exceeds the diameter limits set forth in item 2b below or 2 in. (50 mm) for Seismic Design Categories D, E or F where I_p is greater than 1.0 and the total weight supported by any single trapeze is 100 lb (445 N) or less, or

2. Piping that has an R_p in Table 13.6-1 of 4.5 or greater is either supported by rod hangers and provisions are made to avoid impact with other structural or nonstructural components or to protect the piping in the event of such impact, or pipes with I_p = 1.0 are supported by individual rod hangers 3/8 in. (10 mm) or 1/2 in. (13 mm) in diameter; where each hanger in the pipe run is 12 in. (305 mm) or less in length from the pipe support point to the connection at the supporting structure; and the total weight supported by any single hanger is 50 lb (220 N) or less. In addition, the following limitations on the size of piping shall be observed:

a. In structures assigned to Seismic Design Categories D, E, or F where I_p is greater than 1.0, the nominal pipe size shall be 1 in. (25 mm) or less.

b. In structures assigned to Seismic Design Categories D, E, or F where I_p = 1.0, the nominal pipe size shall be 3 in. (80 mm) or less.

3. Pneumatic tube systems supported with trapeze assemblies using 3/8-in. (10-mm) diameter rod hangers not exceeding 12 in. (305 mm) in length from the tube support point to the connection at the supporting structure and the total weight supported by any single trapeze is 100 lb (445 N) or less.

4. Pneumatic tube systems supported by individual rod hangers 3/8 in. (10 mm) or 1/2 in (13 mm) in diameter, and each hanger in the run is 12 in. (305 mm) or less in length from the tube support point to the connection at the supporting structure, and the total weight supported by any single rod is 50 lb (220 N) or less.

B) Flexible connections in piping required in Section 13.6.7.3 are not required where pipe is rigidly attached to the same floor or wall that provides vertical and lateral support for the equipment, or to a fixture.

C) Flexible connections in piping are required at seismic separation joints and shall be detailed to accommodate the seismic relative displacements at connections.

1617~~6~~A.1.27 ASCE 7, Section 13.6.~~10~~11.1. *Modify ASCE 7 Section 13.6.~~10~~11.1 by adding Section 13.6.~~10~~11.1.1 as follows:*

13.6.~~10~~11.1.1 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~~11.1, the minimum seismic forces shall be 0.5g acting in any horizontal direction.*

1617~~6~~A.1.28 ASCE 7, Section 13.6.~~10~~11.4. *Replace ASCE 7, Section 13.6.~~10~~11.4 as follows:*

13.6.~~10~~11.4 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~~11.1. 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.*

1617~~6~~A.1.29 *Reserved.* ***~~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.~~

1617~~6~~A.1.30 *Reserved.* ***~~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.~~

1617~~6~~A.1.31 *Reserved.* ***~~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.~~

1617~~6~~A.1.32 *Reserved.* ***~~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.~~

1617~~6~~A.1.33 *Reserved.* ***~~ASCE 7, Section 16.2.4.1. [OSHPD 1 & 4]~~*** *~~Replace ASCE 7 exception to Section 16.2.3 by the following:~~*

~~Where this standard requires the consideration of the load combinations with overstrength factor of Section 12.4.3.2, average demand from MCE_R analysis obtained from suite of analysis in accordance with Section 16.2.4 shall be used with Immediate Occupancy (IO) acceptance criteria in Section 16.2.4.2.~~

1617~~6~~A.1.34 *Reserved.* ***~~ASCE 7, Section 16.2.4.2. [OSHPD 1 & 4]~~*** *~~Modify ASCE 7 Section 16.2.4.2 by the following:~~*

~~Acceptance criteria for elements subjected to deformation beyond their linear range of response shall be based on ASCE 41 for Immediate Occupancy (IO) at Design Earthquake (DE) and Life Safety (LS) at Risk-Targeted Maximum Considered Earthquake (MCE_R).~~

1617~~6~~A.1.35 ASCE 7 Section 17.2.4.7. *Modify ASCE 7, Section 17.2.4.7 by adding the following:*

The effects of uplift shall be explicitly accounted for in the testing of the isolator units.

1617~~6~~A.1.36 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 and F structures.*

1617~~6~~A.1.37 *Reserved.* ***~~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.~~*

1617~~6~~A.1.38 ASCE 7, Section 18.3.~~~~1.~~ ~~*Modify*~~ *Replace exception to ASCE 7, Section 18.3~~~~.1~~* ~~*by replacing the third paragraph with*~~ *the following:*

EXCEPTION: *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.*

1617~~6~~A.1.39 Earthquake Motion Measuring Instrumentation and Post-Earthquake Structural Monitoring/Verification. [OSHPD 1 & 4] *Modify ASCE 7 by the following:*

Scope: *For buildings with a seismic isolation system, a damping system or a lateral force resisting system (LFRS) not listed in ASCE 7 Table 12.2-1, earthquake motion measuring instrumentation and monitoring shall be required. For buildings with welded steel moment frames constructed under a permit issued prior to October 25, 1994 post earthquake verification shall be in accordance with this section.*

Instrumentation: *Earthquake monitoring instrumentation shall be installed in accordance with Section 104.11.4.*

Monitoring: *After every significant seismic events, where the ground shaking acceleration at the site exceeds 0.3g, or the acceleration at any monitored building level 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 structural system. The inspection shall include viewing the performance of the building, reviewing the strong motion records, and a visual examination of the isolators, dampers and connections for deterioration, offset or physical damage. A report for each inspection, including conclusions on the continuing adequacy of the structural system, shall be submitted to the enforcement agency.*

Verification: *After every seismic event that generates ground motions specified in the California Administrative Code, Chapter 6, Section 4.2.0.1 or the damage indicators specified in the California Administrative Code, Chapter 6, Section 4.2.0.2 at a welded steel moment frame building constructed under a permit issued prior to October 25, 1994, the owner shall retain a structural engineer to perform detailed joint evaluations required to meet the following requirements:*

1. A detailed joint evaluation program shall be submitted to the enforcement agency for approval prepared in accordance with the requirements of the California Administrative Code, Chapter 6, Section 4.2.0.3.

2. Upon approval of the joint evaluation program required by Item 1 above for the joint inspections, a project to perform the joint inspections, detailed in the program, shall be submitted and a building permit shall be obtained by the owner no later than 6 months from the date of occurrence of the seismic event.

Exception: *Where the ground motions at the building site are less than 0.4g, the permit shall be obtained no later than 12 months from the date of occurrence of the seismic event.*

3. A detailed joint evaluation report shall be submitted to the enforcement agency no later than 6 months of obtaining the building permit. The report shall document the findings from the inspections of the joints and include conclusions on the adequacy of the structural system. Where unsafe conditions are discovered, the provisions of Section 116 shall apply.

Where the detailed joint evaluation report is not submitted within the timeframes specified above, the building shall not be issued a building permit for any projects except for those for seismic compliance, maintenance and repair until the detailed joint evaluation work is complete.

1617~~6~~A.1.40 Operational Nonstructural Performance Level Requirements. [OSHPD 1 & 4] *New general acute care hospitals and new building(s) required for general acute care services shall satisfy Operational Nonstructural Performance Level (NPC-5) requirements.*

Exception: *A new building which is required for general acute care services that is added to an existing general acute care hospital and which has a building area of 4,000 square feet (371 m^2) or less, need not satisfy the NPC-5 requirements until the deadline specified in California Administrative Code (Part 1, Title 24 CCR), Chapter 6.*

Hospitals and buildings designed and constructed to the provisions of this code for new construction shall be deemed to satisfy Operational Nonstructural Performance Level (NPC-5) requirements when:

1. *The facility has on-site supplies of water and holding tanks for sewage and liquid waste, sufficient to support 72 hours of emergency operations for the hospital or building, which are integrated into the building plumbing systems in accordance with the California Plumbing Code.*

2. *An on-site emergency system as defined in the California Electrical Code is incorporated into the building electrical system for critical care areas. Additionally, the system shall provide for radiological service and an onsite fuel supply for 72 hours of acute care operation.*

   Emergency and standby generators shall not be located above the higher of the Design Flood Elevation (DFE) or Base Flood Elevation (BFE) plus two feet (BFE + 2 ft.) or 500 year flood elevation, whichever is higher, and shall be located at an elevation close to grade for easy accessibility from outside for maintenance.

(Relocated from CBC 3414A)
1617A.1.41 Peer Review Requirements. [OSHPD 1, 1R, 2, & 4, & 5]

1. General. *Independent peer review is an objective technical review by knowledgeable reviewer(s) experienced in structural design, analysis and performance issues involved. The reviewer(s) shall examine the available information on the condition of the building, basic engineering concept employed and recommendations for action.*

2. Timing of Independent Review. *The independent reviewer (s) shall be selected prior to initiation of substantial portion of the design and analysis work that is to be reviewed, and review shall start as soon as practical and sufficient information defining the project is available.*

3. Qualifications and Terms of Employment. *The reviewer shall be independent from the design and construction team.*

3.1 The reviewer(s) shall have no other involvement in the project before, during or after the review, except in a review capacity.

3.2 The reviewer shall be selected and paid by owner and shall have technical expertise similar to the project being reviewed, as determined by enforcement agent.

3.3 The reviewer (in case of review team, the chair) shall be a California-licensed structural engineer who is familiar with technical issues and regulations governing the work to be reviewed.

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 enforcement agent, owner, and the engineer of record. When a reviewer is terminated or resigns, a qualified replacement shall be appointed within 10 working days or a timeframe mutually agreed to by the Owner, Registered Design Professional (RDP) and the Office.

4. Scope of Review. *Review activities shall include, where appropriate, available construction documents, design criteria, observation of the condition of structure, all new and original inspection*

reports, including methods of sampling, analyses prepared by the engineer of record and consultants, and the new, retrofit or repair design. Review shall include consideration of the proposed design approach, method, materials and details.

5. Reports. *The reviewer(s) shall prepare a written report to the owner and responsible enforcement agent that covers all aspect of the review performed including conclusions reached by the reviewer. Report shall be issued after the schematic phase, during design development, and at the completion of construction documents, but prior to their issuance of permit. Such report shall include, at the minimum, statement of the following:*

a. Scope of engineering design peer review with limitations defined.
b. The status of the project documents at each review stage.
c. Ability of selected materials and framing systems to meet the performance criteria with given loads and configuration.

d. Degree of structural system redundancy and the deformation compatibility among structural and non-structural elements.
e. Basic constructability of the new, retrofit or repair system.
f. Other recommendation that will be appropriate for the specific project.
g. Presentation of the conclusions of the reviewer identifying any areas that need further review, investigation and / or clarification.
h. Recommendations.

6. Responses and Corrective Actions. *The engineer of record shall review the report from the reviewer(s) and shall develop corrective actions and other 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 corrective actions prepared pursuant to this section shall be submitted to the responsible enforcement agent and the owner along with other plans, specifications and calculations required. If the reviewer resigns or is terminated by the owner prior to completion of the project, then the reviewer shall submit copies of all reports, notes, and the correspondence to the responsible enforcement agent, the owner, and the engineer of record within 10 working days of such termination.*

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

NOTATION:
Authority: Health and Safety Code Section 130005(g) & 130021
Reference: Health and Safety Code Section 1275, 129790, 129850 & 130005(

CHAPTER 17
SPECIAL INSPECTIONS AND TESTS

SECTION 1701
GENERAL

1701.1 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.

1701.1.1 Application*. The scope of application of Chapter 17 is as follows:*

Structures regulated by the Office of Statewide Health Planning and Development (OSHPD), which include hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings and acute psychiatric hospital buildings regulated by the Office of Statewide Health Planning and Development [OSHPD] as listed in Sections 1.10.1, 1.10.2 and 1.10.5.

1701.1.2 Amendments in this chapter. *OSHPD adopts this chapter and all amendments. Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725 need not comply with [OSHPD 2] amendments, except those in Sections 1701.1, 1703.4, 1704.2, 1705.3.3, 1705.5.3, 1705.13.3.1.*

1701.1.3 Identification of amendments. [OSHPD 1R, 2 & 5] *Office of Statewide Health Planning and Development (OSHPD) amendments appear in this chapter preceded with the appropriate acronym, as follows:*

[OSHPD 1R*] - For applications listed in Section 1.10.1.*
[OSHPD 2] *- For applications listed in Section 1.10.2.*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

…

SECTION 1703
APPROVALS

…

1703.4 Performance. Specific information consisting of test reports conducted by an approved agency in accordance with the appropriate referenced standards, or other such information as necessary, shall be provided for the building official to determine that the product, material or assembly meets the applicable code requirements.

[OSHPD 1R, 2 & 5] *Tests performed by an independent approved testing agency/laboratory ~~having accreditation to the International Standards Organization (ISO) accreditation Standard 17025~~ or under the responsible charge of a competent approved independent Registered Design Professional shall be deemed to comply with requirements of this section. Test reports for structural tests shall be reviewed and accepted by an independent California licensed structural engineer.*

…

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

…

1704.2 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 the 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 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.

*[**OSHPD 1R, 2 & 5**] In addition, the approved agencies shall provide special inspections and tests during construction on the types of work listed under Chapters 17, 18, 19, 20, 21, 22, 23, 25, and noted in the Test, Inspection and Observation (TIO) program as required by the Office. ~~Sections 7-141, 7-145, 7-149 and 7-151 of the California Administrative Code as required by the Office.~~*

The inspectors shall act under the direction of the architect or structural engineer or both, and be responsible to the Owner. Where the California Administrative Code Section 7-115 (a) 2 permits construction documents to be prepared under the responsible charge of a mechanical, electrical or civil engineer, inspectors shall be permitted to work under the direction of engineer in appropriate branch as permitted therein.

~~*[**OSHPD 2**] An inspection agency having accreditation to the International Standards Organization (ISO) accreditation Standard 17020 shall be deemed to comply with the requirements for an approved inspection agency.*~~

Exceptions:

…

2. Unless otherwise required by the *building official*, *special inspections* and tests 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 and tests 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. *[OSHPD 1R, 2 & 5] Not permitted by OSHPD.*

4. The contractor is permitted to employ the approved agencies where the contractor is also the owner. *[OSHPD 1R, 2 & 5] Not permitted by OSHPD.*

…

1704.2.3 Statement of special inspections. The applicant shall submit a statement of special inspections in accordance with Section 107.1 as a condition for permit issuance. This statement shall be in accordance with Section 1704.3.

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 2211.1.2 or the conventional light-frame construction provisions of Section 2308. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.*

…

1704.2.4 Report requirement. *Approved agencies* shall keep records of special inspections and tests. The *approved agency* shall submit reports of *special* inspections and tests to the *building official* and to the *registered design professional in responsible charge*. Reports shall indicate that work inspected or tested was or was not completed in conformance to *approved construction documents*. 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 the owner's authorized agent to the *building official*.

[OSHPD 1R, 2 & 5] *Report requirement shall be per 1704A.2.4.*

1704.2.5 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 except where the fabricator has been approved to perform work without special inspections in accordance with Section 1704.2.5.1.

1704.2.5.1 Fabricator approval. *[**OSHPD 1R, 2 & 5**] Not permitted by OSHPD.*
Special inspections during fabrication are not required where the work is done on the premises of a fabricator approved to perform such work without special inspection. Approval shall be based on review of the fabricator's written fabrication procedures and quality control manuals that provide a basis for control of materials and workmanship, with periodic auditing of fabrication and quality control practices by an approved agency or the building official. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the owner or the 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.

…

1704.3.2 Seismic requirements in the statement of special inspections. Where Section 1705.12 or 1705.13 specifies *special inspections* or tests for seismic resistance, the statement of *special inspections* shall identify the designated seismic systems and seismic force-resisting systems that are subject to the *special inspections* or tests.

*[**OSHPD 1R, 2 & 5**] Where Section 1705.12 or 1705.13 specifies special inspections or tests for seismic resistance, the statement of special inspections shall identify the equipment/components that require special seismic certification and seismic force-resisting systems that are subject to the special inspections or tests.*

…

SECTION 1705
REQUIRED SPECIAL INSPECTIONS AND TESTS

…

1705.2.1 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.

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.

*[**OSHPD 1R, 2, 5**] 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, Chapter 22 and quality control requirements of AISC 360, AISC 341 and AISC 358.*

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. *N5., Item 3 (Coordinated Inspection)*
4. *N5., Item 4 (Inspection of Welding)*
5. *N6 (Approved Fabricators and Erectors)*
6. *N7 (Nonconforming Material and Workmanship).*

…

1705.2.3.1 Steel joist and joist girder inspection. [OSHPD 1R, 2, 5] Special inspection is required during the manufacture and welding of steel joists or joist girders. The approved agency 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 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.

…

1705.2.4.1 Light-framed steel truss inspection and testing. [OSHPD 1R, 2, 5] Regardless of truss span, the manufacture of cold-formed light framed steel trusses shall be continuously inspected by an approved agency. The approved agency shall verify conformance of materials and manufacture with approved plans and specifications. The approved agency 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. Refer to Section 2211.1.3.3 for requirements applicable to manufactured trusses specified therein.

1705.2.5 Inspection and tests of structural welding. [OSHPD 1R, 2 & 5] Inspection and testing (including non-destructive testing) of all shop and field welding operations shall be in accordance with this section and Section 1705.2.1. Inspections 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.

The welding inspector shall make a systematic daily record of all welds. 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 Section 2213.2 and the approved plans and specifications. The approved agency shall furnish the architect, structural engineer, and the enforcement agency with a verified report that the welding has been done in conformance with AWS D1.1, D1.3, D1.4, D1.8, and the approved construction documents.

1705.2.6 Special inspection and tests of high-strength fastener assemblies. [OSHPD 1R, 2 & 5] *Special inspections and tests for high-strength fasteners shall be in accordance with this section and Section 2213.1.*

1705.3 Concrete construction. *Special inspections* and tests of concrete construction shall be performed in accordance with this section and Table 1705.3.

Exception: *Special inspections and tests* shall not be required for: ***[OSHPD 1R, 2 & 5]*** *Exceptions 1 through 4 are not permitted by OSHPD.*

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. Concrete patios, driveways and sidewalks, on grade.

...

1705.3.3 Batch plant inspection. [OSHPD 1R, 2 & 5] *Except as provided under this section, the quality and quantity of materials used in transit-mixed concrete and in batched aggregates shall be continuously inspected by an approved agency at the location where materials are measured.*

1705.3.3.1 Waiver of continuous batch plant inspection. [OSHPD 1R, 2 & 5] *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 and 10, 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) and isolated foundations supporting equipment only, where deep foundation elements are not used.*

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

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

2. *A licensed weighmaster shall positively identify quantity of materials and certify 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 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 keep a daily record of placements, identifying each truck, its load, and time of receipt at the job site, and approximate location of deposit in the structure and shall maintain a copy of the daily record as required by the enforcement agency.*

1705.3.4 Inspection and testing of prestressed concrete. [OSHPD 1R, 2 & 5] *Inspections and tests for prestressed concrete work shall be in accordance with this section. Tests for prestressing steel and anchorage shall be per Section 1910A.3. Inspection shall be in accordance with the following:*

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.

Exception: *The special inspector need not be continuously present for the placement of prestress or posttensioned cables or tendons.*

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 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 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

1705.3.5 Concrete pre-placement inspection. [OSHPD 1R, 2 & 5] *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.*

1705.3.6 Placing record. [OSHPD 1R, 2 & 5] *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.*

1705.3.7 Composite construction cores. [OSHPD 1R, 2 & 5] *Composite construction cores shall be taken and tested in accordance with Section 1910A.4 .*

1705.3.8 Special Inspections and tests for post-installed anchors in concrete. [OSHPD 1R, 2 & 5] *Special inspections and tests for post-installed anchors in concrete shall be in accordance with Table 1705.3 and Section 1901.3.*

1705.4 Masonry construction. *Special inspections* and tests of masonry construction shall be performed in accordance with the quality assurance program requirements of TMS 402 and TMS 602*. [OSHPD 1R, 2 & 5] as set forth in Tables 3 and 4 Level 3 requirements and Chapter 21. Testing shall be performed in accordance with Section 2105. Special inspection and testing of post-installed anchors in masonry shall be*

required in accordance with requirements for concrete in Chapters 17 and 19.

Exception: *[**OSHPD 1R, 2 & 5**] Not permitted by OSHPD. 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 a structure classified as *Risk Category* I, II or III.

…

1705.4.1 Empirically designed masonry, glass unit masonry and masonry veneer in Risk Category IV. *Special inspections* and tests for 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 a structure classified as *Risk Category* IV shall be performed in accordance with TMS 402, Level B Quality Assurance. *[**OSHPD 1R, 2 & 5**] Not permitted by OSHPD.*

*[**OSHPD 1R, 2 & 5**] **Glass unit masonry and masonry veneer in Risk Category II, III or IV.** Special inspections and tests for glass unit masonry or masonry veneer designed by Section 2110 or Chapter 14, respectively, in structures classified as Risk Categories II, III or IV, shall be performed in accordance with TMS 602 Tables 3 and 4 Level 2 Quality Assurance.*

…

***1705.5.3 Manufactured Trusses and Assemblies**. [**OSHPD 1R, 2 & 5**] The fabrication of trusses and other assemblages constructed using wood and metal members, or using light metal plate connectors, shall be continuously inspected by an approved agency. The approved agency shall furnish the architect, structural engineer and the enforcement agency with a report that the lumber species, grades and moisture content; type of glue, temperature and gluing procedure; type of metal members and metal plate connectors; and the workmanship conform in every material respect with the duly approved construction documents. Each inspected truss shall be stamped by the approved agency with an identifying mark.*

...

***1705.5.4 Structural glued laminated timber. [OSHPD 1R, 2 & 5**] Manufacture of all structural glued laminated timber shall be continuously inspected by an approved agency.*

The approved agency 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 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/APA A190.1 Section 13.1 for non-custom members.*

***1705.5.5 Manufactured open web trusses. [OSHPD 1R, 2 & 5**] The manufacture of open web trusses shall be continuously inspected by an approved agency.*

The approved agency 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 approved agency.

***1705.5.6 Timber connectors. [OSHPD 1R, 2 & 5]** The installation of all split ring and shear plate timber*

connectors, and timber rivets shall be continuously inspected by an approved agency. The approved agency shall furnish the architect, structural engineer and the enforcement agency with a report verifying that the materials, timber connectors and workmanship conform to the approved construction documents.

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TABLE 1705.3 REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

...

(Add footnote c to the Table 1705.3)

[OSHPD 1R, 2 & 5] 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.

...

1705.6.1 Soil fill. [OSHPD 1R, 2 & 5] *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.

...

1705.7.1 Driven deep foundations observation. [OSHPD 1R, 2 & 5] *The installation of driven deep foundations shall be continuously observed 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.

...

1705.13 Testing for seismic resistance. Testing for seismic resistance shall be required as specified in Sections 1705.13.1.1 through 1705.13.4, unless exempted from special inspections by exceptions of Section 1704*A*.2.

1705.13.1 Structural Steel. Nondestructive testing for seismic resistance shall be in accordance with Section 1705.13.1.1 or 1705.13.1.2, as applicable.

1705.13.1.1 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.

Exceptions: ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.*

1. In buildings and structures assigned to Seismic Design Category B or C, nondestructive testing is not required for structural steel seismic force-resisting systems where 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, has been used for design and detailing.
2. In structures assigned to Seismic Design Category D, E, or F, nondestructive testing is not required for structural steel seismic force-resisting systems where design and detailing in accordance with AISC 360 is permitted by ASCE 7, Table 15.4-1.

1705.13.1.2 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 1705.13.1.1, including struts, collectors, chords, and foundation elements, shall be performed in accordance with quality assurance requirements of AISC 341.

Exceptions: ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.*

1. In buildings and structures assigned to Seismic Design Category B or C, nondestructive testing of structural steel elements is not required or seismic force-resisting systems with a response modification coefficient, R, of 3 or less.
2. In structures assigned to Seismic Design Category D, E or F, nondestructive testing of structural steel elements is not required for seismic force-resisting systems where design and detailing other than AISC 341 is permitted by ASCE 7, Table 15.4-1. Nondestructive testing of structural steel elements shall be in accordance with the applicable referenced standard listed in ASCE 7, Table 15.4-1.

…

1705.13.2 Nonstructural components. For structures assigned to *Seismic Design Category* B, C, D, E or F, where the requirements of Section 13.2.1 of ASCE 7 for nonstructural components, supports or attachments are met by seismic qualification as specified in Item 2 therein, the *registered design professional* shall specify on the *approved construction documents* the requirements for seismic qualification by analysis, testing or experience data. *Certificates of compliance* for the seismic qualification shall be submitted to the *building official* as specified in Section 1704.5.

[OSHPD 1R, 2 & 5] *Seismic sway bracing components satisfying requirements of FM 1950 or using an alternative testing protocol approved by the building official shall be deemed to satisfy the requirements of this Section.*

1705.13.3 Designated Seismic System. For structures assigned to *Seismic design* Category C, D, E or F and with *designated seismic systems* that are subject to the requirements of Section 13.2.2 of

ASCE 7 for certification, the *registered design professional* shall specify on the *approved construction documents* the requirements to be met by analysis, 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 1704.5.

1705.13.3.1 Special Seismic Certification. [OSHPD 1R, 2 & 5]

1. *Special seismic certification shall be required for life-safety components, such as emergency and standby power systems, mechanical smoke removal systems, and fire sprinkler/fire protection systems.*
2. *Medical, mechanical and electrical ~~E~~equipment and components required for life support for patients ~~supporting sub-acute bed(s)~~ shall have special seismic certification in accordance with Section 1705A.*

(Relocated to Section 1225) ~~Construction documents for OSHPD 2 buildings without sub-acute beds shall explicitly state that skilled nursing facility or intermediate care facility does not admit patients needing sustained electrical life-support equipment.~~

…

1705.17 Fire-resistant penetrations and joints.

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In high-rise buildings or in buildings assigned to Risk Category III or IV, special inspections for through-penetrations, membrane penetration firestops, fire-resistant joint systems and perimeter fire barrier systems that are tested and listed in accordance with Sections 714.3.1.2, 714.4.2, 715.3 and 715.4 shall be in accordance with Section 1705.17.1 or 1705.17.2.

*[**OSHPD 1R, 2 & 5**] Buildings assigned to all Risk Categories shall be subject to special inspections for fire-resistant penetrations and joints.*

…

1705.19 Shotcrete. [OSHPD 1R, 2 & 5] *All shotcrete work shall be continuously inspected during placing by an approved agency. The special shotcrete inspector shall check the materials, placing equipment, details of construction and construction procedure. The 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. Preconstruction and strength tests of shotcrete shall be in accordance with Sections 1908.5 and 1908.10, respectively.*

1705.19.1 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:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275, 129850 and 129790

CHAPTER 17*A*
SPECIAL INSPECTIONS AND TESTS

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. (Reserved for DSA).

2. Structures regulated by the Office of Statewide Health Planning and Development (OSHPD), which include those applications listed in Section 1.10.1, and 1.10.4. These applications include hospitals, ~~skilled nursing facilities, intermediate care facilities~~ and correctional treatment centers.

~~Exception: [OSHPD 2]~~ *~~Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 17 and any applicable amendments therein.~~*

1701A.1.2 Amendments in this chapter. *OSHPD 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. (Reserved for DSA).

2. Office of Statewide Health Planning and Development:
[OSHPD 1] *- For applications listed in Section 1.10.1.*
[OSHPD 4] *- For applications listed in Section 1.10.4.*

…

1701A.3 Special inspections and tests. [OSHPD 1 and 4] *In addition to the inspector(s) of record required by the California Administrative Code, Section 7-144, the owner shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work listed under Chapters 17A, 18A, 19A, 20, 21A, 22A, 23, 24, 25, ~~34A,~~ and noted in the Test, Inspection, and Observation (TIO) program required by Sections 7-141, 7-145 and 7-149 of the California Administrative Code. Test, Inspection, and Observation (TIO) program shall satisfy requirements of Section~~s~~ 1704A.*

…

~~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, have the meanings shown herein.*~~

…

(Moved to Chapter 2)~~***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.*~~

(Moved to Chapter 2)~~***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.*~~

(Moved to Chapter 2)~~***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 1703*A*
APPROVALS

…

1703*A*.4 Performance. Specific information consisting of test reports conducted by an approved agency in accordance with the appropriate referenced standards, or other such information as necessary, shall be provided for the building official to determine that the product, material or assembly meets the applicable code requirements.

[OSHPD 1 & 4] *Tests performed by an independent approved testing agency/laboratory* ~~*having accreditation to the International Standards Organization (ISO) accreditation Standard 17025*~~ *or under the responsible charge of a competent approved independent Registered Design Professional shall be deemed to comply with requirements of this section. Test reports for structural tests shall be reviewed and accepted by an independent California licensed structural engineer.*

…

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

1704*A*.1 General. Special inspections and tests, statements of special inspections, responsibilities of contractors, submittal to the building official and structural observation shall meet applicable requirements of this section.

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.

[OSHPD 1 & 4] *~~An inspection agency having accreditation to the International Standards Organization (ISO) accreditation Standard 17020 shall be deemed to comply with the requirements for an approved inspection agency.~~*

The inspectors shall act under the direction of the architect or structural engineer or both, and be responsible to the Owner. Where the California Administrative Code (CAC) Section 7-115 (a) 2 permits construction documents to be prepared under the responsible charge of a mechanical, electrical or civil engineer, inspectors shall be permitted to work under the direction of engineer in appropriate branch as permitted therein.

Exception:
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. 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 2211.1.2 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.~~

...

1704*A*.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 107.1 as a condition for ~~permit issuance~~ *construction documents review*. This statement shall be in accordance with Section 1704*A*.3.

~~**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 2211.1.2 or the conventional light-frame construction provisions of Section 2308.~~

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1704A.2.4 Report requirement. The *inspector(s) of record and* ~~A a~~pproved 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.* 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~~.~~, ~~except where the fabricator has been approved to perform work without special inspections in accordance with~~

~~Section 1704.2.5.1.~~

~~**Exceptions:** *[OSHPD 1 & 4]*~~
~~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 *special inspector and/or* building official*, as determined by the building official.*~~

1704A.2.5.1 Fabricator approval. *Not permitted by OSHPD*
~~Special inspections during fabrication are not required where the work is done on the premises of a fabricator approved to perform such work without special inspection. Approval shall be based on review of the fabricator's written fabrication procedures and quality control manuals that provide a basis for control of materials and workmanship, with periodic auditing of fabrication and quality control practices by an approved agency or the building official. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the owner or the 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.

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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. ~~***[OSHPD 1 & 4]** Certificates of Compliance* for the fabrication of structural, load-bearing or lateral load-resisting members or assemblies on the premises of a*n approved fabricator* in accordance with Section *1704A.2.5* ~~1704.2.5.1.~~

~~2.~~ *Certificates of compliance* for the ~~seismic qualification~~ *manufacturer's certification* of non-structural components, supports and attachments in Section 1705A.13.2.

2 ~~3.~~ *Certificates of compliance* for the ~~designated seismic system~~ *equipment/components requiring special seismic certification* in accordance with Section 1705A.13.3.

3 ~~4~~. Reports of preconstruction tests for shotcrete in accordance with Section 1908.5.

4 ~~5~~. Certificates of compliance for open web steel joists and joist girders in accordance with Section 2207.5.

5 ~~6~~. Reports of material properties verifying compliance with the requirements of AWS D1.4 for weldability as specified in Section 26.5.4 of ACI 318 for reinforcing bars in concrete complying with a standard other than ASTM A706 that are to be welded; and

6 ~~7~~. Reports of mill tests in accordance with Section 20.2.2.5 of ACI 318 for reinforcing bars complying with ASTM A615 and used to resist earthquake induced flexural or axial forces in the special moment frames, special structural walls or coupling beams connecting special structural walls of seismic force-resisting systems in structures assigned to Seismic Design Category B, C, D, E or F.

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1704*A*.6 Structural observations. ~~Where required by the provisions of Section 1704.6.1, 1704.6.2, or 1704.6.3, 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 1705*A* 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.

~~**1704.6.1 Structural observations for structures.** Structural observations shall be provided for those structures where one or more of the following conditions exist:~~

~~1. The structure is classified as Risk Category IV.~~
~~2. The structure is a high-rise building.~~
~~3. Such observation is required by the registered design professional responsible for the structural design.~~
~~4. Such observation is specifically required by the building official.~~

~~**1704.6.2 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 structure is assigned to *Seismic Design Category* E, is classified as *Risk Category* I or II, and is greater than two *stories above* the *grade plane*.~~

~~**1704.6.3 Structural observations for wind resistance.** Structural observations shall be provided for those structures sited where *Vasd* is 130 mph (58 m/sec) and the structure is classified as *Risk Category* III or IV.~~

SECTION 1705*A*
REQUIRED SPECIAL INSPECTIONS AND TESTS

1705*A*.1 General. Special inspections and tests of elements and nonstructural components of buildings and structures shall meet the applicable requirements of this section.

...

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, Chapter 22A and quality control requirements of AISC 360, AISC 341 and AISC 358.*

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. *N5., Item 3 (Coordinated Inspection)*
4. *N5., Item 4 (Inspection of Welding)*
5. *N~~7~~6 (Approved Fabricators and Erectors)*
6. *N~~8~~7 (Nonconforming Material and Workmanship).*

~~In addition to the quality assurance inspection requirements contained in AISC 360, Section N5 (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~~1 ~~(Minimum Requirements for Inspection of Composite Construction),~~ Additionally, 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~~SPECIAL INSPECTIONS AND TESTS OF STEEL CONSTRUCTION

~~TYPE~~VERIFICATION AND INSPECTION	***CONTINUOUS SPECIAL INSPECTION***	***PERIODIC SPECIAL INSPECTION***	***REFERENCED STANDARD[a]***	***CBC REFERENCE[a]***
1. Material ~~verification~~ identification and testing of high-strength bolts, nuts and washers:				
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	—	*X*	*RCSC: 1.5, AISC 360:~~,~~ ~~Section~~ A3.3 & J3.1 and applicable ASTM material standards.*	*2202A.1*
b. Manufacturers certificate of compliance required.	—	*X*	*RCSC: 1.5 & 2.1; AISC 360: A3.3 & N3.2*	—
c. Testing of high-strength bolts, nuts and washers.	—	—	*RCSC: 7.2, Applicable ASTM material standards*	*2213A.1,*
2. Inspection of high-strength bolting:				
a. Snug-tight joints.	—	*X*	*RCSC: 7-9, AISC 360:~~,~~ ~~Section~~ J3.1, J3.2, M2.5 & N5.6*	*1705A.2.6, 2204A.2*
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~~ identification and testing 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*	*2202~~3~~A.1*
b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents.	*—*	*X*	*Applicable ASTM material standards*	*2202A.1*
c. Manufacturer's certified test reports.	*—*	*X*	*AISC 360: A3.1& N3.2*	*—*
d. Testing of unidentified steel.	*—*	*—*	*Applicable ASTM material standards*	*2202A.1*
4. Material ~~verification~~ identification of welding consumables and testing of welded elements ~~filler materials~~:				
a. Identification markings to conform to AWS specification in the approved construction documents.	*—*	*X*	*AISC 360: ~~,~~ ~~Section~~ A3.5 & N3.2 and applicable AWS A5 documents*	*—*
b. Manufacturer's certificate of compliance required.	*—*	*X*	*AISC 360: N3.2*	*—*
c. Nondestructive testing of welded joints.	*—*	*—*	*AISC 360: N5.5*	
5. Inspection of welding:				
a. Structural steel and cold-formed steel deck:				
1) Complete and partial joint penetration groove welds.	*X*	*—*	*AISC 360: J2, M2.4, & M4.5, AWS D1.1, AWS D1.8*	*1705A.2.1, 1705A.2.5*
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, SDI QA/QC*	*1705A.2.1, 1705A.2.2, 1705A.2.5*
7) End-welded studs.	*—*	*X*	*AWS D1.1*	*1705A.2.5, 2213A.2*
8) Welded sheet steel for cold-formed framing members	*—*	*X*	*AWS D1.3.*	*1705A.2.5, 1705A.2.4.1*
b. Reinforcing steel:				
1) Verification of weldability of reinforcing steel other than ASTM A706.	*—*	*X*	*AWS D1.4, ACI 318: ~~Sections~~ 18.2.8, 25.5.7.4, 26.6.4.1*	*1705A.3.1, 1903A.8*
2) Reinforcing steel resisting flexural and axial forces in intermediate and special	*X*	*—*		

moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.				
3) Shear reinforcement.	*X*	*—*		
4) Other reinforcing steel.	*—*	*X*		
5) Tests of reinforcing bars.	*—*	*—*	*—*	*1910A.2,*
6. Inspection of steel frame joint details for compliance:				
a. Details such as bracing and stiffening.	*—*	*X*	*AISC 360: N5.8*	*1705A.2.1*
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.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 and testing shall also satisfy requirements in Table 1705A.2.1 and Section 1705A.2.5.

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1705A.2.3.1 Steel joist and joist girder inspection. *Special inspection is required during the manufacture and welding of steel joists or joist girders. The approved agency 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 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 Light-framed steel truss inspection and testing. *Regardless of truss span, ~~T~~the manufacture of cold-formed light framed steel trusses shall be continuously inspected by an approved agency. The approved agency shall verify conformance of materials and manufacture with approved plans and specifications. The approved agency 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. Refer to Section 2211A.1.3.3 for requirements applicable to manufactured trusses specified therein.*

1705A.2.5 Inspection and tests of structural welding. *Inspection and testing (including non-destructive testing) of all shop and field welding operations shall be in accordance with this section, Section 1705A.2.1, and Table 1705A.2.1. Inspections 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.*

~~***Exception: [OSHPD 1 & 4]*** *Inspection and nondestructive testing personnel meeting the requirements of AISC 341 Section J4 (in addition to AISC 360 Section N4) shall be permitted to perform quality control and quality assurance inspections at the premises of an approved fabricator's shop.*~~

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~~ Section 2213A.2 and the approved plans and specifications. The approved agency shall furnish the architect, structural engineer, and the enforcement agency with a verified report that the welding has been done in conformance with AWS D1.1, D1.3, D1.4, D1.8, and the approved construction documents.

1705A.2.6 Special inspection and tests of high-strength fastener assemblies. *Special inspections and tests for high-strength fasteners shall be in accordance with this section, Section 1705A.2.1, and Table 1705A.2.1. Tests of high-strength bolts, nuts, and washers shall be in accordance with Section 2213A.1.*

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.3.1 Welding of reinforcing bars. Special inspections of welding and qualifications of special inspectors for reinforcing bars shall be in accordance with *1705A.2.5,* the requirements of AWS D1.4 for special inspection and of AWS D1.4 for special inspector qualification.

1705A.3.2 Material tests. In the absence of sufficient data or documentation providing evidence of conformance to quality standards for materials in Chapters 19, ~~and~~ 20*, and 26* of ACI 318, *as modified by Chapter 19,* the building official shall require testing of materials in accordance with the appropriate standards and criteria for the material in Chapters 19, ~~and~~ 20*, and 26* of ACI 318 *as modified by*

Chapter 19A. *Test of reinforcing bars shall be in accordance with Section 1910A.2 .*

1705A.3.3 Batch plant inspection. *Except as provided under this section, the quality and quantity of materials used in transit-mixed concrete and in batched aggregates shall be continuously inspected by an approved agency at the location where materials are measured.*

1705A.3.3.1 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 and 10, 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) and isolated foundations supporting equipment only, where deep foundation elements are not used.*

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

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

2. *A licensed weighmaster shall positively identify quantity of materials and certify 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 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 keep a daily record of placements, identifying each truck, its load, and time of receipt at the job site, and approximate location of deposit in the structure and shall maintain a copy of the daily record as required by the enforcement agency.*

1705A.3.4 Inspection and testing of prestressed concrete. *Inspections and tests for prestressed concrete work shall be in accordance with this section. Tests for prestressing steel and anchorage shall be per Section 1910A.3. Inspection shall be in accordance with the following:*

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.*

   Exception: *The special inspector need not be continuously present for the placement of prestress or posttensioned cables or tendons.*

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 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 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.*

1705A.3.7 Composite construction cores*. Composite construction cores shall be taken and tested in accordance with Section 1910A.4 .*

1705A.3.8 Special Inspections and tests for post-installed anchors in concrete*. Special inspections and tests for post-installed anchors in concrete shall be in accordance with Table 1705A.3 and Section 1910A.5.*

...

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

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD[a]	~~IBC~~*CBC* REFERENCE
1. Inspect *and test* reinforcement, including prestressing tendons, and verify placement.	–	X	ACI 318: Ch. 20, 25.2, 25.3, 26.6.1- 26.6.3	*1908A.3,* 1908*A*.4, *1910A.2, 1910A.3;*
2. Reinforcing bar welding: a. Verify weldability of reinforcing bars other than ASTM A706. b. Inspect single pass fillet welds, maximum 5/16", and c. Inspect all other welds.	– X	X X	AWS D1.4 ACI 318: 26.6.4	*1705A.3.1, 1903A.8*
3. Inspect anchors cast in concrete.	–	X	ACI 318: 17.8.2, *26.7.2, 26.8.2*	–

4. Inspect *and test* anchors post-installed in hardened concrete members.[b, c] a. Adhesive anchors installed 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	*1705A.3.8, 1910A.5,* *1705A.3.8, 1910A.5,*
5. Verify use of required design mix.	—	X	ACI 318: Ch.19, *26.4*~~26.4.3, 26.4.4~~	*1903A.5,, 1903A.7,* 1904*A*.1, 1904*A*.2, 1908*A*.2, 1908*A*.3, *1910A.1, 1903A.6 [OSHPD 1 & 4]*
6. Prior to *and during* concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	—	ASTM C172 ASTM C31 ACI 318: 26.4, 26.12	*1705A.3.5, 1705A.3.6, 1905A.1.16, 1908A.5,* 1908*A*.10,
7. Inspect concrete and shotcrete for proper application techniques.	X	—	ACI 318: 26.5, *ACI 506: 3.4*	*1908A.5,*1908*A*.6, 1908*A*.7, 1908*A*.8, *1908A.10, 1908A.12,*
8. Verify maintenance of specific curing temperature and techniques.	—	X	ACI 318: 26.5.3–26.5.5	1908*A*.9
9. Inspect prestressed concrete for: a. Application of prestressing forces; and b. Grouting of bonded prestressing tendons.	X X	— —	ACI 318: 26.10.*2*	*1705A.3.4*
10. Inspect erection of precast concrete members.	—	X	ACI 318: ~~Ch.~~ 26.*9.2*~~8~~	—
11. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	—	X	ACI 318: *26.10.2,* 26.11.2	*1911A.1,*
12. Inspect formwork for shape, location and dimensions of the concrete member being formed	—	X	ACI 318: 26.11.1.2(b)	*1908A.11,*

...

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*~~, as set forth in Table 3.1.3 Level C requirements,~~* and TMS 602*, as set forth in Tables 3 and 4 Level 3 requirements and Chapter 21A. Testing shall be performed in accordance with Section 2105A. Special 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 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 *602*~~402~~, *Tables 3 and 4* Level ~~B~~*2* 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 approved construction documents, and applicable standards.*
The approved agency 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.*

The approved agency 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 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~~APA A190.1 Section ~~6.1.1~~13.1 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.*

The approved agency 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 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. The approved agency shall furnish the architect, structural engineer and the enforcement agency with a report verifying that the materials, timber connectors and workmanship conform to the approved 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.

...

1705A.6.2 Earth retaining shoring. *Special inspections and tests of earth retaining shoring shall be in accordance with applicable portions of Section 1812A*

1705A.6.3 Vibro stone columns. *Special inspections and tests of vibro stone columns for ground improvement shall be in accordance with applicable portions of Section 1813A.*

1705A.7 Driven deep foundations. Special inspections and tests shall be performed during installation of driven deep foundation elements as specified in *1810A.3.3.1.2 and* Table 1705A.7. The approved geotechnical report and the construction documents prepared by the registered design professionals shall be used to determine compliance.

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.

...

1705A.8 Cast-in-place deep foundations. Special inspections and tests shall be performed during installation of cast-in-place deep foundation elements as specified in *1810A.3.3.1.2 and* Table 1705A.8. The approved geotechnical report and the construction documents prepared by the registered design professionals shall be used to determine compliance.

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 specified fastener spacing at the panel edges 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 1613.2.4, 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 1613.2.4, 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 in 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*.

Exceptions:

~~1. In buildings and structures assigned to *Seismic Design Category* B or C, *special inspections* are not required for structural steel seismic force resisting systems where 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, has been used for design and detailing~~

~~2. In structures assigned to *Seismic Design Category* D, E, or F, *special inspections* are not required for structural steel seismic force-resisting systems where design and detailing in accordance with AISC 360 is permitted by ASCE 7, Table 15.4-1.~~

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*.

~~**Exceptions:**~~

~~1. In buildings and structures assigned to *Seismic Design Category* B or C, *special inspections* of *structural steel elements* are not required for seismic force-resisting systems with a response modification coefficient, *R*, of 3 or less.~~

~~2. In structures assigned to Seismic Design Cate-gory D, E, or F, special inspections of structural steel elements are not required for seismic force-resisting systems where design and detailing other than AISC 341 is permitted by ASCE 7, Table 15.4-1. Special inspection shall be in accordance with the applicable referenced standard listed in ASCE 7, Table 15.4-1~~

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 for both:

…

~~**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.
6. Installation of mechanical and electrical equipment, including duct work, piping systems and their structural supports, where automatic fire sprinkler systems are installed in structures assigned to Seismic Design Category C, D, E or F to verify one of the following:
   6.1. Minimum clearances have been provided as required by Section 13.2.3 ASCE/SEI 7.
   6.2. A nominal clearance of not less than 3 inches (76 mm) has been ~~be~~ provided between fire protection sprinkler system drops and sprigs and structural members not used collectively or independently to support the sprinklers; equipment attached to the building structure; and other systems' piping.

Where flexible sprinkler hose fittings are used, special inspection of minimum clearances is not required.

…

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.*

~~**1705A.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 exceptions 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 in 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.

~~**Exceptions:**~~
~~1. In buildings and structures assigned to Seismic Design Category B or C, nondestructive testing is not required for structural steel seismic force-resisting systems where 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, has been used for design and detailing.~~
~~2. In structures assigned to Seismic Design Cate-gory D, E, or F, nondestructive testing is not required for structural steel seismic force-resisting systems where design and detailing in accordance with AISC 360 is permitted by ASCE 7, Table 15.4-1.~~

1705*A*.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.

~~**Exceptions:**~~
~~1. In buildings and structures assigned to Seismic Design Category B or C, nondestructive testing of structural steel elements is not required or seismic force-resisting systems with a response modification coefficient, R, of 3 or less.~~
~~2. In structures assigned to Seismic Design Category D, E or F, nondestructive testing of structural steel elements is not required for seismic force-resisting systems where design and detailing other than AISC 341 is permitted by ASCE 7, Table 15.4-1. Nondestructive testing of structural steel elements shall be in accordance with the applicable referenced standard listed in ASCE 7, Table 15.4-1.~~

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 bracesing components satisfying requirements of FM 1950 or using an alternative testing protocol approved by the building official shall be deemed to satisfy the requirements of this Section. ~~*Component tests shall be supplemented by assembly tests, when required by the building official.*~~

1705*A*.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. *Certificates 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 or equivalent shake table testing criteria approved by the building official. 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 [OSHPD 1 & 4] *Special seismic certification shall be required for the following systems, equipment, and components:*

1. *Emergency and standby power systems.*
2. *Elevator equipment (excluding elevator cabs).*
3. *Components with hazardous contents.*
4. *Exhaust and Smoke control fans.*
5. *Switchgear and Switchboards.*
6. *Motor control centers.*
7. *Fluoroscopy and x-ray equipment required for radiological/diagnostic imaging service (for service requirements see CBC Section 1224.18.1), and any fluoroscopy and/or radiographic system provided in support of diagnostic assessment of trauma injuries.*

8. *CT (Computerized Tomography) systems used for diagnostic assessment of trauma injuries.*

   Exception: *CT equipment used for treatment or in hybrid operating rooms, including those used for interventional CT, unless used for diagnostic assessment of trauma injuries.*
9. *Air conditioning units excluding Variable/Constant Air Volume (VAV/CAV) boxes up to 75 lbs.*
10. *Air handling units.*
11. *Chillers, including associated evaporators, and condensers.*
12. *Cooling Towers.*
13. *Transformers.*
14. *Electrical substations.*
15. *UPS and batteries.*
16. *Panelboards as defined in the California Electrical Code (CEC) Article 100.*
17. *Industrial Control panels as defined in the California Electrical Code (CEC) Article 100.*
18. *Power isolation and correction systems.*
19. *Motorized surgical lighting systems.*
20. *Motorized operating table systems*
21. *Internal communication servers and routers.*
22. *Medical gas and vacuum systems.*
23. *Electrical busways as defined in UL 857.*
24. *Electrical control panels powered by the life safety branch in accordance with the California Electrical Code (CEC) Article 517.32 or the critical branch in accordance with the California Electrical Code (CEC) Article 517.33.*

Exceptions:

1. *Equipment and components weighing not more than 50 lbs. supported directly on structures or surface mounted on equipment or components~~)~~ that are not required to have special seismic certification by this section.*

2. ~~*Movable (m*~~ *Mobile* ~~*) and temporary*~~ *equipment/components*~~*, which are not anchored to structure or 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.*~~
3. *Pipes, ducts, conduits, and cable trays, excluding in-line equipment and components.*
4. *Underground tanks.*
5. *Electric motors, base-mounted horizontal pumps, and compressors* ~~*up to 20 hp.*~~
6. *Based-mounted vertical pumps up to 20 hp.*
~~6~~7. *Certified subcomponents* ~~*Electrical Controllers, Switches, Transformers, Circuit Breakers, and fuses*~~ *up to operating weight of 10 lbs.* ~~*or 10 amperes*~~
~~7~~8. *Components where importance factor, I_p, is permitted to be 1.0 by this code.*
~~8~~9. *Emergency generators up to 25 kilowatts.*
~~9~~10. *Equipment and Components used for clinical trials only.*
11. *Elevator machines and governors.*

For Exceptions 5, 6, and 7:
Exempt subcomponents, which are an integral part of equipment that require special seismic certification, shall be tested attached to the equipment. Exempt subcomponents shall be permitted to be substituted without testing, provided the substituted subcomponent relative to the certified subcomponent has:

1. *Similar configuration with equivalent function.*
2. *Supports and attachments of similar configuration with equivalent strength and stiffness.*
3. *Same attachment location.*
4. *Changes in dimensions, center of gravity, and mass, of not more than 10% of the certified subcomponent and still meets exception 5, 6, or 7.*
5. *Manufacturing process with ISO 9001 certification.*

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~~6 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 Shotcrete. *All shotcrete work shall be continuously inspected during placing by an approved agency. The special shotcrete inspector shall check the materials, placing equipment, details of construction and construction procedure. The 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 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:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275, 129850 and 129790

CHAPTER 18
SOILS AND FOUNDATIONS

SECTION 1801
GENERAL

1801.1 Scope. The provisions of this chapter shall apply to building and foundation systems.

1801.1.1 Application*. The scope of application of Chapter 18 is as follows:*
Structures regulated by the Office of Statewide Health Planning and Development (OSHPD), which include those applications listed in Sections 1.10.1, 1.10.2 and 1.10.5. These applications include: Hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings and acute psychiatric hospital buildings.

1801.1.2 Amendments in this chapter. *OSHPD adopts this chapter and all amendments.*

Exception: *Amendments not adopted or adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency.*

1801.1.3 Identification of amendments. [OSHPD 1R, 2 & 5] *Office of Statewide Health Planning and Development (OSHPD) amendments appear in this chapter preceded with the appropriate acronym, as follows:*

[OSHPD 1R*] - For applications listed in Section 1.10.1.*
[OSHPD 2] *- For applications listed in Section 1.10.2.*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

…

SECTION 1803
GEOTECHNICAL INVESTIGATIONS

1803.1 General. Geotechnical investigations shall be conducted in accordance with Section 1803.2 and reported in accordance with Section 1803.6. 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*. ***[OSHPD 1R, 2 & 5]*** *The classification, testing 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.*

1803.2 Investigations required. Geotechnical investigations shall be conducted in accordance with

Sections 1803.3 through 1803.5.

Exception: 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.

[OSHPD 2] *Geotechnical reports are not required for one-story, wood-frame and light-steel-frame buildings of 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). Allowable foundation and lateral soil pressure values may be determined from Table 1806.2.*

…

1803.3 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.

1803.3.1 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*.

*[**OSHPD 1R, 2 & 5**] 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.

***Exception:** Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel frame construction.*

…

1803.5.4 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: ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

…

1803.6 Reporting.

…

*11. [**OSHPD 1R, 2 & 5**] The report shall consider the effects of seismic hazard in accordance with Section 1803.7.*

...

1803.7 Geohazard reports. [OSHPD 1R, 2 & 5]

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 V skilled nursing or intermediate care facilities 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); 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 1803.5.11 and 1803.5.12, 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 Section 1613 and ASCE 7.

...

SECTION 1805
DAMPPROOFING AND WATERPROOFING

1805.1 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 1202.4.

...

1805.2 Dampproofing. Where hydrostatic pressure will not occur as determined by Section 1803.5.4, floors and walls for other than wood foundation systems shall be dampproofed in accordance with this section. ***[OSHPD 1R, 2 & 5]*** *Wood foundation systems are not permitted by OSHPD.* Wood foundation systems shall be constructed in accordance with AWC PWF.

…

SECTION 1807
FOUNDATION WALLS, RETAINING WALLS AND
EMBEDDED POSTS AND POLES

1807.1 Foundation walls. Foundation walls shall be designed and constructed in accordance with Sections 1807.1.1 through 1807.1.6. Foundation walls shall be supported by foundations designed in accordance with Section 1808.

1807.1.1 Design lateral soil loads. Foundation walls shall be designed for the lateral soil loads set forth in Section 1610.

1807.1.2 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.

1807.1.3 Rubble stone foundation walls. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

1807.1.4 Permanent wood foundation systems. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* Permanent wood foundation systems shall be designed and installed in accordance with AWC PWF. Lumber and plywood shall be preservative treated in accordance with AWPA U1 (Commodity Specification A, Special Requirement 4.2) and shall be identified in accordance with Section 2303*A*.1.9.1.

1807.1.5 Concrete and masonry foundation walls. Concrete and masonry foundation walls shall be designed in accordance with Chapter 19 or 21, as applicable.

Exception: ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

...

1807.2 Retaining walls. Retaining walls shall be designed in accordance with Sections 1807.2.1 through 1807.2.3. ***[OSHPD 1R, 2 & 5]*** *Freestanding cantilever walls shall be designed in accordance with Section 1807.2.4.*

1807.2.1 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.

1807.2.2 Design lateral soil loads. Retaining walls shall be designed for the lateral soil loads set forth in Section 1610. ***[OSHPD 1R, 2 & 5]*** *Retaining wall lateral soil loads determined by a geotechnical investigation report in accordance with Section 1803.5.12 and shall not be less than eighty percent of the lateral soil loads determined in accordance with Section 1610. 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*. For structures assigned to Seismic Design Category D, E, or F, the design of retaining walls supporting more than 6 feet (1829 mm) of backfill height shall incorporate the additional seismic lateral earth pressure in accordance with the geotechnical investigation where required in Section 1803.2.

…

1807.2.4 Freestanding Cantilever Walls. [OSHPD 1R, 2 & 5] *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
FOUNDATIONS

1808.1 General. Foundations shall be designed and constructed in accordance with Sections 1808.2 through 1808.9. Shallow foundations shall also satisfy the requirements of Section 1809. Deep foundations shall also satisfy the requirements of Section 1810.

1808.2 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 1808.6.

…

1808.8 Concrete foundations. The design, materials and construction of concrete foundations shall comply with Sections1808.8.1 through 1808.8.6 and the provisions of Chapter 19.

Exception**:** ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD*. 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 1808.8.1
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. *[**OSHPD 1R, 2 & 5**] Not permitted by OSHPD*	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. *[**OSHPD 1R, 2 & 5**] Not permitted by OSHPD*	2,500 psi
2b. Foundations for other structures assigned to Seismic Design Category D, E or F	3,000 psi
3. Precast nonprestressed driven piles	4,000 psi
~~4~~. Socketed drilled shafts	4,000 psi
5. Micropiles	4,000 psi
6. Precast prestressed driven piles	5,000 psi

For SI: 1 pound per square inch = 0.00689MPa.

…

1808.8.6 Seismic requirements. ***[OSHPD 1R, 2 & 5]*** See Section 1905 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 through 1810.

Exceptions: *[**OSHPD 1R, 2 & 5**] Not permitted by OSHPD*

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 of ACI 318.

2. Section 18.13.4.3(a) of ACI 318 shall not apply.

…

SECTION 1809
SHALLOW FOUNDATIONS

1809.1 General. Shallow foundations shall be designed and constructed in accordance with Sections 1809.2 through 1809.13.

1809.2 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 1804.5. CLSM shall be placed in accordance with Section 1804.6.

1809.3 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).

[OSHPD 1R, 2 & 5] *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.

…

1809.7 Prescriptive footings for light-frame construction. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

…

1809.8 Plain concrete footings. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

…

1809.9 Masonry-unit footings. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

…

1809.12 Timber footings. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

…

1809.14 Pipes and Trenches. [OSHPD 1R, 2 & 5] *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.*

…

1810.3.1.5 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.

1810.3.1.5.1 Helical piles seismic requirements. [OSHPD 1R, 2 & 5] *For structures assigned to Seismic Design Category D, E or F, capacities of helical piles shall be determined in accordance with Section 1810.3.3 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 design ultimate strength determined by using load combinations in Section 1605.2.1.*

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.

...

1810.3.2.4 Timber. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* 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.

...

1810.3.5.3.3 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.

[OSHPD 1R, 2 & 5] *Installation of sheet piling shall satisfy inspection, monitoring, and observation requirements in Sections 1812.6 and 1812.7.*

...

1810.3.8.3 Precast prestressed piles. Precast prestressed concrete piles shall comply with the requirements of Sections 1810.3.8.3.1 through 1810.3.8.3.3.

...

...

1810.3.8.3.3 Seismic reinforcement in Seismic Design Categories D through F. For structures assigned to *Seismic Design Category* D, E or F, 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:

$$\rho_s = 0.06(f'_c / f_{yh})[2.8 + 2.34\ P/ f'_c\ A_g)] \qquad \text{(Equation 18-6)}$$

but not exceed:

$$\rho_s = 0.021 \qquad \text{(Equation 18-7)}$$

where:

A_g = Pile cross-sectional area square inches (mm^2).

f'_c = Specified compressive strength of concrete, psi (MPa).

P = Axial load on pile, pounds (kN), as determined from Equations 16-5 and 16-7.

f_{yh} = Yield strength of spiral reinforcement ≤ 85,000 psi (586 MPa).

ρ_s = Spiral reinforcement index (vol. spiral/vol. core).

This required amount of spiral reinforcement is permitted to be obtained by providing an inner and outer spiral.

Exception: ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* The minimum spiral reinforcement required by Equation 18-6 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 and the applicable overstrength factor, Ω_o. In such cases, minimum spiral reinforcement shall be as specified in Section 1810.3.8.1.

...

1810.3.8.3.4 Axial load limit in Seismic Design Categories C through F. For structures assigned to Seismic Design Category C, D, E, or F, the maximum factored axial load on precast prestressed piles subjected to a combination of seismic lateral force and axial load shall not exceed the following values:

1. $0.2\ f'_c\ A_g$ for square piles
2. $0.4\ f'_c\ A_g$ for circular or octagonal piles

[OSHPD 1R, 2 & 5] ***Exception****: Where the axial load from seismic forces is amplified by the applicable overstrength factor,Ω_o, the axial load limits may be increased by 2 times,*

...

1810.3.9.4.2.1 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. ***[OSHPD 1R, 2 & 5]*** *A transverse spiral reinforcement ratio of not less than one-half of that required in Section 18.7.5.4 of ACI 318 shall be permitted for concrete deep foundation elements.*

...

1810.3.10.4 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.

1810.3.10.4.1 ***Seismic requirements****.* ***[OSHPD 1R, 2 & 5]*** *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 1810.3.3 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 design ultimate strength determined by using load combinations in Section 1605.2.1.*

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.

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.

1810.3.11 Pile caps. Pile caps shall be of reinforced concrete, and shall include all elements to which vertical deep foundation elements are connected, including grade beams and mats. The soil immediately below the pile cap shall not be considered as carrying any vertical load, with the exception of a combined pile raft. ***[OSHPD 1R, 2 & 5]*** *A combined pile raft foundation shall be an alternative system.* The tops of vertical deep foundation elements shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend not less than 4 inches (102 mm) beyond the edges of the elements. The tops of elements shall be cut or chipped back to sound material before capping.

…

1810.4 Installation. Deep foundations shall be installed in accordance with Section 1810.4. 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.

1810.4.1 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.

…

1810.4.1.5 Defective timber piles. ***[OSHPD 1R, 2 & 5]*** *Not permitted by OSHPD.* Any substantial sudden change in rate of penetration of a timber pile shall be investigated for possible damage. If the sudden change in rate of penetration cannot be correlated to soil strata, the pile shall be removed for inspection or rejected.

…

SECTION 1811
PRESTRESSED ROCK AND SOIL FOUNDATION ANCHORS [OSHPD 1R, 2, 5]

1811.1 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.*

1811.2 Adoption. *Except for the modifications as set forth in Sections 1811.3 and 1811.4, all prestressed rock and soil foundation anchors shall comply with PTI Recommendations for Prestressed Rock and Soil Anchors.*

1811.3 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. A minimum of Class II Corrosion Protection is required for temporary anchors in service less than or equal to two (2) years.*
8. *Performance test shall be at a minimum of 1.6 times the design loads, but shall not exceed 80 percent of the specified minimum tensile strength of the tendons. There shall be a minimum of two preproduction test anchors. Preproduction test anchors shall be tested to ultimate load or maximum of 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.*

1811.4 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 1605.3.1 and shall not exceed 60 percent of the specified minimum tensile strength of the tendons.*
4. *Ultimate Load shall be based upon the lesser of the strength of the superstructure elements, the maximum forces from a fully yielded structural system and forces from the load combinations with overstrength factor in accordance with ASCE 7 Section 12.4.3 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 1812
EARTH RETAINING SHORING [OSHPD 1R, 2, 5]

1812.1 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 facilities are affected. Shoring used as construction means and methods only, which does not affect existing or new facilities, are not regulated by this section 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 1812.2 through 1812.8.

1812.2 Duration. *Shoring shall be considered temporary when elements of the shoring will be*

exposed to site conditions for a period of less than or equal to two (2) years, 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.

1812.3 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.*

1812.4 Design and testing. *Except for the modifications as set forth in Sections 1812.4.1 through 1812.4.3 below, all Prestressed Rock and Soil Tie-back Anchors shall comply with PTI Recommendations for Prestressed Rock and Soil Anchors.*

1812.4.1 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 Recommendations for Prestressed Rock and Soil Anchors 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. A minimum of Class II Corrosion Protection is required for temporary anchors in service less than or equal to two (2) years.*
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.*

***1812.4.2 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 1605.3.1 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 1812.8*
5. *Design of shoring system shall account for both short and long term deformation.*

***1812.4.3 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 Recommendations for Prestressed Rock and Soil Anchors.*
4. *The shoring design engineer shall specify design loads for each anchor.*

***1812.5 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 Recommendations for Prestressed Rock and Soil Anchors 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.*

1812.6 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.*

1812.7 Monitoring of existing OSHPD 1, 1R, 2, 4 and 5 structures

1. *The contractor shall complete a written and photographic log of all existing OSHPD 1, 1R, 2, 4 & 5 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.*

1812.8 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.*

Section 1813
Vibro Stone Columns for Ground Improvement [OSHPD 1R, 2, 5]

1813.1 General. *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 1813.2 through 1813.5.

1813.2 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 in accordance with ASTM D 5778 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.*

1813.3 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.*

1813.4 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.

1813.5 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:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

CHAPTER 18*A*
SOILS AND FOUNDATIONS

SECTION 1801*A*
GENERAL

1801*A*.1 Scope. The provisions of this chapter shall apply to building and foundation systems.

1801A.1.1 Application. *The scope of application of Chapter 18A is as follows:*

1. *(Reserved for DSA).*
2. *Applications listed in Section 1.10.1, and 1.10.4 regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals~~, skilled nursing facilities, intermediate care facilities,~~ and correctional treatment centers.*

   ***~~Exception: [OSHPD 2]~~** ~~Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 18 and any applicable amendments therein.~~*

1801A.1.2 Amendments in this chapter. *OSHPD 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. *(Reserved for DSA).*

2. *Office of Statewide Health Planning and Development:*

[OSHPD 1] *- For applications listed in Section 1.10.1.*
[OSHPD 4] *- For applications listed in Section 1.10.4.*

…

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 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, 1616~~7~~A & ASCE*

The ~~three~~ Next Generation Attenuation West 2 (NGA-West 2) relations used for the ~~2008~~ 2014 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, and approved by the enforcement agency, other attenuation relations ~~NGA (NGA West 1)~~ relations, that were not used for the ~~2008~~ 2014 USGS maps, shall be permitted as additions or substitutions. No fewer than three ~~NGA~~ attenuation relations shall be utilized.

1803A.7 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.*

...

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 1202.4.

…

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 AWC 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 1808*A*.

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 OSHPD.* ~~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 OSHPD.* ~~Permanent wood foundation systems shall be designed and installed in accordance with AWC PWF. Lumber and plywood shall be preservative treated in accordance with AWPA U1 (Commodity Specification A, Special Requirement 4.2) and shall be identified in accordance with Section 2303*A*.1.9.1.~~

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 be not less than the thickness of the wall supported, except that foundation walls not less than 8-inch (203 mm) nominal width shall be permitted to support brick veneered frame walls and 10-inch-wide (254 mm) cavity walls provided that 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 that 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, where 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. Not less than 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 not less than 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 that 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 designed 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.* For structures assigned to Seismic Design Category D, E, or F, the design of retaining walls supporting more than 6 feet (1829 mm) of backfill height shall incorporate the additional seismic lateral earth pressure in accordance with the geotechnical investigation where required in Section 1803*A*.2.

…

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 1808*A*.9. Shallow foundations shall also satisfy the requirements of Section 1809*A*. 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 of 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 OSHPD .* ~~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 OSHPD.* ~~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 OSHPD.* ~~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.** Masonry-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 that 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 OSHPD.* 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.*

...

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 1616~~7~~A.1.16.

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 (25.7.3.3).** Where this chapter requires detailing of concrete deep foundation elements in accordance with Section 18.7.5.4 of ACI 318, compliance with Equation (25.7.3.3) of ACI 318 shall not be required.~~

...

1810*A*.3.2.4 Timber. *Not permitted by OSHPD.* ~~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. One element or more 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

(for example, 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 not less than 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 OSHPD.* ~~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.~~

~~$\rho_s = 0.04(f'_c / f_{yh})[2.8 + 2.34P/ f'_c A_g)]$ **(Equation 18-5)**~~

~~where:~~

~~A_g = Pile cross-sectional area square inches (mm^2).~~

~~f'_c = Specified compressive strength of concrete, psi (MPa).~~

~~P = Axial load on pile, pounds (kN), as determined from Equations 16-5 and 16-7.~~

~~f_{yh} = Yield strength of spiral reinforcement ≤ 85,000 psi (586 MPa).~~

~~ρ_s = Spiral reinforcement index (vol. spiral/vol. core).~~

~~Not less than one-half the volumetric ratio required by Equation 18-5 shall be provided below the upper 20 feet (6096 mm) of the pile.~~

~~**Exception:** The minimum spiral reinforcement index required by Equation 18-5 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 and the applicable overstrength factor, Ω_o. In such cases, minimum spiral reinforcement index shall be as specified in Section 1810.3.8.1.~~

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:

$$\rho_s = 0.06(f'_c / f_{yh})[2.8 + 2.34\ P/ f'_c\ A_g)] \quad \text{(Equation 18-6)}$$

but not exceed:

$$\rho_s = 0.021 \quad \text{(Equation 18-7)}$$

where:

A_g = Pile cross-sectional area square inches (mm^2).

f'_c = Specified compressive strength of concrete, psi (MPa).

P = Axial load on pile, pounds (kN), as determined from Equations 16-5 and 16-7.

f_{yh} = Yield strength of spiral reinforcement ≤ 85,000 psi (586 MPa).

ρ_s = Spiral reinforcement index (vol. spiral/vol. core).

~~This required amount of spiral reinforcement is permitted to be obtained by providing an inner and outer spiral.~~

~~Exception: The minimum spiral reinforcement required by Equation 18-6 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 and the applicable overstrength factor, Ω_o. In such cases, minimum spiral reinforcement shall be as specified in Section 1810.3.8.1.~~

...

1810A.3.8.3.4 Axial load limit in Seismic Design Categories C through F. For structures assigned to Seismic Design Category C, D, E, or F, the maximum factored axial load on precast prestressed piles subjected to a combination of seismic lateral force and axial load shall not exceed the following values:

1. $0.2\ f'_c\ A_g$ for square piles
2. $0.4\ f'_c\ A_g$ for circular or octagonal piles

***Exception**: Where the axial load from seismic forces is amplified by the applicable overstrength factor, Ω_o, the axial load limits may be increased by 2 times.*

...

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 1616~~.~~7A.1.16.~~.~~*

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.

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.

1810A.3.11 Pile caps. Pile caps shall be of reinforced concrete, and shall include all elements to which vertical deep foundation elements are connected, including grade beams and mats. The soil immediately below the pile cap shall not be considered as carrying any vertical load, with the exception of a combined pile raft. *A combined pile raft foundation shall be an alternative system.* The tops of vertical deep foundation elements shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend not less than 4 inches (102 mm) beyond the edges of the elements. The tops of elements shall be cut or chipped back to sound material before capping.

…

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 OSHPD.* ~~Any substantial sudden change in rate of penetration of a timber pile shall be investigated for possible damage. If the sudden change 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 comply 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. ~~The Geotechnical Report shall specify the corrosion protection recommendations.~~ A minimum of Class II Corrosion Protection is required for temporary anchors in service less than or equal to two (2) years.*
8. *Performance test shall be at a minimum of 1.6 times the design loads, but shall not exceed 80 percent of the specified minimum tensile strength of the tendons. There shall be a minimum of two preproduction test anchors. Preproduction test anchors shall be tested to ultimate load or maximum of 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.*

…

SECTION 1812A
EARTH RETAINING SHORING

1812A.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 facilities are affected. Shoring used as construction means and methods only, which does not affect existing or new facilities, are not regulated by this section 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 through 1812A.8.

1812A.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~~ or equal to two (~~1~~2) years, 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.

1812A.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 Design and testing. *Except for the modifications as set forth in Sections 1812A.4.1 through 1812A.4.3 below, all Prestressed Rock and Soil Tie-back Anchors shall comply with PTI Recommendations for Prestressed Rock and Soil Anchors ~~(PTI-2004)~~.*

1812A.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~~ Recommendations for Prestressed Rock and Soil Anchors 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~~ A minimum of Class II Corrosion Protection is required for temporary anchors in service less than or equal to two (2) years.*
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.*

…

1812A.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~~ Recommendations for Prestressed Rock and Soil Anchors.*

4. *The shoring design engineer shall specify design loads for each anchor.*

1812A.5 Construction: *The construction procedure shall address the following:*

…

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~~ Recommendations for Prestressed Rock and Soil Anchors Section 6.11.

…

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

NOTATION:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275, 129850 and 129790

CHAPTER 19
CONCRETE

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. [OSHPD] *The scope of application of Chapter 19 is as follows:*

1. (Reserved for DSA)

2. Office of Statewide Health Planning and Development
Applications listed in Sections 1.10.1, 1.10.2 and 1.10.5, regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings and acute psychiatric hospital buildings.

1901.1.2 Amendments in this chapter. *[OSHPD] OSHPD 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:*

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

2. Office of Statewide Health Planning and Development:
[OSHPD 1R] *- For applications listed in Section 1.10.1.*
[OSHPD 2] *- For applications listed in Section 1.10.2.*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

1901.1.3 Reference to other chapters. *(Reserved for DSA)*

1901.1.4 Amendments. [OSHPD]

1. ***[OSHPD 1R, 2 & 5]*** *See Section 1910 for additional requirements applicable to hospital buildings that have been removed from acute care service, Skilled nursing and intermediate care facility buildings, and Acute psychiatric hospital buildings.*

2. (Reserved for DSA)

…

1901.3 Anchorage to concrete. Anchorage to concrete shall be in accordance with ACI 318 as amended in Section 1905, and applies to cast-in (headed bolts, headed studs and hooked J- or L-bolts, post installed expansion (torque controlled and displacement-controlled), undercut and adhesive anchors.

1901.3.1 Power Actuated Fasteners. [OSHPD 1R, 2 & 5] *Power actuated fasteners qualified in accordance with ICC-ES AC 70 shall be deemed to satisfy the requirements of ASCE 7 Section 13.4.5.*

Power actuated fasteners shall be permitted in seismic shear for components exempt from construction documents review by ASCE 7 Section 13.1.4 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.*

1901.3.2 Mechanical Anchors and Specialty Inserts. [OSHPD 1R, 2 & 5] *Mechanical anchors qualified in accordance with ICC-ES AC 193 shall be deemed to satisfy the requirements of this section.*

Specialty inserts, including cast-in-place specialty inserts, tested in accordance with ICC-ES AC 232 or AC 446 shall be deemed to satisfy the requirements of this section.

1901.3.3 Post-Installed Adhesive Anchors. [OSHPD 1R, 2 & 5] *Adhesive anchors qualified in accordance with ICC-ES AC 308 shall be deemed to satisfy the requirements of this section.*

1901.3.4 Tests for Post-Installed Anchors in Concrete. [OSHPD 1R, 2 & 5] *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.*

1901.3.4.1 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.

1901.3.4.2 Testing Procedure. *The test procedure shall be as permitted by an approved evaluation report using criteria adopted in this code. All post-installed anchors shall be tension tested. [OSHPD 1R, 2 & 5] Tension testing to verify proper installation shall be performed in accordance with ASTM E3121.*

Exception: *Torque controlled post installed anchors shall be permitted to be tested using torque based on an approved ~~test~~ evaluation report using criteria adopted in this code.*

Alternatively, manufacturer's recommendation for testing may be approved by the enforcement agency based on an approved evaluation report using criteria adopted in this code.

1901.3.4.3 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 components, 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 rest 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 twelve (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.*

…

1903.2 Special Inspections. Where required, special inspections and tests shall be in accordance with Chapter 17 ***[OSHPD 1R, 2 & 5]*** *and Section 1901.*

…

1903.4 Flat wall insulating concrete form (ICF) systems. ***[OSHPD 1R, 2 & 5]*** *Not Permitted by OSHPD.* Insulating concrete form material used for forming flat concrete walls shall conform to ASTM E 2634.

1903.5 Aggregates *-* ***[OSHPD 1R, 2 & 5]*** *Modify ACI 318 Section 26.4.1.2.1(a).(1) as follows:*

(1) ***Normal weight aggregate:*** *Aggregate shall be non-reactive as determined by one of the methods in ASTM C33 Appendix X1: 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 X1 of ASTM C 33, when approved by the building official.*

1903.6 Limits on Cementitious Materials. [OSHPD 1R, 2 & 5] *Modify ACI 318 Section 26.4.2.2(b) and Table 26.4.2.2(b) as follows:*

The maximum percentage of pozzolans, including fly ash and silica fume, and slag cement in concrete assigned to all exposure categories shall be in accordance with Table 26.4.2.2(b) and Section 26.4.2.2(b) Items (1) and (2).

Where pozzolans are used as cementitous materials, duration for minimum specified compressive strength of concrete (f'_c) that exceeds 28-days shall be considered an alternative system.

1903.7 Steel fiber reinforcement - [OSHPD 1R, 2 & 5] *Not permitted.*

1903.8 Welding of reinforcing bars - [OSHPD 1R, 2 & 5] *Modify ACI 318 Section 26.6.4.1(b) by adding the following:*

Subject to prior approval of the enforcing agency, longitudinal holding wires conforming to ASTM A1064, of maximum wire size W5, that are machine resistance welded to stirrup/tie cage (or spiral assemblies) consisting of low alloy steel reinforcing conforming to ASTM A706 are permitted when performed under continuous competent control in a fabrication shop. Tack welding of primary reinforcing bars together or to stirrups/ties is not permitted. Holding wire weld locations shall not occur on any longitudinal or primary reinforcing nor on any portion of a reinforcing bar that is or will be bent in accordance with ACI 318 Section 25.3 for the extents specified in AWS D1.4 Section 4.2.6.

Quality control tests shall be performed on shop welded specimens by the fabricator. Reinforcing steel specimens containing the holding wire shall be tested for yield and tensile strength at the frequency required by 1910.2. Test reports shall be available on request to the approved agency, design professional and enforcement agency.

…

SECTION 1906
STRUCTURAL PLAIN CONCRETE

[OSHPD 1R, 2 & 5] *Not permitted by OSHPD.*

…

SECTION 1908
SHOTCRETE

1908.1 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 *[OSHPD 1R, 2 & 5] and the provisions of ACI 506R. The specified compressive strength of shotcrete shall not be less than 3,000 psi (20.69 MPa).*

[OSHPD 1R, 2 & 5] Concrete or masonry to receive shotcrete shall have the entire surface thoroughly

cleaned and roughened by a method acceptable to the enforcement agency, 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.

…

1908.3 Aggregate. Coarse aggregate, if used, shall not exceed $^3/_4$ inch (19.1 mm).

[OSHPD 1R, 2 & 5] *For structural 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 coarse aggregate grading No. 2 in accordance with Table 1.1.1 of ACI 506R.*

…

1908.5 Preconstruction tests. Where preconstruction test are required by Section 1908.4, a test panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. ***[OSHPD 1R, 2 & 5]*** *a preconstruction test panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project for all shotcrete work.* 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 1704.5.

…

1908.7 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.

[OSHPD 1R, 2 & 5] *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.*

…

1908.9 Curing. During the curing periods specified herein, shotcrete shall be maintained above ***[OSHPD 1R, 2 & 5]*** *50*~~40~~°F (*10*~~4~~°C) and in moist condition.

…

1908.10 Strength tests. Strength tests for shotcrete shall be made *in accordance with ASTM C1604* 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.

1908.10.1 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.

1908.10.2 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. ***[OSHPD 1R, 2 & 5]*** *Approval from the enforcement agency shall be obtained prior to performing the test panel method.*

...

1908.11 Forms and Ground Wires for Shotcrete. [OSHPD 1R, 2 & 5] *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.

1908.12 Placing. [OSHPD 1R, 2 & 5] *Shotcrete shall be placed in accordance with ACI 506R.*

SECTION 1909

(Reserved for DSA)

SECTION 1910
ADDITIONAL REQUIREMENTS FOR SKILLED NURSING FACILITIES, INTERMEDIATE CARE FACILITIES, ACUTE PSYCHIATIC AND NON-GAC BUILDINGS [OSHPD 1R, 2 & 5]

1910.1 General.

1910.1.1 Construction documents. *Openings larger than 12 inches (305 mm) in any dimension shall be detailed on the structural drawings.*

1910.2 Tests and materials. *Where required, special inspections and tests shall be in accordance with Chapter 17 and this section.*

1910.2.1 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.*

1910.2.2 Tests of reinforcing bars. *Samples shall be taken from bundles as delivered from the mill, with the bundles identified as to heat number and the accompanying mill certificate. One tensile test and one bend test shall be made from a sample 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.

***1910.2.3 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 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.

***1910.2.4 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 (465 m^2) 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.

1910.3 Modifications to ACI 318

1910.3.1 ACI 318, Section 12.7.3. *Add Section 12.7.3.4 to ACI 318 as follows:*

> ***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.*

1910.3.2 ACI 318, Section 18.12.6. *Add Section 18.12.6.2 to ACI 318 as follows:*

> *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.*

1910.3.3 ACI 318, Table 19.2.1.1. *Modify ACI 318 Table 19.2.1.1 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.*

1910.3.4 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]*	$0.75 + 0.15\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^* - \varepsilon_{ty}}$	*(c)*	$0.65 + 0.25\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^* - \varepsilon_{ty}}$	*(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.

SECTION 1911
EXISTING CONCRETE STRUCTURES [OSHPD 1R, 2 & 5]

1911.1 Concrete Core Sampling. *Where concrete cores are required to be taken for material property determination, 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).

1911.2 Crack Repair by Epoxy Injection. *Crack Repair of concrete and masonry member by epoxy injection shall conform to all requirements of ACI 503.7.*

1911.3 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.

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:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

CHAPTER 19*A*
CONCRETE

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 1901*A*
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. *(Reserved for DSA).*
2. *Applications listed in Sections 1.10.1, and 1.10.4, regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals~~, skilled nursing facilities, intermediate care facilities,~~ and correctional treatment centers.*

~~Exception: [OSHPD 2]~~ *~~Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 19 and any applicable amendments therein.~~*

1901A.1.2 Amendments in this chapter. *OSHPD 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. *(Reserved for DSA).*

2. *Office of Statewide Health Planning and Development.*
   ***[OSHPD 1]** - For applications listed in Section 1.10.1.*
   ***[OSHPD 4]** - For applications listed in Section 1.10.4.*

…

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.*

…

1901.6 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.*

…

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.* ***[OSHPD 1 & 4]** Not Permitted by OSHPD.*

***1903A.5 Aggregates** - Modify ACI 318 Section 26.4.1.2.1(a).(1) as follows:*

(2) ***Normal weight aggregate:** Aggregate shall be non-reactive as determined by one of the methods in ASTM C33 Appendix X1: 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 X1 of ASTM C 33, when approved by the building official.

1903A.6 [OSHPD 1 & 4] Limits on Cementitious Materials. *Modify ACI 318 Section 26.4.2.2(b) and Table 26.4.2.2(b) as follows:*

The maximum percentage of pozzolans, including fly ash and silica fume, and slag cement in concrete assigned to all exposure categories shall be in accordance with Table 26.4.2.2(b) and Section 26.4.2.2(b) Items (1) and (2).

Where pozzolans are used as cementitous materials, duration for minimum specified compressive strength of concrete (f'_c) that exceeds 28-days shall be considered an alternative system.

1903A.7 Steel fiber reinforcement *- Not permitted.*

1903A.8 Welding of reinforcing bars *- Modify ACI 318 Section 26.6.4.1(b) by adding the following:*

~~Shop fusion welded stirrup/tie cage (or spiral assemblies) consisting of low-alloy steel reinforcing stirrups/ties conforming to ASTM A706 and~~ Subject to prior approval of the enforcing agency, longitudinal holding wires~~,~~ conforming to ASTM A1064, of maximum wire size W5, that are machine resistance welded to stirrup/tie cage (or spiral assemblies) consisting of low alloy steel reinforcing conforming to ASTM A706 ~~shall be~~ are permitted when performed under continuous competent control in a fabrication shop. ~~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 h~~Holding wire~~s~~ weld locations shall not occur ~~is not permitted~~ on any longitudinal or primary reinforcing nor on any portion of a reinforcing bar that is or will be bent in accordance with ACI 318 Section 25.3 for the extents specified in AWS D1.4 Section 4.2.6.

Quality control tests shall be performed on shop welded specimens by the fabricator. Reinforcing steel specimens containing the holding wire shall be tested for yield and tensile strength at the frequency required by 1910A.2. Test reports shall be available on request to the approved agency, design professional and enforcement agency.

…

SECTION 1904*A*
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 1905*A*
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 ~~1905.1.8~~ *1905A.1.~~16~~15*.

~~1905.1.1 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 ACI 318 Section 4.12.2.2. *Modify ACI 318 Section 4.12.2.2 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.

1905A.1.2 ACI 318, Section 4.12.2.3. *Modify ACI 318 Section 4.12.2.3 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.

1905A.1.3 ACI 318, Section 9.6.1.3. *Modify ACI 318 Section 9.6.1.3 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 ACI 318, Section 11.2.4.1. *Replace ACI 318 Section 11.2.4.1 as follows:*

> ***11.2.4.1*** *- 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 ACI 318 Section 11.7. *Add Section 11.7.6 to ACI 318 as follows:*

> ***11.7.6 - 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. Where wall panels do not connect to 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.*
>
> *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 half of this continuous horizontal reinforcing shall 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 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.

***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 ACI 318, Section 11.9.** Modify ACI 318 by adding Section 11.9 as follows:*

***11.9 - 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.

***1905A.1.7 ACI 318, Section 12.7.3.** Add Section 12.7.3.4 to ACI 318 as follows:*

***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 **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 11~~2~~E 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 ~~E~~J3.3.1.

3. In light-frame construction, bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 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 ACI 318, Table 19.2.1.1. *Modify ACI 318 Table 19.2.1.1 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.

~~**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.~~

~~Special moment frames and special structural walls shall also satisfy 18.2.4 through 18.2.8.~~

1905A.1.10 (*Chapter 19, Section 1905.1.3)* ***(Reserved for DSA)*** ~~**1905.1.3 ACI 318, Section 18.5.**~~
~~Modify ACI 318, Section 18.5, by 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:~~

~~*18.5.2.2 – 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 ACI 318, Section 18.10.6.5. *Modify ACI 318, Section18.10.6.5 by adding the following:*

(c) Where boundary members are not required by ACI 318 Section18.10.6.2 or 18.10.6.3, 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 in accordance with ACI 318 Section 18.10.6.4 (a),

(b) and (c).

1905.1.4 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 ACI 318, Section 18.12.6*. Add Section 18.12.6.2 to ACI 318 as follows:*

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 **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~~13 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]	$0.75 + 0.15\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^* - \varepsilon_{ty}}$	(c)	$0.65 + 0.25\frac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^* - \varepsilon_{ty}}$	(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~~14 ACI 318, Section 24.2.1. *Add Section 24.2.1.1 to ACI 318 as follows:*

***24.2.1.1** - 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 Section 24.2.2.

1905A.1.~~16~~15 ACI 318, Section 26.12.2.1(a). *Replace ACI 318 Section 26.12.2.1(a) by the following.*

26.12.2.1(a) 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 1906*A*
STRUCTURAL PLAIN CONCRETE

Not permitted by OSHPD.

~~**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 1908*A*
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 506R. The specified compressive strength of shotcrete shall not be less than 4,000 ~~3,000~~ psi (~~20.69~~27.6 MPa).*

Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by ~~sand blasting,~~ a method acceptable to the enforcement agency, 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~~ structural 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~~ in accordance with Table 1.1.1 of ACI 506R.

…

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*.9 Curing. During the curing periods specified herein, shotcrete shall be maintained above *50*~~40~~°F (*10*~~4~~°C) and in moist condition.

…

1908A.12 Placing. *Shotcrete shall be placed in accordance with ACI 506R.*

SECTION 1909A
RESERVED

SECTION 1910A
CONCRETE, REINFORCEMENT AND ANCHOR TESTING

…

1910A.5 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 General. *Test loads or torques and acceptance criteria shall be shown on the approved 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 Testing Procedure. *The test procedure shall be as permitted by an approved evaluation report using criteria adopted in this code. All post-installed anchors shall be tension tested. [OSHPD 1 & 4] Tension testing to verify proper installation shall be performed in accordance with ASTM E3121.*

Exception: [OSHPD 1 & 4] *Torque controlled post installed anchors shall be permitted to be tested using torque based on an approved ~~test~~ evaluation report using criteria adopted in this code.*

Alternatively, manufacturer's recommendation for testing may be approved by the enforcement agency based on an approved evaluation report using criteria adopted in this code.

1910A.5.3 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 components, 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.*

...

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

NOTATION:
Authority: Health and Safety Code Section 130005(g) & 130021
Reference: Health and Safety Code Section 1275, 129790, 129850 & 130005(g)

CHAPTER 20
ALUMINUM

SECTION 2001
GENERAL

2001.1 Scope. This chapter shall govern the quality, design, fabrication and erection of aluminum. ***[OSHPD]***

2001.1.1 Application*. The scope of application of Chapter 20 is as follows:*
1. Applications listed in Sections 1.10.1, 1.10.2, 1.10.4 and 1.10.5 regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals, hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings, correctional treatment centers and acute psychiatric hospital buildings.

2.(Reserved for DSA)

2001.1.2 Amendments in this chapter. [OSHPD] *OSHPD adopts this chapter and all amendments.*

Exception: *Amendments not adopted or adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency.*

1. ***[OSHPD 1, 1R, 2, 4 & 5]*** *Office of Statewide Health Planning and Development (OSHPD) amendments appear in this chapter preceded with the appropriate acronym, as follows:*

[OSHPD 1] *- For applications listed in Section 1.10.1*
[OSHPD 1R] *- For applications listed in Section 1.10.1.*
[OSHPD 2] *- For applications listed in Section 1.10.2.*
[OSHPD 4] *- For applications listed in Section 1.10.4*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

2. (Reserved for DSA)

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 – TESTING AND INSPECTION

2003.1 Testing and Inspection. [OSHPD 1 & 4] *Testing and ~~I~~inspection of ~~A~~aluminum shall be required in accordance with the requirements for steel in Chapter 17A, except references to AWS D1.1 shall be to AWS D1.2.*

[OSHPD 1R, 2 & 5] Testing and inspection of aluminum shall be required in accordance with the requirements for steel in Chapter 17, except references to AWS D1.1 shall be to AWS D1.2.

(All existing amendments are continued without any change)

NOTATION:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275,129850 and 129790

CHAPTER 21

MASONRY

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)~~Application. [OSHPD] *The scope of application of Chapter 20 is as follows:*

1. (Reserved for DSA)

2. Office of Statewide health planning and development (OSHPD). Buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings and acute psychiatric hospital buildings regulated by OSHPD. Applications listed in Sections 1.10.1, 1.10.2 and 1.10.5.

2101.1.2 Amendments in this chapter. [OSHPD] *OSHPD, adopts this chapter and all amendments.*

> ***Exception:*** *~~OSHPD, Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC) a~~Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym, as follows:*
>
> *1. (Reserved for DSA)*
>
> *2. Office of Statewide Health Planning and Development:*
> ***[OSHPD 1R]*** *- For applications listed in Section 1.10.1.*
> ***[OSHPD 2]*** *- For applications listed in Section 1.10.2.*
> ***[OSHPD 5]*** *- For applications listed in Section 1.10.5*
>
> .

…

2101.2 Design methods. Masonry shall comply with the provisions of TMS402,TMS 403 or TMS 404 as well as applicable requirements of this chapter. ***[OSHPD 1R, 2 & 5]*** *TMS 403 Not permitted by OSHPD*

…

2101.2.2 Prohibition. [OSHPD 1R, 2 & 5] *The following design methods, systems, and materials are not permitted by OSHPD:*

1. *Unreinforced Masonry.*
2. *Autoclaved Aerated Concrete (AAC) Masonry.*
3. *Empirical Design of Masonry and prescriptive design of masonry partition walls.*
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.*

…

SECTION 2103

MASONRY CONSTRUCTION MATERIALS

…

2103.4 Metal reinforcement and accessories. Metal reinforcement and accessories shall conform to Article 2.4 of TMS 602. Where unidentified reinforcement is approved for use, not less than three tension and three bending tests shall be made on representative specimens of the reinforcement from each shipment and grade of reinforcing steel proposed for use in the work. ***[OSHPD 1R, 2 & 5]*** *Alternatively, the frequency of sampling for unidentifiable reinforcing bars specified in Section 1910.2 can be used.*

2103.5 Air entrainment. [OSHPD 1R, 2 & 5] *Air-entraining substances shall not be used in grout unless tests are conducted to determine compliance with the requirements of this code.*

…

SECTION 2104
CONSTRUCTION

2104.1 Masonry construction. Masonry construction shall comply with the requirements of Sections 2104*A*.1.1 through 2104A.1.3 and with the requirements of either TMS 602 or TMS 604. ***[OSHPD 1R, 2 & 5]*** *Architectural cast stone construction shall be considered as an alternative system.*

…

2104.2 Grouted masonry. [OSHPD 1R, 2 & 5]

> ***2104.2.1 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 1/4 inch (6.4mm), mortar droppings and other foreign material.*
>
> *All cells shall be solidly filled with grout.*
>
> > ***Exception:*** *Reinforced hollow-unit masonry laid in running bond used for freestanding site walls or interior nonbearing non-shear wall partitions may be 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 OSHPD.

2104.3 Aluminum equipment. [OSHPD 1R, 2 & 5] *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.*

SECTION 2105
QUALITY ASSURANCE

…

2105.2 Compressive Strength, *f '$_m$*. *[OSHPD 1R, 2 & 5]* *The specified compressive strength, f '$_m$, assumed in design shall be 2000 psi (13.79MPa) for all masonry construction using materials and details of construction required herein. Testing of the constructed masonry shall be provided in accordance with Section 2105.5 or Section 2105.6.*

EXCEPTION: *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 (20.7MPa).*

Where an f'$_m$ greater than 2000 psi (13.79MPa) 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 strength of constructed masonry shall be provided using prism test method and core shear testing in accordance with Sections 2105.5 and 2105.4. Substantiation for the specified compressive strength prior to the start of construction shall be obtained by using prism test method in Section 2105.5.

2105.3 Mortar and grout tests. [OSHPD 1R, 2 & 5] *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 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 TMS 402 Section 7.4.4.2.2 for mortar and ASTM C476/TMS 602 Section 2.2 for grout. Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official. When the prism test method in accordance with Section 2105.5 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.

Exception: *For non-bearing non-shear masonry walls not exceeding total wall height of 12 feet above top of foundation, mortar test shall be permitted to be limited to those at the beginning of masonry work for each mix design.*

2105.4 Masonry core testing. [OSHPD 1R, 2 & 5] *Not less than two cores shall be taken from each building for each 5,000 square feet (465 m^2) of the masonry wall area or fraction thereof. The 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 samples shall comply with the following:

1. *Cored no sooner than 7 days after grouting of the selected area;*
2. *Be a minimum of 3-3/4" in nominal diameter; and*
3. *Sampled in such a manner as to exclude any masonry unit webs, mortar joint, or 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 and the condition of the cores reported as required by the California Administrative Code. Shear test both joints between the grout core and the outside wythes or face shell of the masonry 28 days after grouting of the sample area using a shear test apparatus acceptable to 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 core shall not be less than 2.5 $\sqrt{f'_m}$ psi.

All cores shall be submitted to an approved agency for examination, even where the core specimens failed during the cutting operation. The approved agency 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 top of foundation, 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 2000 psi (13.79MPa).*
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 conjunction with reduced core sampling and testing. A minimum of two cores shall be taken from each building for each 10,000 square feet (930 m^2) of the wall.*

2105.5 Masonry prism method testing. [OSHPD 1R, 2 & 5] *Prism test method performed prior to the start or during construction shall be in accordance with TMS 602 Section 1.4 B.3. Prism test method performed on constructed walls shall be in accordance with TMS 602 Section 1.4 B.4.*

2105.6 Unit strength method testing. [OSHPD 1R, 2 & 5] *Unit strength method testing shall be performed in accordance with TMS 602 Section 1.4 B.2.*

SECTION 2106
SEISMIC DESIGN

2106.1 Seismic design requirements for masonry. Masonry structures and components shall comply with the requirements in Chapter 7 of TMS 402 depending on the structure's *Seismic Design Category.*

2106.1.1 Modifications to TMS 402. [OSHPD 1R, 2 & 5] *Modify TMS 402 Section 7.4.4 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.*

> ***Exception:*** *Reinforced hollow-unit masonry used for freestanding site walls or interior non-bearing non-shear wall partitions shall have horizontal reinforcing spaced not more than 4'-0" on center, except as required by TMS 402 Section 7.4.5 when applicable.*

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 shall be considered as continuous reinforcement.

Horizontal reinforcing 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.

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 2107
ALLOWABLE STRESS DESIGN

2107.1 General. ***[OSHPD 1R, 2 & 5]*** The design of masonry structures using *allowable stress design* shall comply with Section 2106 and the requirements of Chapters 1 through 8 of TMS 402 except as modified by Sections 2107.2 through ~~2107.3~~ *2107.6*.

…

2107.4 [OSHPD 1R, 2 & 5] TMS 402, Section 8.3.7, maximum bar size. [OSHPD 1R, 2 & 5] *Add the following to Chapter 8:*

8.3.7 – Maximum bar size. The bar diameter shall not exceed one-eighth of the nominal wall thickness and shall not exceed one-quarter of the least dimension of the cell, course or collar joint in which it is placed, nor be larger than #9 in size.

2107.5 [OSHPD 1R, 2 & 5] Modify TMS 402 by adding Section 8.3.8 as follows:

8.3.8 - 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 2107.5.

Piers. *Every pier or wall section with a width 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 with a width 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 2107.5 - 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.

2107.6 [OSHPD 1R, 2 & 5] Modify TMS402, Section 8.3.4.4 by the following:

All reinforced masonry components that are subjected to in-plane forces shall have a maximum reinforcement ratio, ρ_{max}, not greater than that computed by equation 8-20.

…

SECTION 2109
EMPIRICAL DESIGN OF ADOBE MASONRY

[OSHPD 1R, 2 & 5] *Not permitted by OSHPD.*

(Deleted Section 2109 is not shown here for clarity)

SECTION 2110
GLASS UNIT MASONRY

2110.1 General. ***[OSHPD 1R, 2 & 5]*** Glass unit masonry construction shall comply with Chapter 13 of TMS402 and this section.

Masonry glass block walls or panels shall be designed for seismic forces. Stresses in glass block shall not be utilized.

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

Notation:

Authority: Health and Safety Code Section 129850

Reference: Health and Safety Code Sections 1275 and 129850

CHAPTER 21*A*
MASONRY

…

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. *(Reserved for DSA).*
2. *Applications listed in Section 1.10.1, and 1.10.4 regulated by the Office of Statewide Health Planning and Development (OSHPD).These applications include hospitals~~, skilled nursing~~*

~~*facilities, intermediate care facilities*~~ *and correctional treatment centers.*

~~***Exception:*** *[**OSHPD 2**] Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 21 and any applicable amendments therein.~~

2101A.1.2 Amendments in this chapter. *OSHPD 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. *(Reserved for DSA).*
2*. Office of Statewide Health Planning and Development:*
[OSHPD 1] *- For applications listed in Section 1.10.1.*
[OSHPD 4] *- For applications listed in Section 1.10.4.*

2101A.1.3 Prohibition: *The following design methods, systems, and materials are not permitted by OSHPD:*

1. *Unreinforced Masonry.*
2. *Autoclaved Aerated Concrete (AAC) Masonry.*
3. *Empirical Design of Masonry and prescriptive design of masonry partition walls.*
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,~~TMS 403~~ or TMS 404 as well as applicable requirements of this chapter.

…

SECTION 2102*A*
NOTATIONS

2102A.1 General. The following notations are used in the chapter~~*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.*~~

…

SECTION 2103*A*
MASONRY CONSTRUCTION MATERIALS

2103*A*.1 Masonry units. Concrete masonry units, clay or shale masonry units, stone masonry units *and* glass unit masonry ~~and AAC masonry units~~ shall comply with Article 2.3 of TMS 602. Architectural cast stone shall conform to ASTM C 1364 and TMS 504. Adhered manufactured stone masonry veneer units shall conform to ASTM C1670.

…

2103A.3 Grout. Grout shall comply with Article 2.2 of TMS 602.

2103A.3.1 Aggregate. *Coarse grout shall be used in grout spaces between wythes 2 inches (51 mm) or more in width as determined in accordance with TMS 602 Table ~~7~~6, footnote 3, and in all grouted cells of hollow unit masonry construction.*

2103A.4 Metal reinforcement and accessories. Metal reinforcement and accessories shall conform to Article 2.4 of TMS 602. Where unidentified reinforcement is approved for use, not less than three tension and three bending tests shall be made on representative specimens of the reinforcement from each shipment and grade of reinforcing steel proposed for use in the work. *Alternatively, the frequency of sampling for unidentifiable reinforcing bars specified in Section 1910A.2 can be used.*

2103A.5 Air entrainment. *Air-entraining substances shall not be used in 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 through ~~*through 2104A.1.3*~~ 2104*A*.1.3 and with the requirements of either TMS 602 or TMS 604. *Architectural cast stone construction shall be considered as an alternative system.*

…

2104A.1.3 Grouted Masonry.

2104A.1.3.1 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 Reinforced grouted multi-wythe masonry.

2104A.1.3.1.1.1 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 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 clear width of grout space for low-lift grout masonry shall be 2 1/2 inches (64 mm). Clear width is defined in TMS 602, Table 6, footnote 3. 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 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 (W1.7) 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 clear width of grout space in high-lift grouted masonry shall be a minimum of 3 1/2 inches (89 mm). Clear width is defined in TMS 602, Table 6, footnote 3. 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 Reinforced hollow-unit masonry.

2104A.1.3.1.2.1 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. [OSHPD 1 & 4] and shall be constructed using single or double open-end units, except single open-end units shall be used at wall intersections, corners and similar conditions.*

Exception: *Reinforced hollow-unit masonry laid in running bond used for freestanding site walls or interior nonbearing non-shear wall partitions may be 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) per Section 2104A.1.3.1.2.2, or the high-lift method where the full height of construction between horizontal cold joints is grouted in one operation per Section 2104A.1.3.1.2.3. 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 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 6, 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 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.*

***Exception:** The 4 feet maximum wall construction may be increased to 5'-4" for 10 inch nominal and larger hollow-unit masonry.*

***2104A.1.3.1.2.3 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*.1 General. A quality assurance program shall be used to ensure that the constructed masonry is in compliance with the approved construction documents.

The quality assurance program shall comply with the inspection and testing requirements of Chapter 17, ~~and~~ TMS 602 *and Sections 2105A.2 through 2105A.4*.

2105*A*.2 Compressive Strength, f'_m. *The specified compressive strength, f'_m, assumed in design shall be 2000 psi (13.79MPa) 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 or Section 2105A.6.*

***EXCEPTION:** 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 (20.7MPa).*

Where an f'_m greater than 2000 psi (13.79MPa) 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 strength of constructed masonry shall be provided using prism test method ~~and core shear testing~~ in accordance with Section 2105A.4~~4~~5. Substantiation for the specified compressive strength prior to the start of construction shall be obtained by using prism test method in Section 2105A.5 and Section 2105A.3.

2105A.3 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 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 TMS 402 Section 7.4.4.2.2 for mortar and ASTM C476/TMS 602 Section 2.2 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. When the prism test method in accordance with Section 2105A.5 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.

> ***Exception:*** *For non-bearing non-shear masonry walls not exceeding total wall height of 12' feet above ~~wall base~~top of foundation, mortar test shall be permitted to be limited to those at the beginning of masonry work for each mix design.*

2105A.4 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 masonry wall area or fraction thereof. The 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 samples shall comply with the following:

1. *Cored no sooner than 7 days after grouting of the selected area;*
2. *Be a minimum of 3-3/4" in nominal diameter; and*
3. *Sampled in such a manner as to exclude any masonry unit webs, mortar joint, or 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 and the condition of the cores reported as required by the California Administrative Code. Shear test both joints between the grout core and the outside wythes or face shell of the masonry 28 days after grouting of the sample area using a shear test apparatus acceptable to 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 core shall not be less than 2.5 $\sqrt{f'_m}$ psi.

All cores shall be submitted to an approved agency for examination, even where the core specimens failed during the cutting operation. The approved agency 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 feet above ~~wall base~~top of foundation, 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 2000 psi (13.79MPa).*
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. [OSHPD 1 & 4] Infrared thermographic survey or other nondestructive test procedures shall also include core tests with a minimum of two cores taken from each building for each 10,000 square feet (930 m^2) of the wall.*

2105A.5 Masonry prism method testing*. Prism test method performed prior to the start or during construction shall be in accordance with TMS 602 Section 1.4 B.3. Prism test method performed on constructed walls shall be in accordance with TMS 602 Section 1.4 B.4.*

2105A.6 Unit strength method testing*. Unit strength method testing shall be performed in accordance with TMS 602 Section 1.4 B.2.*

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 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 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.*

Exception: *Reinforced hollow-unit masonry used for freestanding site walls or interior non-bearing non-shear wall partitions shall have horizontal reinforcing spaced not more than 4'-0" on center, except as required by TMS 402 Section 7.4.5 when applicable.*

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~~ shall be considered as continuous reinforcement.

Horizontal reinforcing 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.

***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 except as modified by Sections 2107*A*.2 through ~~2107*A*.3~~ *2107A.6*.

2107*A*.2 TMS 402, Section 6.1.6.1.1, lap splices. As an alternative to Section 6.1.6.1.1, 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

$l_d = 0.002 d_b f_s$ (Equation 21A-1)

For SI: $l_d = 0.29 d_b f_s$

but not less than 12 inches (305 mm). The length of the lapped splice shall be not less than 40 bar diameters~~, and need not be greater than 72 bar diameters~~.

where:

…

(OSHPD amendment in Section 2107A.2.1 is deleted)

2107A.4 TMS 402~~/ACI 530/ASCE 5~~, Section 8.3.6~~7~~, maximum bar size. *Add the following to Chapter 8:*

*8.3.6~~6~~7 – Maximum bar size. The bar diameter shall not exceed one-eighth of the nominal wall thickness and shall not exceed one-quarter of the least dimension of the cell, course or collar joint in which it is placed~~,~~ **[OSHPD 1 & 4]** nor be larger than #9 in size.*

2107A.5 Modify TMS 402 ~~/ ACI 530/ASCE 5~~ by adding Section 8.~~1.7~~3.8 as follows:

8.~~1.7~~3.8 - 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.

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 [OSHPD 1 & 4] Modify TMS402~~/ACI 530/ASCE 5~~, Section 8.3.4.4 by the following:

All reinforced masonry components that are subjected to in-plane forces shall have a maximum reinforcement ratio, ρ_{max} , not greater than that computed by equation 8-~~23~~20.

SECTION 2108A
STRENGTH DESIGN OF MASONRY

2108A.1 General. The design of masonry structures using strength design shall comply with Section 2106*A* and the requirements of Chapters 1 through 7 and Chapter 9 of TMS 402, except as modified by Sections 2108*A*.2 through 2108*A*.3.

~~**Exception:** AAC masonry shall comply with the requirements of Chapters 1 through 7 and Chapter 11 of TMS 402/ACI 530/ASCE 5.~~

…

SECTION 2109A
EMPIRICAL DESIGN OF ADOBE MASONRY

Not permitted by OSHPD.

(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 and this section.

Masonry glass block walls or panels shall be designed for seismic forces. Stresses in glass block shall not be utilized.

…

(All existing amendments, except where section is deleted in the model code, that are not revised above shall continue without any change)

NOTATION:
Authority: Health and Safety Code Section 130005(g) & 130021
Reference: Health and Safety Code Section 1275, 129790, 129850 & 130005(g)

CHAPTER 22

STEEL

2201.1 Scope. The provisions of this chapter govern the quality, design, fabrication and erection of steel construction.

2201.1.1 Application. [OSHPD] *The scope of application of Chapter 22 is as follows:*

1. *Office of Statewide Health Planning and Development (OSHPD),*

Buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings and acute psychiatric hospital buildings regulated by OSHPD. Applications listed in Sections 1.10.1, 1.10.2 and 1.10.5.

2. (*Reserved for DSA)*

2201.1.2 ~~Identification of a~~Amendments in this chapter. … [OSHPD] *OSHPD 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. Office of Statewide Health Planning and Development:*
> ***[OSHPD 1R]*** *- For applications listed in Section 1.10.1.*
> ***[OSHPD 2]*** *- For applications listed in Section 1.10.2.*
> ***[OSHPD 5]*** *- For applications listed in Section 1.10.5*
>
> *2. (Reserved for DSA)*

2201.1.3 *(Reserved for DSA)*

2201.1.4 Amendments. … [OSHPD]

> ***…***
>
> ***[OSHPD 1R, 2 & 5]*** *See Section 2213 for additional requirements.*

SECTION 2204
CONNECTIONS

2204.1 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, 2206, 2207, 2208, 2210 and 2211. For *Special inspection* of welding, see Section 1705.2.

> ***2204.1.1 Restrained welded connections. [OSHPD 1R, 2 & 5]*** *Welded structural steel connections having a medium or high level of restraint, as defined by AWS D1.1 Annex H, shall have a minimum pre-heat temperature of not less than 150º F (66º C). Welded structural steel connections with welds to flange, web, wall or plate having a high level of restraint shall maintain a post-heat temperature of 300º F (149º C) for a minimum of 1 hour after completion of welding.*

…

> ***2204.4 Column base plate. [OSHPD 1R, 2 & 5]*** *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 into the reinforced concrete foundation element 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 2205
STRUCTURAL STEEL

2205.1 General. The design, fabrication and erection of structural steel elements in buildings, structures and portions thereof shall be in accordance with AISC 360.

Exceptions: [OSHPD 1R, 2 & 5]

1. *For members designed on the basis of tension, the slenderness ratio (L/r) shall not exceed 300, except for design of hangers and bracing in accordance with NFPA 13 and for rod hangers in tension.*
2. *For members designed on the basis of compression, the slenderness ratio (KL/r) shall not exceed 200, except for design of hangers and bracing in accordance with NFPA 13.*

2205.2 Seismic Design. Where required, the seismic design, fabrication and erection of buildings, structures and portions thereof shall be in accordance with Section 2205.2.1 or 2205.2.2.

2205.2.1 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 2205.2.1.1 or 2205.2.1.2, as applicable.
…

2205.2.1.2 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. ***[OSHPD 1R, 2 & 5]*** *All structural steel seismic force resisting systems in ASCE 7 Table 15.4-1 shall be designed in accordance with AISC 341.*
…

2205.3 MODIFICATIONS TO AISC 341. [OSHPD 1R, 2 & 5]

2205.3.1 Section A4. *Replace Section A4.1 item (c) as follows:*

(c) Locations and dimensions of protected zones. The fabricator shall permanently mark protected zones of structural elements in the Seismic Force Resisting System in the building that are designated on the construction documents. If these markings are obscured during construction, such as after the application of fire protection, the owner's designated representative shall re-mark the protected zones as they are designated on the construction documents. Primers or paints used to mark protected zones on steel surfaces, which are to receive sprayed fire-resistance material, shall comply with California Building Code Section 704.13.3.2.

2205.3.2 Section I2. *Replace Section I2.1 item (d) as follows:*

(d) Decking attachments that penetrate the beam flange shall not be placed on beam flanges within the protected zone, except power-actuated fasteners up to 0.18 in. diameter are permitted, provided that the penetration is less than 85% of beam flange thickness.

2205.4 MODIFICATIONS TO AISC 358. [OSHPD 1R, 2 & 5]

2205.4.1 Design Requirements, 2.1 Special and Intermediate Moment Frame Connection Types, Table 2-1 Prequalified Moment Connections modifications

The prequalified bolted moment connections are not permitted in buildings.

Exceptions:

1. *Erection bolts are permitted.*
2. *The approved moment connection in accordance with AISC 358 Chapter 10 as permitted by the exception to Section 2206.2.*
3. *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

2205.4.2 Moment Connection - Chapter 11. *The welded sideplate steel moment connection shall be permitted provided:*

1. *The beams shall consist of either rolled or built-up wide flange sections.*
2. *The biaxial dual-strong axis and column minor axis configurations of the moment connection shall be considered as an alternative system.*
3. *For SMF and IMF systems, U-shaped cover plates shall be used and the hinge-to-hinge span to beam depth, L_h/d, shall be greater than or equal to 5.*
4. *The width-to-thickness ratios for beam flanges shall not be less than 3.*
5. *The spacing for lateral bracing of wide flange beams, L_b, shall include the length of the side plate at beam ends.*
6. *The extension of the side plates beyond the face of the column shall be within the range of 0.77d to 1.0d.*
7. *The gap-to-side plate thickness ratio shall range from 2.1 to 2.3.*
8. *Demand Critical fillet welds {2}, {5}, {5a} and {7} shall have Magnetic Particle Testing (MT) in accordance with AWS D1.1 for procedure, technique and acceptance. Inspect the beginning and end of these welds for a 6 inch length, plus any location along the length of the weld where a start and restart is visually noted for a distance of 6 inches on either side of the start/stop location.*

SECTION 2206
COMPOSITE STRUCTURAL STEEL AND CONCRETE STRUCTURES

2206.1 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.

2206.2 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 2206.2.1.

2206.2.1 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

*[**OSHPD 1R, 2 & 5**] Seismic requirements for composite structural steel and concrete construction shall be considered as an alternative system*.

Exception:

Steel and concrete composite special moment frame with the approved moment connections in accordance with AISC 358 Chapter 10 shall be permitted provided:

a. Beams are provided with Reduced Beam Sections (RBS),

b. 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

c. The built-up box column wall thickness shall not be less than 1.25" and the HSS column wall thickness shall not be less than ½ inch.

…

SECTION 2207
STEEL JOISTS

…

2207.4 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 2207.2. 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 *[OSHPD 1R, 2 & 5] Not permitted by OSHPD.*

…

2207.6 Joist Chord Bracing. [OSHPD 1R, 2 & 5] *The chords of all joists shall be laterally supported at all points where the chords change direction.*

…

SECTION 2208
STEEL CABLE STRUCTURES

2208.1 General. The design, fabrication and erection including related connections, and protective coatings of steel cables for buildings shall be in accordance with ASCE 19. *[OSHPD 1R, 2 & 5] Steel cables with glass or polymer fabric material acting as a tensile membrane structure is an alternative system.*

…

SECTION 2210
COLD-FORMED STEEL

2210.1 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. Where required, the seismic design of cold formed steel structures shall be in accordance with the additional provisions of Section 2210.2.

*[**OSHPD 1R, 2 & 5**] Modify AISI S100 Chapter J (Connections and Joints, Section J7.2) by the following: Power-actuated fastener allowable design strength shall not exceed that permitted in the evaluation report qualified by ICC AC 70 nor ASCE 7 Section 13.4.5.*

2210.1.1 Steel decks. The design and construction of cold formed steel decks shall be in accordance with this section.

2210.1.1.1 Noncomposite steel floor decks. Noncomposite steel floor decks shall be permitted to be designed and constructed in accordance with ANSI/SDI-NC1.0.

2210.1.1.2 Steel roof deck. Steel roof decks shall be permitted to be designed and constructed in accordance with ANSI/SDI-RD1.0. *[OSHPD 1R, 2 & 5] The base material thickness of steel deck shall not be less than 0.0359 inch (0.9 mm) (20 gage).*

***Exception:** For single-story, non-building structures similar to buildings, the minimum deck thickness need not apply if the steel roof deck is not being used as the diaphragm and there are no suspended hangers or bracing for nonstructural components attached to the deck.*

2210.1.1.3 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.

2210.2 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, ASCE 8, or, for cold-formed steel special-bolted moment frames, AISI S400. ***[OSHPD 1R, 2 & 5]*** *Design of cold-formed steel structures shall be designed and detailed in accordance with the requirements of AISI S100 and AISI S400. Cold-formed steel special bolted moment frames are not permitted by OSHPD.*

SECTION 2211
COLD-FORMED STEEL LIGHT-FRAME CONSTRUCTION

...

2211.1.1.2 Seismic Design Categories D through F. In cold-formed steel light-frame construction assigned to Seismic Design Category D, E or F, the seismic force-resisting system shall be designed and detailed in accordance with AISI S400.

[OSHPD 1R, 2 & 5]:

1. 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.

2. Shear wall assemblies in accordance with Sections E5, E6 and E7 of AISI S400 are not permitted within the seismic force-resisting system of buildings.

...

2211.1.3 Truss design. Cold-formed steel trusses shall comply with the additional provisions of Sections 2211.1.3.1 through 2211.1.3.3.

*[**OSHPD 1R, 2 & 5**] 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.*

…

2211.2 Nonstructural members. For cold-formed steel light-frame construction, the design and installation of non-structural members and connections shall be in accordance with AISI S220 *[OSHPD 1R, 2 & 5] for non-composite assembly design. Where non-structural members do not qualify for design under AISI S220, the design and installation of non-structural members and connections shall be in accordance with AISI S240 or S100.*

SECTION 2212
(Reserved for DSA)

SECTION 2213
TESTING AND FIELD VERIFICATION [OSHPD 1R, 2 & 5]

2213.1 Tests of High-strength Bolts, Nuts and Washers*. High-strength bolts, nuts and washers shall be sampled and tested by an approved agency for conformance with the requirements of applicable ASTM standards.*

A minimum of 9 samples per lot, as defined in the ASTM standards for bolts [not nuts and washers], shall be tested for tensile properties in accordance with ASTM F606, but need not exceed 3-samples per 400-bolts.

2213.2 Tests of End-welded Studs*. End-welded studs shall be tested in accordance with the requirements of the AWS D1.1, Sections 7.7 and 7.8.*

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

Notation:

Authority: Health and Safety Code Section 129850

Reference: Health and Safety Code Sections 1275 and 129850

CHAPTER 22A
STEEL

…

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. *(Reserved for DSA).*

2. *Structures regulated by the Office of Statewide Health Planning and Development (OSHPD), which include those applications listed in Section 1.10.2, and 1.10.4.These applications include hospitals~~, skilled nursing facilities, intermediate care facilities~~ and correctional treatment centers.*

   ~~Exception: [OSHPD 2]~~ *~~Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 22 and any applicable amendments therein.~~*

2201A.1.2 ~~Identification of a~~Amendments. [OSHPD] … *OSHPD 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. *(Reserved for DSA).*
2. *Office of Statewide Health Planning and Development:*
   [OSHPD 1] *- For applications listed in Section 1.10.1.*
   [OSHPD 4] *- For applications listed in Section 1.10.4.*

…

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.1.1 Restrained welded connections. [OSHPD 1 & 4] *Welded structural steel connections having a medium or high level of restraint, as defined by AWS D1.1 Annex H, shall have a minimum pre-heat temperature of not less than 150º F (66º C). Welded structural steel connections with welds to flange, web, wall or plate having a high level of restraint shall maintain a post-heat temperature of 300º F (149º C) for a minimum of 1 hour after completion of welding.*

…

2204A.4 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 into the reinforced concrete foundation element 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.

Exceptions: [OSHPD 1 & 4]

1. For members designed on the basis of tension, the slenderness ratio (L/r) shall not exceed 300, except for design of hangers and bracing in accordance with NFPA 13 and for rod hangers in tension.

2. For members designed on the basis of compression, the slenderness ratio (KL/r) shall not exceed 200, except for design of hangers and bracing in accordance with NFPA 13.

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 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 OSHPD.* ~~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 *(Reserved for DSA).*

2205A.4 MODIFICATIONS TO AISC 341. [OSHPD 1 & 4]

2205A.4.1 Glossary. *Modify Glossary by adding the following:*

Inelastic Rotation: *The permanent or plastic portion of the rotation angle between a beam and the column, or between a Link and the column of the Test Specimen, measured in radians. The Inelastic Rotation shall be computed based upon an analysis of the Test Specimen deformations. Sources of Inelastic Rotation include yielding of members and connectors, yielding of connection elements and slip between members and connection elements. For beam-to-column moment connections in Special Moment Frames, the inelastic rotation is represented by the plastic chord rotation angle calculated as the plastic deflection of the beam or girder, at the center of its span divided by the distance between the center of the beam span and the centerline of the panel zone of the beam-column connection. For link-to-column connections in Eccentrically Braced Frames, inelastic rotation shall be computed based upon the assumption that inelastic action is concentrated at a single point located at the intersection of the centerline of the link with the face of the column.*

2205A.4.2 Section A4. *Replace Section A4.1 item (c) as follows:*

(c) Locations and dimensions of protected zones. The fabricator shall permanently mark protected zones of structural elements in the Seismic Force Resisting System in the building that are designated on the construction documents. If these markings are obscured during construction, such as after the application of fire protection, the owner's designated representative shall re-mark the protected zones as they are designated on the construction documents. [OSHPD 1 & 4] Primers or paints used to mark protected zones on steel surfaces, which are to receive sprayed fire-resistance material, shall comply with California Building Code Section 704.13.3.2.

2205A.4.3 Section I2. [OSHPD 1 & 4] *Replace Section I2.1 item (d) as follows:*

(d) Decking attachments that penetrate the beam flange shall not be placed on beam flanges within the protected zone, except power-actuated fasteners up to 0.18 in. diameter are permitted, provided that the penetration is less than 85% of beam flange thickness.

(Renumber remaining subsections in this section)

2205A.4.24 Section E2. *Replace Section E2.6c Item (a) by the following:*

(a) Use of IMF connections designed in accordance with ANSI/AISC 358 shall be as modified in Section 2205A.5.2.

2205A.4.35 Section E3. *Replace Section E3.6b Item 1 (a) by the following:*

(1) (a) The connection shall be capable of sustaining an interstory drift angle of at least 0.04 radians and an inelastic rotation of 0.03 radians.

2205A.4.46 Section E3. *Replace Section E3.6c Item (a) by the following:*

(a) Use of SMF connections designed in accordance with ANSI /AISC 358 shall be as modified in Section 2205A.5.

2205A.4.57 Section F2. Special Concentrically Braced Frames (SCBF) modifications

5b. Diagonal Braces, Add a new section as follows.

(4d) The use of rectangular or square HSS are not permitted for bracing members, unless filled solid with cement grout having a minimum compressive strength of 3000 psi at 28 days. The effects of composite action in the filled composite brace shall be considered in the sectional properties of the system where it results in the more severe loading condition or detailing.

2205A.4.~~6~~8 Section F3. *Modify Section F3.6e Item 2 as follows:*

Exception is not permitted.

2205A.4.~~7~~9 Section K2. *Replace Section K2.3b as follows:*

The size of the beam or Link used in the Test Specimen shall be within the following limits:

1. *At least one of the test beams or Links shall be no less than 100% of the depth of the prototype beam or Link. For the remaining specimens, the depth of the test beam or Link shall be no less than 90 percent of the depth of the Prototype beam or Link.*

2. *At least one of the test beams or Links shall be no less than 100% of the weight per foot of the prototype beam or Link. For the remaining specimens, the weight per foot of the test beam or Link shall be no less than 75 percent of the weight per foot of the Prototype beam or Link.*

The size of the column used in the test specimen shall properly represent the inelastic action in the column, as per the requirements in Section K2.3a. In addition, the depth of the test column shall be no less than 90% of the depth of the prototype column.

Extrapolation beyond the limitations stated in this section shall be permitted subject to peer review and approval by the enforcement agency.

2205A.4.~~8~~10 Section K2. *Modify Section K2.8 by the following:*

The test specimen must sustain the required interstory drift angle, or link rotation angle, and inelastic rotation for at least two complete loading cycles.

2205A.5 MODIFICATIONS TO AISC 358. [OSHPD 1 & 4]

2205A.5.1 Design Requirements, 2.1 Special and Intermediate Moment Frame Connection Types, Table 2-1 Prequalified Moment Connections modifications

The prequalified bolted moment connections are not permitted in buildings.

Exceptions:

1. Erection bolts are permitted.

2. The approved moment connection in accordance with AISC 358 Chapter 10 as permitted by the exception to Section 2206A.2.

2205A.5.2 Moment Connection - Chapter 11. *The welded sideplate steel moment connection shall be permitted provided:*

1. *The beams shall consist of either rolled or built-up wide flange sections.*

2. *The biaxial dual-strong axis and column minor axis configurations of the moment connection shall be considered as an alternative system.*

3. *For SMF and IMF systems, U-shaped cover plates shall be used and the hinge-to-hinge span to beam depth, L_h/d, shall be greater than or equal to 5.*

4. *The width-to-thickness ratios for beam flanges shall not be less than 3.*

5. *The spacing for lateral bracing of wide flange beams, L_b, shall include the length of the side plate at beam ends.*

6. *The extension of the side plates beyond the face of the column shall be within the range of 0.77d to 1.0d.*

7. *The gap-to-side plate thickness ratio shall range from 2.1 to 2.3.*

8. Demand Critical fillet welds {2}, {5}, {5a} and {7} shall have Magnetic Particle Testing (MT) in accordance with AWS D1.1 for procedure, technique and acceptance. Inspect the beginning and end of these welds for a 6 inch length, plus any location along the length of the weld where a start and restart is visually noted for a distance of 6 inches on either side of the start/stop location.

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. *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*
3. *The built-up box column wall thickness shall not be less than 1.25" and 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.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. *Steel cables with glass or polymer fabric material acting as a tensile membrane structure is an alternative system.*

...

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.

(OSHPD 1 & 4) *Modify AISI S100 Chapter J (Connections and Joints, Section J7.2) by the following: Power –actuated fastener available strength shall not exceed those strengths determined in accordance with Section 1617A.1.20 of this code.*

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).*

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.

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,~~and *AISI S400*.

SECTION 2211*A*
COLD-FORMED STEEL LIGHT-FRAME CONSTRUCTION

2211A.1 Structural framing. For cold-formed steel light-frame construction, the design and installation of the following structural framing systems, including their members and connections, shall be in accordance with AISI S240, and Sections 2211.1.1 through 2211.1.3, as applicable:

1. Floor and roof systems.
2. Structural walls.
3. Shear walls, strap-braced walls and diaphragms that resist in-plane lateral loads.
4. Trusses.

2211A.1.1 Seismic requirements for cold-formed steel structural systems. The design of cold-formed steel light-frame construction to resist seismic forces shall be in accordance with the provisions of Section 2211.1.1.1 or 2211.1.1.2, as applicable.

2211A.1.1.1 Seismic Design Categories B and C. *Not permitted by OSHPD* ~~Where a response modification coefficient, R, in accordance with ASCE 7, Table 12.2-1 is used for the design of cold-formed steel light-frame construction assigned to Seismic Design Category B or C, the seismic force-resisting system shall be designed and detailed in accordance with the requirements of AISI S400.~~

~~**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 AISI S240 and need not be designed and detailed in accordance with AISI S400.~~

2211A.1.1.2 Seismic Design Categories D through F. In cold-formed steel light-frame construction assigned to Seismic Design Category D, E or F, the seismic force-resisting system shall be designed and detailed in accordance with AISI S400.

1. (Relocated from 2211*A*.4) *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.*

2. (Relocated from 2211*A*.6) *Shear wall assemblies in accordance with Sections E5, E6 and E7 ~~C2.2.3~~ of AISI ~~S213~~ 400 are not permitted within the seismic force-resisting system of buildings.*

2211A.1.2 (Formerly 2211*A*.7) Prescriptive framing. *Not Permitted by OSHPD* ~~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.~~

2211A.1.3 (Formerly 2211A.3) Truss design. Cold-formed steel trusses shall comply with the additional provisions of Sections 2211A.1.3.1 through 2211A.1.3.3.

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.

2211A.1.3.1 (Formerly 2211A.3.1) Truss design drawings. The truss design drawings shall conform to the requirements of Section I1 of AISI S202 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 I1.6 of AISI S202 where these methods are utilized to provide restraint/bracing.

2211A.1.3.2 (Formerly 2211A.3.3) Trusses spanning 60 feet or greater. The owner or the owner's authorized agent shall contract with a registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing for trusses with clear spans 60 feet (18 288 mm) or greater. Special inspection of trusses over 60 feet (18 288 mm) in length shall be in accordance with Section 1705A.2.

2211A.1.3.3 (Formerly 2211A.3.4) Truss quality assurance. Trusses not part of a manufacturing process that provides requirements for quality control done under the supervision of a third-party quality control agency in accordance with AISI S240 Chapter D shall be fabricated in compliance with Sections 1704A.2.5 and 1705A.2, as applicable.

2211A.2 Nonstructural members. For cold-formed steel light-frame construction, the design and installation of non-structural members and connections shall be in accordance with AISI S220 *for non-composite assembly design. Where non-structural members do not qualify for design under AISI S220, the design and installation of non-structural members and connections shall be in accordance with AISI S240 or S100.*

SECTION 2212A
(Reserved for DSA)

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~~ agency for conformance with the requirements of applicable ASTM standards.*

[OSHPD 1 & 4] *A minimum of ~~3~~9-samples per lot, as defined in the ASTM standards for bolts [~~&~~ not nuts and washers], shall be tested for tensile properties in accordance with ASTM F606, but need not exceed 3-samples per 400-bolts.*

2213A.2 Tests of End-welded Studs. *End-welded studs shall be tested in accordance with 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:
Authority: Health and Safety Code Section 130005(g) & 130021
Reference: Health and Safety Code Section 1275, 129790, 129850 & 130005(g)

CHAPTER 23
WOOD

...

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. [OSHPD 1, 1R, 2, 4 & 54] *The scope of application of Chapter 23 is as follows:*

1. *(Reserved for DSA).*
2. *Applications listed in Section 1.10, regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals, skilled nursing facilities, intermediate care facilities and correctional treatment centers.*

   Exception: *For applications listed in Section 1.10.3 (Licensed Clinics), the provisions of this chapter without OSHPD amendments identified in accordance with Section 2301.1.2 shall apply.*

2301.1.2 ~~Identification of a~~Amendments in this chapter. [OSHPD 1, 1R, 2, 4 & 54] *~~Office of Statewide Health Planning and Development amendments appear in this chapter preceded with the appropriate acronym, as follows:~~ OSHPD 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. *(Reserved for DSA).*

2. *Office of Statewide Health Planning and Development:*
[OSHPD 1] *- For applications listed in Section 1.10.1.*
[OSHPD 1R] *- For applications listed in Section 1.10.1.*
[OSHPD 2] *- For applications listed in Section 1.10.2.*
[OSHPD 4] *- For applications listed in Section 1.10.4.*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

2301.1.3 Reference to other chapters.

2301.1.3.1 [OSHPD 1 & 4] *Where reference within this chapter is made to sections in Chapters 16, 17, 18, 19, 21 and 22 the provisions in Chapters 16A, 17A, 18A, 19A, 21A and 22A respectively shall apply instead.*

2301.1.3.2 *(Reserved for DSA).*

2301.1.4 Prohibition. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *The following design methods, systems, and materials are not permitted by OSHPD:*

1. *Straight-sheathed horizontal lumber diaphragms.*
2. *Gypsum-based sheathing shear walls and portland cement plaster shear walls.*
3. *Shear wall foundation anchor bolt washers in accordance with exception to AWC SDPWS Section 4.3.6.4.3.*
4. *Wood structural panel shear walls and diaphragms using staples as fasteners.*
5. *Unblocked shear walls.*
6. *Any wood structural panel sheathing used for diaphragms and shear walls, that are part of the seismic force-resisting system, not applied directly to framing members.*

7. Single and double diagonally sheathed lumber walls used to resist seismic forces.
8. Log structures in accordance with ICC 400.
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.

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/APA A190.1 and ASTM D 3737.

2303.1.3.1 Additional requirements. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *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.

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. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *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. **[OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~]** Exceptions 1 and 2 are not permitted by OSHPD.*

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. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~]** 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.*

...

SECTION 2304
GENERAL CONSTRUCTION REQUIREMENTS

2304.1 General. The provisions of this section apply to design methods specified in Section 2302.1.

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. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *The following additional requirements apply:*

1. *Engineering analysis shall be furnished that demonstrates compliance of wall framing elements and connections with Section 230~~1~~2.~~2~~1, 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. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *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 230~~1~~2.~~2~~1, Items 1 or 2.*
2. *Construction documents shall include detailing and limitations for notches and bored holes in floor and roof framing members.*

…

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 2302.1. 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 Additional requirements. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *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: [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *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 Additional Requirements. [OSHPD 1, 1R, 2, 4 & 5 ~~& 4~~] *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~~ and 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. *See Section 2301.1.4 for modifications to AWC SDPWS.*

…

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.

…

SECTION 2308
CONVENTIONAL LIGHT-FRAME CONSTRUCTION

…

2308.2.7 Additional requirements [OSHPD 1R, 2 & 5] *The use of conventional light-frame construction provisions in this section is permitted, subject to the following conditions:*

1. *The design and construction shall also comply with Section 2304 and Section 2305.*

2. *In conjunction with the use of provisions in Section 2308.6 (Wall Bracing), engineering analysis shall be furnished that demonstrates compliance of lateral-force-resisting systems with Section 2305.*
3. *In addition to the use of provisions in Section 2308.4 (Floor framing), engineering analysis shall be furnished that demonstrates compliance of floor framing elements and connections with Section 230~~1~~2.~~2~~1, Item 1 or 2.*
4. *In addition to the use of provisions in Section 2308.5 (Wall construction), engineering analysis shall be furnished that demonstrates compliance of wall framing elements and connections with Section 230~~1~~2.~~2~~1, Item 1 or 2.*
5. *In addition to the use of provisions in Section 2308.7 (Roof and Ceiling Framing), engineering analysis shall be furnished demonstrating compliance of roof and ceiling framing elements and connections with Section 230~~1~~2.~~2~~1, 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 [OSHPD 1R, 2 & 5] *The use of the AWC WFCM is permitted provided the design and construction also comply with Sections 2304, 2305, and 230~~1~~2.~~2~~1, 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:
Authority: Health and Safety Code Section 130005(g) & 130021
Reference: Health and Safety Code Section 1275, 129790, 129850 & 130005(g)

CHAPTER 24
GLASS AND GLAZING

…

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.

2401.1.1 Application. [OSHPD] *The scope of application of Chapter 24 is as follows:*

1. Applications listed in Sections 1.10.1, 1.10.2, 1.10.4 and 1.10.5 regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals, hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings, correctional treatment centers and acute psychiatric hospital buildings.

2. (Reserved for DSA)

2401.1.2 Amendments in this chapter. [OSHPD] *OSHPD 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. OSHPD amendments appear in this chapter preceded with the appropriate acronym, as follows:

[OSHPD 1] *- For applications listed in Section 1.10.1*
[OSHPD 1R] *- For applications listed in Section 1.10.1*
[OSHPD 2] *- For applications listed in Section 1.10.2*
[OSHPD 4] *- For applications listed in Section 1.10.4*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

2. (Reserved for DSA)

...

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 2406.3.

...

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 and OSHPD 1, 1R, 2, 4 and 45] *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.*

Exception: *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

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 m², × 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, OSHPD 1, 1R, 2, 4 & ~~4~~5]
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.

Exception: [OSHPD 2] *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

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 SSG~~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.*

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.*

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. *Joints 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 SSG~~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.*

SECTION 2411 [OSHPD 1, 1R, 2, 4 & 5] THERMAL BARRIERS IN ALUMINUM MULLION SYSTEMS

2411.1 General. *The requirements of this section address the use of thermal barriers composite in aluminum mullion systems. The thermal barriers shall consist of either poured and debridged or mechanically locked pre-formed construction. The thermal barrier systems used shall be those tested and complying with AAMA TIR-A8. The thermal barrier manufacturer, formulation number or insulating strut size/material and aluminum extrusions shall be consistent between testing, design and construction.*

Exception: *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

2411.1.1 Structural Design. *Structural design of thermal barrier mullions shall satisfy the following requirements:*

1. *The allowable design stresses for thermal barrier materials composite with aluminum extrusions shall be determined by AAMA TIR-A8 testing for in-plane shear, tension and eccentric load at a minimum of ambient and high temperature using a factor of safety determined by AAMA TIR-A8 Section 6.7.*

2. *The shear modulus, G_c, of the thermal barrier in similar composite aluminum extrusions shall be determined by AAMA TIR-A8 testing for flexure in AAMA TIR-A8 Section 7.2 at a minimum of ambient and high temperature.*

3. *The aluminum extrusions used to determine allowable stresses in the thermal barriers and the shear modulus G_c shall be from a specific aluminum extrusion manufacturer and the aluminum sections used in the project. The similarity of the composite aluminum extrusions shall be subject to approval by the building official.*

4. *The effective moment of inertia of the in-plane composite thermal barrier-aluminum section used in flexural design, based upon the tested G_c, shall not exceed 85% of the moment of inertia of the combined unbridged aluminum portions of the composite section, unless substantiated and approved by the building official.*

5. *A high temperature of not less than 120 degrees Fahrenheit shall be used for composite section flexure design for wind pressure where the historical high temperature exceeds 100 degrees F. The minimum high temperature for in-plane shear, tension and eccentric load thermal barrier design shall be determined by AAMA TIR-A8 Section 6.5.*

6. *The lowest allowable stress value and shear modulus G_c from the ambient and high temperature testing shall be used for design.*

7. *Structural analysis and design for loads on pour and debridged thermal barriers with skip-debridging that has not been tested under AAMA TIR-A8 with skip-debridged test specimens for the specific actions or load direction shall be based upon the relative stiffness between the remaining aluminum bridge and the thermal barrier material and size.*

8. *Reactions on supporting thermal barrier mullions where the thermal barrier resists the concentrated load, the load shall not be assumed to be distributed over a length greater than 12 inches (305 mm) on the supporting mullion.*

9. *Mechanically locked pre-formed thermal barriers shall be designed and used in pairs.*

2411.1.2 Testing and Inspection. *Testing and Inspection of thermal barrier mullions shall satisfy the following requirements:*

1. *Thermal barrier material properties shall be tested in accordance with AAMA TIR-A8 Section 6.1 by the manufacturer. All other testing shall done by an approved testing laboratory or agency.*

2. *Testing shall include AAMA TIR-A8 Section 7.2 for the flexural tests using the composite section under ambient and high temperature. Thermocouples shall be placed on the outside and interior surfaces and in the middle of the thermal barrier for high temperature testing. Test cycles shall be in accordance with AAMA TIR-A8 Section 7.2.3.*

3. *Testing shall include AAMA TIR-A8 Section 7.3 for in-plane shear, tension and eccentric load using the composite section under ambient and high temperature.*

4. *The flexural test for the composite section shall include a span length of 12 feet (3660 mm). The maximum P load in the test shall generate close to a L/175 deflection, where L is the span length, center to center of supports, but shall not exceed the allowable design stresses for the aluminum composite section in meeting that deflection. Permanent deflection shall not exceed the requirement in AAMA TIR-A8 Section 7.2.2.5.*

5. *A minimum of two different simple span lengths shall be used to determine G_c under the flexural test. The span lengths tested shall include a short span.*

6. *The shear modulus, G_c, of the thermal barrier shall be determined using the lowest average I_{et} from the flexural testing for each composite aluminum extrusion, temperature and span length tested.*

7. *Each different composite aluminum extrusion in the project shall be tested to the requirements of AAMA TIR-A8. The magnitude of eccentricity of load on the thermal barrier shall be considered in selecting composite aluminum extrusions for testing.*

8. *The applicability of existing AAMA TIR-A8 testing of thermal barrier mullions that satisfy the requirements of this section shall be permitted, in lieu of project specific tests, when approved by the building official.*

9. *Periodic special inspection to insure compliance with the AAMA TIR-A8 processing for the thermal isolator material shall be performed. Inspections shall include tests of thermal barrier material properties per manufacturer's recommendation and AAMA TIR-A8 Section 6.1 and composite performance requirements per AAMA TIR-A8 Sections 7.2 and 7.3.*

10. *Periodic special inspection of pour and debridge thermal barrier shall include:*
    a. *Verification that the thermal barrier formulation being used matches that in the design and construction documents.*

    b. *Verification that poured wet or dry shrinkage as set forth in AAMA TIR-A8 section 4.1.3.1 does not occur.*

    c. *Proper adhesion of poured thermal barrier material per AAMA TIR-A8 Section 4.2.1.*

    d. *Confirmation of proper manufacturing process per manufacturer's recommendations and AAMA TIR-A8 Section 4.3.*

    e. *Inspection of fabrication and handling practices in accordance with AAMA TIR-A8 Sections 4.3 and 4.4.*

    f. *Testing for thermal barrier material properties per manufacturer's recommendation and AAMA TIR-A8 Section 6.1.*

    g. *Periodic special inspection of the removal of the temporary thermal bridge shall be provided to assure that no thermal barrier material is removed in the process.*

11. *Periodic special inspection of mechanically locked pre-formed thermal barrier shall include:*
    a. *Verification that the insulating struts being used matches that in the design and construction documents.*

    b. *Verification that the mechanical lock cavity distortion and locking distortion does not exist as set forth in AAMA TIR-A8 sections 4.1.3.3 and 4.1.3.4.*

    c. *Verification of proper knurling of the aluminum and crimping of the insulating struts per AAMA TIR-A8 Section 4.2.2.*

    d. *Confirmation of proper manufacturing process per manufacturer's recommendations and AAMA TIR-A8 Section 4.5.*

    e. *Inspection of fabrication and handling practices in accordance with AAMA TIR-A8 Sections 4.5 and 4.6.*

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

NOTATION:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275, 129850 and 129790

CHAPTER 25
GYPSUM BOARD, GYPSUM PANEL PRODUCTS AND PLASTER

…

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 Application. [OSHPD] *The scope of application of Chapter 25 is as follows:*

1. Applications listed in Sections 1.10.1, 1.10.2, 1.10.4 and 1.10.5 regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals, hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings, correctional treatment centers and acute psychiatric hospital buildings.

2. (Reserved for DSA)

2501.1.2 Amendments in this chapter. [OSHPD] *OSHPD 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. OSHPD amendments appear in this chapter preceded with the appropriate acronym, as follows:

[OSHPD 1] *- For applications listed in Section 1.10.1*
[OSHPD 1R] *- For applications listed in Section 1.10.1*

[OSHPD 2] *- For applications listed in Section 1.10.2*
[OSHPD 4] *- For applications listed in Section 1.10.4*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

2. (Reserved for DSA)

2501.1.1~~3~~3 Additional Requirements. [DSA-SS, DSA-SS/CC and OSHPD 1, 1R, 2, 4 &~~4~~5] *Details of attachment for wall and ceiling coverings which are not provided for in this code shall be detailed in the approved construction documents.*

Exception: *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

...

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 and OSHPD 1, 1R, 2, 4 &~~4~~5]

1. Lath, 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 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.

4. The testing of gypsum board and gypsum panel products shall conform with standards listed in Table 2506.2.

Exception: [OSHPD 2] *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

...

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 and OSHPD 1, 1R, 2, 4 &~~4~~5] *In addition to the requirements of this section, the horizontal and vertical assemblies of plaster, gypsum board or gypsum panel products shall be designed to resist the loads specified in this code.*

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.

Exception: [OSHPD 2] *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

SECTION 2505
SHEAR WALL CONSTRUCTION

…

2505.3 [DSA-SS, DSA-SS/CC and OSHPD 1, 1R, 2, 4 & 45] *Section 2505.1 and 2505.2 are not permitted.*

> ***Exception: [OSHPD 2]*** *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

…

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 conform to the provisions of Chapter 7.

2507.3 Lath attachment to horizontal wood supports. [DSA-SS, DSA-SS/CC and OSHPD 1, 1R, 2, 4 & 45] *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.

Exception: [OSHPD 2] *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

SECTION 2508
GYPSUM CONSTRUCTION

2508.1 General.

…

2508.6~~5~~.6 Diaphragm ceiling connection to partitions. [DSA-SS, DSA-SS/CC and OSHPD 1, 1R, 2, 4 &~~4~~5] *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.*

Exception: [OSHPD 2] *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

…

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: [DSA-SS and OSHPD 1, 1R, 2, 4 &~~4~~5] *Reinforced gypsum concrete shall be considered as an alternative system, except for [OSHPD 2] single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction.*

…

(All existing amendments are continued without any change)

NOTATION:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275, 129850, and 129790

CHAPTER 26
PLASTIC

2601.1 Scope. These provisions shall govern the materials, design, application, construction and installation of foam plastic, foam plastic insulation, plastic veneer, interior plastic finish and trim, light-transmitting plastics and plastic composites, including plastic lumber. See Chapter 14 for requirements for exterior wall finish and trim.

2601.1.1 Application. [OSHPD] *The scope of application of Chapter 26 is as follows:*

1. Applications listed in Sections 1.10.1, 1.10.2, 1.10.4 and 1.10.5 regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals, hospital buildings removed from general acute care service, skilled nursing facility buildings, intermediate care facility buildings, correctional treatment centers and acute psychiatric hospital buildings.

2. (Reserved for DSA)

2601.1.2 Amendments in this chapter. [OSHPD] *OSHPD 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. OSHPD amendments appear in this chapter preceded with the appropriate acronym, as follows:

[OSHPD 1] *- For applications listed in Section 1.10.1*
[OSHPD 1R] *- For applications listed in Section 1.10.1*
[OSHPD 2] *- For applications listed in Section 1.10.2*
[OSHPD 4] *- For applications listed in Section 1.10.4*
[OSHPD 5] *- For applications listed in Section 1.10.5.*

2. (Reserved for DSA)

…

SECTION 2603

FOAM PLASTIC INSULATION

…

2603.11 Cladding attachment over foam sheathing to masonry or concrete wall construction.

…

2603.11.1 Additional Requirements. [OSHPD 1, 1R, 2, 4 & 5, 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 fur-ring attachments through foam sheathing to cold-formed steel 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 1407.

3. For anchored masonry or stone veneer installed over foam sheathing, refer to Section 1404.

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. [OSHPD 1, 1R, 2, 4 & 5, 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.*

2603.13 Cladding attachment over foam sheathing to wood framing. Cladding shall be specified and installed in accordance with Chapter 14 and the cladding manufacturer's installation instructions. 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 2603.13.1 and 2603.13.2, 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 1407.

3. For anchored masonry or stone veneer installed over foam sheathing, refer to Section 1404.

2603.13.1 Direct attachment. Where cladding is installed directly over foam sheathing without the use of furring, minimum fastening requirements to support the cladding weight shall be as specified in Table 2603.13.1.

2603.13.2 Furred cladding attachment. Where 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 2603.13.2. 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.

2603.13.3 Additional requirements. [OSHPD 1, 1R, 2, 4 & 5] *In addition to the requirements of Section 2603.13, 2603.13.1, and 2603.13.2, cladding and foam sheathing supports and attachments shall be designed and submitted to the enforcement agency for approval.*

…

(All existing amendments are continued without any change)

NOTATION:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275, 129850, and 129790

~~***CHAPTER 34A***~~
~~***EXISTING STRUCTURES***~~

…

(Relocated into Title 24, Part 10 – California Existing Building Code, Chapters 2A, 3A, 4A and 5A)

NOTATION:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275, 129850, and 129790

CHAPTER 35
REFERENCED STANDARDS

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.

[OSHPD 1 & 4] 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.*

. . .

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*

TIR A8-16	*Structural Performance of Composite Thermal Barrier Framing Systems*	*2411.1*

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.3,1810A.3.10.4, 1901.3.4.4,1903A, 1904A, 1905A, 1910A.5.4*
355.2-07	*Qualification of Post-Installed Mechanical Anchors in Concrete and& Commentary*	*1616A.1.19*
355.4-11	*Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary*	*1616A.1.19*
440.2R-08	*Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures*	*1911A.3 1911.3*
. . .		
503.7-07	*Specification for Crack Repair by Epoxy Injection.*	*1911A.2 1911.2*
506R-05 16	*Guide to Shotcrete*	*1908.1, 1908.3, 1908.12, 1908A.1, 1908A.3 1908A.12 1911A.2*
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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
341-16	Seismic Provisions for Structural Steel Buildings	*1705A.2.1, 2212.2, 2205A, 2206A 2205.3*
358- 10 16	*Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications including Supplements No. 1 & 2*	*2212.3, 2205A, 2206A.2 2205.4, 2206.2.1*

360-16	Specifications for Structural Steel Buildings	*1705A.2.1, Table 1705A.2.1, 2212.1.1, 2204A.4, 2212A.1.2. 2212A.2.1 <u>2204.4</u>*

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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*~~	~~Standard for Wood Products - Structural Glued Laminated Timber~~	~~*1705A.5.4*~~

APA	APA - Engineered Wood Association 7011 South 19th Street Tacoma, WA 98466	
ANSI 117–15 (Moved from WCLIB)	Standard Specification for Structural Glued Laminated Timber of Softwood Species	*<u>2303.1.3.1,</u>* 2306.1
ANSI/APA A190.1–17	Structural Glued Laminated Timber	*1705A.5.4*

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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
. . .		
7-16	Minimum Design Loads for Buildings and Other	*104.11, 202, 1616.9,*

	Structures including Supplement No. 1	*1616.10,1603A.2 1613A, 1616~~7~~A, 1803A.6, 2114.13, 2210A.2, 2212A.2.4, 2410.1.1, 2410.1.2,*
. . .		
19-*10*	Structural Application of Steel Cables for Buildings	*2208A.1*
. . .		
24 -14	Flood Resistant Design and Construction	1203.4.2,1612.4, 1612A.4, 1612.5, 1612A.5, 2702.1.7, 3001.2
. . .		
41- 13	*Seismic Evaluation and Retrofit of Existing Buildings*	*1603A.2, ~~1616A.1.30, 3406A,~~ ~~3412A, 3413A~~*
49 -*12*	Wind Tunnel Testing for Buildings and Other Structures	1609.1.1, *1609A.1.1*

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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~~ *16a*	Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware	*2304.10.1.1*
~~*A370 – 13*~~	~~*Standard Test Methods and Definitions for Mechanical Testing of Steel Products*~~	~~*3413A.1.3*~~
. . .		
A 722/A722M-~~*12*~~ *15*	Specifications for Uncoated High-strength Steel Bar for Prestressing Concrete	*1812A.4.2, 1811A.4 1812.4.2, 1811.4*
. . .		
A1064-~~13~~ 17	*Standard Specification for Carbon steel wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete*	*1903A.8 1903.8*
. . .		
B 695-04 *(~~2009~~ 2016)*	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel Strip for Building Construction	*2304.10.1.1*
. . .		
~~*C90-14*~~	~~*Standard Specification for Load Bearing Concrete Masonry Units*~~	~~*2105A.2*~~
C 94/C94M- ~~*14a*~~ *17*	Specifications for Ready Mix Concrete	*1705A.3.3.1*
. . .		
C150-~~*12*~~ *17*	Specification for Portland Cement	*1910A.1*
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C270-*14a*	Specifications for Mortar for Unit Masonry	*2105A.3* *2105.3*
. . .		
C595-~~*13*~~ *17*	Specification for Blended Hydraulic Cement	*1910A.1*
. . .		
C618 – ~~12a~~ 15	*Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*	*1910A.1*
. . .		
C635/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, 1616~~7~~A.1.21*
C636/C 636M - *13*	Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels	*1616.10.16, 1616~~7~~A.1.21*
. . .		
C989-~~13~~ 16e1	*Standard Specification for Slag Cement for Use in Concrete and Mortars*	*1910A.1*
. . .		
C1019-~~*13*~~ *16*	Test Method of Sampling and Testing Grout	*2105A.3, 2114.6.1* *2105.3*
. . .		
C1157/C1157M-~~11~~17	*ASTM Standard Performance Specification for Hydraulic Cement*	*1910A.1*
. . .		
C 1249-06a (2010)	*Standard Guide for Secondary Seal for Sealed Insulated Glass Units for Structural Sealant Glazing Applications*	*2410.1.1*
. . .		
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C 1392-00 (2014)	*Standard Guide for Evaluating Failure of Structural Sealant Glazing*	*2410.1.3*
C 1394-03 (2012)	*Standard Guide for In-Situ Structural Silicone Glazing Evaluation*	*2410.1.3*
. . .		
C 1401-14	*Standard Guide for Structural Sealant Glazing*	*2410.1*
. . .		
C1586-05 (2011)	*Standard Guide for Quality Assurance of Mortars*	*2105A.3* *2105.3*
. . .		
D1586 –11	*Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*	*1813A* *1813*
. . .		
D5778-12	*Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils*	*1813A* *1813*
. . .		
D3966-07 (2013)	*Standard Test Method for Piles Under Lateral Loads*	*1810A.3.3.2*
. . .		
E580- ~~14~~ 17	*Standard Practice for Installation of Ceiling Suspension Systems of Acoustical Tile and Lay-in*	*1616~~7~~A.1.21*

	Panels in Areas Subject to Earthquake Ground Motions	
. . .		
E3121-17	*Standard Test Methods for Field Testing of Anchors in Concrete or Masonry*	*1901.3.4.2* *1910A.5.2*
. . .		
F606-14 16	*Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets*	*2213A.1* *2213.1*
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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 *2018*	National Design Specifications (NDS) for Wood Construction	*1905A.1.8 …*

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AWPA	American Wood Products Association P.O. Box 361784 Birmingham. AL 35236-1784	
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U1-*14 17*	USE CATEGORY SYSTEM: User Specification for Treated Wood Except Section 6, Commodity Specification H	*1812A.2* *1812.2*

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AWS	American Welding Society 550 N.W. LeJeune Road Miami, FL 33126	
Standard reference number	Title	Referenced in code section number
D1.1- ~~10~~ 15	*Structural Welding Code-Steel*	*Table 1705A.2.1, 1705A.2.5, 2212.6.2, 2213A.2 2213.2 2204.1.1, 2204A.1.1*
D1.2-15	*Structural Welding Code-Aluminum*	*2003.1*
D1.3-08	Structural Welding Code-Sheet Steel	*Table 1705A.2.1, 1705A.2.5*
D1.4-11	Structural Welding Code – Reinforcing Steel	*1705.2.5,Table 1705A.2.1, ~~1705.2.2.1.2,~~ ~~2107A.3,~~ 1705A.2.5, ~~2107A.4~~ 1705A.3.1, 1903A.8, 1704A.5, 1903.8*
D1.8-~~09~~ 16	*Structural Welding Code – Seismic Supplement*	*1705.2.5, 1705A.2.5*
QC1-~~07~~ 16	*Standard for AWS Certification of Welding Inspectors*	*1705.2.5, 1705A.2.5*

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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 1950-16	*American National Standard for Seismic Sway Braces for Pipe, Tubing and Conduit*	*1705.13.2, 1705A.13.2*
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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 – ~~15~~ 18**	*Acceptance criteria for expansion anchors in Masonry elements*	*1616~~7~~A.1.19*
*ICC-ES AC 58 - ~~15~~ 18**	*Acceptance criteria for Adhesive anchors in Masonry elements*	*1616~~7~~A.1.19*
*ICC-ES AC 70 - ~~15~~ 18**	*Acceptance criteria for fasteners power-driven into Concrete, Steel and Masonry elements*	*1616~~7~~A.1.20*
*ICC-ES AC 106 - ~~15~~ 18**	*Acceptance criteria for predrilled fasteners (screw anchors) in Masonry*	*1616~~7~~A.1.19*
*ICC-ES AC 125 - ~~15~~ 18**	*Acceptance criteria for Concrete, and Reinforced and Unreinforced Masonry strengthening using externally bonded Fiber-Reinforced Polymer (FRP) composite systems.*	*1911A.3 1911.3*
*ICC-ES AC 156 - ~~15~~ 18**	*Acceptance criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components*	*1705A.13.3*
*ICC-ES AC 178 - ~~15~~ 18**	*Acceptance criteria for inspection and verification of Concrete, and Reinforced and Unreinforced Masonry strengthening using Fiber-Reinforced Polymer (FRP) composite systems.*	*1911A.3 1911.3*
*ICC-ES AC 193 - ~~15~~ 18**	*Acceptance criteria for mechanical anchors in Concrete elements*	*1616~~7~~A.1.19, 1901.3.2*
*ICC-ES AC 232 - ~~15~~ 18**	*Acceptance criteria for anchor channels in Concrete elements*	*1616~~7~~A.1.19, 1901.3.2*
*ICC-ES AC 308 - ~~15~~ 18**	*Acceptance criteria for post-installed adhesive anchors in Concrete elements*	*1616~~7~~A.1.19, 1901.3.3*
*ICC-ES AC 358 - ~~15~~ 18**	*Acceptance criteria for Helical foundation systems and devices*	*1810A.3.1.5.1 1810.3.1.5.1*
*ICC-ES AC 446 - ~~15~~ 18**	*Acceptance criteria for headed cast-in specialty inserts in Concrete*	*1616~~7~~A.1.19, 1901.3.2*

** Refers to International Building Code, ~~2015~~ 2018 as a reference standard.*

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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- 15	*Quality management systems – Requirements*	*1705A.13.3*
~~*ISO 17020-12*~~	~~*Conformity assessment - Requirements for the operation of various types of bodies performing inspection*~~	~~*1704A.2*~~
~~*ISO 17025-05*~~	~~*General requirement for competence of testing and calibration laboratories*~~	~~*1703A.4*~~

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PCI	Precast Prestressed Concrete Institute 200 West Adams Street, Suite 2100 Chicago, IL 60606-5230	
Standard reference number	Title	Referenced in code section number
. . .		
~~*PCI*~~ *MNL-120-17* ~~*10*~~	*PCI Design Handbook, 8th* ~~*7th*~~ *Edition*	*1905A.1.1, 1905A.1.2*

PTI	Post-Tensioning Institute 8601 North Black Canyon Highway, Suite 103 Phoenix, AZ 85021	
Standard reference number	Title	Referenced in code section number
. . .		
PTI DC35.1-14 ~~*-2004*~~	*Recommendations for Prestressed Rock and Soil Anchors* ~~*(4th Edition)*~~	*1810A.3.10.4, 1811A.2, 1812A.4, 1812A.5,1813A.2* *1810.3.10.4.1, 1811.2, 1812.4, 1812.5,1813.2*

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TMS	The Masonry Society 3970 Broadway, Unit 201-D Boulder, CO 80304-1135	
Standard reference number	Title	Referenced in code section number
. . .		
402— ~~2013~~2016	Building Code Requirements for Masonry Structures	*2107.4, 2107.5, 2107A.5, 2107.6, 2107A.6 2105A.3, 2106A.1.1*
602-~~2013~~2016	Specification for Masonry Structures	*2105A.3, 2104A.1.3, 2105A.2 1705.4, 1705A.4, 2103.4, 2104.1, 2105.3, 2105.5, 2105A.5, 2105A.6, 2105.6 2105A.1.3.1.2, 2104A.1.3.1.1*

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UL	UL LLC 333 Pfingsten Road Northbrook, IL 60062-2096	
Standard reference number	Title	Referenced in code section number
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857— 13	*Busways*	*1705A.13.3.1*
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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~~ (Moved to APA)	~~Standard Specifications for Structural Glued Laminated Timber of Softwood Species~~	~~*2303.1.3.1*~~
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AITC 404-05	*Standard for Radially Reinforcing Curved Glued Laminated Timber Members to Resist Radial Tension*	*2303.1.3.1*

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

NOTATION:
Authority: Health and Safety Code Section 130005(g) & 130021
Reference: Health and Safety Code Section 1275, 129790, 129850 & 130005(g)