REVISION RECORD FOR THE STATE OF CALIFORNIA

SUPPLEMENT

January 1, 2009

2007 Title 24, Part 2, California Building Code

PLEASE NOTE: The date of this supplement is for identification purposes only.
See the History Note Appendix for the adoption and effective dates of the provisions.

It is suggested that the section number as well as the page number be checked when inserting this material and removing the superseded material. In case of doubt, rely on the section numbers rather than the page numbers because the section numbers must run consecutively.

It is further suggested that the material be retained with this revision record sheet so that the prior wording of any section can be easily ascertained.

Please keep the removed pages with this revision page for future reference.

Note

Due to the fact that the application date for a building permit establishes the California Building Standards code provisions that are effective at the local level, which apply to the plans, specifications, and construction for that permit, it is strongly recommended that the removed pages be retained for historical reference.

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California Code of Regulations, Title 24

California Agency Information Contact List

California Energy Commission

Energy Hotline. . . . . (800) 772-3300
Building Efficiency Standards
Appliance Efficiency Standards
Compliance Manual/Forms

California State Lands Commission

Marine Oil Terminals . . . . . (562) 499-6317

California State Library

Construction Standards. . . . . (918) 445-9604

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Office Standards . . . . . (916) 445-3021

Department of Consumer Affairs – Board of Pharmacy

Pharmacy Standards . . . . . (916) 574-7900

Department of Consumer Affairs – Bureau of Barbering and Cosmetology

Barber and Beauty Shop and
College Standards . . . . . (916) 952-5210

Department of Consumer Affairs – Bureau of Home Furnishings and Thermal Insulation

Insulation Testing Standards . . . . . (916) 574-2041

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Structural Standards . . . . . (800) 737-8188

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Veterinary Hospital Standard . . . . . (916) 263-2610

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Essential Services Building Standards . . . . . (916) 445-8100

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Fire Safety Standards. . . . . (916) 445-8200
Fireplace Standards. . . . . (916) 445-8200
Day Care Centers Standards. . . . . (916) 445-8200
Exit Standards . . . . . (916) 445-8200

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

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
1. Apartments (see residential)	—	—
2. Access floor systems		
Office use	50	2,000
Computer use	100	2,000
3. Armories and drill rooms	150	—
4. Assembly areas and theaters		
Fixed seats (fastened to floor)	60	
Follow spot, projections and control rooms	50	—
Lobbies	100	
Movable seats	100	
Stages and platforms	125	
5. Balconies	100	
On one- and two-family residences only, and not exceeding 100 sq ft	60	—
6. Bowling alleys	75	—
7. Catwalks	40	300
8. Dance halls and ballrooms	100	—
9. Decks	Same as occupancy served[h]	—
10. Dining rooms and restaurants	100	—
11. Dwellings (see residential)	—	—
12. Cornices	60	—
13. Corridors, except as otherwise indicated	100	—
14. Elevator machine room grating (on area of 4 in^2)	—	300
15. Finish light floor plate construction (on area of 1 in^2)	— —	200
16. Fire escapes	100	
On single-family dwellings only	40	—
17. Garages (passenger vehicles only)	40	Note a
Trucks and buses	See Section 1607*A*.6	
18. Grandstands (see stadium and arena bleachers)	—	—
19. Gymnasiums, main floors and balconies	100	—
20. Handrails, guards and grab bars	See Section 1607*A*.7	
21. Hospitals		
Corridors above first floor	80	1,000
Operating rooms, laboratories	60	1,000
Patient rooms	40	1,000
22. Hotels (see residential)	—	—
23. Libraries		
Corridors above first floor	80	1,000
Reading rooms	60	1,000
Stack rooms	150[b]	1,000

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
24. Manufacturing		
Heavy	250	3,000
Light	125	2,000
25. Marquees	75	—
26. Office buildings		
Corridors above first floor	80	2,000
File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—-	—-
Lobbies and first-floor corridors	100	2,000
Offices	50	2,000
27. Penal institutions		
Cell blocks	40	—-
Corridors	100	
28. Residential		
One- and two-family dwellings		
Uninhabitable attics without storage[i]	10	
Uninhabitable attics with limited storage[i, j, k]	20	
Habitable attics and sleeping areas	30	
All other areas except balconies and decks	40	—-
Hotels and multiple-family dwellings		
Private rooms and corridors serving them	40	
Public rooms and corridors serving them	100	
29. Reviewing stands, grandstands and bleachers	Note c	
30. Roofs		
All roof surfaces subject to maintenance workers		300
Awnings and canopies		
Fabric construction supported by a lightweight rigid skeleton structure	5 nonreduceable	
All other construction	20	
Ordinary flat, pitched, and curved roofs		
Primary roof members, exposed to a work floor		
Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs:		
Over manufacturing, storage warehouses, and repair garages		2,000
All other occupancies		300
Roofs used for other special purposes	Note 1	Note 1
Roofs used for promenade purposes	60	
Roofs used for roof gardens or assembly purposes	100	

TABLE 1607.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
31. Schools		
Classrooms	40	1,000
Corridors above first floor	80	1,000
First-floor corridors	100	1,000
32. Scuttles, skylight ribs and accessible ceilings	—	200
33. Sidewalks, vehicular driveways and yards, subject to trucking	250[d]	8,000[e]
34. Skating rinks	100	—
35. Stadiums and arenas		
Bleachers	100[c]	—
Fixed seats (fastened to floor)	60[c]	
36. Stairs and exits		Note f
One- and two-family dwellings	40	
All other	100	
37. Storage warehouses (shall be designed for heavier loads if required for anticipated storage)		
Heavy	250	
Light	125	
38. Stores		
Retail		
First floor	100	1,000
Upper floors	75	1,000
Wholesale, all floors	125	1,000
39. Vehicle barriers	See Section 1607.7.3	
40. Walkways and elevated platforms (other than exitways)	60	—
41. Yards and terraces, pedestrians	100	—
42. [OSHPD 2] Storage racks and wall-hung cabinets	*Total loads [m]*	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kN/m^2, 1 pound = 0.004448 kN, 1 pound per cubic foot = 16 kg/m^3

a. Floors in garages or portions of buildings used for the storage of motor vehicles shall be designed for the uniformly distributed live loads of Table 1607.1 or the following concentrated loads: (1) for garages restricted to vehicles accommodating not more than nine passengers, 3,000 pounds acting on an area of 4.5 inches by 4.5 inches; (2) for mechanical parking structures without slab or deck which are used for storing passenger vehicles only, 2,250 pounds per wheel.

b. The loading applies to stack room floors that support nonmobile, double-faced library bookstacks, subject to the following limitations:
   1. The nominal bookstack unit height shall not exceed 90 inches;
   2. The nominal shelf depth shall not exceed 12 inches for each face; and
   3. Parallel rows of double-faced bookstacks shall be separated by aisles not less than 36 inches wide.

c. Design in accordance with the ICC *Standard on Bleachers, Folding and Telescopic Seating and Grandstands*.

d. Other uniform loads in accordance with an approved method which contains provisions for truck loadings shall also be considered where appropriate.

e. The concentrated wheel load shall be applied on an area of 20 square inches.

f. Minimum concentrated load on stair treads (on area of 4 square inches) is 300 pounds.

g. Where snow loads occur that are in excess of the design conditions, the structure shall be designed to support the loads due to the increased loads caused by drift buildup or a greater snow design determined by the building official (see Section 1608). For special-purpose roofs, see Section 1607.11.2.2.

h. See Section 1604.8.3 for decks attached to exterior walls.

i. Attics without storage are those where the maximum clear height between the joist and rafter is less than 42 inches, or where there are not two or more adjacent trusses with the same web configuration capable of containing a rectangle 42 inches high by 2 feet wide, or greater, located within the plane of the truss. For attics without storage, this live load need not be assumed to act concurrently with any other live load requirements.

j. For attics with limited storage and constructed with trusses, this live load need only be applied to those portions of the bottom chord where there are two or more adjacent trusses with the same web configuration capable of containing a rectangle 42 inches high by 2 feet wide or greater, located within the plane of the truss. The rectangle shall fit between the top of the bottom chord and the bottom of any other truss member, provided that each of the following criteria is met:
   i. The attic area is accessible by a pull-down stairway or framed opening in accordance with Section 1209.2, and
   ii. The truss shall have a bottom chord pitch less than 2:12.
   iii. Bottom chords of trusses shall be designed for the greater of actual imposed dead load or 10 psf, uniformly distributed over the entire span.

k. Attic spaces served by a fixed stair shall be designed to support the minimum live load specified for habitable attics and sleeping rooms.

l. Roofs used for other special purposes shall be designed for appropriate loads as approved by the building official.

m. [OSHPD 2] The minimum vertical design live load shall be as follows:

Paper media:

12-inch-deep shelf — 33 pounds per lineal foot

15-inch-deep shelf — 41 pounds per lineal foot, or

33 pounds per cubic foot per total volume of the rack or cabinet, whichever is less,

Film media:

18-inch-deep shelf — 100 pounds per lineal foot, or

50 pounds per cubic foot per total volume of the rack or cabinet, whichever is less,

Other media:

20 pounds per cubic foot or 20 pounds per square foot, whichever is less but not less than actual loads.

1607.7.3 Vehicle barriers. Vehicle barrier systems for passenger cars shall be designed to resist a single load of 6,000 pounds (26.70 kN) applied horizontally in any direction to the barrier system and shall have anchorage or attachment capable of transmitting this load to the structure. For design of the system, the load shall be assumed to act at a minimum height of 1 foot, 6 inches (457 mm) above the floor or ramp surface on an area not to exceed 1 square foot (305 mm^2), and is not required to be assumed to act concurrently with any handrail or guard loadings specified in the preceding paragraphs of Section 1607.7.1. Garages accommodating trucks and buses shall be designed in accordance with an approved method that contains provision for traffic railings.

1607.8 Impact loads. The live loads specified in Section 1607.3 include allowance for impact conditions. Provisions shall be made in the structural design for uses and loads that involve unusual vibration and impact forces.

1607.8.1 Elevators. Elevator loads shall be increased by 100 percent for impact and the structural supports shall be designed within the limits of deflection prescribed by ASME A17.1.

1609.1.1 Determination of wind loads. Wind loads on every building or structure shall be determined in accordance with Chapter 6 of ASCE 7 *[BSC, OSHPD 2, HCD 1 & HCD 2] or provisions of the Alternate All-Heights Method in Section 1609.6*. The type of opening protection required, the basic wind speed and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

Exceptions:

1. Subject to the limitations of Section 1609.1.1.1, the provisions of SBCCI SSTD 10 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the AF&PA WFCM.
3. Designs using NAAMM FP 1001.
4. Designs using TIA/EIA-222 for antenna-supporting structures and antennas.
5. *[OSHPD 2] Exception in Section 1609.4 shall apply to ASCE 7.*

1609.1.1.1 Applicability. The provisions of SSTD 10 are applicable only to buildings located within Exposure B or C as defined in Section 1609.4. The provisions of SBCCI SSTD 10 and the AF&PA WFCM shall not apply to buildings sited on the upper half of an isolated hill, ridge or escarpment meeting the following conditions:

1. The hill, ridge or escarpment is 60 feet (18 288 mm) or higher if located in Exposure B or 30 feet (9144 mm) or higher if located in Exposure C;
2. The maximum average slope of the hill exceeds 10 percent; and
3. The hill, ridge or escarpment is unobstructed upwind by other such topographic features for a distance from the high point of 50 times the height of the hill or 1 mile (1.61 km), whichever is greater.

1609.1.2 Protection of openings. In wind-borne debris regions, glazing in buildings shall be impact-resistant or protected with an impact-resistant covering meeting the requirements of an approved impact-resisting standard or ASTM E 1996 and ASTM E 1886 referenced therein as follows:

1. Glazed openings located within 30 feet (9144 mm) of grade shall meet the requirements of the Large Missile Test of ASTM E 1996.
2. Glazed openings located more than 30 feet (9144 mm) above grade shall meet the provisions of the Small Missile Test of ASTM E 1996.

Exceptions:

1. Wood structural panels with a minimum thickness of $^{7}/_{16}$ inch (11.1 mm) and maximum panel span of 8 feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut so that they shall be attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be secured with the attachment hardware provided. Attachments shall be designed to resist the components and cladding loads determined in accordance with the provisions of ASCE 7. Attachment in accordance with Table 1609.1.2 is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where wind speeds do not exceed 130 mph (57.2 m/s).
2. Glazing in Occupancy Category I buildings as defined in Section 1604.5, including greenhouses that are occupied for growing plants on a production or research basis, without public access shall be permitted to be unprotected.
3. Glazing in Occupancy Category II, III or IV buildings located over 60 feet (18 288 mm) above the ground and over 30 feet (9144 mm) above aggregate surface roofs located within 1,500 feet (458 m) of the building shall be permitted to be unprotected.

1609.1.2.1 Louvers. Louvers protecting intake and exhaust ventilation ducts not assumed to be open that are located within 30 feet (9144 mm) of grade shall meet requirements of an approved impact-resisting standard or the Large Missile Test of ASTM E 1996.

TABLE 1609.1.2
WIND-BORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS[a,b,c,d]

FASTENER TYPE	FASTENER SPACING (inches)		
	Panel Span £ 4 feet	4 feet < Panel Span £ 6 feet	6 feet < Panel Span £ 8 feet
No. 6 screws	16	12	9
No. 8 screws	16	16	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.4 N, 1 mile per hour = 0.44 m/s.

a. This table is based on a maximum wind speed (3-second gust) of 130 mph and mean roof height of 33 feet or less.

b. Fasteners shall be installed at opposing ends of the wood structural panel. Fasteners shall be located a minimum of 1 inch from the edge of the panel.

c. Fasteners shall be long enough to penetrate through the exterior wall covering a minimum of 1.75 inches into wood wall framing; a minimum of 1.25 inches into concrete block or concrete; or into steel framing by at least three threads. Fasteners shall be located a minimum of 2.5 inches from the edge of concrete block or concrete.

d. Where screws are attached to masonry or masonry/stucco, they shall be attached utilizing vibration-resistant anchors having a minimum withdrawal capacity of 490 pounds.

1609.2 Definitions. The following words and terms shall, for the purposes of Section 1609, have the meanings shown herein.

HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes defined as:

1. The U. S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed is greater than 90 mph (40 m/s) and
2. Hawaii, Puerto Rico, Guam, Virgin Islands and American Samoa.

WIND-BORNE DEBRIS REGION. Portions of hurricane-prone regions that are within 1 mile (1.61 km) of the

coastal mean high water line where the basic wind speed is 110 mph (48 m/s) or greater; or portions of hurricane-prone regions where the basic wind speed is 120 mph (53 m/s) or greater; or Hawaii.

1609.3 Basic wind speed. The basic wind speed, in mph, for the determination of the wind loads shall be determined by Figure 1609. Basic wind speed for the special wind regions indicated, near mountainous terrain and near gorges shall be in accordance with local jurisdiction requirements. Basic wind speeds determined by the local jurisdiction shall be in accordance with Section 6.5.4 of ASCE 7.

In nonhurricane-prone regions, when the basic wind speed is estimated from regional climatic data, the basic wind speed shall be not less than the wind speed associated with an annual probability of 0.02 (50-year mean recurrence interval), and the estimate shall be adjusted for equivalence to a 3-second gust wind speed at 33 feet (10 m) above ground in Exposure Category C. The data analysis shall be performed in accordance with Section 6.5.4.2 of ASCE 7.

1609.3.1 Wind speed conversion. When required, the 3-second gust basic wind speeds of Figure 1609 shall be converted to fastest-mile wind speeds, V_{fm}, using Table 1609.3.1 or Equation 16-34.

$$V_{fm} = \frac{(V_{3S} - 10.5)}{1.05} \qquad \textbf{(Equation 16-34)}$$

where:

V_{3S} = 3-second gust basic wind speed from Figure 1609.

1609.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features.

Exception: [OSHPD 2] *The wind design shall comply with Exposure C requirements unless the architect or structural engineer in general responsible charge can justify to the enforcement agency that the building site and surrounding terrain conform to the criteria for Exposure B. Minimum data to establish the exposure category shall be a topographic map (e.g., United States Geological Survey quadrangle maps) and aerial photographs except that for Exposure B sites located within urban areas, a vicinity map of sufficient size and scale to verify compliance may be provided.*

1609.4.1 Wind directions and sectors. For each selected wind direction at which the wind loads are to be evaluated, the exposure of the building or structure shall be determined for the two upwind sectors extending 45 degrees (0.79 rad) either side of the selected wind direction. The exposures in these two sectors shall be determined in accordance with Sections 1609.4.2 and 1609.4.3 and the exposure resulting in the highest wind loads shall be used to represent winds from that direction.

1609.4.2 Surface roughness categories. A ground surface roughness within each 45-degree (0.79 rad) sector shall be determined for a distance upwind of the site as defined in Section 1609.4.3 from the categories defined below, for the purpose of assigning an exposure category as defined in Section 1609.4.3.

Surface Roughness B. Urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.

Surface Roughness C. Open terrain with scattered obstructions having heights generally less than 30 feet (9144 mm). This category includes flat open country, grasslands, and all water surfaces in hurricane-prone regions.

Surface Roughness D. Flat, unobstructed areas and water surfaces outside hurricane-prone regions. This category includes smooth mud flats, salt flats and unbroken ice.

1609.4.3 Exposure categories. An exposure category shall be determined in accordance with the following:

Exposure B. Exposure B shall apply where the ground surface roughness condition, as defined by Surface Roughness B, prevails in the upwind direction for a distance of at least 2,600 feet (792 m) or 20 times the height of the building, whichever is greater.

Exception: For buildings whose mean roof height is less than or equal to 30 feet (9144 mm), the upwind distance is permitted to be reduced to 1,500 feet (457 m).

Exposure C. Exposure C shall apply for all cases where Exposures B or D do not apply.

Exposure D. Exposure D shall apply where the ground surface roughness, as defined by Surface Roughness D, prevails in the upwind direction for a distance of at least 5,000 feet (1524 m) or 20 times the height of the building, whichever is greater. Exposure D shall extend inland from the shoreline for a distance of 600 feet (183 m) or 20 times the height of the building, whichever is greater.

TABLE 1609.3.1
EQUIVALENT BASIC WIND SPEEDS[a,b,c]

V_{3S}	85	90	100	105	110	120	125	130	140	145	150	160	170
V_{fm}	71	76	85	90	95	104	109	114	123	128	133	142	152

For SI: 1 mile per hour = 0.44 m/s.

a. Linear interpolation is permitted.

b. V_{3S} is the 3-second gust wind speed (mph).

c. V_{fm} is the fastest mile wind speed (mph).

1609.5 Roof systems.

1609.5.1 Roof deck. The roof deck shall be designed to withstand the wind pressures determined in accordance with ASCE 7.

1609.5.2 Roof coverings. Roof coverings shall comply with Section 1609.5.1.

Exception: Rigid tile roof coverings that are air permeable and installed over a roof deck complying with Section 1609.5.1 are permitted to be designed in accordance with Section 1609.5.3.

Asphalt shingles installed over a roof deck complying with Section 1609.5.1 shall be tested to determine the resistance of the sealant to uplift forces using ASTM D 6381.

Asphalt shingles installed over a roof deck complying with Section 1609.5.1 are permitted to be designed using UL 2390 to determine appropriate uplift and force coefficients applied to the shingle.

1609.5.3 Rigid tile. Wind loads on rigid tile roof coverings shall be determined in accordance with the following equation:

$$M_a = q_h C_L b L L_a [1.0 - G C_p] \qquad \textbf{(Equation 16-35)}$$

For SI: $$M_a = \frac{q_h C_L b L L_a \left[1.0 - G C_p\right]}{1{,}000}$$

where:

b = Exposed width, feet (mm) of the roof tile.

C_L = Lift coefficient. The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined by test in accordance with Section 1715.2.

GC_p = Roof pressure coefficient for each applicable roof zone determined from Chapter 6 of ASCE 7. Roof coefficients shall not be adjusted for internal pressure.

L = Length, feet (mm) of the roof tile.

L_a = Moment arm, feet (mm) from the axis of rotation to the point of uplift on the roof tile. The point of uplift shall be taken at 0.76L from the head of the tile and the middle of the exposed width. For roof tiles with nails or screws (with or without a tail clip), the axis of rotation shall be taken as the head of the tile for direct deck application or as the top edge of the batten for battened applications. For roof tiles fastened only by a nail or screw along the side of the tile, the axis of rotation shall be determined by testing. For roof tiles installed with battens and fastened only by a clip near the tail of the tile, the moment arm shall be determined about the top edge of the batten with consideration given for the point of rotation of the tiles based on straight bond or broken bond and the tile profile.

M_a = Aerodynamic uplift moment, feet-pounds (N-mm) acting to raise the tail of the tile.

q_h = Wind velocity pressure, psf (kN/m^2) determined from Section 6.5.10 of ASCE 7.

Concrete and clay roof tiles complying with the following limitations shall be designed to withstand the aerodynamic uplift moment as determined by this section.

1. The roof tiles shall be either loose laid on battens, mechanically fastened, mortar set or adhesive set.
2. The roof tiles shall be installed on solid sheathing which has been designed as components and cladding.
3. An underlayment shall be installed in accordance with Chapter 15.
4. The tile shall be single lapped interlocking with a minimum head lap of not less than 2 inches (51 mm).
5. The length of the tile shall be between 1.0 and 1.75 feet (305 mm and 533 mm).
6. The exposed width of the tile shall be between 0.67 and 1.25 feet (204 mm and 381 mm).
7. The maximum thickness of the tail of the tile shall not exceed 1.3 inches (33 mm).
8. Roof tiles using mortar set or adhesive set systems shall have at least two-thirds of the tile's area free of mortar or adhesive contact.

1609.6 [BSC, OSHPD 2, HCD 1 & HCD 2] Alternate all-heights method. *The alternate wind design provisions in this section are simplifications of the ASCE 7 Method 2-Analytical Procedure.*

1609.6.1 Scope. *As an alternate to ASCE 7 Section 6.5, the following provisions are permitted to be used to determine the wind effects on regularly shaped buildings, or other structures which meet all of the following conditions:*

1. *The building or other structure is less than or equal to 75 feet height having height to least width ratio of 4 or less, or the building or other structure has a fundamental frequency greater than or equal to 1 hertz.*
2. *The building or other structure is not sensitive to dynamic effects.*
3. *The building or other structure is not located on a site for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.*
4. *The building shall meet the requirements of a simple diaphragm building as defined in ASCE 7 Section 6.2.*

1609.6.1.1 Modifications. *The following modifications shall be made to certain subsections in ASCE 7: Section 1609.6.2 Symbols and Notations that are specific to this section are used in conjunction with the Symbols and Notations in ASCE 7 Section 6.3.*

1609.6.2 Symbols and notations. *Coefficients and variables used in the Alternate All-Heights Method equations are as follows:*

C_{net} = *net-pressure coefficient based on K_d [(G) (Cp) - (GC_{pi})], Ref. Table 1609.6.2(2)*

G = *Gust effect factor equal to 0.85 for rigid structures per ASCE 7 Section 6.5.8.1.*

K_d = *Wind directionality factor per ASCE 7 Table 6-4.*

P_{net} = *Design wind pressure to be used in determination of wind loads on buildings or other structures or their components and cladding, in lb/ft² (N/m²).*

q_s = *Wind velocity pressure in lb/ft² (N/m²). (Per Table 1609.6.2(1))*

1609.6.3 Design equations. *When using the Alternate All-Heights Method, the Main-Wind-Force-Resisting System (MWFRS), and Components and Cladding of every structure shall be designed to resist the effects of wind pressures on the building envelope in accordance with Equation (16-36).*

$$P_{net} = q_s K_z C_{net} [I K_{zt}] \qquad \text{(Equation 16-36)}$$

Design wind forces for the MWFRS shall not be less than 10 lb/ft² (0.48 KN/m²) multiplied by the area of the structure projected on a plane normal to the assumed wind direction. See ASCE 7 Section 6.1.4 for criteria. Design net wind pressure for components and cladding shall not be less than 10 lb/ft² (0.48 KN/m²) acting in either direction normal to the surface.

1609.6.4 Design procedure. *The MWFRS and the components and cladding of every building or other structure shall be designed for the pressures calculated using Equation (16-36).*

1609.6.4.1 Main wind-force-resisting systems. *The MWFRS shall be investigated for the torsional effects identified in ASCE 7 Figure 6-9.*

1609.6.4.2 Determination of K_z and K_{zt}. *Velocity Pressure Exposure Coefficient, K_z, shall be determined in accordance with ASCE 7 Section 6.5.6.6 and the Topographic Factor, K_{zt} shall be determined in accordance with ASCE 7 Section 6.5.7.*

1. *For the windward side of a structure, K_{zt} and K_z shall be based on height z.*
2. *For leeward and side walls, and for windward and leeward roofs, K_{zt} and K_z shall be based on mean roof height h.*

1609.6.4.3 Determination of net pressure coefficients, C_{net}. *For the design of the Main Wind-Force-Resisting System and for Components and Cladding, the sum of the internal and external net pressure shall be based on the net pressure coefficient C_{net}.*

1. *The pressure coefficient, C_{net}, for walls and roofs shall be determined from Table 1609.6.2(2).*
2. *Where C_{net} may have more than one value, the more severe wind load combination shall be used for design.*

1609.6.4.4 Application of wind pressures. *When using the Alternate All-Heights Method, wind pressures shall be applied simultaneously on, and in a direction normal to, all building envelope wall and roof surfaces.*

1609.6.4.4.1 Components and cladding. *Wind pressure for each component or cladding element is applied as follows using C_{net} values based on the effective wind area, A, contained within the zones in areas-of-discontinuity of width and/or length "a", "2a" or "4a" at: corners of roofs and walls; edge strips for ridges, rakes and eaves; or field areas on walls or roofs as indicated in Figures in Table 1609.6.2(2) in accordance with the following:*

1. *Calculated pressures at local discontinuities acting over specific edge strips or corner boundary areas.*
2. *Include "field" (Zone 1, 2 or 4, as applicable) pressures applied to areas beyond the boundaries of the areas-of-discontinuity.*
3. *Where applicable, the calculated pressures at discontinuities (Zone 2 or 3) shall be combined with design pressures that apply specifically on rakes or eave overhangs.*

SECTION 1610
SOIL LATERAL LOADS

1610.1 General. Basement, foundation and retaining walls shall be designed to resist lateral soil loads. Soil loads specified in Table 1610.1 shall be used as the minimum design lateral soil loads unless specified otherwise in a soil investigation report approved by the building official. Basement walls and other walls in which horizontal movement is restricted at the top shall be designed for at-rest pressure. Retaining walls free to move and rotate at the top are permitted to be designed for active pressure. Design lateral pressure from surcharge loads shall be added to the lateral earth pressure load. Design lateral pressure shall be increased if soils with expansion potential are present at the site.

Exception: Basement walls extending not more than 8 feet (2438 mm) below grade and supporting flexible floor systems shall be permitted to be designed for active pressure.

TABLE 1609.6.2(1)
WIND VELOCITY PRESSURE (q_s) AT STANDARD HEIGHT OF 33 FEET[a,b,c]

BASIC WIND SPEED, *V* (mph)	85	90	100	105	110	120	125	130	140	150	160	170
PRESSURE, q_s (psf)	18.5	20.7	25.6	28.2	31.0	36.9	40.0	43.3	50.2	57.6	65.5	74.0

a. For Wind Speeds not shown, use $q_s = 0.00256\ V^2$
b. Multiply by 1.61 to convert to km/h
c. Multiply by 0.048 to convert to kN/m²

TABLE 1609.6.2(2)
NET PRESSURE COEFFICIENTS, C_{net} [a,b,c]

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
1. Main-Wind-Force-Resisting Frames and Systems	WALLS:		Enclosed	Partially Enclosed
	Windward wall		0.43	0.11
	Leeward wall		-0.51	-0.83
	Side wall		-0.66	-0.97
	Parapet wall	Windward	1.28	1.28
		Leeward	-0.85	-0.85
	ROOFS:		Enclosed	Partially Enclosed
	Wind perpendicular to ridge			
	Leeward roof or flat roof		-0.66	-0.97
	Windward roof slopes:			
	Slope < 2:12 (10°)	Case 1	-1.09	-1.41
		Case 2	-0.28	-0.60
	Slope = 4:12 (18°)	Case 1	-0.73	-1.04
		Case 2	-0.05	-0.37
	Slope = 5:12 (23°)	Case 1	-0.58	-0.90
		Case 2	0.03	-0.29
	Slope = 6:12 (27°)	Case 1	-0.47	-0.78
		Case 2	0.06	-0.25
	Slope = 7:12 (30°)	Case 1	-0.37	-0.68
		Case 2	0.07	-0.25
	Slope 9:12 (37°)	Case 1	-0.27	-0.58
		Case 2	0.14	-0.18
	Slope 12:12 (45°)		-0.15	-0.47
	Wind parallel to ridge and flat roofs		-1.09	-1.41
	Nonbuilding structures: chimneys, tanks and similar structures:			
		h/D		
		1	7	25
	Square (wind normal to face)	0.99	1.07	1.53
	Square (wind on diagonal)	0.77	0.84	1.15
	Hexagonal or octagonal	0.81	0.97	1.13
	Round	0.65	0.81	0.97
	Open signs and lattice frameworks	Ratio of solid to gross area		
		< 0.1	0.1 to 0.29	0.3 to 0.7
	Flat	1.45	1.30	1.16
	Round	0.87	0.94	1.08

TABLE 1609.6.2(2)
NET PRESSURE COEFFICIENTS, $C_{net}^{a,b,c}$—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
2. Components and Cladding not in areas of discontinuity — Roofs and overhangs	Roof elements and slopes		Enclosed	Partially Enclosed
	Gable or hipped configurations (Zone 1)			
	Flat < slope < 6:12 (27°)			
	Positive	10 SF or less	0.58	0.89
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.00	-1.32
		100 SF or more	-0.92	-1.23
	Overhang: flat < slope < 6:12 (27°)			
	Negative	10 SF or less	-1.45	
		100 SF or more	-1.36	
		500 SF or more	-0.94	
	6:12 (27°) < slope < 12:12 (45°)			
	Positive	10 SF or less	0.92	1.23
		100 SF or more	0.83	1.15
	Negative	10 SF or less	-1.00	-1.32
		100 SF or more	-0.83	-1.15
	Monosloped configurations (Zone 1)		Enclosed	Partially Enclosed
	Flat < slope < 7:12 (30°)			
	Positive	10 SF or less	0.49	0.81
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.26	-1.57
		100 SF or more	-1.09	-1.40
	Tall flat topped roofs h> 60′		Enclosed	Partially Enclosed
	Flat <slope < 2:12 (10′) (Zone 1)			
	Negative	10 SF or less	-1.34	-1.66
		500 SF or more	-1.00	-1.32

TABLE 1609.6.2(2)
NET PRESSURE COEFFICIENTS, C_{net}[a,b,c]—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
3. Components and Cladding in areas of discontinuities — Roofs and overhangs	Roof elements and slopes		Enclosed	Partially Enclosed
	Gable or hipped configurations at ridges, eaves and rakes (Zone 2)			
	Flat < slope < 6:12 (27°)			
	Positive	10 SF or less	0.58	0.89
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.68	-2.00
		100 SF or more	-1.17	-1.49
	Overhang for slope flat < slope < 6:12 (27°)			
	Negative	10 SF or less	-1.87	
		100 SF or more	-1.87	
	6:12 (27°) < slope < 12:12 (45°)		Enclosed	Partially Enclosed
	Positive	10 SF or less	0.92	1.23
		100 SF or more	0.83	1.15
	Negative	10 SF or less	-1.17	-1.49
		100 SF or more	-1.00	-1.32
	Overhang for 6:12 (27°) < slope < 12:12 (45°)			
	Negative	10 SF or less	-1.70	
		100 SF or more	-1.53	
	Monosloped configurations at ridges, eaves and rakes (Zone 2)			
	Flat < slope < 7:12 (30°)			
	Positive	10 SF or less	0.49	0.81
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.51	-1.83
		100 SF or more	-1.43	-1.74
	Tall flat topped roofs h> 60′		Enclosed	Partially Enclosed
	Flat <slope < 2:12 (10°) (Zone 2)			
	Negative	10 SF or less	-2.11	-2.42
		500 SF or more	-1.51	-1.83
	Gable or hipped configurations at corners (Zone 3)			
	Flat < slope < 6:12 (27°)		Enclosed	Partially Enclosed
	Positive	10 SF or less	0.58	0.89
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-2.53	-2.85
		100 SF or more	-1.85	-2.17
	Overhang for slope flat < slope < 6:12 (27°)			
	Negative	10 SF or less	-3.15	
		100 SF or more	-2.13	

TABLE 1609.6.2(2)
NET PRESSURE COEFFICIENTS, C_{net}[a,b,c]—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
3. Components and Cladding in areas of discontinuities — Roofs and over — (continued)	6:12 (27°) < Slope < 12:12 (45°)			
	Positive	10 SF or less	0.92	1.23
		100 SF or more	0.83	1.15
	Negative	10 SF or less	-1.17	-1.49
		100 SF or more	-1.00	-1.32
	Overhang for 6:12 (27°) < slope < 12:12 (45°)		Enclosed	Partially Enclosed
	Negative	10 SF or less	-1.70	
		100 SF or more	-1.53	
	Monosloped configurations at corners (Zone 3)			
	Flat < Slope < 7:12 (30°)			
	Positive	10 SF or less	0.49	0.81
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-2.62	-2.93
		100 SF or more	-1.85	-2.17
	Tall flat topped roofs h> 60'		Enclosed	Partially Enclosed
	Flat <slope < 2:12 (10°) (Zone 3)			
	Negative	10 SF or less	-2.87	-3.19
		500 SF or more	-2.11	-2.42
4. Components and Cladding not in areas of discontinuity — Walls and parapets	Wall elements: h ≤ 60' (Zone 4)		Enclosed	Partially Enclosed
	Positive	10 SF or less	1.00	1.32
		500 SF or more	0.75	1.06
	Negative	10 SF or less	-1.09	-1.40
		500 SF or more	-0.83	-1.15
	Wall elements: h > 60' (Zone 4)			
	Positive	20 SF or less	0.92	1.23
		500 SF or more	0.66	0.98
	Negative	20 SF or less	-0.92	-1.23
		500 SF or more	-0.75	-1.06
	Parapet walls			
	Positive		2.87	3.19
	Negative		-1.68	-2.00

TABLE 1609.6.2(2)
NET PRESSURE COEFFICIENTS, C_{net}[a,b,c]—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
5. Components and Cladding in areas of discontinuity - Walls and parapets	Wall elements: h ≤ 60′ (Zone 5)		Enclosed	Partially Enclosed
	Positive	10 SF or less	1.00	1.32
		500 SF or more	0.75	1.06
	Negative	10 SF or less	-1.34	-1.66
		500 SF or more	-0.83	-1.05
	Wall Elements: h > 60′ (Zone 5)			
	Positive	20 SF or less	0.92	1.23
		500 SF or more	0.66	0.98
	Negative	20 SF or less	-1.68	-2.00
		500 SF or more	-1.00	-1.32
	Parapet walls			
	Positive		3.64	3.95
	Negative		-2.45	-2.76

a. Linear interpolation between values in the table is acceptable.
b. For open buildings, multispan gable roofs, stepped roofs, sawtooth roofs, domed roofs, solid free standing walls and solid signs apply ASCE 7.
c. Some C_{net} values have been grouped together. Less conservative results may be obtained by applying ASCE 7.

SECTION 1611
RAIN LOADS

1611.1 Design rain loads. Each portion of a roof shall be designed to sustain the load of rainwater that will accumulate on it if the primary drainage system for that portion is blocked plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow.

$$R = 5.2\,(d_s + d_h) \qquad \textbf{(Equation 16-36)}$$

For SI: $R = 0.0098\,(d_s + d_h)$

where:

d_h = Additional depth of water on the undeflected roof above the inlet of secondary drainage system at its design flow (i.e., the hydraulic head), in inches (mm).

d_s = Depth of water on the undeflected roof up to the inlet of secondary drainage system when the primary drainage system is blocked (i.e., the static head), in inches (mm).

R = Rain load on the undeflected roof, in psf (kN/m^2). When the phrase "undeflected roof" is used, deflections from loads (including dead loads) shall not be considered when determining the amount of rain on the roof.

1611.2 Ponding instability. For roofs with a slope less than $^1/_4$ inch per foot [1.19 degrees (0.0208 rad)], the design calculations shall include verification of adequate stiffness to preclude progressive deflection in accordance with Section 8.4 of ASCE 7.

1611.3 Controlled drainage. Roofs equipped with hardware to control the rate of drainage shall be equipped with a secondary drainage system at a higher elevation that limits accumulation of water on the roof above that elevation. Such roofs shall be designed to sustain the load of rainwater that will accumulate on them to the elevation of the secondary drainage system plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow determined from Section 1611.1. Such roofs shall also be checked for ponding instability in accordance with Section 1611.2.

SECTION 1612
FLOOD LOADS

1612.1 General. Within flood hazard areas as established in Section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one flood hazard area, the provisions associated with the most restrictive flood hazard area shall apply.

1612.2 Definitions. The following words and terms shall, for the purposes of this section, have the meanings shown herein.

BASE FLOOD. The flood having a 1-percent chance of being equaled or exceeded in any given year.

BASE FLOOD ELEVATION. The elevation of the base flood, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the Flood Insurance Rate Map (FIRM).

TABLE 1610.1
SOIL LATERAL LOAD

DESCRIPTION OF BACKFILL MATERIAL[c]	UNIFIED SOIL CLASSIFICATION	DESIGN LATERAL SOIL LOAD[a] (pound per square foot per foot of depth)	
		Active pressure	At-rest pressure
Well-graded, clean gravels; gravel-sand mixes	GW	30	60
Poorly graded clean gravels; gravel-sand mixes	GP	30	60
Silty gravels, poorly graded gravel-sand mixes	GM	40	60
Clayey gravels, poorly graded gravel-and-clay mixes	GC	45	60
Well-graded, clean sands; gravelly sand mixes	SW	30	60
Poorly graded clean sands; sand-gravel mixes	SP	30	60
Silty sands, poorly graded sand-silt mixes	SM	45	60
Sand-silt clay mix with plastic fines	SM-SC	45	100
Clayey sands, poorly graded sand-clay mixes	SC	60	100
Inorganic silts and clayey silts	ML	45	100
Mixture of inorganic silt and clay	ML-CL	60	100
Inorganic clays of low to medium plasticity	CL	60	100
Organic silts and silt clays, low plasticity	OL	Note b	Note b
Inorganic clayey silts, elastic silts	MH	Note b	Note b
Inorganic clays of high plasticity	CH	Note b	Note b
Organic clays and silty clays	OH	Note b	Note b

For SI: 1 pound per square foot per foot of depth = 0.157 kPa/m, 1 foot = 304.8 mm.

a. Design lateral soil loads are given for moist conditions for the specified soils at their optimum densities. Actual field conditions shall govern. Submerged or saturated soil pressures shall include the weight of the buoyant soil plus the hydrostatic loads.

b. Unsuitable as backfill material.

c. The definition and classification of soil materials shall be in accordance with ASTM D 2487.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 16A – STRUCTURAL DESIGN

Adopting Agency		BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter								X	X			X								
Adopt Entire Chapter as amended (amended sections listed below)																				
Adopt only those sections that are listed below							X													
Chapter / Section	Codes																			
1607A.7.2							X													

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. *Applications listed in Section 109.2, regulated by the Division of the State Architect—Structural Safety (DSA-SS). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*
2. *Applications listed in Sections 110.1 and 110.4, 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. *DSA-SS 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. *Division of the State Architect—Structural Safety:*

   [DSA-SS] *For applications listed in Section 109.2*

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

   [OSHPD 1] *For applications listed in Section 110.1.*

   [OSHPD 4] *For applications listed in Section 110.4.*

1601A.2 References. *All referenced codes and standards listed in Chapter 35 shall include all the modifications contained in this code to referenced standards. In the event of any discrepancy between this code and a referenced standard, refer to Section 101.7.*

1601A.3 Enforcement agency approval. *In addition to the requirements of California Code of Regulations (C.C.R.) Title 24, Parts 1 and 2, any aspect of project design, construction, quality assurance or quality control programs for which this code requires approval by the design professional are also subject to approval by the enforcement agency.*

SECTION 1602*A* DEFINITIONS AND NOTATIONS

1602*A*.1 Definitions. The following words and terms shall, for the purposes of this chapter, have the meanings shown herein.

ALLOWABLE STRESS DESIGN. A method of proportioning structural members, such that elastically computed stresses produced in the members by nominal loads do not exceed specified allowable stresses (also called "working stress design").

ALTERNATIVE SYSTEM. [OSHPD 1 & 4] *Alternative materials, design and methods of construction in accordance with Section 104.11 of Appendix Chapter 1, Section 11.1.4 of ASCE 7 or structural design criteria as approved by the enforcement agency.*

BALCONY, EXTERIOR. An exterior floor projecting from and supported by a structure without additional independent supports.

DEAD LOADS. The weight of materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding and other similarly incorporated architectural and structural items, and the weight of fixed service equipment, such as cranes, plumbing stacks and risers, electrical feeders, heating, ventilating and air-conditioning systems and fire sprinkler systems.

DECK. An exterior floor supported on at least two opposing sides by an adjacent structure, and/or posts, piers or other independent supports.

DESIGN STRENGTH. The product of the nominal strength and a resistance factor (or strength reduction factor).

DIAPHRAGM. A horizontal or sloped system acting to transmit lateral forces to the vertical-resisting elements. When the term "diaphragm" is used, it shall include horizontal bracing systems.

Diaphragm, blocked. In light-frame construction, a diaphragm in which all sheathing edges not occurring on a framing member are supported on and fastened to blocking.

Diaphragm boundary. In light-frame construction, a location where shear is transferred into or out of the diaphragm sheathing. Transfer is either to a boundary element or to another force-resisting element.

Diaphragm chord. A diaphragm boundary element perpendicular to the applied load that is assumed to take axial stresses due to the diaphragm moment.

Diaphragm flexible. A diaphragm is flexible for the purpose of distribution of story shear and torsional moment where so indicated in Section 12.3.1 of ASCE 7, as modified in Section 1613*A*.6.1.

Diaphragm, rigid. A diaphragm is rigid for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is less than or equal to two times the average story drift.

DURATION OF LOAD. The period of continuous application of a given load, or the aggregate of periods of intermittent applications of the same load.

ENFORCEMENT AGENT. *That individual within the agency or organization charged with responsibility for agency or organization compliance with the requirements of this code. Used interchangeably with "Building official" or "Code official."*

ESSENTIAL FACILITIES. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, snow or earthquakes.

FABRIC PARTITION. A partition consisting of a finished surface made of fabric, without a continuous rigid backing, that is directly attached to a framing system in which the vertical framing members are spaced greater than 4 feet (1219 mm) on center.

FACTORED LOAD. The product of a nominal load and a load factor.

GUARD. See Section 1002.1.

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

IMPACT LOAD. The load resulting from moving machinery, elevators, craneways, vehicles and other similar forces and kinetic loads, pressure and possible surcharge from fixed or moving loads.

LIMIT STATE. A condition beyond which a structure or member becomes unfit for service and is judged to be no longer useful for its intended function (serviceability limit state) or to be unsafe (strength limit state).

LIVE LOADS. Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

LIVE LOADS (ROOF). Those loads produced (1) during maintenance by workers, equipment and materials; and (2) during the life of the structure by movable objects such as planters and by people.

LOAD AND RESISTANCE FACTOR DESIGN (LRFD). A method of proportioning structural members and their connections using load and resistance factors such that no applicable limit state is reached when the structure is subjected to appropriate load combinations. The term "LRFD" is used in the design of steel and wood structures.

LOAD EFFECTS. Forces and deformations produced in structural members by the applied loads.

LOAD FACTOR. A factor that accounts for deviations of the actual load from the nominal load, for uncertainties in the analysis that transforms the load into a load effect, and for the probability that more than one extreme load will occur simultaneously.

LOADS. Forces or other actions that result from the weight of building materials, occupants and their possessions, environmental effects, differential movement and restrained dimensional changes. Permanent loads are those loads in which variations over time are rare or of small magnitude, such as dead loads. All other loads are variable loads (see also "Nominal loads").

NOMINAL LOADS. The magnitudes of the loads specified in this chapter (dead, live, soil, wind, snow, rain, flood and earthquake).

OCCUPANCY CATEGORY. A category used to determine structural requirements based on occupancy.

OTHER STRUCTURES. Structures, other than buildings, for which loads are specified in this chapter.

PANEL (PART OF A STRUCTURE). The section of a floor, wall or roof comprised between the supporting frame of two adjacent rows of columns and girders or column bands of floor or roof construction.

RESISTANCE FACTOR. A factor that accounts for deviations of the actual strength from the nominal strength and the manner and consequences of failure (also called "strength reduction factor").

STRENGTH, NOMINAL. The capacity of a structure or member to resist the effects of loads, as determined by computations using specified material strengths and dimensions and equations derived from accepted principles of structural mechanics or by field tests or laboratory tests of scaled models, allowing for modeling effects and differences between laboratory and field conditions.

STRENGTH, REQUIRED. Strength of a member, cross section or connection required to resist factored loads or related internal moments and forces in such combinations as stipulated by these provisions.

STRENGTH DESIGN. A method of proportioning structural members such that the computed forces produced in the members by factored loads do not exceed the member design strength [also called "load and resistance factor design" (LRFD)]. The term "strength design" is used in the design of concrete and masonry structural elements.

VEHICLE BARRIER SYSTEM. A system of building components near open sides of a garage floor or ramp or building walls that act as restraints for vehicles.

NOTATIONS.

D = Dead load.

E = Combined effect of horizontal and vertical earthquake induced forces as defined in Section 12.4.2 of ASCE 7.

E_m = Maximum seismic load effect of horizontal and vertical seismic forces as set forth in Section 12.4.3 of ASCE 7.

F = Load due to fluids with well-defined pressures and maximum heights.

F_a = Flood load.

H = Load due to lateral earth pressures, ground water pressure or pressure of bulk materials.

L = Live load, except roof live load, including any permitted live load reduction.

L_r = Roof live load including any permitted live load reduction.

R = Rain load.

S = Snow load.

L_o = Unreduced live load per square foot (m^2) of area supported.

R = Reduction in percent.

1607*A*.10 Distribution of floor loads. Where uniform floor live loads are involved in the design of structural members arranged so as to create continuity, the minimum applied loads shall be the full dead loads on all spans in combination with the floor live loads on spans selected to produce the greatest effect at each location under consideration. It shall be permitted to reduce floor live loads in accordance with Section 1607*A*.9.

1607*A*.11 Roof loads. The structural supports of roofs and marquees shall be designed to resist wind and, where applicable, snow and earthquake loads, in addition to the dead load of construction and the appropriate live loads as prescribed in this section, or as set forth in Table 1607*A*.1. The live loads acting on a sloping surface shall be assumed to act vertically on the horizontal projection of that surface.

1607*A*.11.1 Distribution of roof loads. Where uniform roof live loads are reduced to less than 20 psf (0.96 kN/m^2) in accordance with Section 1607*A*.11.2.1 and are involved in the design of structural members arranged so as to create continuity, the minimum applied loads shall be the full dead loads on all spans in combination with the roof live loads on adjacent spans or on alternate spans, whichever produces the greatest effect. See Section 1607*A*.11.2 for minimum roof live loads and Section 7.5 of ASCE 7 for partial snow loading.

1607*A*.11.2 Reduction in roof live loads. The minimum uniformly distributed roof live loads, L_o, in Table 1607*A*.1 are permitted to be reduced according to the following provisions.

1607*A*.11.2.1 Flat, pitched and curved roofs. Ordinary flat, pitched and curved roofs are permitted to be designed for a reduced roof live load as specified in the following equation or other controlling combinations of loads in Section 1605*A,* whichever produces the greater load. In structures where special scaffolding is used as a work surface for workers and materials during maintenance and repair operations, a lower roof load than specified in the following equation shall not be used unless approved by the building official. Greenhouses shall be designed for a minimum roof live load of 12 psf (0.58 kN/m^2).

$$L_r = L_o R_1 R_2 \qquad \textbf{(Equation 16A-27)}$$

where: $12 \le L_r \le 20$

For SI: $L_r = L_o R_1 R_2$

where: $0.58 \le L_r \le 0.96$

L_r = Reduced live load per square foot (m^2) of horizontal projection in pounds per square foot (kN/m^2).

The reduction factors R_1 and R_2 shall be determined as follows:

$R_1 = 1$ for $A_t \le 200$ square feet (18.58 m^2) **(Equation 16A-28)**

$R_1 = 1.2 - 0.001\ A_t$ for 200 square feet $< A_t <$ 600 square feet **(Equation 16A-29)**

For SI: $1.2 - 0.011A_t$ for 18.58 square meters $< A_t <$ 55.74 square meters

$R_1 = 0.6$ for $A_t >$ *600 square feet (55.74 m^2)* **(Equation 16A-30)**

where:

A_t = Tributary area (span length multiplied by effective width) in square feet (m^2) supported by any structural member, and

$R_2 = 1$ for $F \le 4$ **(Equation 16A-31)**

$R_2 = 1.2 - 0.05\ F$ for $4 < F < 12$ **(Equation 16A-32)**

$R_2 = 0.6$ for $F > 12$ **(Equation 16A-33)**

where:

F = For a sloped roof, the number of inches of rise per foot (for SI: $F = 0.12 \times$ slope, with slope expressed as a percentage), or for an arch or dome, the rise-to-span ratio multiplied by 32.

1607*A*.11.2.2 Special-purpose roofs. Roofs used for promenade purposes, roof gardens, assembly purposes or other special purposes shall be designed for a minimum live load as required in Table 1607*A*.1. Such roof live loads are permitted to be reduced in accordance with Section 1607*A*.9. *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*.11.2.3 Landscaped roofs. Where roofs are to be landscaped, the uniform design live load in the landscaped area shall be 20 psf (0.958 kN/m^2). The weight of the landscaping materials shall be considered as dead load and shall be computed on the basis of saturation of the soil.

1607*A*.11.2.4 Awnings and canopies. Awnings and canopies shall be designed for uniform live loads as required in Table 1607*A*.1 as well as for snow loads and wind loads as specified in Sections 1608*A* and 1609*A*.

1607*A*.12 Crane loads. The crane live load shall be the rated capacity of the crane. Design loads for the runway beams, including connections and support brackets, of moving bridge cranes and monorail cranes shall include the maximum wheel loads of the crane and the vertical impact, lateral and longitudinal forces induced by the moving crane.

1607*A*.12.1 Maximum wheel load. The maximum wheel loads shall be the wheel loads produced by the weight of the bridge, as applicable, plus the sum of the rated capacity and the weight of the trolley with the trolley positioned on its runway at the location where the resulting load effect is maximum.

1607*A*.12.2 Vertical impact force. The maximum wheel loads of the crane shall be increased by the percentages

shown below to determine the induced vertical impact or vibration force:

Monorail cranes (powered)	25 percent
Cab-operated or remotely operated bridge cranes (powered)	25 percent
Pendant-operated bridge cranes (powered)	10 percent
Bridge cranes or monorail cranes with hand-geared bridge, trolley and hoist	0 percent

1607A.12.3 Lateral force. The lateral force on crane runway beams with electrically powered trolleys shall be calculated as 20 percent of the sum of the rated capacity of the crane and the weight of the hoist and trolley. The lateral force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction perpendicular to the beam, and shall be distributed according to the lateral stiffness of the runway beam and supporting structure.

1607*A*.12.4 Longitudinal force. The longitudinal force on crane runway beams, except for bridge cranes with hand-geared bridges, shall be calculated as 10 percent of the maximum wheel loads of the crane. The longitudinal force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction parallel to the beam.

1607*A*.13 Interior walls and partitions. Interior walls and partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength 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) 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 $^1/_{240}$ of the span for walls with brittle finishes and $^1/_{120}$ of the span for walls with flexible finishes.*

Exception: Fabric partitions complying with Section 1607*A*.13.1 shall not be required to resist the minimum horizontal load of 5 psf (0.24 kN/m^2).

1607*A*.13.1 Fabric partitions. Fabric partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength to resist the following load conditions:

1. A horizontal distributed load of 5 psf (0.24 kN/m^2) applied to the partition framing. The total area used to determine the distributed load shall be the area of the fabric face between the framing members to which the fabric is attached. The total distributed load shall be uniformly applied to such framing members in proportion to the length of each member.
2. A concentrated load of 40 pounds (0.176 kN) applied to an 8-inch diameter (203 mm) area [50.3 square inches (32 452 mm^2)] of the fabric face at a height of 54 inches (1372 mm) above the floor.

SECTION 1608*A*
SNOW LOADS

1608*A*.1 General. Design snow loads shall be determined in accordance with Chapter 7 of ASCE 7, but the design roof load shall not be less than that determined by Section 1607*A*.

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. 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).

1608A.3 Determination of snow loads. [DSA-SS] *The ground snow load or the design snow load for roofs shall conform with the adopted ordinance of the city, county or city and county in which the project site is located, and shall be approved by DSA.*

SECTION 1609*A*
WIND LOADS

1609*A*.1 Applications. Buildings, structures and parts thereof shall be designed to withstand the minimum wind loads prescribed herein. Decreases in wind loads shall not be made for the effect of shielding by other structures.

1609*A*.1.1 Determination of wind loads. Wind loads on every building or structure shall be determined in accordance with Chapter 6 of ASCE 7 *or provisions of the Alternate All-heights Method in Section 1609A.6*. The type of opening protection required, the basic wind speed and the exposure category for a site is permitted to be determined in accordance with Section 1609*A* or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

Exceptions:

1. Subject to the limitations of Section 1609*A*.1.1.1, the provisions of SBCCI SSTD 10 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609*A*.1.1.1, residential structures using the provisions of the AF&PA WFCM.
3. Designs using NAAMM FP 1001.
4. Designs using TIA/EIA-222 for antenna-supporting structures and antennas.

1609*A*.5 Roof systems.

1609*A*.5.1 Roof deck. The roof deck shall be designed to withstand the wind pressures determined in accordance with ASCE 7.

1609*A*.5.2 Roof coverings. Roof coverings shall comply with Section 1609*A*.5.1.

Exception: Rigid tile roof coverings that are air permeable and installed over a roof deck complying with Section 1609*A*.5.1 are permitted to be designed in accordance with Section 1609 *A*.5.3.

Asphalt shingles installed over a roof deck complying with Section 1609*A*.5.1 shall be tested to determine the resistance of the sealant to uplift forces using ASTM D 6381.

Asphalt shingles installed over a roof deck complying with Section 1609*A*.5.1 are permitted to be designed using UL 2390 to determine appropriate uplift and force coefficients applied to the shingle.

1609*A*.5.3 Rigid tile. Wind loads on rigid tile roof coverings shall be determined in accordance with the following equation:

$$M_a = q_h C_L b L L_a [1.0 - GC_p] \qquad \textbf{(Equation 16}\textit{A}\textbf{-35)}$$

For SI: $$M_a = \frac{q_h C_L b L L_a \left[1.0 - GC_p\right]}{1{,}000}$$

where:

b = Exposed width, feet (mm) of the roof tile.

C_L = Lift coefficient. The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined by test in accordance with Section 1715*A*.2.

GC_p = Roof pressure coefficient for each applicable roof zone determined from Chapter 6 of ASCE 7. Roof coefficients shall not be adjusted for internal pressure.

L = Length, feet (mm) of the roof tile.

L_a = Moment arm, feet (mm) from the axis of rotation to the point of uplift on the roof tile. The point of uplift shall be taken at 0.76L from the head of the tile and the middle of the exposed width. For roof tiles with nails or screws (with or without a tail clip), the axis of rotation shall be taken as the head of the tile for direct deck application or as the top edge of the batten for battened applications. For roof tiles fastened only by a nail or screw along the side of the tile, the axis of rotation shall be determined by testing. For roof tiles installed with battens and fastened only by a clip near the tail of the tile, the moment arm shall be determined about the top edge of the batten with consideration given for the point of rotation of the tiles based on straight bond or broken bond and the tile profile.

M_a = Aerodynamic uplift moment, feet-pounds (N-mm) acting to raise the tail of the tile.

q_h = Wind velocity pressure, psf (kN/m^2) determined from Section 6.5.10 of ASCE 7.

Concrete and clay roof tiles complying with the following limitations shall be designed to withstand the aerodynamic uplift moment as determined by this section.

1. The roof tiles shall be either loose laid on battens, mechanically fastened, mortar set or adhesive set.
2. The roof tiles shall be installed on solid sheathing which has been designed as components and cladding.
3. An underlayment shall be installed in accordance with Chapter 15.
4. The tile shall be single lapped interlocking with a minimum head lap of not less than 2 inches (51 mm).
5. The length of the tile shall be between 1.0 and 1.75 feet (305 mm and 533 mm).
6. The exposed width of the tile shall be between 0.67 and 1.25 feet (204 mm and 381 mm).
7. The maximum thickness of the tail of the tile shall not exceed 1.3 inches (33 mm).
8. Roof tiles using mortar set or adhesive set systems shall have at least two-thirds of the tile's area free of mortar or adhesive contact.

1609A.6 Alternate All-Heights Method. *The alternate wind design provisions in this section are simplifications of the ASCE 7 Method 2-Analytical Procedure.*

1609A.6.1 Scope. *As an alternate to ASCE 7 Section 6.5, the following provisions are permitted to be used to determine the wind effects on regularly shaped buildings, or other structures which meet all of the following conditions:*

1. *The building or other structure is less than or equal to 75 feet height having height to least width ratio of 4 or less, or the building or other structure has a fundamental frequency greater than or equal to 1 hertz.*
2. *The building or other structure is not sensitive to dynamic effects.*
3. *The building or other structure is not located on a site for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.*
4. *The building shall meet the requirements of a simple diaphragm building as defined in ASCE 7 Section 6.2.*

1609A.6.1.1 Modifications. *The following modifications shall be made to certain subsections in ASCE 7: Section 1609A.6.2 Symbols and Notations that are specific to this section are used in conjunction with the Symbols and Notations in ASCE 7 Section 6.3.*

1609A.6.2 Symbols and notations. *Coefficients and variables used in the Alternate All-Heights Method equations are as follows:*

C_{net} = *net-pressure coefficient based on K_d [(G) (Cp) - (GC_{pi})], Ref. Table 1609A.6.2(2)*

G = *Gust effect factor equal to 0.85 for rigid structures per ASCE 7 Section 6.5.8.1.*

K_d = *Wind directionality factor per ASCE 7 Table 6-4.*

P_{net} = *Design wind pressure to be used in determination of wind loads on buildings or other structures or their components and cladding, in lb/ft² (N/m²).*

q_s = *Wind velocity pressure in lb/ft² (N/m²). (Per Table 1609A.6.2(1))*

1609A.6.3 Design equations. *When using the Alternate All-Heights Method, the Main-Wind-Force-Resisting System (MWFRS), and Components and Cladding of every structure shall be designed to resist the effects of wind pressures on the building envelope in accordance with Equation (16-36).*

$$P_{net} = q_s K_z C_{net} [I K_{zt}] \qquad \text{(Equation 16A-36)}$$

Design wind forces for the MWFRS shall not be less than 10 lb/ft² (0.48 KN/m²) multiplied by the area of the structure projected on a plane normal to the assumed wind direction. See ASCE 7 Section 6.1.4 for criteria. Design net wind pressure for components and cladding shall not be less than 10 lb/ft² (0.48 KN/m²) acting in either direction normal to the surface.

1609A.6.4 Design procedure. *The MWFRS and the components and cladding of every building or other structure shall be designed for the pressures calculated using Equation (16A-36).*

1609A.6.4.1 Main wind-force-resisting systems. *The MWFRS shall be investigated for the torsional effects identified in ASCE 7 Figure 6-9.*

1609A.6.4.2 Determination of K_z and K_{zt}. *Velocity Pressure Exposure Coefficient, K_z, shall be determined in accordance with ASCE 7 Section 6.5.6.6 and the Topographic Factor, K_{zt} shall be determined in accordance with ASCE 7 Section 6.5.7.*

1. *For the windward side of a structure, K_{zt} and K_z shall be based on height z.*
2. *For leeward and side walls, and for windward and leeward roofs, K_{zt} and K_z shall be based on mean roof height h.*

1609A.6.4.3 Determination of net pressure coefficients, C_{net}. *For the design of the Main Wind-Force-Resisting-System and for Components and Cladding, the sum of the internal and external net pressure shall be based on the net pressure coefficient C_{net}.*

1. *The pressure coefficient, C_{net}, for walls and roofs shall be determined from Table 1609A.6.2(2).*
2. *Where C_{net} may have more than one value, the more severe wind load combination shall be used for design.*

1609A.6.4.4 Application of wind pressures. *When using the Alternate All-Heights Method, wind pressures shall be applied simultaneously on, and in a direction normal to, all building envelope wall and roof surfaces.*

1609A.6.4.4.1 Components and cladding. *Wind pressure for each component or cladding element is applied as follows using C_{net} values based on the effective wind area, A, contained within the zones in areas-of-discontinuity of width and/or length "a", "2a" or "4a" at: corners of roofs and walls; edge strips for ridges, rakes and eaves; or field areas on walls or roofs as indicated in Figures in Table 1609A.6.2(2) in accordance with the following:*

1. *Calculated pressures at local discontinuities acting over specific edge strips or corner boundary areas.*
2. *Include "field" (zone 1, 2 or 4, as applicable) pressures applied to areas beyond the boundaries of the areas-of-discontinuity.*
3. *Where applicable, the calculated pressures at discontinuities (zone 2 or 3) shall be combined with design pressures that apply specifically on rakes or eave overhangs.*

SECTION 1610*A*
SOIL LATERAL LOADS

1610*A*.1 General. Basement, foundation and retaining walls shall be designed to resist lateral soil loads. Soil loads specified in Table 1610*A*.1 shall be used as the minimum design lateral soil loads unless specified otherwise in a soil investigation report approved by the building official. Basement walls and other walls in which horizontal movement is restricted at the top shall be designed for at-rest pressure. Retaining walls free to move and rotate at the top are permitted to be designed for active pressure. Design lateral pressure from surcharge loads shall be added to the lateral earth pressure load. Design lateral pressure shall be increased if soils with expansion potential are present at the site.

Exception: Basement walls extending not more than 8 feet (2438 mm) below grade and supporting flexible floor systems shall be permitted to be designed for active pressure.

TABLE 1609A.6.2(1)
WIND VELOCITY PRESSURE (q_s) AT STANDARD HEIGHT OF 33 FEET[a,b,c]

BASIC WIND SPEED, *V* (mph)	85	90	100	105	110	120	125	130	140	150	160	170
PRESSURE, q_s (psf)	18.5	20.7	25.6	28.2	31.0	36.9	40.0	43.3	50.2	57.6	65.5	74.0

a. For Wind Speeds not shown, use $q_s = 0.00256\ V^2$
b. Multiply by 1.61 to convert to km/h
c. Multiply by 0.048 to convert to kN/m²

TABLE 1609A.6.2(2)
NET PRESSURE COEFFICIENTS, C_{net} [a,b,c]

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
1. Main-Wind-Force-Resisting Frames and Systems	WALLS:		Enclosed	Partially Enclosed
	Windward wall		0.43	0.11
	Leeward wall		-0.51	-0.83
	Side wall		-0.66	-0.97
	Parapet wall	Windward	1.28	1.28
		Leeward	-0.85	-0.85
	ROOFS:		Enclosed	Partially Enclosed
	Wind perpendicular to ridge			
	Leeward roof or flat roof		-0.66	-0.97
	Windward roof slopes:			
	Slope < 2:12 (10°)	Case 1	-1.09	-1.41
		Case 2	-0.28	-0.60
	Slope = 4:12 (18°)	Case 1	-0.73	-1.04
		Case 2	-0.05	-0.37
	Slope = 5:12 (23°)	Case 1	-0.58	-0.90
		Case 2	0.03	-0.29
	Slope = 6:12 (27°)	Case 1	-0.47	-0.78
		Case 2	0.06	-0.25
	Slope = 7:12 (30°)	Case 1	-0.37	-0.68
		Case 2	0.07	-0.25
	Slope 9:12 (37°)	Case 1	-0.27	-0.58
		Case 2	0.14	-0.18
	Slope 12:12 (45°)		-0.15	-0.47
	Wind parallel to ridge and flat roofs		-1.09	-1.41
	Nonbuilding structures: chimneys, tanks and similar structures:			
		h/D		
		1	7	25
	Square (wind normal to face)	0.99	1.07	1.53
	Square (wind on diagonal)	0.77	0.84	1.15
	Hexagonal or octagonal	0.81	0.97	1.13
	Round	0.65	0.81	0.97
	Open signs and lattice frameworks	Ratio of solid to gross area		
		< 0.1	0.1 to 0.29	0.3 to 0.7
	Flat	1.45	1.30	1.16
	Round	0.87	0.94	1.08

TABLE 1609A.6.2(2)
NET PRESSURE COEFFICIENTS, $C_{net}^{a,b,c}$—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
2. Components and Cladding not in areas of discontinuity — Roofs and overhangs	Roof elements and slopes		Enclosed	Partially Enclosed
	Gable or hipped configurations (Zone 1)			
	Flat < Slope < 6:12 (27°)			
	Positive	10 SF or less	0.58	0.89
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.00	-1.32
		100 SF or more	-0.92	-1.23
	Overhang: flat < slope < 6:12 (27°)			
	Negative	10 SF or less	-1.45	
		100 SF or more	-1.36	
		500 SF or more	-0.94	
	6:12 (27°) < slope < 12:12 (45°)			
	Positive	10 SF or less	0.92	1.23
		100 SF or more	0.83	1.15
	Negative	10 SF or less	-1.00	-1.32
		100 SF or more	-0.83	-1.15
	Monosloped configurations (Zone 1)		Enclosed	Partially Enclosed
	Flat < slope < 7:12 (30°)			
	Positive	10 SF or less	0.49	0.81
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.26	-1.57
		100 SF or more	-1.09	-1.40
	Tall flat topped roofs h> 60′		Enclosed	Partially Enclosed
	Flat <slope < 2:12 (10′) (Zone 1)			
	Negative	10 SF or less	-1.34	-1.66
		500 SF or more	-1.00	-1.32

TABLE 1609A.6.2(2)
NET PRESSURE COEFFICIENTS, $C_{net}^{a,b,c}$—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
3. Components and Cladding in areas of discontinuities — Roofs and overhangs	Roof elements and slopes		Enclosed	Partially Enclosed
	Gable or hipped configurations at ridges, eaves and rakes (Zone 2)			
	Flat < slope < 6:12 (27°)			
	Positive	10 SF or less	0.58	0.89
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.68	-2.00
		100 SF or more	-1.17	-1.49
	Overhang for slope flat < slope < 6:12 (27°)			
	Negative	10 SF or less	-1.87	
		100 SF or more	-1.87	
	6:12 (27°) < slope < 12:12 (45°)		Enclosed	Partially Enclosed
	Positive	10 SF or less	0.92	1.23
		100 SF or more	0.83	1.15
	Negative	10 SF or less	-1.17	-1.49
		100 SF or more	-1.00	-1.32
	Overhang for 6:12 (27°) < slope < 12:12 (45°)			
	Negative	10 SF or less	-1.70	
		100 SF or more	-1.53	
	Monosloped configurations at ridges, eaves and rakes (Zone 2)			
	Flat < slope < 7:12 (30°)			
	Positive	10 SF or less	0.49	0.81
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-1.51	-1.83
		100 SF or more	-1.43	-1.74
	Tall flat topped roofs h> 60′		Enclosed	Partially Enclosed
	Flat <slope < 2:12 (10°) (Zone 2)			
	Negative	10 SF or less	-2.11	-2.42
		500 SF or more	-1.51	-1.83
	Gable or hipped configurations at corners (Zone 3)			
	Flat < slope < 6:12 (27°)		Enclosed	Partially Enclosed
	Positive	10 SF or less	0.58	0.89
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-2.53	-2.85
		100 SF or more	-1.85	-2.17
	Overhang for slope flat < slope < 6:12 (27°)			
	Negative	10 SF or less	-3.15	
		100 SF or more	-2.13	

TABLE 1609A.6.2(2)
NET PRESSURE COEFFICIENTS, $C_{net}^{a,b,c}$—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
3. Components and Cladding in areas of discontinuities — Roofs and over — (continued)	6:12 (27°) < slope < 12:12 (45°)			
	Positive	10 SF or less	0.92	1.23
		100 SF or more	0.83	1.15
	Negative	10 SF or less	-1.17	-1.49
		100 SF or more	-1.00	-1.32
	Overhang for 6:12 (27°) < slope < 12:12 (45°)		Enclosed	Partially Enclosed
	Negative	10 SF or less	-1.70	
		100 SF or more	-1.53	
	Monosloped configurations at corners (Zone 3)			
	Flat < slope < 7:12 (30°)			
	Positive	10 SF or less	0.49	0.81
		100 SF or more	0.41	0.72
	Negative	10 SF or less	-2.62	-2.93
		100 SF or more	-1.85	-2.17
	Tall flat topped roofs h> 60′		Enclosed	Partially Enclosed
	Flat <slope < 2:12 (10°) (Zone 3)			
	Negative	10 SF or less	-2.87	-3.19
		500 SF or more	-2.11	-2.42
4. Components and Cladding not in areas of discontinuity — Walls and parapets	Wall elements: h ≤ 60′ (Zone 4)		Enclosed	Partially Enclosed
	Positive	10 SF or less	1.00	1.32
		500 SF or more	0.75	1.06
	Negative	10 SF or less	-1.09	-1.40
		500 SF or more	-0.83	-1.15
	Wall elements: h > 60′ (Zone 4)			
	Positive	20 SF or less	0.92	1.23
		500 SF or more	0.66	0.98
	Negative	20 SF or less	-0.92	-1.23
		500 SF or more	-0.75	-1.06
	Parapet walls			
	Positive		2.87	3.19
	Negative		-1.68	-2.00

TABLE 1609A.6.2(2)
NET PRESSURE COEFFICIENTS, C_{net}[a,b,c]—continued

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
5. Components and Cladding in areas of discontinuity - Walls and parapets	Wall elements: h ≤ 60′ (Zone 5)		Enclosed	Partially Enclosed
	Positive	10 SF or less	1.00	1.32
		500 SF or more	0.75	1.06
	Negative	10 SF or less	-1.34	-1.66
		500 SF or more	-0.83	-1.05
	Wall elements: h > 60′ (Zone 5)			
	Positive	20 SF or less	0.92	1.23
		500 SF or more	0.66	0.98
	Negative	20 SF or less	-1.68	-2.00
		500 SF or more	-1.00	-1.32
	Parapet walls			
	Positive		3.64	3.95
	Negative		-2.45	-2.76

a. Linear interpolation between values in the table is acceptable.
b. For open buildings, multispan gable roofs, stepped roofs, sawtooth roofs, domed roofs, solid free standing walls and solid signs apply ASCE 7.
c. Some C_{net} values have been grouped together. Less conservative results may be obtained by applying ASCE 7.

SECTION 1611*A*
RAIN LOADS

1611*A*.1 Design rain loads. Each portion of a roof shall be designed to sustain the load of rainwater that will accumulate on it if the primary drainage system for that portion is blocked plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow.

$$R = 5.2\,(d_s + d_h) \qquad \textbf{(Equation 16}\textit{A}\textbf{-36)}$$

For SI: $R = 0.0098\,(d_s + d_h)$

where:

d_h = Additional depth of water on the undeflected roof above the inlet of secondary drainage system at its design flow (i.e., the hydraulic head), in inches (mm).

d_s = Depth of water on the undeflected roof up to the inlet of secondary drainage system when the primary drainage system is blocked (i.e., the static head), in inches (mm).

R = Rain load on the undeflected roof, in psf (kN/m^2). When the phrase "undeflected roof" is used, deflections from loads (including dead loads) shall not be considered when determining the amount of rain on the roof.

1611*A*.2 Ponding instability. For roofs with a slope less than $^1/_4$ inch per foot [1.19 degrees (0.0208 rad)], the design calculations shall include verification of adequate stiffness to preclude progressive deflection in accordance with Section 8.4 of ASCE 7.

1611*A*.3 Controlled drainage. Roofs equipped with hardware to control the rate of drainage shall be equipped with a secondary drainage system at a higher elevation that limits accumulation of water on the roof above that elevation. Such roofs shall be designed to sustain the load of rainwater that will accumulate on them to the elevation of the secondary drainage system plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow determined from Section 1611*A*.1. Such roofs shall also be checked for ponding instability in accordance with Section 1611*A*.2.

SECTION 1612*A*
FLOOD LOADS

1612*A*.1 General. Within flood hazard areas as established in Section 1612*A*.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one flood hazard area, the provisions associated with the most restrictive flood hazard area shall apply.

1612*A*.2 Definitions. The following words and terms shall, for the purposes of this section, have the meanings shown herein.

BASE FLOOD. The flood having a 1-percent chance of being equaled or exceeded in any given year.

BASE FLOOD ELEVATION. The elevation of the base flood, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the Flood Insurance Rate Map (FIRM).

BASEMENT. The portion of a building having its floor subgrade (below ground level) on all sides.

TABLE 1610*A*.1
SOIL LATERAL LOAD

DESCRIPTION OF BACKFILL MATERIAL[c]	UNIFIED SOIL CLASSIFICATION	DESIGN LATERAL SOIL LOAD[a] (pound per square foot per foot of depth)	
		Active pressure	At-rest pressure
Well-graded, clean gravels; gravel-sand mixes	GW	30	60
Poorly graded clean gravels; gravel-sand mixes	GP	30	60
Silty gravels, poorly graded gravel-sand mixes	GM	40	60
Clayey gravels, poorly graded gravel-and-clay mixes	GC	45	60
Well-graded, clean sands; gravelly sand mixes	SW	30	60
Poorly graded clean sands; sand-gravel mixes	SP	30	60
Silty sands, poorly graded sand-silt mixes	SM	45	60
Sand-silt clay mix with plastic fines	SM-SC	45	100
Clayey sands, poorly graded sand-clay mixes	SC	60	100
Inorganic silts and clayey silts	ML	45	100
Mixture of inorganic silt and clay	ML-CL	60	100
Inorganic clays of low to medium plasticity	CL	60	100
Organic silts and silt clays, low plasticity	OL	Note b	Note b
Inorganic clayey silts, elastic silts	MH	Note b	Note b
Inorganic clays of high plasticity	CH	Note b	Note b
Organic clays and silty clays	OH	Note b	Note b

For SI: 1 pound per square foot per foot of depth = 0.157 kPa/m, 1 foot = 304.8 mm.

a. Design lateral soil loads are given for moist conditions for the specified soils at their optimum densities. Actual field conditions shall govern. Submerged or saturated soil pressures shall include the weight of the buoyant soil plus the hydrostatic loads.

b. Unsuitable as backfill material.

c. The definition and classification of soil materials shall be in accordance with ASTM D 2487.

DESIGN FLOOD. The flood associated with the greater of the following two areas:

1. Area with a flood plain subject to a 1-percent or greater chance of flooding in any year; or
2. Area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

DESIGN FLOOD ELEVATION. The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

DRY FLOODPROOFING. A combination of design modifiations that results in a building or structure, including the attendant utility and sanitary facilitites, being water tight with walls substantially impermeable to the passage of water and with structural componenets having the capacity to resist loads as identified in ASCE 7.

EXISTING CONSTRUCTION: Any buildings and structures for which the "start of construction" commenced before the effective date of the community's first flood plain management code, ordinance or standard. "Existing construction" is also referred to as "existing structures."

EXISTING STRUCTURE. See "Existing construction."

FLOOD OR FLOODING. A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waves.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

FLOOD DAMAGE-RESISTANT MATERIALS. Any construction material capable of withstanding direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic repair.

FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

FLOOD HAZARD AREA SUBJECT TO HIGH VELOCITY WAVE ACTION. Area within the flood hazard area that is subject to high velocity wave action, and shown on a Flood Insurance Rate Map (FIRM) or other flood hazard map as Zone V, VO, VE or V1-30.

FLOOD INSURANCE RATE MAP (FIRM). An official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

FLOOD INSURANCE STUDY. The official report provided by the Federal Emergency Management Agency containing the Flood Insurance Rate Map (FIRM), the Flood Boundary and Floodway Map (FBFM), the water surface elevation of the base flood and supporting technical data.

FLOODWAY. The channel of the river, creek or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

LOWEST FLOOR. The floor of the lowest enclosed area, including basement, but excluding any unfinished or flood-resistant enclosure, usable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the structure in violation of this section.

SPECIAL FLOOD HAZARD AREA. The land area subject to flood hazards and shown on a Flood Insurance Rate Map or other flood hazard map as Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE or V1-30.

START OF CONSTRUCTION. The date of permit issuance for new construction and substantial improvements to existing structures, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement is within 180 days after the date of issuance. The actual start of construction means the first placement of permanent construction of a building (including a manufactured home) on a site, such as the pouring of a slab or footings, installation of pilings or construction of columns.

Permanent construction does not include land preparation (such as clearing, excavation, grading or filling), the installation of streets or walkways, excavation for a basement, footings, piers or foundations, the erection of temporary forms or the installation of accessory buildings such as garages or sheds not occupied as dwelling units or not part of the main building. For a substantial improvement, the actual "start of construction" means the first alteration of any wall, ceiling, floor or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

SUBSTANTIAL DAMAGE. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT. Any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to assure safe living conditions.
2. Any alteration of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure.

1612*A*.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'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.

1612*A*.4 Design and construction. The design and construction of buildings and structures located in flood hazard areas, including flood hazard areas subject to high velocity wave action, shall be in accordance with ASCE 24.

1612*A*.5 Flood hazard documentation. The following documentation shall be prepared and sealed by a registered design professional and submitted to the building official:

1. For construction in flood hazard areas not subject to high-velocity wave action:
    1.1. The elevation of the lowest floor, including the basement, as required by the lowest floor elevation inspection in Section 109.3.3, *Appendix Chapter 1.*
    1.2. For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.6.2.1 of ASCE 24, construction documents shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.6.2.2 of ASCE 24.
    1.3. For dry floodproofed nonresidential buildings, construction documents shall include a statement that the dry floodproofing is designed in accordance with ASCE 24.
2. For construction in flood hazard areas subject to high-velocity wave action:
    2.1. The elevation of the bottom of the lowest horizontal structural member as required by the lowest floor elevation inspection in Section 109.3.3, *Appendix Chapter 1.*
    2.2. Construction documents shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16*A*.
    2.3. For breakaway walls designed to resist a nominal load of less than 10 psf (0.48 kN/m^2) or more than 20 psf (0.96 kN/m^2), construction documents shall include a statement that the breakaway wall is designed in accordance with ASCE 24.

SECTION 1613*A*
EARTHQUAKE LOADS

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

Exception: 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.

1613A.1.1 Configuration. *When the design of a structure, due to the unusual configuration of the structure or parts of the structure, does not provide at least the same safety against earthquake damage as provided by the applicable portions of this section, when applied in the design of a similar structure of customary configuration, framing and assembly of materials, the enforcement agency shall withhold its approval.*

1613*A*.2 Definitions. The following words and terms shall, for the purposes of this section, have the meanings shown herein. *Definitions provided in Section 3402A.1 and ASCE 7 Section 11.2 shall apply when appropriate in addition to terms defined in this section.*

ACTIVE EARTHQUAKE FAULT. *A fault that has exhibited surface displacement within Holocene time (about 11,000 years) as determined by the California Geological Survey (CGS) under the Alquist-Priolo Earthquake Fault Zoning Act or other authoritative source, federal, state or local governmental agency.*

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

DESIGN EARTHQUAKE GROUND MOTION. The earthquake ground motion that buildings and structures are specifically proportioned to resist in Section 1613*A*.

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.*

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

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

2. Where the exception to Section 20.3.1 is applicable except for base isolated buildings.

2. A ground motion hazard analysis shall be performed in accordance with Section 21.2 when:
   a. A time history response analysis of the building is performed as part of the design.
   b. The building site is located within 10 kilometers of an active fault.
   c. For seismically isolated structures and for structures with damping systems.

1614A.1.3 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.

14. Light-framed walls with shear panels of all other materials—Not permitted by OSHPD and DSA-SS.

B. BUILDING FRAME SYSTEMS

2. Steel eccentrically braced frames, non-moment-resisting connections at columns away from links-Not permitted OSHPD.

4. Ordinary steel concentrically braced frames—Not permitted by OSHPD.

9. Intermediate Precast Shear Walls—Not permitted by OSHPD.

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

25. Buckling-restrained braced frames, nonmoment-resisting beam-column connections —Not permitted by OSHPD.

27. Special steel plate shear wall—Not permitted by OSHPD.

C. MOMENT-RESISTING FRAME SYSTEMS

2. Special steel truss moment frames—Not permitted by OSHPD.

3. Intermediate steel moment frames—Not permitted by OSHPD.

4. Ordinary steel moment frames—Not permitted by OSHPD.

Exceptions:

1. *Systems listed in this section can be used as an alternative system when preapproved by the enforcement agency.*
2. *Rooftop or other supported structures not exceeding two stories in height and 10 percent of the total structure weight can use the systems in this section when designed as components per ASCE 7 Chapter 13.*
3. *Systems listed in this section can be used for seismically isolated buildings when permitted by Section 1613A.6.2.*

1614A.1.4 ASCE 7, Section 12.2.3.1. *Modify ASCE 7 Section 12.2.3.1 by adding the following additional requirements for two stage equivalent lateral force procedure:*

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

f. The detailing requirements required for the lateral system of the upper portion shall be used for structural components common to the structural system of thr lower portion.

g. If separate models are used to design the upper and lower portions, the model boundary conditions of the upper portion shall be compatible with actual strength and stiffness of the supporting elements of the lower portion.

h. Both flexible upper portion and rigid lower portion considered separately can be classified as being regular.

Exception: *When dynamic analysis is used, regularity requirements in Item h above need not apply.*

1614A.1.5 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.

1614A.1.6 ASCE 7, Section 12.7.2. *Modify ASCE 7 Section 12.7.2 by adding Item 5 to read as follows:*

5. *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.*

1614A.1.7 Reserved.

1614A.1.8 ASCE 7, Section 12.8.7. *Modify ASCE 7 Section 12.8.7 by replacing Equation 12.8-16 as follows:*

$$\theta = \frac{P_x \Delta I}{V_x h_{sx} C_d} \qquad (12.8\text{-}16)$$

1614A.1.9 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 shear shall not be less than the base shear calculated using the equivalent lateral force procedure of Section 12.8.

1614A.1.10 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.

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

1. *The strength of the superstructure elements.*
2. *The maximum forces that would occur in the fully yielded structural system.*
3. *Forces from load combinations with overstrength factor per ASCE 7 Section 12.4.3.2.*

Exceptions:

1. *Where structures are designed using $R \leq 2.5$ such as for inverted pendulum-type structures.*
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 the basic structural system consists of light-framed walls with shear panels.*

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.

Exception: *The seismic loads defined above need not be considered for friction and passive resistance. Ultimate soil pressure can be used when considering load combinations with the seismic loads defined above.*

1614A.1.11 ASCE 7, Section 13.3.2. *Modify ASCE 7 Section 13.3.2 by adding the following:*

The seismic relative displacements to be used in design of displacement sensitive nonstructural components is $D_p I$ instead of D_p, where D_p is given by Equations 13.3-5 to 13.3-8 and I is the building importance factor given in Section 11.5.

1614A.1.12 ASCE 7, Section 13.5.6.2. *Modify ASCE 7 Section 13.5.6.2 by adding Section 13.5.6.2.3 as follows:*

13.5.6.2.3 Additional requirements.

1. ***Exitways.*** *Lay-in ceiling assemblies in exitways of hospitals and essential services buildings shall be installed with a main runner or cross runner surrounding all sides of each piece of tile, board or panel and each light fixture or grille. A cross runner that supports another cross runner shall be considered as a main runner for the purpose of structural classification. Splices or intersections of such runners shall be attached with through connectors such as pop rivets, screws, pins, plates with end tabs or other approved connectors.*
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 $^1/_2$ pound per square foot (24 N/m²) other than acoustical tiles shall be positively attached to the ceiling suspension runners.*
4. ***Grid members, connectors and expansion devices.*** *The allowable load-carrying capacity as determined by test shall not exceed one-third of the mean ultimate test value based on tests of no fewer than three identical specimens. Rational analysis can be substituted for test where permitted by ASCE 7 and the enforcement agency.*
5. ***Vertical hangers.*** *Each vertical hanger shall be attached to the ceiling suspension member and to the support above with a minimum of three tight twists in $1^1/_2$ inches (38 mm).*

6a. ***[OSHPD 1 & 4] Lateral-force bracing.*** *Substantiating design calculations or test reports shall be provided for all lateral-force bracing, their connections and anchorages. Lateral forces must comply with the seismic force requirements of ASCE 7 Chapter 13. Horizontal restraint points shall not be placed more than 8 feet by 12 feet (2438 mm by 3658 mm) on center. Horizontal restraint wires shall be No. 12 gage minimum and secured to main runners with four tight twists in $1^1/_2$ inches (38 mm).*

6b. ***[DSA-SS] Lateral-force bracing.*** *Substantiating design calculations or test reports shall be provided for all lateral-force bracing, their connections and anchorages. Lateral forces must comply with the seismic force requirements of ASCE 7 Chapter 13. Horizontal restraint points shall not be placed more than 12 feet by 12 feet (3658 mm by 3658 mm) on center. Horizontal restraint wires shall be No. 12 gage minimum and secured to main runners with four tight twists in $1^1/_2$ inches.*

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

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

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

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

8. ***Mechanical services.*** *Terminals and services weighing no more than 20 pounds (9 kg) shall have two No. 12-gage hangers from the terminal or service to the structure above. These wires may be slack.*

9. ***Lighting fixtures.*** *All lighting fixtures shall be positively attached to the suspended ceiling system. The attachment device shall have a capacity of 100 percent of the lighting fixture weight acting in any direction.*

   Lighting fixtures weighing 56 pounds (25 kg) or more shall be supported directly from the structure above by approved hangers. In such cases the slack wires required by Item 7 above may be omitted.

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

11. ***Construction documents.*** *The construction documents shall include detailing and specifications for suspended ceiling members, connections, support systems, light fixture and mechanical fixture attachments, partition supports and seismic bracing.*

1614A.1.13 ASCE 7, Section 13.6.1. *Modify ASCE 7 Section 13.6.1 by adding Sections 13.6.1.1 and 13.6.1.2 as followings:*

13.6.1.1 HVAC ductwork, plumbing/piping and conduit systems. Ductwork shall be constructed in accordance with provisions contained in Part 4, Title 24, California Mechanical Code. Where possible, pipes, conduit and their connections shall be constructed of ductile materials (copper, ductile iron, steel or aluminum and brazed, welded or screwed connections). Pipes, conduits and their connections, constructed of nonductile materials (e.g., cast iron, no-hub pipe and plastic), shall have the brace spacing reduced to satisfy requirements of ASCE 7 Chapter 13 and not to exceed one-half of the spacing allowed for ductile materials.

13.6.1.2 Trapeze assemblies. All trapeze assemblies supporting pipes, ducts and conduit shall be braced to resist the forces and relative displacements per ASCE 7 Chapter 13, considering the total weight of the elements on the trapeze.

Pipes, ducts and conduit supported by a trapeze where none of those elements would individually be braced need not be braced if connections to the pipe/conduit/ductwork or directional changes do not restrict the movement of the trapeze. If this flexibility is not provided, bracing will be required when the aggregate weight of the pipes and conduit exceed 10 pounds per foot (146 N/m). The weight shall be determined assuming all pipes and conduit are filled with water.

1614A.1.14 ASCE 7 Section 13.6.7. *Modify ASCE 7 Section 13.6.7 by the following:*

Requirements of this section shall also apply for I_p= 1.5.

1614A.1.15 ASCE 7, Section 13.6.10.1. *Modify ASCE 7 Section 13.6.10.1 by adding Section 13.6.10.1.1 as follows:*

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

1614A.1.16 ASCE 7, Section 13.6.10.4. *Replace ASCE 7 Section 13.6.10.4 as follows:*

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

1. *The seismic force shall be computed per the requirements of ASCE 7 Section 13.6.10.1. The minimum horizontal acceleration shall be 0.5g for all buildings.*
2. *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 1/4	0.20
11	1 1/2	0.30
12	1 3/4	0.40
15	1 31/32	0.50
18 1/2	1 31/32	0.50
22 1/2	2	0.50
30	2 1/4	0.50

For SI: 1 inch = 25 mm, 1 foot = 305 mm, 1 pound = 0.454 kg.

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

4. *Where guide rails are continuous over supports and rail joints are within 2 feet (610 mm) of their supporting brackets, a simple span may be assumed.*
5. *The use of spreader brackets is allowed.*
6. *Cab stabilizers and counterweight frames shall be designed to withstand computed lateral load with a minimum horizontal acceleration of 0.5g.*

1614A.1.17 Reserved.

1614A.1.18 ASCE 7, Section 17.2.1. *Modify ASCE 7 Section 17.2.1 by adding the following:*

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

1614A.1.19 ASCE 7, Section 17.2.4.7. *Modify ASCE 7 Section 17.2.4.7 by adding the following:*

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

1614A.1.20 ASCE 7, Section 17.2.4.8. *Modify ASCE 7 Section 17.2.4.8 by adding the following:*

f. Inspection and replacement programs shall be submitted to the enforcement agency for approval with the plans and specifications and shall be a condition of occupancy for the structure.

g. After every significant seismic event, the owner shall retain a structural engineer to make an inspection of the structural system. The inspection shall consist of viewing the performance of the building, reviewing the strong motion records and a visual examination of the isolators and their 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 as required to the enforcement agency.

1614A.1.21 ASCE 7, Section 17.2.4.9. *Modify ASCE 7 Section 17.2.4.9 by adding the following:*

The quality control testing program shall include provisions for both prototype and production isolator units. The quality control testing program shall be subject to preapproval by the enforcement agency.

1614A.1.22 ASCE 7, Section 17.2.4. *Modify ASCE 7 Section 17.2.4 by adding Section 17.2.4.10 as follows:*

17.2.4.10 Instrumentation. A proposal for instrumentation and equipment specifications shall be forwarded to the enforcement agency for approval.

There shall be sufficient numbers of instruments to characterize the response of the building during an earthquake. Motion measuring instruments shall be located within the building and at levels immediately above and below the isolators. The owner of the building is responsible for the implementation of the instrumentation program. Maintenance of the instrumentation and removal and processing of the records shall be the responsibility of the enforcement agency or its designated agent.

1614A.1.23 ASCE 7, Section 17.2.5.2. *Modify ASCE 7 Section 17.2.5.2 by adding the following:*

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

1. *For seismically isolated buildings, the elastic deformation resulting from the dynamic analyses using the maximum considered earthquake unmodified by R_I.*
2. *For fixed-based buildings, C_d times the elastic deformations resulting from an equivalent static analysis using the seismic base shear computed via ASCE 7 Section 12.8.*

1614A.1.24 ASCE 7, Section 17.3.1. *Modify ASCE 7 Section 17.3.1 by adding the following:*

Site-specific ground motion spectra of the design earthquake and the maximum considered earthquake, developed in accordance with Section 1802A.6 and ASCE 7, shall be used for design and analysis of all seis-

professional registration and certification of engineers or architects.

3. Unless otherwise required by the building official, special *inspections* are not required for occupancies in Group R-3 and occupancies in Group U that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1

4. *[HCD 1] The provisions of Health and Safety Code Division 13, Part 6 and the California Code of Regulations, Title 25, Division 1, Chapter 3, commencing with Section 3000, shall apply to the construction and inspection of factory-built housing as defined in Health and Safety Code Section 19971.*

1704.1.1 Statement of special inspections. The permit applicant shall submit a statement of special inspections prepared by the registered design professional in responsible charge in accordance with *Section 106.1, Appendix Chapter 1,* as a condition for permit issuance. This statement shall be in accordance with Section 1705.

Exceptions:

1. *[OSHPD 2] Not permitted by OSHPD.* A statement of special inspections is not required for structures designed and constructed in accordance with the conventional construction provisions of Section 2308.
2. The statement of special inspections is permitted to be prepared by a qualified person approved by the building official for construction not designed by a registered design professional.

1704.1.2 Report requirement. Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies 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 correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon by the permit applicant and the building official prior to the start of work.

1704.2 Inspection of fabricators. Where fabrication of structural load-bearing members and assemblies is being performed on the premises of a fabricator's shop, special inspection of the fabricated items shall be required by this section and as required elsewhere in this code.

1704.2.1 Fabrication and implementation procedures. The special inspector shall verify that the fabricator maintains detailed fabrication and quality control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work.

Exception: Special inspections as required by Section 1704.2 shall not be required where the fabricator is approved in accordance with Section 1704.2.2.

1704.2.2 Fabricator approval. Special inspections required by this code are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building official stating that the work was performed in accordance with the approved construction documents.

1704.3 Steel construction. The special inspections for steel elements of buildings and structures shall be as required by Section 1704.3 and Table 1704.3.

Exceptions:

1. Special inspection of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, grade and mill test reports for the main stress-carrying elements are capable of being determined.
2. The special inspector need not be continuously present during welding of the following items, provided the materials, welding procedures and qualifications of welders are verified prior to the start of the work; periodic inspections are made of the work in progress; and a visual inspection of all welds is made prior to completion or prior to shipment of shop welding.
   2.1. Single-pass fillet welds not exceeding $^{5}/_{16}$ inch (7.9 mm) in size.
   2.2. Floor and roof deck welding.
   2.3. Welded studs when used for structural diaphragm.
   2.4. Welded sheet steel for cold-formed steel framing members such as studs and joists.
   2.5. Welding of stairs and railing systems.

1704.3.1 Welding. Welding inspection shall be in compliance with AWS D1.1. The basis for welding inspector qualification shall be AWS D1.1.

1704.3.2 Details. The special inspector shall perform an inspection of the steel frame to verify compliance with the details shown on the approved construction documents, such as bracing, stiffening, member locations and proper application of joint details at each connection.

TABLE 1704.3
REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD[a]	IBC REFERENCE
1. Material verification of high-strength bolts, nuts and washers:				
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	—	X	Applicable ASTM material specifications; AISC 360, Section A3.3	—
b. Manufacturer's certificate of compliance required.	—	X	—	—
2. Inspection of high-strength bolting:				
a. Bearing-type connections.	—	X	AISC 360, Section M2.5	1704.3.3
b. Slip-critical connections.	X	X		
3. Material verification of structural steel:				
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	—	—	ASTM A 6 or ASTM A 568	1708.4
b. Manufacturers' certified mill test reports.	—	—	ASTM A 6 or ASTM A 568	
4. Material verification of weld filler materials:				
a. Identification markings to conform to AWS specification in the approved construction documents.	—	—	AISC 360, Section A3.5	—
b. Manufacturer's certificate of compliance required.	—	—	—	—
5. Inspection of welding:	—	—		
a. Structural steel:				
1) Complete and partial penetration groove welds.	X	—	AWS D1.1	1704.3.1
2) Multipass fillet welds.	X	—		
3) Single-pass fillet welds > $^5/_{16}$″	X	—		
4) Single-pass fillet welds ≤ $^5/_{16}$″	—	X		
5) Floor and roof deck welds.	—	X	AWS D1.3	—
b. Reinforcing steel:	—	—	AWS D1.4 ACI 318: 3.5.2	—
1) Verification of weldability of reinforcing steel other than ASTM A 706.	—	X		
2) Reinforcing steel-resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special reinforced concrete shear walls and shear reinforcement.	X	—		
3) Shear reinforcement.	X	—		
4) Other reinforcing steel.	—	X		
6. Inspection of steel frame joint details for compliance with approved construction documents:		X	—	1704.3.2
a. Details such as bracing and stiffening.	—	—		
b. Member locations.	—	—		
c. Application of joint details at each connection.	—			

For SI: 1 inch = 25.4 mm.

a. Where applicable, see also Section 1707.1, Special inspection for seismic resistance.

CHAPTER 18
SOILS AND FOUNDATIONS

SECTION 1801
GENERAL

1801.1 Scope. The provisions of this chapter shall apply to building and foundation systems in those areas not subject to scour or water pressure by wind and wave action. Buildings and foundations subject to such scour or water pressure loads shall be designed in accordance with Chapter 16.

1801.2 Design. Allowable bearing pressures, allowable stresses and design formulas provided in this chapter shall be used with the allowable stress design load combinations specified in Section 1605.3. The quality and design of materials used structurally in excavations, footings and foundations shall conform to the requirements specified in Chapters 16, 19, 21, 22 and 23 of this code. Excavations and fills shall also comply with Chapter 33.

[HCD 1] For limited-density owner-built rural dwellings, pier foundations, stone masonry footings and foundations, pressure-treated lumber, poles, or equivalent foundation materials or designs may be used provided that the bearing is sufficient for the purpose intended.

1801.2.1 Foundation design for seismic overturning. Where the foundation is proportioned using the load combinations of Section 1605.2, and the computation of the seismic overturning moment is by the equivalent lateral-force method or the modal analysis method, the proportioning shall be in accordance with Section 12.13.4 of ASCE 7.

SECTION 1802
FOUNDATION AND SOILS INVESTIGATIONS

1802.1 General. Foundation and soils investigations shall be conducted in conformance with Sections 1802.2 through 1802.*8.* Where required by the building official, the classification and investigation of the soil shall be made by a registered design professional.

1802.1.1 General and where required for applications listed in Section 108.2.1.1 regulated by the Department of Housing and Community Development. [HCD 1] *Foundation and soils investigations shall be conducted in conformance with Health and Safety Code Sections 17953 through 17955 as summarized below.*

1802.1.1.1 Preliminary soil report. *Each city, county, or city and county shall enact an ordinance which requires a preliminary soil report, prepared by a civil engineer who is registered by the state. The report shall be based upon adequate test borings or excavations, of every subdivision, where a tentative and final map is required pursuant to Section 66426 of the Government Code.*

The preliminary soil report may be waived if the building department of the city, county or city and county, or other enforcement agency charged with the administration and enforcement of the provisions of this part, shall determine that, due to the knowledge such department has as to the soil qualities of the soil of the subdivision or lot, no preliminary analysis is necessary.

1802.1.1.2 Soil investigation by lot, necessity, preparation, and recommendations. *If the preliminary soil report indicates the presence of critically expansive soils or other soil problems which, if not corrected, would lead to structural defects, such ordinance shall require a soil investigation of each lot in the subdivision.*

The soil investigation shall be prepared by a civil engineer who is registered in this state. It shall recommend corrective action which is likely to prevent structural damage to each dwelling proposed to be constructed on the expansive soil.

1802.1.1.3 Approval, building permit conditions, appeal. *The building department of each city, county or city and county, or other enforcement agency charged with the administration and enforcement of the provisions of this part, shall approve the soil investigation if it determines that the recommended action is likely to prevent structural damage to each dwelling to be constructed. As a condition to the building permit, the ordinance shall require that the approved recommended action be incorporated in the construction of each dwelling. Appeal from such determination shall be to the local appeals board.*

1802.2 Where required. The owner or applicant shall submit a foundation and soils investigation to the building official where required in Sections 1802.2.1 through 1802.2.7.

Exception: The building official need not require a foundation or soils investigation where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1802.2.1 through 1802.2.6.

[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 California Geological Survey (CGS). Allowable foundation and lateral soil pressure values may be determined from Table 1804.2.

1802.2.1 Questionable soil. Where the classification, strength or compressibility of the soil are in doubt or where a load-bearing value superior to that specified in this code is claimed, the building official shall require that the necessary investigation be made. Such investigation shall comply with the provisions of Sections 1802.4 through 1802.6.

1802.2.2 Expansive soils. In areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist.

1802.2.3 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 shall not be required where waterproofing is provided in accordance with Section 1807.

1802.2.4 Pile and pier foundations. Pile and pier foundations shall be designed and installed on the basis of a foundation investigation and report as specified in Sections 1802.4 through 1802.6 and Section 1808.2.2.

1802.2.5 Rock strata. Where subsurface explorations at the project site indicate variations or doubtful characteristics in the structure of the rock upon which foundations are to be constructed, a sufficient number of borings shall be made to a depth of not less than 10 feet (3048 mm) below the level of the foundations to provide assurance of the soundness of the foundation bed and its load-bearing capacity.

1802.2.6 Seismic Design Category C. Where a structure is determined to be in Seismic Design Category C in accordance with Section 1613, an investigation shall be conducted and shall include an evaluation of the following potential hazards resulting from earthquake motions: slope instability, liquefaction and surface rupture due to faulting or lateral spreading.

1802.2.7 Seismic Design Category D, E or F. Where the structure is determined to be in Seismic Design Category D, E or F, in accordance with Section 1613, the soils investigation requirements for Seismic Design Category C, given in Section 1802.2.6, shall be met, in addition to the following. The investigation shall include:

1. A determination of lateral pressures on basement and retaining walls due to earthquake motions.
2. An assessment of potential consequences of any liquefaction and soil strength loss, including estimation of differential settlement, lateral movement or reduction in foundation soil-bearing capacity, and shall address mitigation measures. Such measures shall be given consideration in the design of the structure and can include but are not limited to ground stabilization, selection of appropriate foundation type and depths, selection of appropriate structural systems to accommodate anticipated displacements or any combination of these measures. The potential for liquefaction and soil strength loss shall be evaluated for site peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions. Peak ground acceleration shall be determined from a site-specific study taking into account soil amplification effects, as specified in Chapter 21 of ASCE 7.

   Exception: A site-specific study need not be performed, provided that peak ground acceleration equal to $S_{DS}/2.5$ is used, where S_{DS} is determined in accordance with Section 21.2.1 of ASCE 7.

1802.3 Soil classification. Where required, soils shall be classified in accordance with Section 1802.3.1 or 1802.3.2.

1802.3.1 General. For the purposes of this chapter, the definition and classification of soil materials for use in Table 1804.2 shall be in accordance with ASTM D 2487.

1802.3.2 Expansive soils. Soils meeting all four of the following provisions shall be considered expansive, except that tests to show compliance with Items 1, 2 and 3 shall not be required if the test prescribed in Item 4 is conducted:

1. Plasticity index (PI) of 15 or greater, determined in accordance with ASTM D 4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (75 μm), determined in accordance with ASTM D 422.
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422.
4. Expansion index greater than 20, determined in accordance with ASTM D 4829.

1802.4 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.

1802.4.1 Exploratory boring. The scope of the soil investigation including the number and types of borings or soundings, the equipment used to drill and sample, the in-situ testing equipment and the laboratory testing program shall be determined by a registered design professional.

1802.5 Soil boring and sampling. The soil boring and sampling procedure and apparatus shall be in accordance with generally accepted engineering practice. The registered design professional shall have a fully qualified representative on the site during all boring and sampling operations.

1802.6 Reports. The soil classification and design load-bearing capacity shall be shown on the construction document. Where required by the building official, a written report of the investigation shall be submitted that includes, but need not be limited to, the following information:

1. A plot showing the location of test borings and/or excavations.
2. A complete record of the soil samples.
3. A record of the soil profile.
4. Elevation of the water table, if encountered.
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.

2. Backfill shall be of clean sand. The sand shall be thoroughly compacted by tamping in layers not more than 8 inches (203 mm) in depth.
3. Backfill shall be of controlled low-strength material (CLSM).

1805*A*.8 Design for expansive soils. Footings or foundations for buildings and structures founded on expansive soils shall be designed in accordance with Section 1805*A*.8.1 or 1805*A*.8.2.

Footing or foundation design need not comply with Section 1805*A*.8.1 or 1805*A*.8.2 where the soil is removed in accordance with Section 1805*A*.8.3, nor where the building official approves stabilization of the soil in accordance with Section 1805*A*.8.4.

1805*A*.8.1 Foundations. Footings or foundations placed on or within the active zone of expansive soils shall be designed to resist differential volume changes and to prevent structural damage to the supported structure. Deflection and racking of the supported structure shall be limited to that which will not interfere with the usability and serviceability of the structure.

Foundations placed below where volume change occurs or below expansive soil shall comply with the following provisions:

1. Foundations extending into or penetrating expansive soils shall be designed to prevent uplift of the supported structure.
2. Foundations penetrating expansive soils shall be designed to resist forces exerted on the foundation due to soil volume changes or shall be isolated from the expansive soil.

1805*A*.8.2 Slab-on-ground foundations. Moments, shears and deflections for use in designing slab-on-ground, mat or raft foundations on expansive soils shall be determined in accordance with *WRI/CRSI Design of Slab-on-Ground Foundations* or *PTI Standard Requirements for Analysis of Shallow Concrete Foundations on Expansive Soils.* Using the moments, shears and deflections determined above, nonprestressed slabs-on-ground, mat or raft foundations on expansive soils shall be designed in accordance with *WRI/CRSI Design of Slab-on-Ground Foundations* and post-tensioned slab-on-ground, mat or raft foundations on expansive soils shall be designed in accordance with *PTI Standard Requirements for Design of Shallow Post-Tensioned Concrete Foundations on Expansive Soils.* It shall be permitted to analyze and design such slabs by other methods that account for soil-structure interaction, the deformed shape of the soil support, the plate or stiffened plate action of the slab as well as both center lift and edge lift conditions. Such alternative methods shall be rational and the basis for all aspects and parameters of the method shall be available for peer review.

1805*A*.8.3 Removal of expansive soil. Where expansive soil is removed in lieu of designing footings or foundations in accordance with Section 1805*A*.8.1 or 1805*A*.8.2, the soil shall be removed to a depth sufficient to ensure a constant moisture content in the remaining soil. Fill material shall not contain expansive soils and shall comply with Section 1803*A*.5 or 1803*A*.6.

Exception: Expansive soil need not be removed to the depth of constant moisture, provided the confining pressure in the expansive soil created by the fill and supported structure exceeds the swell pressure.

1805*A*.8.4 Stabilization. Where the active zone of expansive soils is stabilized in lieu of designing footings or foundations in accordance with Section 1805*A*.8.1 or 1805*A*.8.2, the soil shall be stabilized by chemical, dewatering, presaturation or equivalent techniques.

1805*A*.9 Seismic requirements. See Section 1908*A* for additional requirements for footings and foundations of structures assigned to Seismic Design Category D, E or F.

For structures assigned to Seismic Design Category D, E or F, provisions of ACI 318, Sections 21.10.1 to 21.10.3, shall apply when not in conflict with the provisions of Section 1805*A*. Concrete shall have a specified compressive strength of not less than 3,000 psi (20.68 MPa) at 28 days.

Exceptions:

1. Group R or U occupancies of light-frame construction and two stories or less in height are permitted to use concrete with a specified compressive strength of not less than 2,500 psi (17.2 MPa) at 28 days.
2. Detached one- and two-family dwellings of light-frame construction and two stories or less in height are not required to comply with the provisions of ACI 318, Sections 21.10.1 to 21.10.3.

SECTION 1806*A*
RETAINING WALLS *AND CANTILEVER WALLS*

1806*A*.1 General. Retaining walls shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning.

Retaining walls higher than 12 feet (3658 mm), as measured from the top of the foundation, shall be designed to resist the additional earth pressure caused by seismic ground shaking.

The resultant of the vertical loads and lateral pressures using load combinations of Section 1605A.3 acting on the wall and its base shall pass through the middle half of the bottom of the footing.

Retaining walls shall be restrained against sliding by friction of the base against the earth, by passive resistance of the soil or by a combination of the two. When used, keys may be assumed to lower the plane of frictional resistance and depth of passive resistance to the level of the bottom of the key. Passive resistance pressures shall be assumed to act on a vertical plane located at the toe of the footing. Overturning shall be computed about the bottom of the spread footing. Passive resistance on the face of the wall may be included in computing resistance to overturning. Frictional resistance on the face of the wall may be included in computing resistance to overturning, except when lateral loads include seismic forces.

Gravity-type retaining walls utilizing precast concrete units may be used as an alternative to the conventional cantilever retaining systems only after they have been accepted by the enforcement agency.

1806A.2 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 1807*A*
DAMPPROOFING AND WATERPROOFING

1807*A*.1 Where required. Walls or portions thereof that retain earth and enclose interior spaces and floors below grade shall be waterproofed and dampproofed in accordance with this section, with the exception of those spaces containing groups other than residential and institutional where such omission is not detrimental to the building or occupancy.

Ventilation for crawl spaces shall comply with Section 1203.4.

1807*A*.1.1 Story above grade plane. Where a basement is considered a story above grade plane and the finished ground level adjacent to the basement wall is below the basement floor elevation for 25 percent or more of the perimeter, the floor and walls shall be dampproofed in accordance with Section 1807*A*.2 and a foundation drain shall be installed in accordance with Section 1807*A*.4.2. The foundation drain shall be installed around the portion of the perimeter where the basement floor is below ground level. The provisions of Sections 1802*A*.2.3, 1807*A*.3 and 1807*A*.4.1 shall not apply in this case.

1807*A*.1.2 Under-floor space. The finished ground level of an under-floor space such as a crawl space shall not be located below the bottom of the footings. Where there is evidence that the ground-water table rises to within 6 inches (152 mm) of the ground level at the outside building perimeter, or that the surface water does not readily drain from the building site, the ground level of the under-floor space shall be as high as the outside finished ground level, unless an approved drainage system is provided. The provisions of Sections 1802*A*.2.3, 1807*A*.2, 1807*A*.3 and 1807*A*.4 shall not apply in this case.

1807*A*.1.2.1 Flood hazard areas. For buildings and structures in flood hazard areas as established in Section 1612*A*.3, the finished ground level of an under-floor space such as a crawl space shall be equal to or higher than the outside finished ground level.

Exception: Under-floor spaces of Group R-3 buildings that meet the requirements of FEMA/FIA-TB-11.

1807*A*.1.3 Ground-water control. Where the ground-water table is lowered and maintained at an elevation not less than 6 inches (152 mm) below the bottom of the lowest floor, the floor and walls shall be dampproofed in accordance with Section 1807*A*.2. The design of the system to lower the ground-water table shall be based on accepted principles of engineering that shall consider, but not necessarily be limited to, permeability of the soil, rate at which water enters the drainage system, rated capacity of pumps, head against which pumps are to operate and the rated capacity of the disposal area of the system.

1807*A*.2 Dampproofing required. Where hydrostatic pressure will not occur as determined by Section 1802*A*.2.3, floors and walls shall be dampproofed in accordance with this section.

1807*A*.2.1 Floors. Dampproofing materials for floors shall be installed between the floor and the base course required by Section 1807*A*.4.1, except where a separate floor is provided above a concrete slab.

Where installed beneath the slab, dampproofing shall consist of not less than 6-mil (0.006 inch; 0.152 mm) polyethylene with joints lapped not less than 6 inches (152 mm), or other approved methods or materials. Where permitted to be installed on top of the slab, dampproofing shall consist of mopped-on bitumen, not less than 4-mil (0.004 inch; 0.102 mm) polyethylene, or other approved methods or materials. Joints in the membrane shall be lapped and sealed in accordance with the manufacturer's installation instructions.

1807*A*.2.2 Walls. Dampproofing materials for walls shall be installed on the exterior surface of the wall, and shall extend from the top of the footing to above ground level.

Dampproofing shall consist of a bituminous material, 3 pounds per square yard (16 N/m^2) of acrylic modified cement, 0.125 inch (3.2 mm) coat of surface-bonding mortar complying with ASTM C 887, any of the materials permitted for waterproofing by Section 1807*A*.3.2 or other approved methods or materials.

1807*A*.2.2.1 Surface preparation of walls. Prior to application of dampproofing materials on concrete walls, holes and recesses resulting from the removal of form ties shall be sealed with a bituminous material or other approved methods or materials. Unit masonry walls shall be parged on the exterior surface below ground level with not less than 0.375 inch (9.5 mm) of portland cement mortar. The parging shall be coved at the footing.

Exception: Parging of unit masonry walls is not required where a material is approved for direct application to the masonry.

1807*A*.3 Waterproofing required. Where the ground-water investigation required by Section 1802*A*.2.3 indicates that a hydrostatic pressure condition exists, and the design does not include a ground-water control system as described in Section 1807*A*.1.3, walls and floors shall be waterproofed in accordance with this section.

1807*A*.3.1 Floors. Floors required to be waterproofed shall be of concrete and designed and constructed to withstand

reinforcement shall be placed within one-half of the specified spacing at the top and bottom of the wall.

1908A.1.9 ACI 318, Section 14.3. *Add Section 14.3.8 to ACI 318 as follows:*

14.3.8—The minimum requirements for horizontal and vertical steel of ACI 318 Sections 14.3.2 and 14.3.3 may be interchanged for precast panels which are not restrained along vertical edges to inhibit temperature expansion or contraction.

1908A.1.10 ACI 318, Section 14.5 Empirical design method. *Not permitted by OSHPD and DSA-SS.*

1908A.1.11 ACI 318, Section 14.6.1. *Replace ACI 318 Section 14.6.1 as follows:*

14.6.1—Nonbearing walls or nonbearing shear walls shall have a thickness of not less than 4 inches (102 mm) nor a thickness less than $^{1}/_{30}$ of the shorter unsupported distance between vertical or horizontal stiffening elements.

Where walls are supported laterally by vertical elements, the stiffness of each vertical element shall exceed that of the tributary area of the wall.

1908A.1.12 ACI 318, Section 14. *Modify ACI 318 by adding Section 14.9 as follows:*

14.9—Foundation walls. Horizontal reinforcing of concrete foundation walls for wood-frame or light-steel buildings shall consist of the equivalent of not less than one No. 5 bar located at the top and bottom of the wall. Where such walls exceed 3 feet (914 mm) in height, intermediate horizontal reinforcing shall be provided at spacing not to exceed 2 feet (610 mm) on center. Minimum vertical reinforcing shall consist of No. 3 bars at 24 inches (610 mm) on center.

Where concrete foundation walls or curbs extend above the floor line and support wood-frame or light-steel exterior, bearing or shear walls, they shall be doweled to the foundation wall below with a minimum of No. 3 bars at 24 inches (610 mm) on center. Where the height of the wall above the floor line exceeds 18 inches (457 mm), the wall above and below the floor line shall meet the requirements of ACI 318 Section 14.3.

1908A.1.13 ACI 318, Section 15.2.1. *Modify ACI 318 Section 15.2.1 by adding the following:*

The appropriate induced reactions for strength design may be computed as those due to a factor of 1.4 times the soil pressures from gravity load combinations and the seismic load combinations of Section 1605A.3.

1908A.1.14 ACI 318, Section 15.2.2. *Modify ACI 318 Section 15.2.2 by adding the following:*

External forces and moments are those resulting from the load combinations of Section 1605A.3.

1908A.1.15 ACI 318, Section 15.8.3.2. *Replace ACI 318 Section 15.8.3.2 as follows:*

15.8.3.2—Connection between precast walls and supporting members shall meet the requirements of ACI 318 Sections 16.5.1.3(b) and (c) but not less than required by Section 1604A.

Exception: *In tilt-up construction, this connection may be to an adjacent floor slab. In no case shall the connection provided be less than that required by Section 1604A.*

1908A.1.16 ACI 318, Section 16.3. *Add Section 16.3.3 to ACI 318 as follows:*

16.3.3—Nonbearing, nonshear panels such as nonstructural architectural cladding panels or column covers are not required to meet the provisions of Section 1908A.1.17.

1908A.1.17 ACI 318, Section 16. *Add Section 16.11 to ACI 318 as follows:*

16.11—Reinforcement. Perimeters of precast walls shall be reinforced continuously with a minimum of one No. 5 bar extending the full height and width of the wall panel. Bars shall be continuous around corners. Where wall panels do not abut columns or other wall panels, perimeter bars shall be retained by hooked wall bars. Edges of openings in precast walls shall be reinforced with a minimum of one No. 5 bar continuous past corners sufficient to develop the bar.

A continuous tie or bond beam shall be provided at the roof line either as a part of the roof structure or part of the wall panels as described in the next paragraph below. This tie may be designed as the edge member of the roof diaphragm but, in any case, shall not be less than equivalent to two No. 6 bars continuous. A continuous tie equivalent to two No. 5 bars minimum shall also be provided either in the footing or with an enlarged section of the floor slab.

Wall panels of shear wall buildings shall be connected to columns or to each other in such a manner as to develop at least 75 percent of the horizontal wall steel. Half of this continuous horizontal reinforcing may be concentrated in bond or tie beams at the top and bottom of the walls and at points of intermediate lateral support. If possible, cast-in-place joints with reinforcing bars extending from the panels into the joint a sufficient distance to meet the splice requirements of ACI 318 Section 12.15 for Class A shall be used. The reinforcing bars or welded tie details shall not be spaced over eight times the wall thickness vertically nor fewer than four used in the wall panel height. Where wall panels are designed for their respective overturning forces, the panel connections need not comply with the requirements of this paragraph.

Where splicing of reinforcement must be made at points of maximum stress or at closer spacing than permitted by ACI 318 Section 7.6, welding may be used when the entire procedure is suitable for the particular quality of steel used and the ambient conditions. Unless the welds develop 125 percent of the specified yield strength of the steel used, reinforcement in the form of continuous bars or fully anchored dowels shall be added to provide 25-percent excess steel area and the welds

shall develop not less than the specified yield strength of the steel.

Where reinforcing bars are used to transfer shear across a joint the shear value for bolts set forth in Table 1912A.2 may be used.

Wall panels shall be positively connected to all floors and roofs as specified in Sections 1604A, 1607A.13 and ASCE 7 Section 13.5. They shall be connected to the foundations when not anchored to the floor slab or otherwise properly anchored.

See ACI 318 Sections 10.10, 10.11, 10.12 and 10.13 for design of compression forces in the precast walls.

1908A.1.18 ACI 318, Section 16. *Add Section 16.12 to ACI 318 as follows:*

16.12—On-site cast precast wall panels.

16.12.1—The provisions of ACI 318 Sections 16.1, 16.2, 16.3, 16.4, 16.5, 16.6 and 16.11 shall apply to precast wall panels cast on site.

16.12.2—Precast bearing and nonbearing walls shall be designed in accordance with the provisions of ACI 318 Chapter 14. Panel concrete shall have attained the specified compressive strength (f'_c) before erection unless calculations provided by the structural engineer or architect demonstrate adequate serviceability during handling and erection for concrete panels of lesser strength.

16.12.3—In lieu of unsupported height limitations, the panel may be supported laterally by vertical elements, provided the panel thickness is not less than $^1/_{36}$ the distance between the panel edges and the stiffness of the vertical elements exceeds that of the tributary area of the wall panels. See ASCE 7 Section 13.5 for exterior elements.

16.12.4—All embedded items shall be securely anchored in place prior to placing the concrete.

16.12.5—Panels shall be allowed as much time as possible in the erect position before making longitudinal connections with an elapsed time of 28 days minimum between casting and connecting the panels.

16.12.6—All details of reinforcement, connections, bearing seats, inserts, anchors, concrete cover, openings, fabrication and erection tolerances shall be shown on contract drawings.

1908A.1.19 ACI 318, Section 17.5.1. *Modify ACI 318 Section 17.5.1 by adding Sections 17.5.1.1 and 17.5.1.2 as follows:*

17.5.1.1—Full transfer of horizontal shear forces may be assumed when all of the following are satisfied:

1. *Contact surfaces are clean, free of laitance and intentionally roughened to a full amplitude of approximately $^1/_4$ inch (6.4 mm);*
2. *Minimum ties are provided in accordance with ACI 318 Section 17.6;*
3. *Web members are designed to resist total vertical shear; and*
4. *All shear reinforcement is fully anchored into all interconnected elements.*

17.5.1.2—If all requirements of ACI 318 Section 17.5.1.1 are not satisfied, horizontal shear shall be investigated in accordance with ACI 318 Section 17.5.3 or 17.5.4.

1908A.1.20 ACI 318, Section 18.2.3. *Modify ACI 318 Section 18.2.3 by adding the following:*

For prestressed concrete members with recessed or dapped ends, an analysis of the connections shall be made in accordance with procedures given in Part 6 of the PCI Design Handbook, 6th edition.

1908A.1.21 ACI 318, Section 18.2.4. *Modify ACI 318 Section 18.2.4 by adding the following:*

Where prestressed concrete elements are restrained from movement, an analysis of the stresses in the prestressed elements and loads in the adjoining structural system induced by the above-described effects shall be made in accordance with Part 3 of the PCI Design Handbook, 6th edition.

1908A.1.22 ACI 318, Section 18.2. *Add Section 18.2.7 to ACI 318 as follows:*

18.2.7—Span-to-depth ratio. Span-to-depth ratios for prestressed concrete members shall not exceed the following, except when calculations of deflections 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*
Flat Slabs	*Section 1908A.1.28*

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 9.5.

1908A.1.23 ACI 318, Section 18.6. *Add Section 18.6.4 to ACI 318 as follows:*

18.6.4—Presumptive loss of prestress. In lieu of an analysis to determine the loss of prestress from the above sources the loss may be assumed to be 35,000 psi (241 MPa) for pretensioned prestressed members. For post-tensioned prestressed members the loss due to elastic shortening of concrete, creep of concrete, shrinkage of concrete and relaxation of steel stress may be assumed to be 25,000 psi (172 MPa).

1908A.1.24 ACI 318, Section 18.9.2.2. *Modify ACI 318 Section 18.9.2.2 by adding the following:*

One-way, unbonded, post-tensioned slabs and beams shall be designed to carry the dead load of the slab or beam plus 25 percent of the unreduced superimposed live load by some method other than the primary

form of the shotcrete work. All surfaces shall be rodded to these wires.

1913A.13 Placing. *Shotcrete shall be placed in accordance with ACI 506.*

SECTION 1914*A*
REINFORCED GYPSUM CONCRETE

1914*A*.1 General. Reinforced gypsum concrete shall comply with the requirements of ASTM C 317 and ASTM C 956. *Reinforced gymsum concrete shall be considered as an alternative system.*

1914*A*.2 Minimum thickness. The minimum thickness of reinforced gypsum concrete shall be 2 inches (51 mm) except the minimum required thickness shall be reduced to $1^1/_2$ inches (38 mm), provided the following conditions are satisfied:

1. The overall thickness, including the formboard, is not less than 2 inches (51 mm).
2. The clear span of the gypsum concrete between supports does not exceed 33 inches (838 mm).
3. Diaphragm action is not required.
4. The design live load does not exceed 40 pounds per square foot (psf) (1915 Pa).

SECTION 1915*A*
CONCRETE-FILLED PIPE COLUMNS

1915*A*.1 General. Concrete-filled pipe columns shall be manufactured from standard, extra-strong or double-extra-strong steel pipe or tubing that is filled with concrete so placed and manipulated as to secure maximum density and to ensure complete filling of the pipe without voids.

1915*A*.2 Design. The safe supporting capacity of concrete-filled pipe columns shall be computed in accordance with the approved rules or as determined by a test.

1915*A*.3 Connections. Caps, base plates and connections shall be of approved types and shall be positively attached to the shell and anchored to the concrete core. Welding of brackets without mechanical anchorage shall be prohibited. Where the pipe is slotted to accommodate webs of brackets or other connections, the integrity of the shell shall be restored by welding to ensure hooping action of the composite section.

1915*A*.4 Reinforcement. To increase the safe load-supporting capacity of concrete-filled pipe columns, the steel reinforcement shall be in the form of rods, structural shapes or pipe embedded in the concrete core with sufficient clearance to ensure the composite action of the section, but not nearer than 1 inch (25 mm) to the exterior steel shell. Structural shapes used as reinforcement shall be milled to ensure bearing on cap and base plates.

1915*A*.5 Fire-resistance-rating protection. Pipe columns shall be of such size or so protected as to develop the required fire-resistance ratings specified in Table 601. Where an outer steel shell is used to enclose the fire-resistant covering, the shell shall not be included in the calculations for strength of the column section. The minimum diameter of pipe columns shall be 4 inches (102 mm) except that in structures of Type V construction not exceeding three stories or 40 feet (12 192 mm) in height, pipe columns used in the basement and as secondary steel members shall have a minimum diameter of 3 inches (76 mm).

1915*A*.6 Approvals. Details of column connections and splices shall be shop fabricated by approved methods and shall be approved only after tests in accordance with the approved rules. Shop-fabricated concrete-filled pipe columns shall be inspected by the building official or by an approved representative of the manufacturer at the plant.

SECTION 1916A
CONCRETE TESTING

1916A.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.*

1916A.2 Tests of reinforcing bars. *Where samples are taken from bundles as delivered from the mill, with the bundles identified as to heat number and provided the mill analyses accompany the report, one tensile test and one bend test shall be made from a specimen from each 10 tons (9080 kg) or fraction thereof of each size of reinforcing steel.*

Where positive identification of the heat number cannot be made or where random samples are to be taken, one series of tests shall be made from each $2^1/_2$ tons (2270 kg) or fraction thereof of each size of reinforcing steel. See Section 1916A.4 for waiver of tests.

1916A.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.*

1916A.4 Waiver of material testing. *Tests of reinforcing bars may be waived by the architect or structural engineer with the approval of the enforcement agency for one-story buildings where the specified compressive strength of the concrete, f'_c, delivered to the job site is 3,500 psi (24.13 MPa) and where the f'_c used in design is 2,500 psi (17.24 MPa).*

1916A.5 Composite construction cores. *Cores of the completed composite concrete construction shall be taken to demonstrate the shear strength along the contact surfaces. The cores shall be tested when the cast-in-place concrete is approximately 28 days old and shall be tested by a shear loading parallel to the joint between the precast concrete and the cast-in-place concrete. The minimum unit shear strength of the contact surface area of the core shall not be less than 100 psi (689 kPa).*

At least one core shall be taken from each building for each 5,000 square feet (465 m²) of area of composite concrete construction and not less than three cores shall be taken from each project. The architect or structural engineer in responsible charge of the project or his or her representative shall designate the location for sampling.

1916A.6 Tests of shotcrete. *Testing of shotcrete shall follow the provisions of Section 1913A and the general requirements of ACI 318 Section 5.6.*

1916A.7 Gymsum field tests. *Field tests shall be made during construction to verify gypsum strength. One sample consisting of three specimens shall be made for each 5,000 square feet (465 m²) or fraction thereof of all gypsum poured, but not less than one sample shall be taken from each half-day's pour.*

1916A.8 Tests for post-installed anchors in concrete. *When drilled-in expansion-type anchors or other post-installed anchors acceptable to the enforcement agency are used in lieu of cast-in-place bolts, the allowable shear and tension values and installation verification test loads shall be acceptable to the enforcement agency.*

When expansion-type anchors are listed for sill plate bolting applications, 10 percent of the anchors shall be tension tested.

When expansion-type anchors are used for other structural applications, all such expansion anchors shall be tension tested. Expansion-type anchors shall not be used as hold-down bolts.

When expansion-type anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group, including at least one-half the anchors in each group, shall be tension tested.

The tension testing of the expansion 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. If any anchors fail the tension-testing requirements, the additional testing requirements shall be acceptable to the enforcement agency. The above requirements shall also apply to other post-installed anchors acceptable to the enforcement agency and bolts or anchors set in concrete with chemical if the long-term durability and stability of the chemical material and its resistance to loss of strength and chemical change at elevated temperatures are established to the satisfaction of the enforcement agency.

SECTION 1917A
EXISTING CONCRETE STRUCTURES

1917A.1 Existing concrete structures. *The structural use of existing concrete with a core strength less than 1,500 psi (10.3 MPa) is not permitted in rehabilitation work.*

For existing concrete structures, sufficient cores shall be taken at representative locations throughout the structure, as designated by the architect or structural engineer, so that knowledge will be had of the in-place strength of the concrete. At least three cores shall be taken from each building for each 4,000 square feet (372 m²) of floor area, or fraction thereof. Cores shall be at least 4 inches (102 mm) in diameter. Cores as small as 2.75 inches (70 mm) in diameter may be allowed by the enforcement agency when reinforcement is closely spaced and the coarse aggregate does not exceed $^3/_4$ inch (19 mm).

1917A.2. [OSHPD 1 & 4] Crack repair by epoxy injection. *Crack repair by epoxy injection of concrete and masonry member shall conform to all requirements of ACI 503.7.*

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.6.1.2.2 Low-lift grouted construction. *Units shall be laid a maximum of 4 feet (1220 mm) before grouting, and all over-hanging mortar and mortar droppings shall be removed. 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. When grouting is stopped for 1 hour or longer, horizontal construction joints shall be formed by stopping the pour of grout not less than $^1/_2$ inch (13 mm) or more than 2 inches (51 mm) below the top of the uppermost unit grouted. Horizontal steel shall be fully embedded in grout in an uninterrupted pour.*

2104A.6.1.2.3 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 open-end bond beam units, cleanout openings need only be provided in every reinforced cell at the bottom of each pour of grout. 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 before grouting. An approved admixture that reduces early water loss and produces an expansive action shall be used in the grout.*

2104A.6.1.2.4 Stresses. *All reinforced hollow-unit masonry shall be so constructed that the units stressed do not exceed those set forth in Section 2107A or 2108A.*

Vertical barriers of masonry may be built across the grout space. The grouting of any section of wall between barriers shall be completed in one day with no interruption longer than 1 hour.

Note: *See Section 2105A for assumed masonry strength.*

2104A.6.2 Construction requirements. *Reinforcement and embedded items shall be placed 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.*

Segregation of the grout materials and damage to the masonry shall be avoided during the grouting process.

Grout shall be consolidated by mechanical vibration during placement before loss of plasticity in a manner to fill the grout space. Grout pours greater than 12 inches (300 mm) in height shall be reconsolidated by mechanical vibration to minimize voids due to water loss. Grout not mechanically vibrated shall be puddled.

2104A.7 Aluminum equipment. *Grout shall not be handled nor pumped utilizing aluminum equipment unless it can be demonstrated with the materials and equipment to be used that there will be no deleterious effect on the strength of the grout.*

SECTION 2105*A*
QUALITY ASSURANCE

2105*A*.1 General. A quality assurance program shall be used to ensure that the constructed masonry is in compliance with the construction documents.

The quality assurance program shall comply with the inspection and testing requirements of Chapter 17*A*.

2105*A*.2 Acceptance relative to strength requirements.

2105*A*.2.1 Compliance with f'_m. Compressive strength of masonry shall be considered satisfactory if the compressive strength of each masonry wythe and grouted collar joint equals or exceeds the value of f'_m for clay and concrete masonry and *requirements of Section 2105A.2.2 is satisfied.* For partially grouted clay and concrete masonry, the compressive strength of both the grouted and ungrouted masonry shall equal or exceed the applicable f'_m. *The specified compressive strength, f'_m, assumed in design shall be 1,500 psi (10.34 MPa) for all masonry construction using materials and details of construction required herein. Testing of the constructed masonry shall be provided in accordance with Section 2105A.4.*

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 assume that the reinforcement will be placed in a location that will produce the largest stresses within the tolerances allowed in Section 2104A.1.1 and shall take into account the mortar joint depth. In no case shall the f'_m assumed in design exceed 2,500 psi (17.24 MPa).*

Where an f'_m greater than 1,500 psi (10.34 MPa) is approved, the architect or structural engineer shall establish a method of quality control of the masonry construction acceptable to the enforcement agency which shall be described in the contract specifications. Compliance with the requirements for the specified compressive strength of masonry f'_m shall be provided in accordance with Sections 2105A.2.2.2, 2105A.4 and 2105A.5. Substantiation for the specified compressive strength prior to the start of construction may be obtained in accordance with Section 2105A.2.2.3.

2105*A*.2.2 Determination of compressive strength. The compressive strength for each wythe shall be determined by the unit strength method or by the prism test method *before construction* as specified herein.

2105*A*.2.2.1 Unit strength method.

2105*A*.2.2.1.1 Clay masonry. The compressive strength of masonry shall be determined based on the strength of the units and the type of mortar specified using Table 2105*A*.2.2.1.1, provided:

1. Units conform to ASTM C 62, ASTM C 216 or ASTM C 652 and are sampled and tested in accordance with ASTM C 67.
2. Thickness of bed joints does not exceed $^5/_8$ inch (15.9 mm).
3. For grouted masonry, the grout meets one of the following requirements:
   3.1. Grout conforms to ASTM C 476.
   3.2. Minimum grout compressive strength equals or exceeds f'_m but not less than 2,000 psi (13.79 MPa). The compressive strength of grout shall be determined in accordance with ASTM C 1019.

TABLE 2105*A*.2.2.1.1
COMPRESSIVE STRENGTH OF CLAY MASONRY

NET AREA COMPRESSIVE STRENGTH OF CLAY MASONRY UNITS (psi)		NET AREA COMPRESSIVE STRENGTH OF MASONRY (psi)
Type M or S mortar	Type N mortar	
1,700	2,100	1,000
3,350	4,150	1,500
4,950	6,200	2,000
6,600	8,250	2,500
8,250	10,300	3,000
9,900	—	3,500
13,200	—	4,000

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

TABLE 2105*A*.2.2.1.2
COMPRESSIVE STRENGTH OF CONCRETE MASONRY

NET AREA COMPRESSIVE STRENGTH OF CONCRETE MASONRY UNITS (psi)		NET AREA COMPRESSIVE STRENGTH OF MASONRY (psi)[a]
Type M or S mortar	Type N mortar	
1,250	1,300	1,000
1,900	2,150	1,500
2,800	3,050	2,000
3,750	4,050	2,500
4,800	5,250	3,000

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 0.00689 MPa.
a. For units less than 4 inches in height, 85 percent of the values listed.

2105*A*.2.2.1.2 Concrete masonry. The compressive strength of masonry shall be determined based on the strength of the unit and type of mortar specified using Table 2105*A*.2.2.1.2, provided:

1. Units conform to ASTM C 55 or ASTM C 90 and are sampled and tested in accordance with ASTM C 140.
2. Thickness of bed joints does not exceed $^5/_8$ inch (15.9 mm).
3. For grouted masonry, the grout meets one of the following requirements:
   3.1. Grout conforms to ASTM C 476
   3.2 Minimum grout compressive strength equals or exceeds f'_m but not less than 2,000 ps (13.79 MPa). The compressive strength of the grout shall be determined in accordance with ASTM C 1019.

2105*A*.2.2.1.3 AAC masonry. *Not permitted by OSHPD and DSA-SS.*

2105*A*.2.2.2 Prism test method.

2105*A*.2.2.2.1 General. The compressive strength of clay and concrete masonry shall be determined by the prism test method *prior to the start of construction and during construction:*

1. Where specified in the construction documents.
2. Where masonry does not meet the requirements for application of the unit strength method in Section 2105*A*.2.2.1.
3. *Where required by Section 2105A.2.1.*

2105*A*.2.2.2.2 Number of prisms per test. *Prior to the start of construction,* a prism test shall consist of *five* prisms constructed and tested in accordance with ASTM C 1314. *A set of three masonry prisms shall be built during construction in accordance with ASTM C 1314 for each 5,000 square feet (465 m^2) of wall area, but not less than one set of three prisms for the project. Each set of prisms shall equal or exceed f'_m.*

2105A.2.2.3 Masonry prism test record. *Compressive design strength verification by masonry prism test records shall meet the following:*

1. *A masonry prism test record approved by the enforcement agency of at least 30 masonry prisms which were built and tested in accordance with ASTM C 1314. Prisms shall have been constructed under the observation of an engineer or special inspector or an approved agency and shall have been tested by an approved agency.*
2. *Masonry prisms shall be representative of the corresponding construction.*
3. *The average compressive strength of the test record shall equal or exceed 1.33 f'_m.*

2105*A*.3 Testing prisms from constructed masonry. When approved by the building official, acceptance of masonry that does not meet the requirements of Section 2105*A*.2.2.1, 2105*A*.2.2.2, *2105A.4 or 2105A.5* shall be permitted to be based on tests of prisms cut from the masonry construction in accordance with Sections 2105*A*.3.1, 2105*A*.3.2 and 2105*A*.3.3.

2105*A*.3.1 Prism sampling and removal. A set of three masonry prisms that are at least 28 days old shall be saw cut from the masonry for each 5,000 square feet (465 m^2) of the wall area that is in question but not less than one set of three masonry prisms for the project. The length, width and

SECTION 2107*A*
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 and 2 of ACI 530/ASCE 5/TMS 402 except as modified by Sections 2107*A*.2 through *2107A.12*.

2107A.1.1 Design assumptions. *The allowable stress design procedure is based on working stresses and linear stress-strain distribution assumptions with all stresses in the elastic range as follows:*

1. *Plane sections before bending remain plane after bending.*
2. *Stress is proportional to strain.*
3. *Masonry elements combine to form a homogenous member.*
4. *Tensile forces are resisted only by the tensile reinforcement.*
5. *Reinforcement is completely surrounded by and bonded to the masonry materials so that they work together as a homogeneous material within the range of working stresses.*

2107*A*.2 ACI 530/ASCE 5/TMS 402, Section 2.1.2, load combinations. Delete Section 2.1.2.1.

2107*A*.3 ACI 530/ASCE 5/TMS 402, Section 2.1.3, design strength. Delete Sections 2.1.3.4 through 2.1.3.4.3.

2107A.4 ACI 530/ASCE 5/TMS 402, Section 2.1.4.2.3. *Modify Section 2.1.4.2.3, last paragraph as follows:*

Where the anchor bolt edge distance, l_{be}, in the direction of load is less than 12 bolt diameters, the value of B_v in Formula (2-5) shall be reduced by linear interpolation to zero at an l_{be} distance of $1^1/_2$ inches (38 mm) and confining reinforcement consisting of not less than No. 3 hairpins, hooks or stirrups for end bolts and between horizontal reinforcing for other bolts shall be provided. Where adjacent anchors are spaced closer than $8d_b$, the allowable shear of the adjacent anchors determined by Formula (2-5) shall be reduced by linear interpolation to 0.75 times the allowable shear value at a center-to-center spacing of four bolt diameters.

2107A.5 ACI 530/ASCE 5/TMS 402, Section 2.1.4.2. *Modify ACI 530/ASCE 5/TMS 402 by adding Section 2.1.4.2.5 as follows:*

2.1.4.2.5—Anchor bolts size and materials. Anchor bolts shall be hex headed bolts conforming to ASTM A 307 or F 1554 with the dimensions of the hex head conforming to ANSI/ASME B18.2.1 or plain rod conforming to ASTM A 36 with threaded ends and double hex nuts at the anchored end. Bent bar anchor bolts shall not be used.

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 (300 mm) nominal masonry.

2107A.6 ACI 530/ASCE 5/TMS 402, Section 2.1.9.1. *Modify ACI 530/ASCE 5/TMS 402, Section 2.1.9.1, by adding the following:*

Structural members framing into or supported by walls or columns shall be securely anchored. The end support of girders, beams or other concentrated loads on masonry shall have at least 3 inches (76 mm) in length upon solid bearing not less than 4 inches (102 mm) thick or upon metal bearing plate of adequate design and dimensions to distribute the loads safely on the wall or pier, or upon a continuous reinforced masonry member projecting not less than 3 inches (76 mm) from the face of the wall or other approved methods.

Joists shall have bearing at least 3 inches (76 mm) in length upon solid masonry at least $2^1/_2$ inches (64 mm) thick, or other provisions shall be made to distribute safely the loads on the wall or pier.

2107*A*.7 (Chapter 21, Section 2107.5) **ACI 530/ASCE 5/TMS 402, Section 2.1.10.7.1.1, lap splices.** Modify Section 2.1.10.7.1.1 as follows:

2.1.10.7.1.1 The minimum length of lap splices for reinforcing bars in tension or compression, l_d, shall be

$$l_d = 0.002 d_b f_s \qquad \textbf{(Equation 21}A\textbf{-2)}$$

For SI: $l_d = 0.29\ d_b f_s$

but not less than 12 inches (305 mm). In no case shall the length of the lapped splice be less than 40 bar diameters.

where:

d_b = Diameter of reinforcement, inches (mm).

f_s = Computed stress in reinforcement due to design loads, psi (MPa).

In regions of moment where the design tensile stresses in the reinforcement are greater than 80 percent of the allowable steel tension stress, F_s, the lap length of splices shall be increased not less than 50 percent of the minimum required length. Other equivalent means of stress transfer to accomplish the same 50 percent increase shall be permitted.

Where epoxy coated bars are used, lap length shall be increased by 50 percent.

2107*A*.8 (Chapter 21, Section 2107.6) **ACI 530/ASCE 5/TMS 402, Section 2.1.10.7, splices of reinforcement:**

2.1.10.7—Splices of reinforcement. Lap splices, welded splices or mechanical splices are permitted in accordance with the provisions of this section. All welding shall conform to AWS D1.4. Reinforcement larger than No. 9 (M #29) shall be spliced using mechanical connections in accordance with Section 2.1.10.7.3.

2107A.9 ACI 530/ASCE 5/TMS 402, Section 2.1. *Modify by adding Section 2.1.11 as follows:*

2.1.11—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.9, unless designed in accordance with ACI 530/ASCE 5/TMS 402 Section 3.3.5.

***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.9
MINIMUM THICKNESS OF MASONRY WALLS [a,b]

TYPE OF MASONRY	MAXIMUM RATIO UNSUPPORTED HEIGHT OR LENGTH TO THICKNESS[b,c]	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*

For SI: 1 inch = 25.4 mm.

a. For walls of varying thickness, use the least thickness when determining the height or length to thickness ratio.

b. 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.

c. 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.10 ACI 530/ASCE 5/TMS 402, Section 2.** Add Section 2.2 as follows:*

2.2—Unreinforced masonry. Not permitted by OSHPD and DSA-SS.

2107*A*.11 (Chapter 21, Section 2107.7) **ACI 530/ASCE 5/TMS 402, Section 2.3.6, maximum bar size.** Add the following to Chapter 2:

2.3.6 Maximum bar size. The bar diameter shall not exceed one-eigth 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.

2107*A*.12 (Chapter 21, Section 2107.8) **ACI 530/ASCE 5/TMS 402, Section 2.3.7,** maximum reinforcement percentage. Add the following text to Chapter 2:

2.3.7 Maximum reinforcement percentage. ***All reinforced masonry components*** that are subjected to in-plane forces shall have a maximum reinforcement ratio, ρ_{max}, not greater than that computed as follows:

$$\rho_{max} = \frac{nf'_m}{2f_y\left(n + \frac{f_y}{f'_m}\right)} \qquad \textbf{(Equation 21}\textit{A}\textbf{-3)}$$

SECTION 2108*A*
STRENGTH DESIGN OF MASONRY

2108*A*.1 General. The design of masonry structures using strength design shall comply with Section 2106A and the requirements of Chapters 1 and 3 of ACI 530/ASCE 5/TMS 402, except as modified by Sections 2108*A*.2 through 2108 *A*.4.

***2108A.2 ACI 530/ASCE 5/TMS 402, Section 3.** Add Section 3.2 as follows:*

3.2—Unreinforced (plane) masonry. Not permitted by OSHPD and DSA-SS.

2108*A*.3 (Chapter 21, Section 2108.2) **ACI 530/ASCE 5/TMS 402, Section 3.3.3.3, development.** Add the following text to Section 3.3.3.3:

The required development length of reinforcement shall be determined by Equation (3-15), but shall not be less than 12 inches (305 mm) and need not be greater than $72d_b$.

2108*A*.4 (Chapter 21, Section 2108.3) **ACI 530/ASCE 5/TMS 402, Section 3.3.3.4, splices.** Modify items (b) and (c) of Section 3.3.3.4 as follows:

3.3.3.4 (b). A welded splice shall have the bars butted and welded to develop at least 125 percent of the yield strength, f_y, of the bar in tension or compression, as required. Welded splices shall be of ASTM A 706 steel reinforcement. Welded splices shall not be permitted in plastic hinge zones of intermediate or special reinforced walls or special moment frames of masonry.

3.3.3.4 (c). Mechanical splices shall be classified as Type 1 or 2 according to Section 21.2.6.1 of ACI 318. Type 1 mechanical splices shall not be used within a plastic hinge zone or within a beam-column joint of intermediate or special reinforced masonry shear walls or special moment frames. Type 2 mechanical splices are permitted in any location within a member.

SECTION 2109*A*
EMPIRICAL DESIGN OF MASONRY

Not permitted by OSHPD and DSA-SS

SECTION 2110*A*
GLASS UNIT MASONRY

***2110A.1 Scope.** Masonry of glass blocks may be used in nonload-bearing exterior or interior walls and shall conform to the requirements of Section 2115A. Stresses in glass block shall not be utilized. Glass block may be solid or hollow and may contain inserts.*

2205A.4.1.5.1 AISC 341, Part I, Section 13, Members. *Add a new section as follows:*

AISC 341, 13.2f—Member Types

The use of rectangular HSS are not permitted for bracing members, unless filled solid with cement grout having a minimum compressive strength of 3000 psi (20.7 MPa) 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.4.1.5.2 Part I, Section 13: Add Section 13.7 as follows.

13.7 Beam to Column Connections.

SCBF frames shall have moment-resisting beam-column connections that can resist a moment equal to the lesser of the available flexural strength of the beam or the column in the SCBF bays. The connection shall include CJP welds from the beam flanges to the column flange, or to a plate in the case of column weak axis connections.

2205A.4.1.6 Part I, Section 14, Ordinary Concentrically Braced Frames (OCBF). *Not permitted by OSHPD.*

2205A.4.1.7 Part I, Section 15, Eccentrically Braced Frames (EBF) Modifications.

Part I, 15.4 Link-to-Column Connections.

Exception: *Not permitted by OSHPD.*

2205*A*.4.2 ***Appendix S, Qualifying Cyclic Tests of Beam-to-Column and Link-to-Column Connections Modifications.***

2205A.4.2.1 Appendix S, S3, Definitions. *Replace the definition of "Inelastic rotation" with 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.4.2.2 Appendix S, S3, Definitions. *Add the following:*

RAPID STRENGTH DETERIORATION. *A mode of behavior characterized by a sudden loss of strength. In a cyclic test with constant or increasing deformation amplitude, a loss of strength of more than 50 percent of the strength attained in the previous excursion in the same loading direction.*

2205A.4.2.3 Appendix S, Section S5.2, Size of Members. *Replace 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 percent 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 percent 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 S5.1. In addition, the depth of the test column shall be no less than 90 percent 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.4.2.4 Appendix S, Section S10, Acceptance Criteria. *Replace as follows:*

The test specimens must satisfy the strength, interstory drift angle, or link rotation angle, and inelastic rotation requirements of these provisions for the special moment frame and eccentrically braced frame connection as applicable. The test specimen must sustain the required interstory drift angle, or link rotation angle, and inelastic rotation for at least two complete loading cycles without exhibiting rapid strength deterioration.

2205*A*.4.3 ***Appendix T, Qualifying Cyclic Tests of Buckling-Restrained Braces Modification.***

AISC 341, T5.3, Similarity of Brace Test Specimen and Prototype, replace Item 2 with the following:

The axial yield strength of the steel core P_{ysc} of the brace prototype shall not be more than 20 percent above nor 50 percent less than that of the test specimen where both strengths are based on the core area, A_{sc}, multiplied by the yield strength as determined from a coupon test. In addition, the material of the test specimen shall be the same ASTM classification and grade as the prototype.

2205A.5 Modifications to AISC 358. [OSHPD 1 & 4]

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

The prequalification of bolted unstiffened extended end plate and bolted stiffened extended end plate connections in buildings is not permitted by OSHPD.

The prequalification of moment connections at orthogonal moment frames sharing common columns or moment connections attached to other than one side or two opposite sides of a column is not permitted by OSHPD.

2205A.5.2 Reduced beam section (RBS) moment connection modifications.

AISC 358, 5.3.1.7—Lateral bracing of beam shall be provided as follows: Replace the exception with the following:

Exception : *For both systems, where the beam supports a concrete structural slab that is connected between the protected zones with welded shear connectors spaced a maximum of 12 inches (300 mm) on center, supplemental top and bottom flange bracing at the reduced section may be omitted, subject to the approval of the enforcement agency. The concrete structural slab for the purposes of lateral bracing of the beam shall have a minimum of $5^1/_4$ inches (133 mm) in total thickness including metal deck, where occurs, have a minimum compressive strength of 4000 psi (27.2 MPa) at 28 days and contain 6x6-W4xW4 WWF or equal.*

SECTION 2206*A*
STEEL JOISTS

2206*A*.1 General. The design, manufacture and use of open web steel joists and joist girders shall be in accordance with one of the following Steel Joist Institute (SJI) specifications:

1. SJI K-1.1
2. SJI LH/DLH-1.1
3. SJI JG-1.1

Where required, the seismic design of buildings shall be in accordance with the additional provisions of Section 2205*A*.2 or 2210*A*.5.

2206*A*.2 Design. The registered design professional shall indicate on the construction documents the steel joist and/or steel joist girder designations from the specifications listed in Section 2206*A*.1 and shall indicate the requirements for joist and joist girder design, layout, end supports, anchorage, non-SJI standard bridging, bridging termination connections and bearing connection design to resist uplift and lateral loads. These documents shall indicate special requirements as follows:

1. Special loads including:
    1.1. Concentrated loads;
    1.2. Nonuniform loads;
    1.3. Net uplift loads;
    1.4. Axial loads;
    1.5. End moments; and
    1.6. Connection forces.
2. Special considerations including:
    2.1. Profiles for nonstandard joist and joist girder configurations (standard joist and joist girder configurations are as indicated in the SJI catalog);
    2.2. Oversized or other nonstandard web openings; and
    2.3. Extended ends.
3. Deflection criteria for live and total loads for non-SJI standard joists.

2206*A*.3 Calculations. The steel joist and joist girder manufacturer shall design the steel joists and/or steel joist girders in accordance with the current SJI specifications and load tables to support the load requirements of Section 2206*A*.2. The registered design professional may require submission of the steel joist and joist girder calculations as prepared by a registered design professional responsible for the product design. If requested by the registered design professional, the steel joist manufacturer shall submit design calculations with a cover letter bearing the seal and signature of the joist manufacturer's registered design professional. In addition to standard calculations under this seal and signature, submittal of the following shall be included:

1. Non-SJI standard bridging details (e.g. for cantilevered conditions, net uplift, etc.).
2. Connection details for:
    2.1. Non-SJI standard connections (e.g. flush-framed or framed connections);
    2.2. Field splices; and
    2.3. Joist headers.

2206*A*.4 Steel joist drawings. Steel joist placement plans shall be provided to show the steel joist products as specified on the construction documents and are to be utilized for field installation in accordance with specific project requirements as stated in Section 2206*A*.2. Steel placement plans shall include, at a minimum, the following:

1. Listing of all applicable loads as stated in Section 2206*A*.2 and used in the design of the steel joists and joist girders as specified in the construction documents.
2. Profiles for nonstandard joist and joist girder configurations (standard joist and joist girder configurations are as indicated in the SJI catalog).
3. Connection requirements for:
    3.1. Joist supports;
    3.2. Joist girder supports;
    3.3. Field splices; and
    3.4. Bridging attachments.
4. Deflection criteria for live and total loads for non-SJI standard joists.
5. Size, location and connections for all bridging.
6. Joist headers.

Design approval. *Joist and joist girder design calculations and profiles with member sizes and connection details, and joist*

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER – 23 WOOD

Adopting Agency		BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter		X									X									
Adopt Entire Chapter as amended (amended sections listed below)				X	X			X	X	X		X								
Adopt only those sections that are listed below			X															X		
Chapter / Section	Codes																			
2301.1	IBC			X	X															
2301.1.1	CA							X	X	X		X								
2301.1.2	CA							X	X	X		X								
2301.1.3	CA							X	X	X		X								
2303.1.3.1	CA							X	X	X		X								
2303.2 – 2303.2.6	IBC		X																	
2303.4.1.2 Exc. 3 only	CA							X	X	X		X								
2303.4.3	CA							X	X	X		X								
2304.3.4	CA							X	X	X		X								
2304.4.1	CA							X	X	X		X								
2304.5	IBC			X	X															
2304.9.1.1	CA							X	X	X		X								
2304.11.2.1.1	CA																	X		
2304.11.2.2 w/Exc.	CA							X	X	X		X								
2304.11.2.4.1	CA							X	X	X		X								
2304.11.2.8	CA																	X		
2304.11.10	CA																	X		
2305.1.7	CA							X	X	X		X								
2305.2.4.2	CA							X	X	X		X								
Table 2306.4.1 Footnote m	CA							X	X	X		X								
2306.4.5 Exc. only	CA							X	X	X		X								
2308.1	IBC			X	X															
2308.2 Item 8	CA							X	X	X		X								
2308.2.2	IBC			X	X															
Table 2308.9.3(1)	IBC			X	X															
2308.11.1	IBC			X	X															
2308.12.1	IBC			X	X															
Table 2308.12.4	IBC			X	X															

tive-treated wood unless separated from such floors or roofs by an impervious moisture barrier.

2304.11.5 Supporting member for permanent appurtenances. Naturally durable or preservative-treated wood shall be utilized for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances where such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering to prevent moisture or water accumulation on the surface or at joints between members.

Exception: When a building is located in a geographical region where experience has demonstrated that climatic conditions preclude the need to use durable materials where the structure is exposed to the weather.

2304.11.6 Termite protection. In geographical areas where hazard of termite damage is known to be very heavy, wood floor framing shall be of naturally durable species (termite resistant) or preservative treated in accordance with AWPA U1 for the species, product preservative and end use or provided with approved methods of termite protection.

2304.11.7 Wood used in retaining walls and cribs. Wood installed in retaining or crib walls shall be preservative treated in accordance with AWPA U1 (Commodity Specifications A or F) for soil and fresh water use.

2304.11.8 Attic ventilation. For attic ventilation, see Section 1203.2.

2304.11.9 Under-floor ventilation (crawl space). For under-floor ventilation (crawl space), see Section 1203.3.

2304.11.10 Earth fills. [SPCB] *Separate the earth fills such as under porches or paving from all woodwork by concrete, masonry, good quality cement plaster or other material approved by local building codes. Chemical treatment of earth fills is considered adequate if the foundation adjoining the fill meets standards of the current building codes.*

2304.12 Long-term loading. Wood members supporting concrete, masonry or similar materials shall be checked for the effects of long-term loading using the provisions of the AF&PA NDS. The total deflection, including the effects of long-term loading, shall be limited in accordance with Section 1604.3.1 for these supported materials.

Exception: Horizontal wood members supporting masonry or concrete nonstructural floor or roof surfacing not more than 4 inches (102 mm) thick need not be checked for long-term loading.

SECTION 2305
GENERAL DESIGN REQUIREMENTS FOR LATERAL-FORCE-RESISTING SYSTEMS

2305.1 General. Structures using wood shear walls and diaphragms to resist wind, seismic and other lateral loads shall be designed and constructed in accordance with the provisions of this section. Alternatively, compliance with the AF&PA SDPWS shall be permitted subject to the limitations therein and the limitations of this code.

2305.1.1 Shear resistance based on principles of mechanics. Shear resistance of diaphragms and shear walls are permitted to be calculated by principles of mechanics using values of fastener strength and sheathing shear resistance.

2305.1.2 Framing. Boundary elements shall be provided to transmit tension and compression forces. Perimeter members at openings shall be provided and shall be detailed to distribute the shearing stresses. Diaphragm and shear wall sheathing shall not be used to splice boundary elements. Diaphragm chords and collectors shall be placed in, or tangent to, the plane of the diaphragm framing unless it can be demonstrated that the moments, shears and deformations, considering eccentricities resulting from other configurations can be tolerated without exceeding the adjusted resistance and drift limits.

2305.1.2.1 Framing members. Framing members shall be at least 2 inch (51 mm) nominal width. In general, adjoining panel edges shall bear and be attached to the framing members and butt along their centerlines. Nails shall be placed not less than $^3/_8$ inch (9.5 mm) from the panel edge, not more than 12 inches (305 mm) apart along intermediate supports, and 6 inches (152 mm) along panel edge bearings, and shall be firmly driven into the framing members.

2305.1.3 Openings in shear panels. Openings in shear panels that materially affect their strength shall be fully detailed on the plans, and shall have their edges adequately reinforced to transfer all shearing stresses.

2305.1.4 Shear panel connections. Positive connections and anchorages capable of resisting the design forces shall be provided between the shear panel and the attached components. In Seismic Design Category D, E or F, the capacity of toenail connections shall not be used when calculating lateral load resistance to transfer lateral earthquake forces in excess of 150 pounds per foot (2189 N/m) from diaphragms to shear walls, drag struts (collectors) or other elements, or from shear walls to other elements.

2305.1.5 Wood members resisting horizontal seismic forces contributed by masonry and concrete walls. Wood shear walls, diaphragms, horizontal trusses and other members shall not be used to resist horizontal seismic forces contributed by masonry or concrete walls in structures over one story in height.

Exceptions:

1. Wood floor and roof members are permitted to be used in horizontal trusses and diaphragms to resist horizontal seismic forces contributed by masonry or concrete walls, provided such forces do not result in torsional force distribution through the truss or diaphragm.
2. Wood structural panel sheathed shear walls are permitted to be used to provide resistance to seismic forces contributed by masonry or concrete walls in two-story structures of masonry or concrete walls, provided the following requirements are met:

2.1. Story-to-story wall heights shall not exceed 12 feet (3658 mm).

2.2. Diaphragms shall not be designed to transmit lateral forces by rotation and shall not cantilever past the outermost supporting shear wall.

2.3. Combined deflections of diaphragms and shear walls shall not permit story drift of supported masonry or concrete walls to exceed the limit of Section 12.12.1 in ASCE 7.

2.4. Wood structural panel sheathing in diaphragms shall have unsupported edges blocked. Wood structural panel sheathing for both stories of shear walls shall have unsupported edges blocked and, for the lower story, shall have a minimum thickness of $^{15}/_{32}$ inch (11.9 mm).

2.5. There shall be no out-of-plane horizontal offsets between the first and second stories of wood structural panel shear walls.

2305.1.6 Wood members resisting seismic forces from nonstructural concrete or masonry. Wood members shall be permitted to resist horizontal seismic forces from nonstructural concrete, masonry veneer or concrete floors.

2305.1.7 Additional requirements. [DSA-SS & OSHPD 1, 2 and 4] *The following limitations shall apply:*

1. *Straight-sheathed horizontal lumber diaphragms are not permitted.*
2. *Gypsum-based sheathing shear walls and portland cement plaster shear walls are not permitted.*
3. *Shear wall foundation anchor bolt washers (refer to Section 4.3.6.4.3 of the SDPWS) shall conform with the requirements of Section 2305.3.11.*
4. *The engineering analysis shall include a statement indicating whether the lateral-force-resisting system has been designed in accordance with Section 2305, or in accordance with the AF&PA SDPWS and the limitations of this code.*

2305.2 Design of wood diaphragms.

2305.2.1 General. Wood diaphragms are permitted to be used to resist horizontal forces provided the deflection in the plane of the diaphragm, as determined by calculations, tests or analogies drawn therefrom, does not exceed the permissible deflection of attached distributing or resisting elements. Connections shall extend into the diaphragm a sufficient distance to develop the force transferred into the diaphragm.

2305.2.2 Deflection. Permissible deflection shall be that deflection up to which the diaphragm and any attached distributing or resisting element will maintain its structural integrity under design load conditions, such that the resisting element will continue to support design loads without danger to occupants of the structure. Calculations for diaphragm deflection shall account for the usual bending and shear components as well as any other factors, such as nail deformation, which will contribute to deflection.

The deflection (Δ) of a blocked wood structural panel diaphragm uniformly nailed throughout is permitted to be calculated by using the following equation. If not uniformly nailed, the constant 0.188 (For SI: $^{1}/_{1627}$) in the third term must be modified accordingly.

$$\Delta = \frac{5vL^3}{8EAb} + \frac{vL}{4Gt} + 0.188Le_n + \frac{\Sigma(\Delta_c X)}{2b} \quad \textbf{(Equation 23-1)}$$

$$\text{For SI: } \Delta = \frac{0.052vL^3}{EAb} + \frac{vL}{4Gt} + \frac{Le_n}{1627} + \frac{\Sigma(\Delta_c X)}{2b}$$

where:

A = Area of chord cross section, in square inches (mm^2).

b = Diaphragm width, in feet (mm).

E = Elastic modulus of chords, in pounds per square inch (N/mm^2).

e_n = Nail or staple deformation, in inches (mm) [see Table 2305.2.2(1)].

Gt = Panel rigidity through the thickness, in pounds per inch (N/mm) of panel width or depth [see Table 2305.2.2(2)].

L = Diaphragm length, in feet (mm).

v = Maximum shear due to design loads in the direction under consideration, in pounds per linear foot (plf) (N/mm).

Δ = The calculated deflection, in inches (mm).

$\sum(\Delta_c X)$ = Sum of individual chord-splice slip values on both sides of the diaphragm, each multiplied by its distance to the nearest support.

TABLE 2305.2.2(1)
e_n VALUES (inches) FOR USE IN CALCULATING DIAPHRAGM DEFLECTION DUE TO FASTENER SLIP (Structural I)[a,d]

LOAD PER FASTENER[c] (pounds)	FASTENER DESIGNATIONS[b]			
	6d	8d	10d	14-Ga staple x 2 inches long
60	0.01	0.00	0.00	0.011
80	0.02	0.01	0.01	0.018
100	0.03	0.01	0.01	0.028
120	0.04	0.02	0.01	0.04
140	0.06	0.03	0.02	0.053
160	0.10	0.04	0.02	0.068
180	—-	0.05	0.03	—-
200	—-	0.07	*0.05*	—-
220	—-	0.09	0.06	—-
240	—-	—-	0.07	—-

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.448 N.

a. Increase e_n values 20 percent for plywood grades other than Structural I.

b. Nail values apply to common wire nails or staples identified.

c. Load per fastener = maximum shear per foot divided by the number of fasteners per foot at interior panel edges.

d. Decrease e_n values 50 percent for seasoned lumber (moisture content < 19 percent).

CHAPTER 25
GYPSUM BOARD AND PLASTER

SECTION 2501
GENERAL

2501.1 Scope.

2501.1.1 General. Provisions of this chapter shall govern the materials, design, construction and quality of gypsum board, lath, gypsum plaster and cement plaster.

2501.1.2 Performance. Lathing, plastering and gypsum board construction shall be done in the manner and with the materials specified in this chapter, and when required for fire protection, shall also comply with the provisions of Chapter 7.

2501.1.3 Other materials. Other approved wall or ceiling coverings shall be permitted to be installed in accordance with the recommendations of the manufacturer and the conditions of approval.

2501.2 Additional requirements. [DSA-SS & OSHPD 1 and 4] *Details of attachment for wall and ceiling coverings which are not provided for in these regulations shall be detailed in the approved plans and specifications.*

SECTION 2502
DEFINITIONS

2502.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

CEMENT PLASTER. A mixture of portland or blended cement, portland cement or blended cement and hydrated lime, masonry cement or plastic cement and aggregate and other approved materials as specified in this code.

EXTERIOR SURFACES. Weather-exposed surfaces.

GYPSUM BOARD. Gypsum wallboard, gypsum sheathing, gypsum base for gypsum veneer plaster, exterior gypsum soffit board, predecorated gypsum board or water-resistant gypsum backing board complying with the standards listed in Tables 2506.2, 2507.2 and Chapter 35.

GYPSUM PLASTER. A mixture of calcined gypsum or calcined gypsum and lime and aggregate and other approved materials as specified in this code.

GYPSUM VENEER PLASTER. Gypsum plaster applied to an approved base in one or more coats normally not exceeding $^1/_4$ inch (6.4 mm) in total thickness.

INTERIOR SURFACES. Surfaces other than weather-exposed surfaces.

WEATHER-EXPOSED SURFACES. Surfaces of walls, ceilings, floors, roofs, soffits and similar surfaces exposed to the weather except the following:

1. Ceilings and roof soffits enclosed by walls, fascia, bulkheads or beams that extend a minimum of 12 inches (305 mm) below such ceiling or roof soffits.
2. Walls or portions of walls beneath an unenclosed roof area, where located a horizontal distance from an open exterior opening equal to at least twice the height of the opening.
3. Ceiling and roof soffits located a minimum horizontal distance of 10 feet (3048 mm) from the outer edges of the ceiling or roof soffits.

WIRE BACKING. Horizontal strands of tautened wire attached to surfaces of vertical supports which, when covered with the building paper, provide a backing for cement plaster.

SECTION 2503
INSPECTION

2503.1 Inspection. Lath and gypsum board shall be inspected in accordance with Section 109.3.5, *Appendix Chapter 1.*

2503.2 Additional requirements for inspection and testing. [DSA-SS & OSHPD 1 and 4]

1. *Lath and gypsum board shall be inspected in accordance with Appendix Chapter 1 and Title 24, Part 1.*
2. *No lath or gypsum wallboard or their attachments shall be covered or finished until it has been inspected and approved by the inspector of record and/or special inspector.*
3. *The enforcement agency may require tests to be made in accordance with approved standards to determine compliance with the provisions of these regulations.*
4. *The testing of gypsum and gypsum products shall conform with standards listed in Table 2506.2.*

SECTION 2504
VERTICAL AND HORIZONTAL ASSEMBLIES

2504.1 Scope. The following requirements shall be met where construction involves gypsum board, lath and plaster in vertical and horizontal assemblies.

2504.1.1 Wood framing. Wood supports for lath or gypsum board, as well as wood stripping or furring, shall not be less

than 2 inches (51 mm) nominal thickness in the least dimension.

Exception: The minimum nominal dimension of wood furring strips installed over solid backing shall not be less than 1 inch by 2 inches (25 mm by 51 mm).

2504.1.2 Studless partitions. The minimum thickness of vertically erected studless solid plaster partitions of $^3/_8$-inch (9.5 mm) and $^3/_4$-inch (19.1 mm) rib metal lath or $^1/_2$-inch-thick (12.7 mm) long-length gypsum lath and gypsum board partitions shall be 2 inches (51 mm).

2504.2 Additional requirements. [DSA-SS & OSHPD 1 and 4] *In addition to the requirements of this section, the horizontal and vertical assemblies of plaster or gypsum board shall be designed to resist the loads specified in Chapter 16A of this code. For wood framing, see Chapter 23. For metal framing, see Chapter 22A. For suspended acoustical ceiling systems, see Section 2506. For gypsum construction, see Section 2508.*

2504.2.1 Wood furring strips. *Wood furring strips for ceilings fastened to floor or ceiling joists shall be nailed at each bearing with two common wire nails, one of which shall be a slant nail and the other a face nail, or by one nail having spirally grooved or annular grooved shanks approved by the enforcement agency for this purpose. All stripping nails shall penetrate not less than $1^3/_4$ inches (44.5 mm) into the member receiving the point. Holes in stripping at joints shall be subdrilled to prevent splitting.*

Where common wire nails are used to support horizontal wood stripping for plaster ceilings, such stripping shall be wire tied to the joists 4 feet (1219 mm) on center with two strands of No. 18 W&M gage galvanized annealed wire to an 8d common wire nail driven into each side of the joist 2 inches (51 mm) above the bottom of the joist or to each end of a 16d common wire nail driven horizontally through the joist 2 inches (51 mm) above the bottom of the joist, and the ends of the wire secured together with three twists of the wire.

SECTION 2505
SHEAR WALL CONSTRUCTION

2505.1 Resistance to shear (wood framing). Wood-framed shear walls sheathed with gypsum board, lath and plaster shall be designed and constructed in accordance with Section 2306.4 and are permitted to resist wind and seismic loads. Walls resisting seismic loads shall be subject to the limitations in Section 12.2.1 of ASCE 7.

2505.2 Resistance to shear (steel framing). Cold-formed steel-framed shear walls sheathed with gypsum board and constructed in accordance with the materials and provisions of Section 2210.5 are permitted to resist wind and seismic loads. Walls resisting seismic loads shall be subject to the limitations in Section 12.2.1 of ASCE 7.

2505.3 [DSA-SS & OSHPD 1, 2 and 4] *Sections 2505.1 and 2505.2 are not permitted by DSA-SS and OSHPD.*

SECTION 2506
GYPSUM BOARD MATERIALS

2506.1 General. Gypsum board materials and accessories shall be identified by the manufacturer's designation to indicate compliance with the appropriate standards referenced in this section and stored to protect such materials from the weather.

2506.2 Standards. Gypsum board materials shall conform to the appropriate standards listed in Table 2506.2 and Chapter 35 and, where required for fire protection, shall conform to the provisions of Chapter 7.

TABLE 2506.2
GYPSUM BOARD MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum board	ASTM C 1047
Adhesives for fastening gypsum wallboard	ASTM C 557
Exterior soffit board	ASTM C 931
Fiber-reinforced gypsum panels	ASTM C 1278
Glass mat gypsum backing panel	ASTM C 1178
Glass mat gypsum substrate	ASTM C 1177
Gypsum backing board and gypsum shaftliner board	ASTM C 442
Gypsum ceiling board	ASTM C 1395
Gypsum sheathing	ASTM C 79
Gypsum wallboard	ASTM C 36
Joint reinforcing tape and compound	ASTM C 474; C 475
Nails for gypsum boards	ASTM C 514, F 547, F 1667
Predecorated gypsum board	ASTM C 960
Steel screws	ASTM C 954; C 1002
Steel studs, load bearing	ASTM C 955
Steel studs, nonload bearing	ASTM C 645
Standard specification for gypsum board	ASTM C 1396
Testing gypsum and gypsum products	ASTM C 22; C 472; C 473
Water-resistant gypsum backing board	ASTM C 630

2506.2.1 Other materials. Metal suspension systems for acoustical and lay-in panel ceilings shall conform with ASTM C 635 listed in Chapter 35 and Section 13.5.6 of ASCE 7 for installation in high seismic areas.

2506.2.1.1 Additional requirements. [DSA-SS & OSHPD 1 and 4] *In addition to the requirements of Section 2506.2.1, metal suspension systems shall comply with Section 13.5.6 of ASCE 7 as modified in Section 1614A.*

SECTION 2507
LATHING AND PLASTERING

2507.1 General. Lathing and plastering materials and accessories shall be marked by the manufacturer's designation to indi-

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 27 – ELECTRICAL

Adopting Agency		BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter								◆												
Adopt Entire Chapter as amended (amended sections listed below)			X																	
Adopt only those sections that are listed below							X													
Chapter / Section	Codes																			
2702.2.5	IBC						X													
2702.2.6	IBC						X													
2702.2.21	CA		X																	

The ◆ designation indicates that the Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures subject to DSA-SS.

CHAPTER 27
ELECTRICAL

SECTION 2701
GENERAL

2701.1 Scope. This chapter governs the electrical components, equipment and systems used in buildings and structures covered by this code. Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of the *California Electrical Code.*

SECTION 2702
[F] EMERGENCY AND STANDBY POWER SYSTEMS

[F] 2702.1 Installation. Emergency and standby power systems required by this code or the *California Fire Code* shall be installed in accordance with this code, NFPA 110 and 111.

[F] 2702.2 Where required. Emergency and standby power systems shall be provided where required by Sections 2702.2.1 through 2702.2.20.

[F] 2702.2.1 Group A occupancies. Emergency power shall be provided for voice communication systems in Group A occupancies in accordance with Section 907.2.1.2.

[F] 2702.2.2 Smoke control systems. Standby power shall be provided for smoke control systems in accordance with Section 909.11.

[F] 2702.2.3 Exit signs. Emergency power shall be provided for exit signs in accordance with Section 1011.5.3.

[F] 2702.2.4 Means of egress illumination. Emergency power shall be provided for means of egress illumination in accordance with Section 1006.3.

[F] 2702.2.5 Accessible means of egress elevators. Standby power shall be provided for elevators that are part of an accessible means of egress in accordance with Section 1007.4.

[F] 2702.2.6 Accessible means of egress platform lifts. Standby power in accordance with this section or ASME A18.1 shall be provided for platform lifts that are part of an accessible means of egress in accordance with Section 1007.5.

[F] 2702.2.7 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors in accordance with Section 1008.1.3.3.

[F] 2702.2.8 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities in accordance with Section 415.8.10.

[F] 2702.2.9 Membrane structures. Standby power shall be provided for auxiliary inflation systems in accordance with Section 3102.8.2. Emergency power shall be provided for exit signs in temporary tents and membrane structures in accordance with the *California Fire Code.*

[F] 2702.2.10 Hazardous materials. Emergency or standby power shall be provided in occupancies with hazardous materials in accordance with Section 414.5.4.

[F] 2702.2.11 Highly toxic and toxic materials. Emergency power shall be provided for occupancies with highly toxic or toxic materials in accordance with the *California Fire Code.*

[F] 2702.2.12 Organic peroxides. Standby power shall be provided for occupancies with silane gas in accordance with the *California Fire Code.*

[F] 2702.2.13 Pyrophoric materials. Emergency power shall be provided for occupancies with silane gas in accordance with the *California Fire Code.*

[F] 2702.2.14 Covered mall buildings. Standby power shall be provided for voice/alarm communication systems in covered mall buildings in accordance with Section 402.13.

[F] 2702.2.15 High-rise buildings *and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access*. Emergency and standby power shall be provided in high-rise buildings *and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access* in accordance with Sections 403.10 and 403.11.

[F] 2702.2.16 Underground buildings. Emergency and standby power shall be provided in underground buildings in accordance with Sections 405.9 and 405.10.

[F] 2702.2.17 Group I-3 occupancies. Emergency power shall be provided for doors in Group I-3 occupancies in accordance with Section 408.4.2.

[F] 2702.2.18 Airport traffic control towers. Standby power shall be provided in airport traffic control towers in accordance with Section 412.1.5.

[F] 2702.2.19 Elevators. Standby power for elevators shall be provided as set forth in Section 3003.1.

[F] 2702.2.20 Smokeproof enclosures. Standby power shall be provided for smokeproof enclosures as required by Section 909.20.

2702.2.21 Group L-Occupancy. *Emergency power shall be provided in Group L occupancies in accordance with Section 443.4.6.*

[F] 2702.3 Maintenance. Emergency and standby power systems shall be maintained and tested in accordance with the *California Fire Code.*

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 30 – ELEVATORS AND CONVEYING SYSTEMS

Adopting Agency		BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter		X						X ◆		X	X	X								
Adopt Entire Chapter as amended (amended sections listed below)			X	◆	◆				X											
Adopt only those sections that are listed below				X	X		X													
Chapter / Section	Codes																			
3001.1 w/Exc.	CA						X													
3001.3	CA			X	X		X													
3002.4a	CA		X																	
3002.9	CA		X																	
3003.2.1 — 3003.2.1.2	CA		X																	
3006.5 – 3006.5.5	CA		X																	
3007.1.1									X											

The ◆ designation indicates that the Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures subject to HCD 1 and/or HCD 2 or DSA-SS.

CHAPTER 30
ELEVATORS AND CONVEYING SYSTEMS

SECTION 3001
GENERAL

3001.1 Scope. This chapter governs the design, construction, installation, alteration and repair of elevators and conveying systems and their components.

Exception: [DSA-AC] *For accessibility requirements for platform (wheelchair) lifts and elevators, see California Code of Regulations, Title 8 and Title 24, Part 2, Sections 1124A and 1116B.*

3001.2 Referenced standards. Except as otherwise provided for in this code, the design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components shall conform to ASME A17.1, ASME A90.1, ASME B20.1, ALI ALCTV, and ASCE 24 for construction in flood hazard areas established in Section 1612.3.

3001.3 Accessibility. Passenger elevators *and platform (wheelchair) lifts* required to be accessible by Chapters 11*A or 11B* shall conform to *Chapter 11A for applications listed in Section 108.2.1.2 regulated by the Department of Housing and Community Development or Chapter 11B for applications listed in Section 109.1 regulated by the Division of the State Architect—Access Compliance.*

3001.4 Change in use. A change in use of an elevator from freight to passenger, passenger to freight, or from one freight class to another freight class shall comply with Part XII of ASME A17.1.

SECTION 3002
HOISTWAY ENCLOSURES

3002.1 Hoistway enclosure protection. Elevator, dumbwaiter and other hoistway enclosures shall be shaft enclosures complying with Section 707.

3002.1.1 Opening protectives. Openings in hoistway enclosures shall be protected as required in Chapter 7.

Exception: The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I Emergency Recall Operation.

3002.1.2 Hardware. Hardware on opening protectives shall be of an approved type installed as tested, except that approved interlocks, mechanical locks and electric contacts, door and gate electric contacts and door-operating mechanisms shall be exempt from the fire test requirements.

3002.2 Number of elevator cars in a hoistway. Where four or more elevator cars serve all or the same portion of a building, the elevators shall be located in at least two separate hoistways. Not more than four elevator cars shall be located in any single hoistway enclosure.

3002.3 Emergency signs. An approved pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the exit stairways and not to use the elevators in case of fire. The sign shall read: IN FIRE EMERGENCY, DO NOT USE ELEVATOR. USE EXIT STAIRS. The emergency sign shall not be required for elevators that are part of an accessible means of egress complying with Section 1007.4.

3002.4 Elevator car to accommodate ambulance stretcher. Where elevators are provided in buildings four or more stories above grade plane or four or more stories below grade plane, at least one elevator shall be provided for fire department emergency access to all floors. The elevator car shall be of such a size and arrangement to accommodate a 24-inch by 84-inch (610 mm by 1930 mm) ambulance stretcher in the horizontal, open position and shall be identified by the international symbol for emergency medical services (star of life). The symbol shall not be less than 3 inches (76 mm) high and shall be placed inside on both sides of the hoistway door frame.

The following California sections replace the corresponding model code section for applications specified in Section 111 for the Office of the State Fire Marshal.

3002.4a General stretcher requirements. *All buildings and structures with one or more passenger service elevators shall be provided with not less than one medical emergency service to all landings meeting the provisions of Section 3002.4a.*

Exceptions:

1. *Elevators in structures used only by maintenance and operating personnel.*
2. *Elevators in jails and penal institutions.*
3. *Elevators in buildings or structures where each landing is at ground level or is accessible at grade level or by a ramp.*
4. *Elevator(s) in two-story buildings or structures equipped with stairs of a configuration that will accommodate the carrying of the gurney or stretcher as permitted by the local jurisdictional authority.*
5. *Elevators in buildings or structures less than four stories in height for which the local jurisdictional authority has granted an exception in the form of a written document.*

3002.4a.1 Gurney size. *The medical emergency service elevator shall accommodate the loading and transport of an ambulance gurney or stretcher [maximum size 24 inches by 84 inches (610 mm by 2134 mm)] in the horizontal position.*

3002.4a.2 Hoistway doors. *The hoistway landing openings shall be provided with power-operated doors.*

3002.4a.3 Elevator entrance openings and car size. *The elevator car shall be of such a size and arrangement to accommodate a 24-inch by 84-inch (610 mm by 2134 mm) ambulance gurney or stretcher in the horizontal, open position, shall be provided with a minimum clear distance between walls or between walls and door excluding return panels not less than 80 inches by 54 inches (2032 mm by 1372 mm), and a minimum distance from wall to return panel not less than 51 inches (1295 mm) with a 42-inch (1067 mm) side slide door.*

Exception: *The elevator car dimensions and/or the clear entrance opening dimensions may be altered where it can be demonstrated to the local jurisdictional authority's satisfaction that the proposed configuration will handle the designated gurney or stretcher with equivalent ease. Documentation from the local authority shall be provided to the Occupational Safety and Health Standards Board.*

3002.4a.4 Elevator recall. *The elevator(s) designated the medical emergency elevator shall be equipped with a key switch to recall the elevator nonstop to the main floor. For the purpose of this section, elevators in compliance with Section 3003.2 shall be acceptable.*

3002.4a.5 Designation. *Medical emergency elevators shall be identified by the international symbol (Star of Life) for emergency medical services.*

3002.4a.6 Symbol size. *The symbol shall not be less than 3 inches (76 mm) in size.*

3002.4a.7 Symbol location. *A symbol shall be permanently attached to each side of the hoistway door frame on the portion of the frame at right angles to the hallway or landing area. Each symbol shall be not less than 78 inches (1981 mm) and not more than 84 inches (2134 mm) above the floor level at the threshold.*

3002.5 Emergency doors. Where an elevator is installed in a single blind hoistway or on the outside of a building, there shall be installed in the blind portion of the hoistway or blank face of the building, an emergency door in accordance with ASME A17.1.

3002.6 Prohibited doors. Doors, other than hoistway doors and the elevator car door, shall be prohibited at the point of access to an elevator car unless such doors are readily openable from the car side without a key, tool, special knowledge or effort.

3002.7 Common enclosure with stairway. Elevators shall not be in a common shaft enclosure with a stairway.

3002.8 Glass in elevator enclosures. Glass in elevator enclosures shall comply with Section 2409.1.

3002.9 Photoelectric tube bypass switch.

3002.9.1 *Elevators equipped with photoelectric tube devices which control the closing of automatic, power-operated car or hoistway doors, or both, shall have a switch in the car which, when actuated, will render the photoelectric tube device ineffective.*

3002.9.2 *The switch shall be constant-pressure type, requiring not less than 10 pounds (44.5 N) or more than 15 pounds (66.7 N) pressure to actuate.*

3002.9.3 *The switch shall be located not less than 6 feet (1829 mm) or more than 6 feet 6 inches (1981 mm) above the car floor and shall be located in or adjacent to the operating panel.*

3002.9.4 *The switch shall be clearly labeled: TO BE USED IN CASE OF FIRE ONLY.*

3002.9.5 *Switches shall be kept in working order or be removed when existing installations are arranged to comply with Section 3002.9.5, Exception 1 or 2.*

Exceptions:

1. *Elevators installed and maintained in compliance with Section 3003.*
2. *Where alternate means acceptable to the fire authority having jurisdiction are provided that will ensure the doors can close under adverse smoke conditions.*

[F] SECTION 3003 EMERGENCY OPERATIONS

[F] 3003.1 Standby power. In buildings and structures where standby power is required or furnished to operate an elevator, the operation shall be in accordance with Sections 3003.1.1 through 3003.1.4.

[F] 3003.1.1 Manual transfer. Standby power shall be manually transferable to all elevators in each bank.

[F] 3003.1.2 One elevator. Where only one elevator is installed, the elevator shall automatically transfer to standby power within 60 seconds after failure of normal power.

[F] 3003.1.3 Two or more elevators. Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to standby power within 60 seconds after failure of normal power where the standby power source is of sufficient capacity to operate all elevators at the same time. Where the standby power source is not of sufficient capacity to operate all elevators at the same time, all elevators shall transfer to standby power in sequence, return to the designated landing and disconnect from the standby power source. After all elevators have been returned to the designated level, at least one elevator shall remain operable from the standby power source.

[F] 3003.1.4 Venting. Where standby power is connected to elevators, the machine room ventilation or air conditioning shall be connected to the standby power source.

[F] 3003.2 Fire-fighters' emergency operation. Elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1.

3003.2.1 Floor numbers. *Elevator hoistways shall have a floor number not less than 4 inches (102 mm) in height, placed on the walls and/or doors of the hoistway at intervals such that a person in a stalled elevator, upon opening the car door, can determine the floor position.*

3003.2.1.1 Fire signs. *All automatic elevators shall have not less than one sign at each landing printed on a contrasting background in letters not less than $^1/_2$ inch (12.7 mm) high to read: IN CASE OF FIRE USE STAIRWAY FOR EXIT. DO NOT USE ELEVATOR.*

3003.2.1.2 Call and car operation buttons. *Automatic passenger elevators shall have call and car operation buttons within 60 inches (1524 mm) of the floor. Emergency telephones shall also be within 60 inches (1524 mm) of the floor.*

SECTION 3004
HOISTWAY VENTING

3004.1 Vents required. Hoistways of elevators and dumbwaiters penetrating more than three stories shall be provided with a means for venting smoke and hot gases to the outer air in case of fire.

Exceptions:

1. In occupancies of other than Groups R-1, R-2, I-1, I-2 and similar occupancies with overnight sleeping quarters, venting of hoistways is not required where the building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Sidewalk elevator hoistways are not required to be vented.

3004.2 Location of vents. Vents shall be located at the top of the hoistway and shall open either directly to the outer air or through noncombustible ducts to the outer air. Noncombustible ducts shall be permitted to pass through the elevator machine room, provided that portions of the ducts located outside the hoistway or machine room are enclosed by construction having not less than the fire protection rating required for the hoistway. Holes in the machine room floors for the passage of ropes, cables or other moving elevator equipment shall be limited so as not to provide greater than 2 inches (51 mm) of clearance on all sides.

3004.3 Area of vents. Except as provided for in Section 3004.3.1, the area of the vents shall not be less than $3^1/_2$ percent of the area of the hoistway nor less than 3 square feet (0.28 m^2) for each elevator car, and not less than $3^1/_2$ percent nor less than 0.5 square feet (0.047 m^2) for each dumbwaiter car in the hoistway, whichever is greater. Of the total required vent area, not less than one-third shall be permanently open. Closed portions of the required vent area shall consist of openings glazed with annealed glass not greater than 0.125 inch (3.2 mm) in thickness.

Exception: The total required vent area shall not be required to be permanently open where all the vent openings automatically open upon detection of smoke in the elevator lobbies or hoistway, upon power failure and upon activation of a manual override control.

3004.3.1 Reduced vent area. Where mechanical ventilation conforming to the *California Mechanical Code* is provided, a reduction in the required vent area is allowed provided that all of the following conditions are met:

1. The occupancy is not in Group R-1, R-2, I-1 or I-2 or of a similar occupancy with overnight sleeping quarters.
2. The vents required by Section 3004.2 do not have outside exposure.
3. The hoistway does not extend to the top of the building.
4. The hoistway and machine room exhaust fan is automatically reactivated by thermostatic means.
5. Equivalent venting of the hoistway is accomplished.

3004.4 Plumbing and mechanical systems. Plumbing and mechanical systems shall not be located in an elevator shaft.

Exception: Floor drains, sumps and sump pumps shall be permitted at the base of the shaft provided they are indirectly connected to the plumbing system.

SECTION 3005
CONVEYING SYSTEMS

3005.1 General. Escalators, moving walks, conveyors, personnel hoists and material hoists shall comply with the provisions of this section.

3005.2 Escalators and moving walks. Escalators and moving walks shall be constructed of approved noncombustible and fire-retardant materials. This requirement shall not apply to electrical equipment, wiring, wheels, handrails and the use of $^1/_{28}$-inch (0.9 mm) wood veneers on balustrades backed up with noncombustible materials.

3005.2.1 Enclosure. Escalator floor openings shall be enclosed with shaft enclosures complying with Section 707.

3005.2.2 Escalators. Where provided in below-grade transportation stations, escalators shall have a clear width of 32 inches (815 mm) minimum.

Exception: The clear width is not required in existing facilities undergoing alterations.

3005.3 Conveyors. Conveyors and conveying systems shall comply with ASME B20.1.

3005.3.1 Enclosure. Conveyors and related equipment connecting successive floors or levels shall be enclosed with shaft enclosures complying with Section 707.

3005.3.2 Conveyor safeties. Power-operated conveyors, belts and other material-moving devices shall be equipped with automatic limit switches which will shut off the power in an emergency and automatically stop all operation of the device.

3005.4 Personnel and material hoists. Personnel and material hoists shall be designed utilizing an approved method that accounts for the conditions imposed during the intended opera-

tion of the hoist device. The design shall include, but is not limited to, anticipated loads, structural stability, impact, vibration, stresses and seismic restraint. The design shall account for the construction, installation, operation and inspection of the hoist tower, car, machinery and control equipment, guide members and hoisting mechanism. Additionally, the design of personnel hoists shall include provisions for field testing and maintenance which will demonstrate that the hoist device functions in accordance with the design. Field tests shall be conducted upon the completion of an installation or following a major alteration of a personnel hoist.

SECTION 3006
MACHINE ROOMS

3006.1 Access. An approved means of access shall be provided to elevator machine rooms and overhead machinery spaces.

3006.2 Venting. Elevator machine rooms that contain solid-state equipment for elevator operation shall be provided with an independent ventilation or air-conditioning system to protect against the overheating of the electrical equipment. The system shall be capable of maintaining temperatures within the range established for the elevator equipment.

3006.3 Pressurization. The elevator machine room serving a pressurized elevator hoistway shall be pressurized upon activation of a heat or smoke detector located in the elevator machine room.

3006.4 Machine rooms and machinery spaces. Elevator machine rooms and machinery spaces shall be enclosed with fire barriers complying with Section 706 or horizontal assemblies complying with Section 711 having a fire-resistance rating not less than the required rating of the hoistway enclosure served by the machinery. Openings shall be protected with assemblies having a fire-protection rating not less than that required for the hoistway enclosure doors.

3006.5 Shunt trip. Where elevator hoistways or elevator machine rooms containing elevator control equipment are protected with automatic sprinklers, a means installed in accordance with NFPA 72, Section *6.16.4,* Elevator Shutdown, shall be provided to disconnect automatically the main line power supply to the affected elevator prior to the application of water. This means shall not be self-resetting. The activation of sprinklers outside the hoistway or machine room shall not disconnect the main line power supply.

3006.5.1 *Elevator power shunt-trip shall not activate prior to the completion of elevator Phase I emergency recall operation to the designated recall floor.*

3006.5.2 *Elevator power shunt-trip capability shall be disabled during Phase II emergency in-car operation.*

3006.5.3 *Audible and visual annunciation shall be provided at the fire alarm control unit indicating the disabling of elevator power shunt-trip capability under Phase II operation.*

3006.5.4 *Audible and visual annunciation shall be provided at the fire alarm control unit indicating that the automatic sprinklers, smoke detectors, or heat detectors in the elevator hoistway or elevator machine room have activated.*

3006.5.5 *Visual annunciation shall be provided inside all elevator cars indicating that the automatic sprinklers, smoke detectors or heat detectors in the elevator hoistway or elevator machine room have activated.*

3006.6 Plumbing systems. Plumbing systems shall not be located in elevator equipment rooms.

SECTION 3007
SPECIAL REQUIREMENTS FOR ELEVATORS IN HOSPITALS

3007.1 General. [OSHPD 1] *In hospital buildings, all elevators shall comply with the provisions of this section.*

3007.1.1 Seismic switch. *The seismic switch, as required by ASME A17.1, shall be connected to the essential electrical system.*

3007.1.2 Annunciator. *Either a visible or an audible annunciator shall be connected to the essential electrical system and be located in the elevator machine room. The annunciator will indicate if the seismic switch is inoperative due to a loss of power. If a visual annunciator is used, it shall be clearly visible in the room.*

3007.1.3 Travel speed. *After a seismic switch has been triggered, the elevator shall have the ability to operate at a "go slow" speed until the elevator can be inspected. "Go slow" speed is defined as a travel speed of not more than 150 feet per minute (45.72 meters per minute).*

3007.1.4 Cable-operated elevators. *For cable-operated elevators, an additional sensor switch shall be installed on the governor rope/sheave. The sensor shall prevent car movement when the governor tail sheave is dislodged from its normal position.*

Pages 417 and 418 have been deleted.
Test begins on page 419.

CHAPTER 31A

SYSTEMS FOR WINDOW CLEANING OR EXTERIOR BUILDING MAINTENANCE

See Title 8, California Code of Regulations, Division 1, Chapter 4, Subchapter 7, General Industry Safety Orders, Group 1, Articles 5 and 6.

controls specified in Section 911 where those systems are provided.

3410.6.10 Smoke control. Evaluate the ability of a natural or mechanical venting, exhaust or pressurization system to control the movement of smoke from a fire. Under the categories and occupancies in Table 3410.6.10, determine the appropriate value and enter that value into Table 3410.7 under Safety Parameter 3410.6.10, Smoke Control, for means of egress and general safety.

TABLE 3410.6.10
SMOKE CONTROL VALUES

	CATEGORIES					
OCCUPANCY	a	b	c	d	e	f
A-1, A-2, A-3	0	1	2	3	6	6
A-4, E	0	0	0	1	3	5
B, M, R	0	2[a]	3[a]	3[a]	3[a]	4[a]
F, S	0	2[a]	2[a]	3[a]	3[a]	3[a]

a. This value shall be 0 if compliance with Category d or e in Section 3410.6.8.1 has not been obtained.

3410.6.10.1 Categories. The categories for smoke control are:

1. Category a—None.
2. Category b—The building is equipped throughout with an automatic sprinkler system. Openings are provided in exterior walls at the rate of 20 square feet (1.86 m^2) per 50 linear feet (15 240 mm) of exterior wall in each story and distributed around the building perimeter at intervals not exceeding 50 feet (15 240 mm). Such openings shall be readily openable from the inside without a key or separate tool and shall be provided with ready access thereto. In lieu of operable openings, clearly and permanently marked tempered glass panels shall be used.
3. Category c—One enclosed exit stairway, with ready access thereto, from each occupied floor of the building. The stairway has operable exterior windows and the building has openings in accordance with Category b.
4. Category d—One smokeproof enclosure and the building has openings in accordance with Category b.
5. Category e—The building is equipped throughout with an automatic sprinkler system. Each fire area is provided with a mechanical air-handling system designed to accomplish smoke containment. Return and exhaust air shall be moved directly to the outside without recirculation to other fire areas of the building under fire conditions. The system shall exhaust not less than six air changes per hour from the fire area. Supply air by mechanical means to the fire area is not required. Containment of smoke shall be considered as confining smoke to the fire area involved without migration to other fire areas. Any other tested and approved design which will adequately accomplish smoke containment is permitted.
6. Category f—Each stairway shall be one of the following: a smokeproof enclosure in accordance with Section 1020.1.7; pressurized in accordance with Section 909.20.5; or shall have operable exterior windows.

3410.6.11 Means of egress capacity and number. Evaluate the means of egress capacity and the number of exits available to the building occupants. In applying this section, the means of egress are required to conform to Sections 1003 through 1015 and 1017 through 1024 (except that the minimum width required by this section shall be determined solely by the width for the required capacity in accordance with Table 1005.1). The number of exits credited is the number that are available to each occupant of the area being evaluated. Existing fire escapes shall be accepted as a component in the means of egress when conforming to Section 3404. Under the categories and occupancies in Table 3410.6.11, determine the appropriate value and enter that value into Table 3410.7 under Safety Parameter 3410.6.11, Means of Egress Capacity, for means of egress and general safety.

TABLE 3410.6.11
MEANS OF EGRESS VALUES

	CATEGORIES				
OCCUPANCY	a[a]	b	c	d	e
A-1, A-2, A-3, A-4, E	-10	0	2	8	10
M	-3	0	1	2	4
B, F, S	-1	0	0	0	0
R	-3	0	0	0	0

a. The values indicated are for buildings six stories or less in height. For buildings over six stories in height, add an additional -10 points.

3410.6.11.1 Categories. The categories for means of egress capacity and number of exits are:

1. Category a—Compliance with the minimum required means of egress capacity or number of exits is achieved through the use of a fire escape in accordance with Section 3404.
2. Category b—Capacity of the means of egress complies with Section 1004 and the number of exits complies with the minimum number required by Section 1019.
3. Category c—Capacity of the means of egress is equal to or exceeds 125 percent of the required means of egress capacity, the means of egress complies with the minimum required width dimensions specified in the code and the number of exits

complies with the minimum number required by Section 1019.

4. Category d—The number of exits provided exceeds the number of exits required by Section 1019. Exits shall be located a distance apart from each other equal to not less than that specified in Section 1015.2.
5. Category e—The area being evaluated meets both Categories c and d.

3410.6.12 Dead ends. In spaces required to be served by more than one means of egress, evaluate the length of the exit access travel path in which the building occupants are confined to a single path of travel. Under the categories and occupancies in Table 3410.6.12, determine the appropriate value and enter that value into Table 3410.7 under Safety Parameter 3410.6.12, Dead Ends, for means of egress and general safety.

TABLE 3410.6.12
DEAD-END VALUES

OCCUPANCY	CATEGORIES[a]		
	a	b	c
A-1, A-3, A-4, B, E, F, M, R, S	-2	0	2
A-2, E	-2	0	2

a. For dead-end distances between categories, the dead-end value shall be obtained by linear interpolation.

3410.6.12.1 Categories. The categories for dead ends are:

1. Category a—Dead end of 35 feet (10 670 mm) in nonsprinklered buildings or 70 feet (21 340 mm) in sprinklered buildings.
2. Category b—Dead end of 20 feet (6096 mm); or 50 feet (15 240 mm) in Group B in accordance with Section 1017.3 exception 2.
3. Category c—No dead ends; or ratio of length to width (l/w) is less than 2.5:1.

3410.6.13 Maximum exit access travel distance. Evaluate the length of exit access travel to an approved exit. Determine the appropriate points in accordance with the following equation and enter that value into Table 3410.7 under Safety Parameter 3410.6.13, Maximum Exit Access Travel Distance, for means of egress and general safety. The maximum allowable exit access travel distance shall be determined in accordance with Section *1016.1*.

$$\text{Points} = 20 \times \frac{\text{Maximum allowable travel distance} - \text{Maximum actual travel distance}}{\text{Max. allowable travel distance}}$$

3410.6.14 Elevator control. Evaluate the passenger elevator equipment and controls that are available to the fire department to reach all occupied floors. Elevator recall controls shall be provided in accordance with the *California Fire Code.* Under the categories and occupancies in Table 3410.6.14, determine the appropriate value and enter that value into Table 3410.7 under Safety Parameter 3410.6.14, Elevator Control, for fire safety, means of egress and general safety. The values shall be zero for a single-story building.

TABLE 3410.6.14
ELEVATOR CONTROL VALUES

ELEVATOR TRAVEL	CATEGORIES			
	a	b	c	d
Less than 25 feet of travel above or below the primary level of elevator access for emergency fire-fighting or rescue personnel	-2	0	0	+2
Travel of 25 feet or more above or below the primary level of elevator access for emergency fire-fighting or rescue personnel	-4	NP	0	+4

For SI: 1 foot = 304.8 mm.

3410.6.14.1 Categories. The categories for elevator controls are:

1. Category a—No elevator.
2. Category b—Any elevator without Phase I and II recall.
3. Category c—All elevators with Phase I and II recall as required by the *California Fire Code.*
4. Category d—All meet Category c; or Category b where permitted to be without recall; and at least one elevator that complies with new construction requirements serves all occupied floors.

3410.6.15 Means of egress emergency lighting. Evaluate the presence of and reliability of means of egress emergency lighting. Under the categories and occupancies in Table 3410.6.15, determine the appropriate value and enter that value into Table 3410.7 under Safety Parameter 3410.6.15, Means of Egress Emergency Lighting, for means of egress and general safety.

TABLE 3410.6.15
MEANS OF EGRESS EMERGENCY LIGHTING VALUES

NUMBER OF EXITS REQUIRED BY SECTION 1010	CATEGORIES		
	a	b	c
Two or more exits	NP	0	4
Minimum of one exit	0	1	1

3410.6.15.1 Categories. The categories for means of egress emergency lighting are:

1. Category a—Means of egress lighting and exit signs not provided with emergency power in accordance with Section 2702.
2. Category b—Means of egress lighting and exit signs provided with emergency power in accordance with Section 2702.
3. Category c—Emergency power provided to means of egress lighting and exit signs which provides protection in the event of power failure to the site or building.

3410.8 Safety scores. The values in Table 3410.8 are the required mandatory safety scores for the evaluation process listed in Section 3410.6.

TABLE 3410.8
MANDATORY SAFETY SCORES[a]

OCCUPANCY	FIRE SAFETY (MFS)	MEANS OF EGRESS (MME)	GENERAL SAFETY (MGS)
A-1	16	27	27
A-2	19	30	30
A-3	18	29	29
A-4, E	23	34	34
B	24	34	34
F	20	30	30
M	19	36	36
R	17	34	34
S-1	15	25	25
S-2	23	33	33

a. MFS = Mandatory Fire Safety;
MME = Mandatory Means of Egress;
MGS = Mandatory General Safety.

3410.9 Evaluation of building safety. The mandatory safety score in Table 3410.8 shall be subtracted from the building score in Table 3410.7 for each category. Where the final score for any category equals zero or more, the building is in compliance with the requirements of this section for that category. Where the final score for any category is less than zero, the building is not in compliance with the requirements of this section.

3410.9.1 Mixed occupancies. For mixed occupancies, the following provisions shall apply:

1. Where the separation between mixed occupancies does not qualify for any category indicated in Section 3410.6.16, the mandatory safety scores for the occupancy with the lowest general safety score in Table 3410.8 shall be utilized (see Section 3410.6.)
2. Where the separation between mixed occupancies qualifies for any category indicated in Section 3410.6.16, the mandatory safety scores for each occupancy shall be placed against the evaluation scores for the appropriate occupancy.

SECTION 3411 [SFM] EXISTING GROUP R-1 AND GROUP R-2 OCCUPANCIES

3411.1 Scope. *The provisions of this section are intended to maintain or increase the current degree of public safety, health and general welfare in existing buildings classified as Group R occupancies.*

3411.1.1 Application. *In accordance with Health and Safety Code Section 13143.2, the provisions of Sections 3411.2 through 3411.12 shall only apply to multiple-story structures existing on January 1, 1975, let for human habitation, including, and limited to, apartment houses, hotels and motels wherein rooms used for sleeping are let above the ground floor.*

3411.2 Number of exits. *Every apartment and every other sleeping room shall have access to not less than two exits when the occupant load is 10 or more (exits need not be directly from the apartment or sleeping room). A fire escape as specified herein may be used as one required exit.*

Subject to approval of the authority having jurisdiction, a ladder device as specified herein may be used in lieu of a fire escape when the construction feature or the location of the building on the property cause the installation of a fire escape to be impractical.

3411.3 Stair construction. *All stairs shall have a minimum run of 9 inches (229 mm) and a maximum rise of 8 inches (203 mm) and a minimum width exclusive of handrails of 30 inches (762 mm). Every stairway shall have at least one handrail. A landing having a minimum horizontal dimension of 30 inches (762 mm) shall be provided at each point of access to the stairway.*

3411.4 Interior stairways. *Every interior stairway shall be enclosed with walls of not less than 1-hour fire-resistive construction. Where existing partitions form part of a stairwell enclosure, wood lath and plaster in good condition will be acceptable in lieu of 1-hour fire-resistive construction. Doors to such enclosures shall be protected by a self-closing door equivalent to a solid wood door with a thickness of not less than $1^3/_4$ inches (44.5 mm).*

Enclosures shall include all landings between flights and any corridors, passageways or public rooms necessary for continuous exit to the exterior of the buildings. The stairway need not be enclosed in a continuous shaft if cut off at each story by the fire-resistive construction required by this subsection for stairwell enclosures. Enclosures shall not be required if an automatic sprinkler system is provided for all portions of the building except bedrooms, apartments and rooms accessory

TABLE 3410.9
EVALUATION FORMULAS[a]

FORMULA	T.3410.7			T.3410.8	SCORE	PASS	FAIL
FS-MFS ≥ 0	_____	(FS)	–	_____ (MFS) =	_____	_____	_____
ME-MME ≥ 0	_____	(ME)	–	_____ (MME) =	_____	_____	_____
GS-MGS ≥ 0	_____	(GS)	–	_____ (MGS) =	_____	_____	_____

a. FS = Fire Safety — MFS = Mandatory Fire Safety
ME = Means of Egress — MME = Mandatory Means of Egress
GS = General Safety — MGS = Mandatory General Safety

thereto. Interior stairs and vertical openings need not be enclosed in two-story buildings.

3411.5 Exterior stairways. *Exterior stairways shall be noncombustible or of wood of not less than 2-inch (51 mm) nominal thickness with solid treads and risers.*

3411.6 Fire escapes, exit ladder devices. *Fire escapes may be used as one means of egress if the pitch does not exceed 60 degrees, the width is not less than 18 inches (457 mm), the treads are not less than 4 inches (102mm) wide and they extend to the ground or are provided with counterbalanced stairs reaching to the ground. Access shall be by an opening having a minimum dimension of 29 inches (737 mm) when open. The sill shall not be more than 30 inches (762 mm) above the floor and landing.*

A ladder device, when used in lieu of a fire escape, shall conform to Section 3411.6.1 and the following:

1. *Serves an occupant load of nine people or less or a single dwelling unit or hotel room.*
2. *The building does not exceed three stories in height.*
3. *The access is adjacent to an opening as specified for emergency egress or rescue or from a balcony.*
4. *The device does not pass in front of any building opening below the unit being served.*
5. *The availability of activating the ladder device is accessible only to the opening or balcony served.*
6. *The device as installed will not cause a person using it to be within 12 feet (3658 mm) of exposed energized high-voltage conductors.*

3411.6.1 Exit ladder devices.

3411.6.1.1 Scope. *This standard for exit ladder devices is applicable where such devices are permitted by the building official for installation on existing apartment houses and hotels in conformance with the California Building Code.*

3411.6.1.2 Instructions. *Installation shall be in accordance with the manufacturer's instructions. Instructions shall be illustrated and shall include directions and information adequate for attaining proper and safe installation of the product. Where exit ladder devices are intended for mounting on different support surfaces, specific installation instructions shall be provided for each surface.*

3411.6.1.3 General design. *All load-bearing surfaces and supporting hardware shall be of noncombustible materials. Exit ladder devices shall have a minimum width of 12 inches (305mm) when in the position intended for use.*

The design load shall not be less than 400 pounds (1780 N) for 16-foot (4877 mm) length and 600 pounds (2699 N) for 25-foot (7620 mm) length.

3411.6.1.4 Performance.

3411.6.1.4.1 *Exit ladder devices shall be capable of withstanding an applied load of four times the design load when installed in the manner intended for use. Test loads shall be applied for a period of 1 hour.*

3411.6.1.4.2 *Exit ladder devices of the retractable type shall, in addition to the static load requirements of Section 3411.6.1.4.1, be capable of withstanding the following tests:*

1. *Rung strength.*
2. *Rung-to-side-rail shear strength.*
3. *Release mechanism.*
4. *Low temperature.*

3411.6.1.5 Rung-strength test. *Rungs of retractable exit ladder devices shall be capable of withstanding a load of 1,000 pounds (4448 N) when applied to a $3^1/_2$-inch-wide (89 mm) block resting at the center of the rung. The test load shall be applied for a period of one hour. The ladder shall remain operational following this test.*

3411.6.1.6 Rung-to-side-rail shear test. *Rungs of retractable exit ladder devices shall be capable of withstanding 1,000 pounds (4448 N) when applied to a $3^1/_2$-inch-wide (89 mm) block resting on the center rung as near the side rail as possible. The test load shall be applied for a period of 1 hour. Upon removal of the test load the fasteners attaching the rung to the side rail shall show no evidence of failure. The ladder shall remain operational following the test.*

3411.6.1.7 Release mechanism test. *The release mechanism of retractable exit ladder devices shall operate with an average applied force of not more than 5 pounds (22.2 N) for hand-operated releasing mechanisms and an average applied force of not more than 25 pounds (111 N) for foot-pedal types of releasing mechanisms. For these tests, a force gauge shall be applied to the release mechanism, and the average of three consecutive readings shall be computed.*

3411.6.1.8 Low temperature operation test. *Representative samples of the exit ladder devices shall be subjected to a temperature of -40°C in an environmental chamber for a period of 24 hours. The release mechanism shall be operated immediately upon removal from the chamber. The ladder device shall function as intended without any restriction of operation.*

3411.7 Doors and openings. *Exit doors and openings shall meet the requirements of Sections 708.6, 1008.1.2, 1008.8.1.8 and 1008.1.9. Doors shall not reduce the required width of stairways more than 6 inches (152 mm) when open. Transoms and openings other than doors from corridors to rooms shall be fixed closed and shall be covered with a minimum of $^3/_4$-inch (19 mm) plywood or $^1/_2$-inch (13 mm) gypsum wallboard or equivalent material.*

Exceptions:

1. *Existing solid-bonded wood-core doors $1^3/_8$ inches thick (34.9 mm), or their equivalent, may be continued in use.*
2. *Where the existing frame will not accommodate a door complying with Section 708.6, a $1^3/_8$ -inch-thick (35 mm) solid-bonded wood-core door may be used.*

which, when approved by the enforcing agency, may be an existing exterior fire escape.

New installations of smokeproof enclosures shall not be required.

***Note:** In determining the adequacy of exits and their design, Chapter 10 may be used as a guide. It is the intent of this section that every existing high-rise building need not mandatorily conform or be made to conform with the requirements for new high-rise buildings. Reasonable judgment in the application of requirements must be exercised by the enforcing agency.*

***3412.9 Fire escapes.** An existing fire escape in good structural condition may be acceptable as one of the required means of egress from each floor. Access to such fire escapes may be by any one of the following:*

1. *Through a room between the corridor and the fire escape if the door to the room is operable from the corridor side without the use of any key, special knowledge or effort.*
2. *By a door operable to a fire escape from the interior without the use of any key, special knowledge or effort.*
3. *By a window operable from the interior. Such window shall have a minimum dimension of 29 inches (737 mm) when open. The sill shall not be more than 30 inches (762 mm) above the floor and landing.*

***3412.10 Protection of exterior openings.** When an existing fire escape is accepted as one of the required means of egress, openings onto the fire escape landing and openings within 5 feet (1524 mm) horizontally of the landings shall be protected in a manner acceptable to the enforcing agency.*

***3412.11 Locking of stairway doors.** When exit doors from corridors to exit stairways are locked to prohibit access from the stairway side, the locking mechanisms shall be retracted to the unlocked position upon failure of electrical power, and a telephone or other two-way communication system connected to an approved emergency service that operates continuously shall be provided at not less than every fifth floor in each required stairway. In lieu thereof, master keys which will unlock all such doors from the stairway side shall be provided in such numbers and locations as approved by the enforcing agency.*

***3412.12 Enclosures.** Interior vertical shafts, including but not limited to, elevators, stairway and utility, shall be enclosed with construction as set forth in Section 3412.6.*

***3412.13 Opening protection.** Doors in other than elevators, which shall be of a type acceptable to the enforcing agency, shall be approved 1-hour, fire-rated, tight-fitting or gasketed doors or equivalent protection, and shall be of the normally closed type, self-closing or a type which will close automatically in accordance with Section 715.*

***Exception:** In lieu of stairway enclosures, smoke barriers may be provided in such a manner that fire and smoke will not spread to other floors or otherwise impair exit facilities.*

In these instances, smoke barriers shall not be less than 1-hour fire resistive with openings protected by not less than approved $^1/_3$-hour, fire-rated, tight-fitting or gasketed doors. Such doors shall be of the self-closing type or of a type which will close automatically in the manner specified in Section 715.

Doors crossing corridors shall be provided with wired-glass vision panels set in approved steel frames.

Doors for elevators shall not be of the open-grille type.

***3412.14 Fire alarm system.** Every existing high-rise building shall be provided with an approved fire alarm system. In department stores, retail sales stores and similar occupancies where the general public is admitted, such systems shall be of a type capable of alerting staff and employees. In office buildings and all other high-rise buildings, such systems shall be of a type capable of alerting all occupants simultaneously.*

Exceptions:

1. *In areas of public assemblage, the type and location of audible appliances shall be as determined by the enforcing agency.*
2. *When acceptable to the enforcing agency, the occupant voice notification system required by Section 3412.17 may be used in lieu of the fire alarm system required by Section 3412.14.*

***3412.15 Existing systems.** Existing fire systems, when acceptable to the enforcing agency, shall be deemed as conforming to the provisions of these regulations. For requirements for existing Group R occupancies, see Section 3411.13.*

***3412.16 Annunciation.** When a new fire alarm system is installed, it shall be connected to an annunciator panel installed in a location approved by the enforcing agency.*

For purposes of annunciation, zoning shall be in accordance with Section 907.9.

***3412.17 Monitoring.** Monitoring shall be in accordance with Section 907.14.*

***3412.18 Systems interconnection.** When an automatic fire detection system or automatic extinguishing system is installed, activation of such system shall cause the sounding of the fire alarm notification appliances at locations designated by the enforcing agency.*

***3412.19 Manual fire alarm boxes.** A manual fire alarm box shall be provided in the locations designated by the enforcing agency. Such locations shall be where boxes are readily accessible and visible and in normal paths of daily travel by occupants of the building.*

***3412.20 Emergency voice/alarm communication system.** An approved emergency voice/alarm system shall be provided in every existing high-rise building which exceeds 150 feet (45 720 mm) in height measured in the manner set forth in Section 3412.1. Such system shall provide communication from a location available to and designated by the enforcing agency to not less than all public areas.*

The emergency voice/alarm system may be combined with a fire alarm system, provided the combined system has been approved and listed by the State Fire Marshal. The sounding of a fire alarm signal in any given area or floor shall not prohibit voice communication to other areas of floors. Combination systems shall be designed to permit voice transmission to over-

ride the fire alarm signal, but the fire alarm signal shall not terminate in less than 3 minutes.

3412.21 Fire department system. *When it is determined by test that portable fire department communication equipment is ineffective, a communication system acceptable to the enforcing agency shall be installed within the building to permit emergency communication between fire-suppression personnel.*

3412.22 Interior wall and ceiling finish. *Interior wall and ceiling finish of exitways shall conform to the provisions of Chapter 8. Where the materials used in such finishes do not conform to the provisions of Chapter 8, such finishes may be surfaced with an approved fire-retardant coating.*

3412.23 Ventilation. *Natural or mechanical ventilation for the removal of products of combustion shall be provided in every story of an existing high-rise building. Such ventilation shall be any one or combination of the following:*

1. *Panels or windows in the exterior wall which can be opened. Such venting facilities shall be provided at the rate of at least 20 square feet (1.86 m^2) of opening per 50 lineal feet (15 240 lineal mm) of exterior wall in each story, distributed around the perimeter at not more than 50-foot (15 240 mm) intervals on at least two sides of the building.*
2. *Approved fixed tempered glass may be used in lieu of openable panels or windows. When only selected panels or windows are of tempered glass, they shall be clearly identified as required by the enforcing agency.*
3. *Any other design which will produce equivalent results.*

3412.24 Smoke control systems. *Existing air-circulation systems shall be provided with an override switch in a location approved by the enforcing agency which will allow for the manual control of shutdown of the systems.*

Exception: *Systems which serve only a single floor, or portion thereof, without any penetration by ducts or other means into adjacent floors.*

3412.25 Elevator recall smoke detection. *Smoke detectors for emergency operation of elevators shall be provided as required by Section 3003.*

3412.26 Exit signs and illumination. *Exits and stairways shall be provided with exit signs and illumination as required by Sections 1011.1 and 1011.2.*

3412.27 Automatic sprinkler system—Existing high-rise buildings. *Regardless of any other provisions of these regulations, every existing high-rise building of Type II-B, III-B or V-B construction shall be provided with an approved automatic sprinkler system conforming to NFPA 13.*

SECTION 3413 [SFM]
EXISTING GROUP I OCCUPANCIES

3413.1 General. *Existing buildings housing existing protective social care homes or facilities established prior to March 4, 1972 may have their use continued if they conform, or are made to conform, to the following provisions:*

3413.2 Use of floors. *The use of floor levels in buildings of Type III, IV or V nonfire-rated construction may be as follows:*

Nonambulatory—first floor only;

Ambulatory—not higher than the third-floor level, provided walls and partitions are constructed of materials equal in fire-resistive quality to that of wood lath and plaster in good repair and all walls are firestopped at each floor level.

3413.3 Enclosure of exits and vertical openings. *Except for two-story structures housing ambulatory guests, all interior stairs shall be enclosed in accordance with Chapter 10. In lieu of stairway enclosures, floor separations or smoke barriers may be provided in such a manner that fire and smoke will not spread rapidly to floors above or otherwise impair exit facilities. In these instances, floor separations or smoke barriers shall have a fire resistance equal to not less than $^1/_2$-inch (13 mm) gypsum wallboard on each side of wood studs with openings protected by not less than a $1^3/_4$-inch (44.5 mm) solid bonded wood-core door of the self-closing type. All other vertical openings shall be enclosed in accordance with the provisions of Section 3412.6.*

3413.4 Exit access. *Each floor or portion thereof of buildings used for the housing of existing protective social care homes or facilities shall have access to not less than two exits in such a manner as to furnish egress from the building or structure in the event of an emergency substantially equivalent to the provisions of Chapter 10.*

3413.5 Corridor openings. *Openings from rooms to interior corridors shall be protected by not less than $1^3/_4$-inch (44.5 mm) solid-bonded wood-core doors. Transoms and other similar openings shall be sealed with materials equivalent to existing corridor wall construction.*

3413.6 Interior finishes. *Interior wall and ceiling finishes shall conform to the requirements for a Group R-1 occupancy as specified in Chapter 8.*

3413.7 Automatic fire sprinklers. *Automatic sprinkler systems shall be installed in existing protective social care occupancies in accordance with the provisions of Section 903.2.5.*

3413.8 Fire alarm systems. *Automatic fire alarm systems shall be installed in existing protective social care homes or facilities in accordance with the provisions of Section 907.2.6.*

Exception: *When an approved automatic sprinkler system conforming to Section 903.2.5 is installed, a separate fire alarm system as specified in this section need not be provided.*

SECTION 3414 [SFM]
EXISTING GROUP L OCCUPANCIES

3414.1 General. *Additions, alterations or repairs, may be made to any building or structure without requiring the existing building or structure to comply with all the requirements of this code section, provided the addition, alteration or repair conforms to that required for a new building or structure.*

3414.2 Unsafe condition. *Additions, repairs, or alterations shall not be made to an existing building or structure that will cause the existing building or structure to be in violation of any*

of the provisions of this code, nor shall such additions or alterations cause the existing building or structure to become unsafe, or to be in violation of any of the provisions of this code. An unsafe condition shall be deemed to have been created if an addition or alteration will cause the existing building or structure to become structurally unsafe or overloaded; will not provide adequate egress in compliance with the provisions of this code or will obstruct existing exits; will create a fire hazard; will reduce required fire resistance or will otherwise create conditions dangerous to human life.

3414.3 Changes in use or occupancy. *Any buildings that have alternations or additions, which involves a change in use or occupancy, shall not exceed the height, number of stories and area permitted for new buildings.*

3414.4 Buildings not in compliance with code. *Additions or alterations shall not be made to an existing building or structure when such existing building or structure is not in full compliance with the provisions of this code except when such addition or alteration will result in the existing building or structure being no more hazardous, based on life safety, fire safety and sanitation, than before such additions or alterations are undertaken.*

3414.5 Maintenance of structural and fire-resistive integrity. *Alterations or repairs to an existing building or structure that are nonstructural and do not adversely affect any structural member of any part of the building or structure having required fire resistance may be made with the same materials of which the building or structure is constructed. The installation or replacement of glass shall be as required for new installations.*

3414.6 Continuation of existing use. *Buildings in existence at the time of the adoption of this code may have their existing use or occupancy continued if such use or occupancy was legal at the time of the adoption of this code, provided such continued use is not dangerous to life.*

3414.7 Maximum Allowable Quantities. *Laboratory suites approved prior to January 1, 2008 shall not exceed the maximum allowable quantities listed in Tables 3414.7 (1) and 3414.7 (2).*

SECTION 3415
EARTHQUAKE EVALUATION AND DESIGN FOR RETROFIT OF EXISTING BUILDINGS

3415.1 Purpose.

3415.1.1 Existing state-owned structures. *The provisions of Sections 3415 through 3420 establish minimum standards for earthquake evaluation and design for retrofit of existing state-owned structures, including buildings owned by the University of California and the California State University.*

The provisions of Sections 3415 through 3420 may be adopted by a local jurisdiction for earthquake evaluation and design for retrofit of existing buildings.

3415.1.2 Public school buildings. *The provisions of Sections 3415 through 3421 establish minimum standards for earthquake evaluation and design for the rehabilitation of existing buildings for use as public school buildings under the jurisdiction of the Division of the State Architect—Structural Safety (DSA-SS, refer to Section 109.2).*

The provisions of Section 3415 through 3421 also establish minimum standards for earthquake evaluation and design for rehabilitation of existing public school buildings under the jurisdiction of DSA-SS.

Note: *For public schools, where reference within this chapter is made to sections in Chapters 16, 17, 18, 19, 21 or 22, the provisions in Chapters 16A, 17A, 18A, 19A, 21A and 22A, respectively, shall apply instead.*

3415.2 Scope. *All modifications, structurally connected additions and/or repairs to existing structures or portions thereof shall, at a minimum, be designed and constructed to resist the effects of seismic ground motions as provided in this section. The structural system shall be evaluated by a registered design professional and, if not meeting or exceeding the minimum seismic design performance requirements of this section, shall be retrofitted in compliance with these requirements.*

Exception: *Those structures for which Section 3415.3 determines that assessment is not required, or for which Section 3415.4 determines that retrofit is not needed, then only the requirements of Section 3415.11 apply.*

3415.3 Applicability.

3415.3.1 Existing state-owned buildings. *For existing state-owned structures including all buildings owned by the University of California and the California State University, the requirements of Section 3415 apply whenever the structure is to be retrofitted, repaired or modified and any of the following apply:*

1. *Total construction cost, not including cost of furnishings, fixtures and equipment, or normal maintenance, for the building exceeds 25 percent of the construction cost for the replacement of the existing building.*

   The changes are cumulative for past modifications to the building that occurred after adoption of the 1995 California Building Code and did not require seismic retrofit.

2. *There are changes in occupancy category.*
3. *The modification to the structural components increases the seismic forces in or strength requirements of any structural component of the existing structure by more than 10 percent cumulative since the original construction, unless the component has the capacity to resist the increased forces determined in accordance with Section 3417. If the building's seismic base shear capacity has been increased since the original construction, the percent change in base shear may be calculated relative to the increased value.*
4. *Structural elements need repair where the damage has reduced the lateral-load-resisting capacity of the structural system by more than 10 percent.*
5. *Changes in live or dead load increase story shear by more than 10 percent.*

TABLE 3414.7(1)
EXEMPT AMOUNTS OF HAZARDOUS MATERIALS, LIQUIDS AND CHEMICALS PRESENTING A PHYSICAL HAZARD BASIC QUANTITIES PER LABORATORY SUITE[1]
When two units are given, values within parentheses are in cubic feet (cu. ft.) or pounds (lbs.)

CONDITION		STORAGE			USE CLOSED SYSTEMS			USE OPEN SYSTEMS		
Material	Class	Solid Lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.	Solid Lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.	Solid Lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.
1.1 Combustible liquid	II	—	120[2]	—	—	120	—	—	30	—
	III-A	—	330[2]	—	—	330	—	—	80	—
	III-B	—	13,200[2]	—	—	13,200	—	—	3,300	—
1.2 Combustible dust lbs./1,000 cu. ft.		1	—	—	1	—	—	1	—	—
1.3 Combustible fiber (loose)		(100)	—	—	(100)	—	—	(20)	—	—
(baled)		(1,000)	—	—	(1,000)	—	—	(200)	—	—
1.4 Cryogenic, flammable or oxidizing			45	—	—	45	—	—	10	—
2.1 Explosives		12	(1)[2]	—	1/4	(1/4)	—	1/4	(1/4)	—
3.1 Flammable solid		125[2]	—	—	25	—	—	25	—	—
3.2 Flammable gas (gaseous)		—	—	750[2]	—	—	750[2]	—	—	—
(liquefied)		—	15[2]	—	—	15[2]	—	—	—	—
3.3 Flammable liquid Combination I-A, I-B, I-C	I-A	—	30[2]	—	—	30	—	—	10	—
	I-B	—	60[2]	—	—	60	—	—	15	—
	I-C	—	90[2]	—	—	90	—	—	20	—
		—	120[2]	—	—	120	—	—	30	—
4.1 Organic peroxide, unclassified detonatable		1[2]	(1)[2]	—	1/4	(1/4)	—	1/4	(1/4)	—
4.2 Organic peroxide	I	5[2]	(5)[2]	—	(1)	(1)	—	1	1	—
	II	50[2]	(50)[2]	—	50	(50)	—	10	(10)	—
	III	125[2]	(125)[2]	—	125	(125)	—	25	(25)	—
	IV	500	(500)	—	500	(500)	—	100	(100)	—
	V	N.L.	N.L.	—	N.L.	N.L.	—	N.L.	N.L.	—
4.3 Oxidizer	4	1[2]	(1)[2]	—	1/4[2]	(1/4)	—	1/4	(1/4)	—
	3	10[2]	(10)[2]	—	2	(2)	—	2	(2)	—
	2	250[2]	(250)[2]	—	50	(250)	—	50	(50)	—
	1	1,000[2]	(1,000)[2]	—	1,000	(1,000)	—	200	(200)	—
4.4 Oxidizer.Gas (gaseous)		—	—	1,500[2]	—	—	1,500[2]	—	—	—
(liquefied)		—	15[2]	—	—	15[2]	—	—	—	—
5.1 Pyrophoric		4[2]	(4)[2]	50[2]	1	(1)	10[2]	0	0	0
6.1 Unstable (reactive)	4	1[2]	(1)[2]	10[2]	1/4	(1/4)	2[2]	1/4	(1/4)	0
	3	5[2]	(5)[2]	50[2]	1	(1)	10[2]	1	(1)	0
	2	50[2]	(50)[2]	250[2]	50	(50)	250[2]	10	(10)	0
	1	125[2]	(125)[2]	750[2]	125	(125)	750[2]	25	(25)	0
7.1 Water (reactive)	3	5[2]	(5)[2]	—	5	(5)	—	1	(1)	—
	2	50[2]	(50)[2]	—	50	(50)	—	10	(10)	—
	1	125[2]	(125)[2]	—	125	(125)[2]	—	25	(25)	—

[1] *A laboratory suite is a space up to 10,000 square feet (929 m^2) bounded by not less than a one-hour fire-resistive occupancy separation within which the exempt amounts of hazardous materials may be stored, dispensed, handled or used. Up through the third floor and down through the first basement floor, the quantity in this table shall apply. Fourth, fifth and sixth floors and the second and third basement floor level quantity shall be reduced to 75 percent of this table. The seventh through 10th floor and below the third basement floor level quantity shall be reduced to 50 percent of this table.*

[2] *Quantities may be increased 100 percent when stored in approved exhausted gas cabinets, exhausted enclosures or fume hoods.*

TABLE 3414.7(2)
EXEMPT AMOUNTS OF HAZARDOUS MATERIALS, LIQUIDS AND CHEMICALS PRESENTING A HEALTH HAZARD MAXIMUM QUANTITIES PER LABORATORY SUITE[1]
When two units are given, values within parentheses are in pounds (lbs.)

MATERIAL	STORAGE			USE CLOSED SYSTEMS			USE OPEN SYSTEMS	
	Solid Lbs.	Liquid Gallons (Lbs.)	Gas Cu. Ft.	Solid Lbs.	Liquid Gallons (Lbs.)	Gas Cu. Ft.	Solid Lbs.	Liquid Gallons (Lbs.)
1. Corrosives	5,000	500	650[2]	5,000	500	650	1,000	100
2a. Highly toxics[2]	40	10	65	5	1	65	2	1/4
2b. Toxics	500	50	650[2]	500	50	650	5	1/2
3. Irritants	5,000	500	650	5,000	500	650	1,000	100
4. Sensitizers	5,000	500	650	5,000	500	650	1,000	100
5. Other health hazards	5,000	500	650	5,000	500	650	1,000	100

[1]*A laboratory suite is a space up to 10,000 square feet (929 m^2) bounded by not less than a one-hour fire-resistive occupancy separation within which the exempt amounts of hazardous materials may be stored, dispensed, handled or used. Up through the third floor and down through the first basement floor, the quantity in this table shall apply. Fourth, fifth and sixth floors and the second and third basement floor level quantity shall be reduced to 75 percent of this table. The seventh through 10th floor and below the third basement floor level quantity shall be reduced to 50 percent of this table.*

[2]*Permitted only when stored or used in approved exhausted gas cabinets, exhausted enclosures or fume hoods. Quantities of high toxics in use in open systems need not be reduced above the third floor or below the first basement floor level. Individual container size shall be limited to 2 pounds (0.91 kg) for solids and 1/4 gallon (0.95 L) for liquids.*

3415.3.2 Public school buildings. *For public schools, the provisions of Section 3415 apply when required in accordance with Sections 4-307 and 4-309(c), Title 24, Part 1.*

3415.4 Evaluation required. *If the criteria in Section 3415.3 apply to the project under consideration, the design professional of record shall provide an evaluation in accordance with Section 3415 to determine the seismic performance of the building in its current configuration and condition. If the structure's seismic performance as required by Section 3415.5 is evaluated as satisfactory and the peer reviewer(s), when Method B of Section 3419 is used, concur, then no structural retrofit is required.*

3415.5 Minimum seismic design performance levels for structural and nonstructural components. *Following the notations of ACSE 41, the seismic requirements for design and assessment are based upon a prescribed Earthquake Hazard Level (BSE-1, BSE-2, BSE-R or BSE-C), a Specified Structural Performace Level (S-1 through S-5) and a Nonstructural Performance Level (N-A through N-E). The minimum seismic performance criteria are given in Table 3415.5 according to the building regulatory authority and the occupancy category as determined in Chapter 16 or by the regulatory authority. The building shall be evaluated at both the Level 1 and Level 2 performance levels, and the more restrictive requirements shall apply.*

Exception: *If the floor area of an addition is greater than the larger of 50 percent of the floor area of the original building or 1,000 square feet (93 m^2), then the Table 3415.5 entries for BSE-R and BSE-C are replaced by BSE-1 and BSE-2, respectively.*

3415.6 Retrofit required. *Where the evaluation indicates the building does not meet the required performance objectives of this section, the owner shall take appropriate steps to ensure that the building's structural system is retrofitted in accordance with the provisions of Section 3415. Appropriate steps are either: 1) undertake the seismic retrofit as part of the additions, modifications and/or repairs of the structure; or 2) provide a plan, acceptable to the building official, to complete the seismic retrofit in a timely manner. The relocation or moving of an existing building is considered to be an alteration requiring filing of the plans and specifications approved by the building official.*

3415.7 *The additions, modification or repair to any existing building are permitted to be prepared in accordance with the requirements for a new building, Chapter 16, Part 2, Title 24, C.C.R., 2007 edition, applied to the entire building.*

3415.8 *The requirements of ASCE 41 Chapter 9 are to apply to the use of seismic isolation or passive energy systems for the repair, modification or retrofit of an existing structure. When seismic isolation or passive energy dissipation is used, the project must have project peer review as prescribed in Section 3420.*

3415.9 *Any construction required by this chapter shall include structural observation by the registered design professional who is responsible for the structural design in accordance with Section 3417.10.*

3415.10 *Where Method B of Section 3419 is used or is required by Section 3415.8, the proposed method of building evaluation and design procedures must be accepted by the building official prior to the commencement of the work.*

TABLE 3415.5
SEISMIC PERFORMANCE REQUIREMENTS BY BUILDING REGULATORY AUTHORITY AND OCCUPANCY CATEGORY. ALL BUILDINGS NOT REGULATED BY DSA ARE ASSIGNED AS "STATE-OWNED"

		Performance Criteria	
Building Regulatory Authority	*Occupancy Category*	*Level 1*	*Level 2*
State-Owned	*I, II, III*	*BSE-R, S-3, N-D*	*BSE-C, S-5, N-E*
State-Owned	*IV*	*BSE-R, S-2, N-B*	*BSE-C, S-4, N-C*
Division of the State Architect—Public Schools	*I, II, III, IV*	*BSE-1, S-2, N-C*	*BSE-2, S-4, N-D*

Footnotes:

1. *ASCE 41 provides acceptance criteria (e.g. m, rotation) for Immediate Occupancy (S1), Life Safety (S3), and Collapse Prevention (S5), and specifies that values for S-2 and S-4 are to be determined by interpolation between the adjacent performance level values.*

   The required method of interpolation is as follows:

   For level S-2, the acceptance value is $^1/_3$ of the sum of the tabulated value for Immediate Occupancy (IO level) and twice the tabulated value for the Life Safety (LS level).

   For level S-4, the acceptance value is one-half the sum of the value for the LS level and the value for the Collapse Prevention (CP) level.

   For nonstructural components, N-A corresponds to the IO level, N-C to the LS level, and N-D to the Hazards Reduced (HR level).

   For evaluation procedures, N-B shall be the same as for N-A. Where numerical values are used, the values for N-B are one half the sum of the appropriate IO and LS values. Where IO or CP values are not given by ASCE 41, then the LS values are permitted to be substituted.

2. *Buildings evaluated and retrofitted to meet the requirements for a new building, Chapter 16, Part 2, Title 24, in accordance with the exception in Section 3417.1, are deemed to meet the seismic performance requirements of this section.*

TABLE 3410*A*.8
MANDATORY SAFETY SCORES[a]

OCCUPANCY	FIRE SAFETY (MFS)	MEANS OF EGRESS (MME)	GENERAL SAFETY (MGS)
A-1	16	27	27
A-2	19	30	30
A-3	18	29	29
A-4, E	23	34	34
B	24	34	34
F	20	30	30
M	19	36	36
R	17	34	34
S-1	15	25	25
S-2	23	33	33

a. MFS = Mandatory Fire Safety;
MME = Mandatory Means of Egress;
MGS = Mandatory General Safety.

3410*A*.9 Evaluation of building safety. The mandatory safety score in Table 3410*A*.8 shall be subtracted from the building score in Table 3410*A*.7 for each category. Where the final score for any category equals zero or more, the building is in compliance with the requirements of this section for that category. Where the final score for any category is less than zero, the building is not in compliance with the requirements of this section.

3410*A*.9.1 Mixed occupancies. For mixed occupancies, the following provisions shall apply:

1. Where the separation between mixed occupancies does not qualify for any category indicated in Section 3410*A*.6.16, the mandatory safety scores for the occupancy with the lowest general safety score in Table 3410*A*.8 shall be utilized (see Section 3410*A*.6.)
2. Where the separation between mixed occupancies qualifies for any category indicated in Section 3410*A*.6.16, the mandatory safety scores for each occupancy shall be placed against the evaluation scores for the appropriate occupancy.

SECTION 3411A
ADDITIONS, ALTERATIONS, REPAIRS AND SEISMIC RETROFIT TO EXISTING BUILDINGS OR STRUCTURES

Existing hospital buildings (as defined in Section 7-111 Part 1, Title 24, Building Standards Administrative Code).

***Note:** Alterations to lateral shear force-resisting capacity and story lateral shear forces shall be considered to be cumulative for purposes of defining incidental or minor alterations or additions. The percentage of cumulative changes shall be based on as-built conditions existing on March 7, 1973 or since the original construction if built after March 7, 1973.*

***3411A.1 Alterations.** For this section, alterations include any additions, alterations, repairs and/or seismic retrofit to a hospital building or portions thereof. The provision of Section 3403A shall apply for hospital buildings.*

***3411A.2 Seismic retrofit.** Any seismic retrofit of hospital buildings required by Article 2 and Article 11, Chapter 6, Part 1, Title 24, shall meet the requirements of Section 3403A.2.3.4.*

***Exception:** Hospital buildings evaluated to SPC 1 due to deficiencies identified by Article 10, Chapter 6, Part 1, Title 24, may be upgraded to SPC 2 by altering, repairing or seismically retrofitting these conditions in accordance with the requirements of Section 3403A.2.3.*

3411A.3 Alterations, additions and repairs to existing buildings or structures not required by Chapter 6, Part 1, Title 24.

***3411A.3.1 Approved existing buildings.** Structural alterations or repairs may be made to an approved building, provided the entire building, as modified, including structural alterations or repairs, conforms to Section 3403A.2.3, except requirements for the seismic structural performance category (SPC) of the building as determined by Chapter 6, Part 1, Title 24 shall apply. Additions shall conform to the requirements of these regulations for new construction.*

3411A.3.2 Pre-1973 buildings.

***3411A.3.2.1 Incidental structural alterations, additions or repairs.** The existing structural elements affected by the alteration, addition or repair shall conform or shall be made to conform to the vertical load requirements of these regulations. Incidental structural additions will be permitted, provided the additions meet these regulations for new construction using importance*

TABLE 3410*A*.9
EVALUATION FORMULAS[a]

FORMULA	T.3410*A*.7			T.3410*A*.8	SCORE	PASS	FAIL
FS-MFS ≥ 0	_____	(FS)	–	_____ (MFS) =	_____	_____	_____
ME-MME ≥ 0	_____	(ME)	–	_____ (MME) =	_____	_____	_____
GS-MGS ≥ 0	_____	(GS)	–	_____ (MGS) =	_____	_____	_____

a. FS = Fire Safety — MFS = Mandatory Fire Safety
ME = Means of Egress — MME = Mandatory Means of Egress
GS = General Safety — MGS = Mandatory General Safety

factor, I, equal to or greater than 1.0. Alterations or repairs to the existing affected lateral-load-resisting elements must meet the requirements of Section 3403A.2.3.

3411A.3.2.2 Minor structural alteration, additions or repairs. *Minor structural alterations, additions or repairs shall be permitted, provided they meet the following: Alterations to existing gravity and/or lateral-load-resisting systems shall be made to conform to the requirements of Section 3403A.2.3; and additions shall meet all of the requirements of these regulations for new construction using an importance factor, I, equal to or greater than 1.0.*

3411A.3.2.3 Major structural alteration, additions or repairs. *Major structural alterations, additions or repairs shall be permitted, provided the entire building, as modified, including the structural alterations or repairs, conforms to the requirements of Section 3403A.2.3. Additions shall meet the requirements of these regulations for new construction.*

It shall also be demonstrated by a written report submitted by the structural engineer, acceptable to the enforcement agency, that an investigation of the existing building structure shows it to be constructed in a reasonable conformance with the submitted drawings and specifications.

3411A.3.2.4 Removal of stories. *An alteration which involves the removal of one or more entire stories will be permitted if the lateral-load-resisting capacity of the remaining structure is not reduced.*

An alteration which involves the removal of other than one or more entire stories will be permitted provided that entire building conforms to Section 3403A.2.3.

SECTION 3412A
RESERVED

SECTION 3413A
MODIFICATIONS TO ASCE 41

3413A.1 General.

The text of ASCE 41 shall be modified as indicated in Sections 3413A.1.1 through 3413A.1.32.

Reference to sections of International Building Code (IBC) in ASCE 41 shall comply with requirements of Sections 110.1 & 110.4.

3413A.1.1 ASCE 41 Section 1.1. *Modify ASCE 41 Section 1.1 with the following:*

Seismic evaluations shall be performed using procedure and criteria of ASCE 41 except for general acute care hospitals, which shall be evaluated per Chapter 6, Part 1, Title 24 when required per provision of that chapter.

3413A.1.2 ASCE 41 Section 1.6 Seismic Hazard. *Modify ASCE 41 Section 1.6 by the following:*

Response spectra and acceleration time histories shall be constructed in accordance with Sections 1613A, 1614A and 1802A.6. Basic Safety Earthquake 2 (BSE-2) in ASCE 41 shall be same as Maximum Considered Earthquake (MCE) in ASCE 7.

3413A.1.3 ASCE 41 Section 2.2.6. *Modify ASCE 41 Section 2.2.6 by the following:*

Data Collection Requirements. *The extent of data collection shall be at Comprehensive level for all structures except that data collection at Usual level shall be permitted for structures with BSO or lower target performance objective. Materials properties testing program shall be preapproved by the enforcement agent.*

For buildings built under an OSHPD permit based on 1976 or later edition of California Building Code, where materials properties are shown on design drawings and original materials test data are available, no materials testing shall be required when approved by the enforcement agent.

3413A.1.4 ASCE 41 Section 2.4.1.1. *Modify ASCE 41 Section 2.4.1.1 by the following:*

1. *If one or more component DCRs exceed 1.5 for the Immediate Occupancy Structural Performance Level(S-1) or 2.0 for the Life Safety Structural Performance Level (S-3) and any irregularity described in Sections 2.4.1.1.1 through 2.4.1.1.4 are present, then linear procedures are not applicable and shall not be used.*
2. *Linear procedures are not applicable to moment-resisting frames where plastic hinges do not form in either the beam at the face of column or in the column panel zone.*

3413A.1.5 ASCE 41 Section 2.4.2.1 *Modify ASCE 41 Section 2.4.2.1 by the following:*

Nonlinear Static Procedure. *If higher mode effects are significant, the Nonlinear Dynamic Procedure shall be used.*

3413A.1.6 ASCE 41 Section 2.4.4.5. *Modify ASCE 41 Section 2.4.4.5 by the following:*

Material Properties. *Expected material properties are not permitted to be determined by multiplying lower bound values by the assumed factors specified in Chapters 5 through 8.*

3413A.1.7 ASCE 41 Section 3.2.10.1. *Modify ASCE 41 Section 3.2.10.1 by the following:*

Linear Procedures. *Equation 3-5 is not permitted by OSHPD.*

3413A.1.8 ASCE 41 Section 3.3.1.3.5. *Replace ASCE 41 Section 3.3.1.3.5 as follows:*

Unreinforced Masonry Buildings. *Unreinforced masonry not permitted by OSHPD.*

3413A.1.9 ASCE 41 Section 3.3.3.2.2 *Modify ASCE 41 Section 3.3.3.2.2 with the following:*

Simplified NSP Analysis. Not permitted by OSHPD.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 35 – REFERENCED STANDARDS

Adopting Agency		BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter		X		X	X															
Adopt Entire Chapter as amended (amended sections listed below)			X						X ◆	X	X	X								
Adopt only those sections that are listed below			X				X													
Chapter / Section	Codes																			
ACI								X	X	X	X	X								
AISC								X	X	X	X	X								
AITC Standards								X	X	X	X	X								
ANSI S3.41-90 (R2001)	CA						X													
ANSI Z97.1-84 (R1994)	IBC						X													
ASCE/SEI								X	X	X	X	X								
ASME A17.1-04	IBC						X													
ASME A18.1-03	IBC						X													
ASTM Standards	IBC		X					X	X	X	X	X								
AWS								X	X	X	X	X								
BHMA A156.10-99	IBC						X													
BHMA A156.19-02	IBC						X													
CPSC 16 CFR Part 1201 (1977)	IBC						X													
FM Standards	CA		X																	
ICC	CA		X					X	X	X	X	X								
NFPA Standards	CA		X						X	X	X	X								
NFPA 72-02	CA							X												
PCI								X	X	X	X	X								
SFM Standards	CA		X																	
UL Standards	CA		X																	

The ◆ designation indicates that the Office of the State Fire Marshal's adoption of their chapter or individual sections is applicable to structures to DSA-SS.

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 Sections 101.5 and 101.7 and in *Appendix Chapter 1*, Section 102.4

Reference to other chapters. [DSA-SS & OSHPD] *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, 22A, and 34A.*

AA

Aluminum Association
900 - 19th Street N.W., Suite 300
Washington, DC 20006

Standard reference number the	Title	Referenced in code section number
ADM 1-05	Aluminum Design Manual: Part 1-A Aluminum Structures, Allowable Stress Design; and Part 1-B—Aluminum Structures, Load and Resistance Factor Design of Buildings and Similar Type Structures	1604.3.5, 2002.1
ASM 35-00	Aluminum Sheet Metal Work in Building Construction (Fourth Edition)	2002.1

AAMA

American Architectural Manufacturers Association
1827 Waldon Office Square, Suite 550
Schaumburg, IL 60173

Standard reference number	Title	Referenced in code section number
1402-86	Standard Specifications for Aluminum Siding, Soffit and Fascia	1404.5.1
101/I.S.2/A440-05	Specifications for Windows, Doors and Unit Skylights	1714.5.1, 2405.5

ACI

American Concrete Institute
P.O. Box 9094
Farmington Hills, MI 48333-9094

Standard reference number	Title	Referenced in code section number
216.1-97	Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	Table 720.1(2), 721.1
318-05	Building Code Requirements for Structural Concrete	1604.3.2, Table 1704.3, 1704.4.1, Table 1704.4, 1708.3, 1805.4.2.6, 1805.9, 1808.2.23.1.1, 1808.2.23.2,1808.2.23.2.1, 1809.2.2.2.2, 1809.2.3.2, 1809.2.3.2.2, 1810.1.2.2, 1812.8, 1901.2, 1901.3, 1901.4, 1902.1, 1903.1, 1904.1, 1904.2.1, 1904.2.2, 1904.2.3, 1904.3, 1904.4, 1905.1.1, 1905.2, 1905.3, 1905.4, 1905.5, 1905.6.2, 1905.6.3, 1905.6.4, 1905.6.5, 1905.7, 1905.8, 1905.9, 1905.10, 1905.11, 1905.12, 1905.13, 1906.1, 1906.2, 1906.3, 1906.4, 1907.1, 1907.2, 1907.3, 1907.4, 1907.5, 1907.6, 1907.7.1, 1907.7.2, 1907.7.3, 1907.7.4, 1907.7.5, 1907.8, 1907.9, 1907.10, 1907.11, 1907.12, 1907.13, 1908, 1908.1, 1908.1.1, 1908.1.2, 1908.1.3, 1908.1.4, 1908.1.5, 1908.1.6, 1908.1.7, 1908.1.8, 1908.1.9, 1908.1.10, 1908.1.11, 1908.1.12, 1908.1.13, 1908.1.14, 1908.1.15, 1908.1.16, 1909.1, 1909.3, 1909.4, 1909.5, 1909.6, 1912.1, 2108.3, 2205.3
506-05	*Guide to Shotcrete*	*1913A*
503.7-07	*Specification for Crack Repair by Epoxy Injection*	*1917A.2*
530-05	Building Code Requirements for Masonry Structures	1405.5, 1405.5.2, 1405.9, 1604.3.4, 1704.5, 1704.5.1, Table 1704.5.1, 1704.5.2, 1704.5.3, 2101.2.2, 2101.2.3, 2101.2.4, 2101.2.5, 2101.2.6, 2103.1.3.6, 2106.1, 2106.1.1, 2106.1.1.1, 2106.1.1.2, 2106.1.1.3, 2106.3, 2106.4, 2106.5, 2106.6, 2107.1, 2107.2, 2107.3, 2107.4, 2107.5, 2107.6, 2107.7, 2107.8, 2108.1, 2108.2, 2108.3, 2108.4, 2109.1, 2109.2.3.1, 2109.7.3
530.1-05	Specifications for Masonry Structures	1405.5.1, Table 1704.5.1, Table 1704.5.3, 2103.13.7, 2104.1, 2104.1.1, 2104.3, 2104.4

AF&PA

American Forest & Paper Association
1111 19th St, NW Suite 800
Washington, DC 20036

Standard reference number	Title	Referenced in code section number
WCD No. 4-89	Wood Construction Data—Plank and Beam Framing for Residential Buildings	2306.1.2
WFCM-01	Wood Frame Construction Manual for One- and Two-family Dwellings	2301.2, 2308.1, 2308.2.1
T.R. No. 7-87	Technical Report—Basic Requirements for Permanent Wood Foundation System	1805.4.6, 1807.2, 2304.9.5
NDS-05	National Design Specification (NDS) for Wood Construction with 2005 Supplement	721.6.3.2, 1715.1.1, 1715.1.4, 1805.4.5, 1809.1.4, 2302.1, 2304.12, 2306.1, 2306.2.1, 2306.3.1, Table 2306.3.1, Table 2306.3.2, Table 2306.4.1, Table 2306.4.4, 2306.3.4, 2306.3.5, 2306.4.1, 2307.1, 2307.1.1
AF&PA-93	Span Tables for Joists and Rafters	2306.1.1, 2308.8, 2308.10.2, 2308.10.3
SDPWS-05	AF&PA Supplement Special Design Provisions for Wind and Seismic	2305.1

AHA

American Hardwood Association
1210 West N.W. Highway
Palatine, IL 60067

Standard reference number	Title	Referenced in code section number
A135.4-2004	Basic Hardboard	1404.3.1, 2303.1.6
A135.5-2004	Prefinished Hardboard Paneling	2303.1.6, 2304.6.2
A135.6-1998	Hardboard Siding	1404.3.2, 2303.1.6

AISC

American Institute of Steel Construction
One East Wacker Drive, Suite 3100
Chicago, IL 60601-2001

Standard reference number	Title	Referenced in code section number
341-05	Seismic Provisions for Structural Steel Buildings, including Supplement No. 1 dated 2006	1613.6.2, 1707.2, 1708.4, 2205.2.1, 2205.2.2, 2205.3, 2205.3.1
358-05	*Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications*	*2205A, 3413A*
360-05	Specification for Structural Steel Buildings	1604.3.3, Table 1704.3, 2203.2, 2205.1, 2205.3, *2205A*, 3413

AISI

American Iron and Steel Institute
1140 Connecticut Avenue
Suite 705
Washington, DC 20036

Standard reference number	Title	Referenced in code section number
NAS-01	North American Specification for the Design of Cold-formed Steel Structural Members, including 2004 Supplement	1604.3.3, 2209.1, 2210.1
General-04	Standard for Cold-formed Steel Framing—General Provisions	1604.3.3, 2210.1
Header-04	Standard for Cold-formed Steel Framing—Header Design	2210.2
Lateral-04	Standard for Cold-formed Steel Framing—Lateral Design	2210.5
PM-01	Standard for Cold-formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings, including 2004 Supplement	2210.6
Truss-04	Standard for Cold-formed Steel Framing—Truss Design	1604.3.3, 2210.3
WSD-04	Standard for Cold-formed Steel Framing—Wall Stud Design	2210.4

AITC

American Institute of Timber Construction
Suite 140
7012 S. Revere Parkway
Englewood, CO 80112

Standard reference number	Title	Referenced in code section number
AITC Technical Note 7-96	Calculation of Fire Resistance of Glued Laminated Timbers	721.6.3.3
AITC 104-03	Typical Construction Details	2306.1
AITC 110-01	Standard Appearance Grades for Structural Glued Laminated Timber	2306.1
AITC 111-05	*Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection*	*2303.1.3.1*
AITC 113-01	Standard for Dimensions of Structural Glued Laminated Timber	2306.1
AITC 117-04	Standard Specifications for Structural Glued Laminated Timber of Softwood Species	2306.1
AITC 119-96	Standard Specifications for Structural Glued Laminated Timber of Hardwood Species	2306.1
AITC 200-04	Manufacturing Quality Control Systems Manual for Structural Glued Laminated Timber	2306.1
AITC 404-05	*Standard for Radially Reinforcing Curved Glued Laminate Timber Members to Resist Radial Tension*	*2303.1.3.1*
ANSI/AITC A 190.1-02	Structural Glued Laminated Timber	2303.1.3, 2306.1

ALI

Automotive Lift Institute
P.O. Box 85
Courtland, NY 13045

Standard reference number	Title	Referenced in code section number
ALI ALCTV-98	Standard for Automotive Lifts—Safety Requirements for Construction, Testing and Validation (ANSI)	3001.2

ANSI

American National Standards Institute
25 West 43rd Street, Fourth Floor
New York, NY 10036

Standard reference number	Title	Referenced in code section number
A13.1-96 (Reaffirmed 2002)	Scheme for the Identification of Piping Systems	415.8.6.4
A108.1A-99	Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar	2103.1
A108.1B-99	Installation of Ceramic Tile, Quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex-portland Mortar	2103.1
A108.4-99	Installation of Ceramic Tile with Organic Adhesives or Water-cleanable Tile-setting Epoxy Adhesive	2103.10.6
A108.5-99	Installation of Ceramic Tile with Dry-set Portland Cement Mortar or Latex-portland Cement Mortar	2103.9.3, 2103.10.1, 2103.10.2
A108.6-99	Installation of Ceramic Tile with Chemical-resistant, Water Cleanable Tile-setting and -grouting Epoxy	2103.10.3
A108.8-99	Installation of Ceramic Tile with Chemical-resistant Furan Resin Mortar and Grout	2103.10.4
A108.9-99	Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout	2103.10.5
A108.10-99	Installation of Grout in Tilework	2103.10.7
A118.1-99	American National Standard Specifications for Dry-set Portland Cement Mortar	2103.10.1
A118.3-99	American National Standard Specifications for Chemical-resistant, Water-cleanable Tile-setting and -grouting Epoxy and Water Cleanable Tile-setting Epoxy Adhesive	2103.10.3
A118.4-99	American National Standard Specifications for Latex-portland Cement Mortar	2103.10.2
A118.5-99	American National Standard Specifications for Chemical Resistant Furan Mortar and Grouts for Tile Installation	2103.10.4
A118.6-99	American National Standard Specifications for Cement Grouts for Tile Installation	2103.10.7
A118.8-99	American National Standard Specifications for Modified Epoxy Emulsion Mortar/Grout	2103.10.5
A136.1-99	American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile	2103.10.6
A137.1-88	American National Standard Specifications for Ceramic Tile	2103.5
A208.1-99	Particleboard	2303.1.7, 2303.1.7.1
S3.41-90 (R2001)	*American National Standard Audible Evacuation Signal*	*907.9.2.1*
Z 97.1-84 (R1994)	Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test (Reaffirmed 1994)	2306.1.2, *2406.1.2*, 2409.1, *7-3094.2*

APA

APA - Engineered Wood Association
P.O. Box 11700
Tacoma, WA 98411-0700

Standard reference number	Title	Referenced in code section number
APA PDS-04	Panel Design Specification	2306.1, 2306.3.1, 2306.4.1
APA PDS Supplement 1-90	Design and Fabrication of Plywood Curved Panels (revised 1995)	2306.1
APA PDS Supplement 2-92	Design and Fabrication of Plywood-lumber beams (revised 1998)	2306.1
APA PDS Supplement 3-90	Design and Fabrication of Plywood Stressed-skin Panels (revised 1996)	2306.1
APA PDS Supplement 4-90	Design and Fabrication of Plywood Sandwich Panels (revised 1993)	2306.1
APA PDS Supplement 5-95	Design and Fabrication of All-plywood Beams (revised 1995)	2306.1
EWS R540-96	Builders Tips: Proper Storage and Handling of Glulam Beams	2306.1
EWS S475-01	Glued Laminated Beam Design Tables	2306.1
EWS S560-03	Field Notching and Drilling of Glued Laminated Timber Beams	2306.1
EWS T300-02	Glulam Connection Details	2306.1
EWS X440-00	Product Guide—Glulam	2306.1
EWS X450-01	Glulam in Residential Construction—Western Edition	2306.1

ASAE

American Society of Agricultural Engineers
2950 Niles Road
St. Joseph, MI 49085-9659

Standard reference number	Title	Referenced in code section number
EP 484.2 (1998)	Diaphragm Design of Metal-clad, Post-frame Rectangular Buildings	2306.1
EP 486.1 (2000)	Shallow-post Foundation Design	2306.1
EP 559 (1997)	Design Requirements and Bending Properties for Mechanically Laminated Columns	2306.1

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
3-91	Structural Design of Composite Slabs	1604.3.3, 2209.2
5-05	Building Code Requirements for Masonry Structures	1405.5, 1405.5.2, 1405.9, 1604.3.4, 1704.5, 1704.5.1, Table 1704.5.1, 1704.5.2, 1704.5.3, Table 1704.5.3, 1708.1.1, 1708.1.2, 1708.1.3, 1708.1.4, 1805.5.2, 1812.7, 2101.2.2, 2101.2.3, 2101.2.4, 2101.2.5, 2101.2.6, 2103.1.3.6, 2106.1, 2106.1.1, 2106.1.1.1, 2106.1.1.2, 2106.1.1.3, 2106.3, 2106.4, 2106.5, 2106.6, 2107.1, 2107.2, 2107.3, 2107.4, 2107.5, 2107.6, 2107.7, 2170.8, 2108.1, 2108.2, 2108.3, 2108.4, 2109.1, 2109.2.3.1, 2109.7.3
6-05	Specifications for Masonry Structures	1405.5.1, Table 1704.5.1, Table 1704.5.3, 1805.5.2.2, 2103.13.7, 2104.1, 2104.1.1, 2104.3, 2104.4
7-05	Minimum Design Loads for Buildings and Other Structures including Supplement Nos. 1 *&* *2* and excluding Chapter 14 and Appendix 11A	1602.1, 1604.3, 1604.10, 1605.1, 1605.2.2, 1605.3.1.2, 1605.3.2, 1605.4, 1607.11.1, 1608.1, 1608.2, 1609.1.1, 1609.1.2, 1609.3, 1609.5.1, 1609.5.3, 1611.2, 1612.2, 1613.1, 1613.2, Table 1613.5.3(1), Table 1613.5.3(2), 1613.5.6, 1613.5.6.1, 1613.5.6.2, 1613.6, 1613.6.1, 1613.6.2, *1614A,* 1801.2.1, 1802.2.7, 2205.2.1, 2205.3, 2205.3.1, 2208.1, 2305.1.5, 2305.2.5, 2305.3.1, 2306.4.5, Table 2306.4.5, Table 2308.10.1
8-02	Standard Specification for the Design of Cold-formed Stainless Steel Structural Members	1604.3.3, 2209.1
19-96	Structural Applications of Steel Cables for Buildings	2207.1, 2207.2
24-05	Flood Resistant Design and Construction	1203.3.2, 1612.4, 1612.5, 3001.2
29-05	Standard Calculation Methods for Structural Fire Protection	721.1
32-01	Design and Construction of Frost Protected Shallow Foundations	1805.2.1
41-06	*Seismic Rehabilitation of Existing Buildings including Supplement No. 1*	*3403.2.3, 3403A.13, 3415.5, 3415.6,* 3415.8, 3417.2, 3417.5, 3417.7, 3417.9

ASTM—continued

E 736-00	Test Method for Cohesion/Adhesion of Sprayed Fire-resistive Materials Applied to Structural Members	1704.10.5
E 814-02	Test Method of Fire Tests of Through-penetration Firestops	702.1, 712.3.1.2, 712.4.1.1, 712.4.1.1.2
E 970-00	Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source	719.3.1
E 1300-04e01	Practice for Determining Load Resistance of Glass in Buildings	2404.1, 2404.2, 2404.3.1, 2404.3.2, 2404.3.3, 2404.3.4, 2404.3.5
E 1592-01	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference	1504.3.2
E 1602-03	Guide for Construction of Solid Fuel-burning Masonry Heaters	2112.2
E 1886-04	Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missiles and exposed to Cyclic Pressure Differentials	1609.1.2
E 1966-00	Test Method for Fire-resistant Joint Systems	702.1, 713.3
E 1996-04	Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes	1609.1.2, 1609.1.2.1
E 2307-04	Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-scale, Multistory Test Apparatus	713.4
F 547-01	Terminology of Nails for Use with Wood and Wood-based Materials	Table 2506.2
F 1346-91 (2003)	Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs	3109.4, 3109.4.1.8
F 1667-03	Specification for Driven Fasteners: Nails, Spikes and Staples	Table 720.1(2), Table 720.1(3), 1507.2.6, 2303.6, Table 2506.2
F 2006-00	Standard/Safety Specification for Window Fall Prevention Devices for Nonemergency Escape (Egress) and Rescue (Ingress) Windows	1405.12.2
F 2090-01a	Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms	1405.12.2
G 152-04	Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials	1504.6
G 154-00A	Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials	1504.6
G 155-04	Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials	1504.6

AWCI

The Association of the Wall and Ceiling Industries International
803 West Broad Street, Suite 600
Falls Church, VA 22046

Standard reference number	Title	Referenced in code section number
12-B-98	Technical Manual 12-B Standard Practice for the Testing and Inspection of Field Applied This—Film Intumescent Fire-resistive Materials; an Annotated Guide, First Edition	1704.11

AWPA

American Wood-Preservers' Association
P.O. Box 5690
Grandbury, TX 76049

Standard reference number	Title	Referenced in code section number
C1-00	All Timber Products—Preservative Treatment by Pressure Processes	1505.6
M4-02	Standard for the Care of Preservative-treated Wood Products	1809.1.2, 2303.1.8
U1-04	USE CATEGORY SYSTEM: User Specification for Treated Wood Except Section 6, Commodity Specification H	1403.5, 1505.6, Table 1507.9.5, 1805.4.5, 1805.4.6, 1805.7.1, 1809.1.2, 2303.1.8, 2304.11.2, 2304.11.4, 2304.11.6, 2304.11.7

AWS

American Welding Society
550 N.W. LeJeune Road
Miami, FL 33126

Standard reference number	Title	Referenced in code section number
D1.1-*06*	Structural Welding Code—Steel	Table 1704.3, 1704.3.1, 1708.4
D1.3-98	Structural Welding Code—Sheet Steel	Table 1704.3
D1.4-*05*	Structural Welding Code—Reinforcing Steel	Table 1704.3, Table 1704.4
QC1-06	*Standard for AWS Certification of Welding Inspectors.*	*1704A.3.1.1*

BHMA

Builders Hardware Manufacturers' Association
355 Lexington Avenue, 17th Floor
New York, NY 10017-6603

Standard reference number	Title	Referenced in code section number
A156.10-99	American National Standard for Power Operated Pedestrian Doors	1008.1.3.2, *1133B.2.3.2*
A156.19-02	Standard for Power Assist and Low Energy Operated Doors	1008.1.3.2, *1133B.2.3.2, 7-3093.4*

CGSB

Canadian General Standards Board
222 Queens Street
14th Floor, Suite 1402
Ottawa, Ontario, Canada KIA 1G6

Standard reference number	Title	Referenced in code section number
37-GP-52M (1984)	Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric	1504.7, 1507.12.2
CAN/CGSB 37.54-95	Polyvinyl Chloride Roofing and Waterproofing Membrane	1507.13.2
37-GP-56M (1980)	Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing—with December 1985 Amendment	1507.11.2

CSA

Canadian Standards Association
5060 Spectrum Way, Suite 100
Mississauga, Ontario, L4W 5N6 Canada

Standard reference number	Title	Referenced in code section number
101/I.S.2/A440-05	Specifications for Windows, Doors and Unit Skylights	1714.5.1, 2405.5

CPSC

Consumer Product Safety Commission
4330 East West Highway
Bethesada, MD 20814-4408

Standard reference number	Title	Referenced in code section number
16 CFR Part 1201(1977)	Safety Standard for Architectural Glazing Material	2406.1.1, 2406.2.1, 2407.1, 2408.2.1, 2408.3
16 CFR Part 1209 (1979)	Interim Safety Standard for Cellulose Insulation	719.6
16 CFR Part 1404 (1979)	Cellulose Insulation.	719.6
16 CFR Part 1500 (1991)	Hazardous Substances and Articles; Administration and Enforcement Regulations	307.2
16 CFR Part 1500.44 (2001)	Method for Determining Extremely Flammable and Flammable Solids	307.2
16 CFR Part 1507 (2001)	Fireworks Devices	307.2
16 CFR Part 1630 (2000)	Standard for the Surface Flammability of Carpets and Rugs.	804.4.1

CSSB

Cedar Shake and Shingle Bureau
P.O. Box 1178
Sumas, WA 98295-1178

Standard reference number	Title	Referenced in code section number
CSSB-97	Grading and Packing Rules for Western Red Cedar Shakes and Western Red Shingles of the Cedar Shake and Shingle Bureau	Table 1507.8.4, Table 1507.9.5

DASMA

Door and Access Systems Manufacturers Association International
1300 Summer Avenue
Cleveland, OH 44115-2851

Standard reference number	Title	Referenced in code section number
107-98 (03)	Room Fire Test Standard for Garage Doors Using Foam Plastic Insulation	2603.4.1.9

DOC

U.S. Department of Commerce
National Institute of Standards and Technology
100 Bureau Drive Stop 3460
Gaithersburg, MD 20899

Standard reference number	Title	Referenced in code section number
PS-1-95	Construction and Industrial Plywood	2303.1.4, 2304.6.2, Table 2304.7(4), Table 2304.7(5), 2306.3.1, Table 2306.3.1, Table 2306.3.2
PS-2-92	Performance Standard for Wood-based Structural-use Panels	2303.1.4, 2304.6.2, Table 2304.7(5), Table 2306.3.1, 2306.3.1, Table 2306.3.2
PS-20-99	American Softwood Lumber Standard	1809.1.1, 2302.1, 2303.1.1

DOL

U.S. Department of Labor
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325

Standard reference number	Title	Referenced in code section number
29 CFR Part 1910.1000 (1974)	Air Contaminants	902.1

DOTn

U.S. Department of Transportation
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325

Standard reference number	Title	Referenced in code section number
49 CFR-1998	Specification of Transportation of Explosive and Other Dangerous Articles, UN 0335,UN 0336 Shipping Containers	307.2
49 CFR Parts 173.137 (1990)	Shippers—General Requirements for Shipments and Packaging—Class 8—Assignment of Packing Group	307.2

FEMA

Federal Emergency Management Agency
Federal Center Plaza
500 C Street S.W.
Washington, DC 20472

Standard reference number	Title	Referenced in code section number
FIA-TB11-01	Crawlspace Construction for Buildings Located in Special Flood Hazard Areas	1807.1.2.1

FM

Factory Mutual
Standards Laboratories Department
1151 Boston-Providence Turnpike
Norwood, MA 02062

Standard reference number	Title	Referenced in code section number
3011-99	*Approved Standard for Control Station Service for Fire Alarm and Protective Equipment Supervision*	*907.2.3.5*
3260–00	*Radiant Energy-sensing Fire Detectors for Automatic Fire Alarm Signaling*	
4430-80	*Acceptance Criteria for Smoke and Heat Vents*	*910.3.1*
4450 (1989)	Approval Standard for Class 1 Insulated Steel Deck Roofs—with Supplements through July 1992	1504.3.1, 1508.1, 2603.3, 2603.4.1.5
4470 (1992)	Approval Standard for Class 1 Roof Covers	1504.3.1, 1504.7
4880 (2001)	American National Standard for Evaluating Insulated Wall or Wall and Roof/Ceiling Assemblies, Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, Interior and Exterior Finish Systems	2603.4, 2603.9

GA

Gypsum Association
810 First Street N.E. #510
Washington, DC 20002-4268

Standard reference number	Title	Referenced in code section number
GA 216-04	Application and Finishing of Gypsum Board	Table 2508.1, 2509.2
GA 600-03	Fire-Resistance Design Manual, 17th Edition	Table 720.1(1), Table 720.1(2), Table 720.1(3)

HPVA

Hardwood Plywood Veneer Association
1825 Michael Faraday Drive
Reston, VA 20190-5350

Standard reference number	Title	Referenced in code section number
HP-1-2000	The American National Standard for Hardwood and Decorative Plywood	2303.3, 2304.6.2

ICC

International Code Council
500 New Jersey Avenue, NW
6th Floor
Washington, DC 20001

Standard reference number	Title	Referenced in code section number
ICC 300-02	ICC Standard on Bleachers, Folding and Telescopic Seating and Grandstands	1025.1.1, 3401.1
ICC-ES AC 43-06	*Acceptance Criteria for Steel Deck Roof and Floor Systems*	*1609A.3.7.2, 2209A.3*
ICC ES AC 331	*Acceptance Criteria for Smoke and Heat Vents*	*910.3.1*
ICC ES AC77	*Acceptance Criteria for Smoke Containment Systems Used with Fire-resistance-rated Elevator Hoistway Doors and Frames*	*707.14.1*
IEBC 2006	*International Existing Building Code*	*3417.1.1, 3417.8*
SBCCI SSTD 10-99	Standard for Hurricane Resistant Residential Construction	1609.1.1, 1609.1.1.1, 2308.2.1
SBCCI SSTD 11-97	Test Standard for Determining Wind Resistance of Concrete or Clay Roof Tiles	1715.2.1, 1715.2.2

ISO

International Standards Organization
ISO Central Secretariat1, rue de Varembee, Case postale 56
CH-1211 Geneva 20, Switzerland

Standard reference number	Title	Referenced in code section number
ISO 8115-86	Cotton Bales—Dimensions and Density	Table 415.8.2.1.1

NAAMM

National Association of Architectural Metal Manufacturers
8 South Michigan Ave
Chicago, IL 60603

Standard reference number	Title	Referenced in code section number
FP1001-97	Guide Specifications for Design of Metal Flag Poles	1609.1.1

NCMA

National Concrete Masonry Association
2302 Horse Pen Road
Herndon, VA 22071-3499

Standard reference number	Title	Referenced in code section number
TEK 5-84 (1996)	Details for Concrete Masonry Fire Walls	Table 720.1(2)

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101

Standard reference number	Title	Referenced in code section number
11-*05*	Low, *Meduim and High* Expansion Foam	905
12-*05*	Carbon Dioxide Extinguishing Systems	904.8, 904.11
12A-04	Halon 1301 Fire Extinguishing Systems	904.9
13-02	Installation of Sprinkler Systems, *as amended**	707.2, 903.2.5.1, 903.2.15, 903.3.1.1, 903.3.2, 903.3.5.1.1, 903.3.5.2, 904.11, 905.3.4, 907.8, 3104.5, 3104.9
	NFPA 13, Amended Sections as follows: ***Add a sentence to the beginning of Section 9.3.5.8.9 as follows:*** *Where pipe is used for sway bracing, it shall have a wall thickness of not less then Schedule 40.* ***Replace Section 9.3.5.9.4 as follows:*** *Lag screws or power-driven fasteners shall not be used to attach braces to the building structure.*	
13D-02	Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes	903.3.1.3, 903.3.5.1.1
13R-02	Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height	903.3.1.2, 903.3.5.1.1, 903.3.5.1.2, 903.4
14-*07*	Installation of Standpipe and Hose System, *as amended**	905.2, 905.3.4, 905.4.2, 905.8
	NFPA 14, Amended Sections as follows: ***Replace Section 6.3.7.1*** ***6.3.7.1*** *System water supply valves, isolation control valves, and other valves in fire mains shall be supervised in an approved manner in the open position by one of the following methods:* *(1) Where a building has a fire alarm system or a sprinkler monitoring system installed, the valve shall be supervised by:* *(a) a central station, proprietary or remote supervising station, or* *(b) a local signaling service that initiates an audible signal at a constantly attended location.* *(2) Where a building does not have a fire alarm system or a sprinkler monitoring system installed, the valve shall be supervised by:* *(a) Locking the valves in the open position, or* *(b) Sealing of valves and an approved weekly recorded inspection where valves are located within fenced enclosures under the control of the owner.*	
15-01	*Water Spray Fixed Systems for Fire Protection*	
16-03	Installation Foam-water Sprinkler and Foam-water Spray Systems	904.7, 904.11
17-02	Dry Chemical Extinguishing Systems	904.6, 904.11
17A-02	Wet Chemical Extinguishing Systems	904.5, 904.11
20-03	*Installation of Stationary Pumps for Fire Protection*	
22-03	*Water Tanks for Private Fire Protection*	
24-07	*Installation of Private Fire Service Mains and Their Appurtenances, as amended**	
	NFPA 24, Amended Sections as follows: ***Amend Section 4.2.1*** **Section 4.2.1.** Installation work shall be done by fully experienced and responsible *contractors. Contractors shall be appropriately licensed in the State of California to install private fire service mains and their appurtenances.* ***Revise Section 4.2.2 as follows:*** ***4.2.2*** *Installation or modification of private fire service mains shall not begin until plans are approved and appropriate permits secured from* the authority having jurisdiction.	

NFPA—continued

Add Section 4.2.2.1 as follows:

4.2.2.1 *As approved by the authority having jurisdiction, emergency repair of existing system may start immediately, with plans being submitted to the authority having jurisdiction within 96 hours from the start of the repair work.*

Revise Section 5.9.1.2 as follows:

Section 5.9.1.2 Fire department connections shall be properly supported *and protected from mechanical damage.*

Revise Section 5.9.5.1 as follows:

5.9.5.1 Fire department connections shall be on the street side of buildings and *as approved by the authority having jurisdiction.*

Revise Section 10.6.5 as follows:

10.6.5 Where a riser is located close to building foundations, underground fittings of proper design and type shall be used. *The pipe under the building or building foundation shall not contain mechanical joints.*

Exception: *Where allowed in accordance with 10.6.2.*

Revise Section 10.9.1 as follows:

10.9.1 Backfill shall be well tamped in layers or puddle under and around pipes to prevent settlement or lateral movement. *Backfill shall consist of clean fill sand or pea gravel to a minimum 6″ below and to a minimum of 12″ above the pipe* and shall contain no ashes, cinders, refuse, organic matter, or other corrosive materials.

30-03 Flammable and Combustible Liquids Code 415.3

31-01 Installation of Oil-burning Equipment 2113.15

32-*04* Dry Cleaning Plants 415.6.4

37-02 *Installation and Use of Stationary Combustion Engines and Gas Turbines*

40-01 Storage and Handling of Cellulose Nitrate Film. 409.1

50-01 *Bulk Oxygen Systems at Consumer Sites* *1224.4.6.5*

52-06 *Compressed Natural Gas (CNG) Vehicular Fuel Systems Code*

54-05 *National Fuel Gas Code*

57-02 *Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code*

58-04 *Standard for the Storage and Handling of Liquefied Petroleum Gases*

61-*02* Prevention of Fires and Dust Explosions in Agricultural and Food Product Facilities 415.6.1

72-*07* National Fire Alarm Code, *as amended** 901.6, 903.4.1, 904.3.5, 907.2, 907.2.1.1, 907.2.3.3, 907.2.3.5, 907.2.3.6.1, 907.2.6.3.3, 907.2.10, 907.2.10.4, 907.2.11.2, 907.2.11.3, 907.2.12.2.3, 907.2.12.3, 907.4, 907.5, 907.9.1, *907.9.1.4*, 907.9.2, *907.9.2.1*, 907.10, 907.10.1.4, 907.10.1.5, 907.10.2.1, 907.14, 907.16, 907.17, 911.1, *1007.9, 1114B.2.2*, 3006.5

****NFPA 72, Amended Sections as follows:***

4.4.4.3. Transient Protection. To reduce the possibility of damage by induced transients, circuits and equipment shall be property protected in accordance with the requirements of *California Electrical Code,* Article 800.

4.4.4.4 Wiring. The installation of all wiring, cable and equipment shall be in accordance with the *California Electrical Code,* and specifically with Articles 760, 770 and 800, where applicable. Optical fiber cables shall be protected against mechanical injury in accordance with Article 760.

4.4.5 Protection of Fire Alarm Systems

Delete Exception No. 2:

~~Exception No. 2: Fully sprinklered buildings shall not require protection in accordance with 4.4.5.~~

5.13.4 The operable part of each manual fire alarm box shall not be less than 1.1 m (3 $^{1}/_{2}$ feet) and not more than *1.22 m (4 feet)* above floor level.

5.13.8 Additional fire alarm boxes shall be provided so that the travel distance to the nearest fire alarm box shall not be in excess of 61 m (200 feet) measured horizontally on the same floor.

Exception: *When individual dwelling units are served by a single exit stairway, additional boxes at other than the ground floor may be omitted.*

5.14 Fire Extinguisher Monitoring Device.

A fire extinguisher monitoring device shall indicate those conditions for a specific fire extinguisher required by California Code of Regulations, Title 19, Chapter 1, — Section FE and California Fire Code to a fire alarm control unit or other control unit.

6.4.2.2.2

Exception: *(4) Where the vertically run conductors are contained in a 2-hour-rated cable assembly, or enclosed (installed) in a 2-hour-rated enclosure or a listed circuit integrity (C.I.) cable, which meets or exceeds a 2-hour fire-resistive rating.*

6.8.5.1.2 ***(Manual Fire Alarm Boxes)***

Exception: Fire alarm systems dedicated to elevator recall control, supervisory service and fire sprinkler monitoring only.

6.8.5.4.1 (2) A smoke detector that is continuously subjected to a smoke concentration above alarm threshold does not delay the system within functions of 4.4.3, 6.8.1.1 or 6.16.2.1 by more than *30 seconds.*

6.8.5.4.1 (5) *Operation of a patient room smoke detector in Group I-1 and I-2 occupancies shall not include an alarm verification feature.*

11.7.2.1 *The alarm verification feature shall not be used for household fire warning equipment.*

11.7.5.7.1 *The alarm verification feature shall not be used for household fire warning equipment.*

NFPA—continued

80-*07*	Fire Doors and Fire Windows	508.2.2.1, 715.4, 715.4.5, 715.4.6.1, 715.4.7.2, 715.5, 1008.1.3.3
85-04	Boiler and Combustion System Hazards Code (Note: NFPA 8503 has been incorporated into NFPA 85)	415.6.1
92A-00	*Recommended Practice for Smoke-Control Systems*	
92B-05	Smoke Management Systems in Malls, Atria and Large Spaces	909.8
99-05	*Health Care Facilities*	*1224.4.6.2, 1224.4.6.3, 1224.4.6.4*
101-*06*	Life Safety Code	1025.6.2
105-03	Standard for the Installation of Smoke Door Assemblies	405.4.2, 715.4.3.1, 909.20.4.1
110-*05*	Emergency and Standby Power Systems	2702.1
111-*05*	Stored Electrical Energy Emergency and Standby Power Systems	2702.1
120-*04*	Coal Preparation Plants	415.6.1
211-03	Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances	2112.5
230-03	Standard for the Fire Protection of Storage	507.3
252-03	Standard Methods of Fire Tests of Door Assemblies	715.3, 715.4.1, 715.4.2, 715.4.3, 715.4.4.1
253-*06*	Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	402.11.1, 406.6.4, 804.2, 804.3
257-00	Standard for Fire Test for Window and Glass Block Assemblies	715.3, 715.4.3.2, 715.5, 715.5.1, 715.5.2, 715.5.8.1
259-*03*	Test Method for Potential Heat of Building Materials	2603.4.1.10, 2603.5.3
265-02	Method of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings on Full Height Panels and Walls	803.6.2, 803.6.2.1
268-01	Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source	1406.2.1, 1406.2.1.1, 1406.2.1.2, 2603.5.7
285-*06*	Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components	1407.10.4, 2603.5.5
286-*06*	Standard Method of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth	402.15.4, 803.2, 803.2.1, 803.5, 803.6.3, 2603.4, 2603.9
288-01	Standard Methods of Fire Tests of Floor Fire Door Assemblies in Fire-resistance-rated Floor Systems	711.8, 712.4.1.5
303-*06*	Fire Protection Standards for Marinas and Boatyards	905.3.7
409-*04*	Aircraft Hangars	412.2.6, 412.4.5
418-01	Standard for Heliports	412.5.5
484-02	*Combustible Metals, Metal Powders and Metal Rust*	
651-98	Machining and Finishing of Aluminum and the Production and Handling of Aluminum Powders	415.6.1
654-*06*	Prevention of Fire & Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids	415.6.1
655-01	Prevention of Sulfur Fires and Explosions	415.6.1
664-02	Prevention of Fires Explosions in Wood Processing and Woodworking Facilities	415.6.1
701-*04*	Standard Methods of Fire Tests for Flame-propagation of Textiles and Films	402.11.1, 410.3.6, 801.1.2, 806.1, 806.1.2, 806.2, 3102.3, 3102.3.1, 3102.6.1.1, 3105.4
704-01	Standard System for the Identification of the Hazards of Materials for Emergency Response	414.7.2, 415.2
1124-*06*	Manufacture, Transportation, and Storage of Fireworks and Pyrotechnic Articles	415.3.1
2001-04	Clean Agent Fire Extinguishing Systems	904.1

PCI

Precast Prestressed Concrete Institute
175 W. Jackson Boulevard, Suite 1859
Chicago, IL 60604-9773

Standard reference number	Title	Referenced in code section number
MNL 124-89	Design for Fire Resistance of Precast Prestressed Concrete	721.2.3.1
MNL 128-01	Recommended Practice for Glass Fiber Reinforced Concrete Panels	1903.2
PCI 120-04	*PCI Design Handbook 6th Edition*	*1908A.1*

PTI

Post-Tensioning Institute
1717 W. Northern Avenue, Suite 114
Phoenix, AZ 85021

Standard reference number	Title	Referenced in code section number
PTI-2004	Standard Requirements for Analysis of Shallow Concrete Foundations on Expansive Soils, First Edition	1805.8.2
PTI-2004	Standard Requirements for Design of Shallow Post-tensioned Concrete Foundation on Expansive Soils	1805.8.2
PTI-2004	*Recommendations for Prestressed Rock and Soil Anchors (4th Edition)*	*1813A.2*

RMI

Rack Manufacturers Institute
8720 Red Oak Boulevard, Suite 201
Charlotte, NC 28217

Standard reference number	Title	Referenced in code section number
RMI (2002)	Specification for Design, Testing and Utilization of Industrial Steel Storage Racks	2208.1

SFM

State of California
Department of Forestry and Fire Protection
Office of the State Fire Marshal
P.O. Box 944246
Sacramento, CA 94246-2460

Standard reference number	Title	Referenced in code section number
12-3	*Releasing Systems for Security Bars in Dwellings*	
12-7-3	*Fire-testing Furnaces*	
12-7A-1	*Exterior Wall Siding and Sheathing*	
12-7A-2	*Exterior Window*	
12-7A-3	*Under Eave*	
12-7A-4	*Decking*	
12-8-100	*Room Fire Tests for Wall and Ceiling Materials*	
12-10-1	*Power Operated Exit Doors*	
12-10-2	*Single Point Latching or Locking Devices*	
12-10-3	*Emergency Exit and Panic Hardware*	

(The Office of the State Fire Marshal standards referred to above are found in the California Code of Regulations, Title 24, Part 12.)

SJI

Steel Joist Institute
3127 10th Avenue, North
Myrtle Beach, SC 29577-6760

Standard reference number	Title	Referenced in code section number
JG-1.1-05	Standard Specification for Joist Girders	1604.3.3, 2206.1
K-1.1-05	Standard Specification for Open Web Steel Joists, K-Series	1604.3.3, 2206.1
LH/DLH-1.1-05	Standard Specification for Longspan Steel Joists, LH Series and Deep Longspan Steel Joists, DLH Series	1604.3.3, 2206.1

SPRI

Single-Ply Roofing Institute
77 Rumford Ave.
Suite 3-B
Walthem, MA 02453

Standard reference number	Title	Referenced in code section number
ES-1-03	Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems	1504.5
RP-4-02	Wind Design Guide for Ballasted Single-ply Roofing Systems	1504.4

TIA

Telecommunications Industry Association
2500 Wilson Boulevard
Arlington, VA 22201-3834

Standard reference number	Title	Referenced in code section number
TIA/EIA-222-F-96	Structural Standards for Steel Antenna Towers and Antenna Supporting Structures	1609.1.1, 3108.4

TMS

The Masonry Society
3970 Broadway, Unit 201-D
Boulder, CO 80304-1135

Standard reference number	Title	Referenced in code section number
0216-97	Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	Table 720.1(2), 721.1
402-05	Building Code Requirements for Masonry Structures	1405.5, 1405.5.2, 1405.9, 1604.3.4, 1704.5, 1704.5.1, Table 1704.5.1, 1704.5.2, 1704.5.3, Table 1703.4.5.3, 1708.1.1, 1708.1.2, 1708.1.3, 1708.1.4, 1805.5.2, 1812.7, 2101.2.2, 2101.2.3, 2101.2.4, 2101.2.5, 2101.2.6, 2103.1.3.6, 2106.1, 2106.1.1, 2106.1.1.1, 2106.1.1.2, 2106.1.1.3, 2106.3, 2106.4, 2106.5, 2106.6, 2107.1, 2107.2, 2107.3, 2107.4, 2107.5, 2107.6, 2107.7, 2107.8, 2108.1, 2108.2, 2108.3, 2108.4, 2109.1, 2109.2.3.1, 2109.7.3
602-05	Specification for Masonry Structures	1405.5.1, Table 1704.5.1, Table 1704.5.3, 2103.13.7, 2104.1, 2104.1.1, 2104.3, 2104.4

TPI

Truss Plate Institute
583 D'Onofrio Drive, Suite 200
Madison, WI 53719

Standard reference number	Title	Referenced in code section number
TPI 1-2002	National Design Standards for Metal-plate-connected Wood Truss Construction	2303.4.2, 2306.1

UL

Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096

Standard reference number	Title	Referenced in code section number
10A-98	Tin Clad Fire Doors—with Revisions through March 2003	715.4
10B-97	Fire Tests of Door Assemblies—with Revisions through October 2001	715.4.2
10C-98	Positive Pressure Fire Tests of Door Assemblies—with Revisions through November 2001	715.4.1, 715.4.3
13-96	*Power-limited Circuit Cables*	
14B-98	Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors—with Revisions through July 2000	715.4
14C-99	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs	715.4
38-99	*Manually Actuated Signaling Boxes—with Revisions through February 2, 2005 as amended.**	

UL—continued

*Amend Section 14.1.5 as follows:

***14.1.5** A signaling box having a glass panel, disc, rod or similar part that must be broken to operate it for a signal or for access to its actuating means shall satisfactorily complete five part-breaking operations using the means provided with the box, without jamming of the mechanism or other interference by broken particles. It shall be practicable to remove and replace the broken parts. A signaling box shall not have a glass panel, disc, rod or similar part requiring a striking action by grasping a tool to operate it for a signal. The force required to activate controls shall be no greater than 5 pounds (22 N) of force.*

Add Appendix B chapter to UL 38 (1999) as follows:

Appendix B, Section 4.1.5

4.1.5 Operation. *Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist.*

94-96 Test for Flammability of Plastic Materials for Parts in Devices and Appliances 402.11.1

103-01 Factory-built Chimneys, for Residential Type and Building Heating Appliances. 717.2.5

127-*96* Factory-built Fireplaces—with Revisions through November1999 . . . . . 717.2.5, 2111.11

193-04 Alarm Valves for Fire-Protection Service

199E-04 Outline of Investigation for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers 904.11.4.1

199-95 Automatic Sprinklers for Fire Protection Service—with Revisions through August 19, 2005

217-97 Single and Multiple Station Smoke Alarms—with Revisions through *August 15, 2005* 907.2.10

Amend Section 34.2.1 as follows:

Each single- and multiple-station smoke alarm may be provided with an automatically resettable alarm silencing means that has a fixed or variable time setting which silences the smoke alarm for a maximum of 15 minutes. Alarm silencing shall not disable the smoke alarm. It may reduce the sensitivity to no more than 4 percent obscuration (0.0177 O.D. per foot). Each device shall operate a distinctive audible trouble signal while in the silence mode. This may be done with a short beep similar to the low-battery signal or by visible indication. Following the silenced period, the alarm shall restore automatically to its intended operation. Silencing of one alarm of a multiple-station system shall not prevent an alarm operation from the other alarms in the system. See 34.2.1 and 34.2.2.

228-97 Door Closers/Holders, with or without Integral Smoke Detectors—with Revisions through January 26, 2006

260-04 Dry Pipe and Deluge Valves for Fire Protection Service

262-04 Gate Valves for Fire Protection Service

268-96 Smoke Detectors for Fire Protective Signaling Systems—with Revisions through *October 22, 2003*. 407.6, 907.2.6.2

268A-98 Smoke Detectors for Duct Application—with Revisions through October 22, 2003

300-96 Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas—with Revisions through December 1998. . . . . 904.11

312-04 Check Valves for Fire-Protection Service

346-05 Waterflow Indicators for Fire Protective Signaling Systems

464-03 Audible Signal Appliances—with Revisions through October 10, 2003

497B-04 Protectors for Data Communication and Fire Alarm Circuits

521-99 Heat Detectors for Fire Protective Signaling Systems—with Revisions through July 20, 2005

539-00 Single- and Multiple-Station Heat Detectors—with Revisions through August 15, 2005

555-99 Fire Dampers—with Revisions through January 2002. . . . . 716.3

555C-96 Ceiling Dampers 716.3, 716.6.2

555S-99 Smoke Dampers—with Revisions through January 2002 . . . . . 716.3, 716.3.1.1

580-94 Test for Uplift Resistance of Roof Assemblies—with Revisions through February 1998 . . . . . 1504.3.1, 1504.3.2

632-00 Electrically Actuated Transmitters

641-95 Type L Low-temperature Venting Systems—with Revisions through April 1999. . . . . 2113.11.1.4

710B-2004 Recirculating Systems. 904.11

753-04 Alarm Accessories for Automatic Water Supply Valves for Fire Protection Service

790-98 Tests for Fire Resistance of Roof Covering Materials—with Revisions through July 1998. . . . . 1505.1, 2603.6, 2610.2, 2610.3

793-97 Standards for Automatically Operated Roof Vents for Smoke and Heat. 910.3.1

813-96 Commercial Audio Equipment—with Revisions through December 7, 1999

864-03 *Control Units for Fire Protective Signaling Systems, as amended*—with Revisions through July 14, 2005* 909.12

Amend No. 55.1 as follows:

***RETARD-RESET-RESTART PERIOD – MAXIMUM 30 SECONDS** —No alarm obtained from control unit. Maximum permissible time is 30 seconds.*

Amend Section 55.2.2 as follows:

Where an alarm verification feature is provided, the maximum retard-reset-restart period before an alarm signal can be confirmed and indicated at the control unit, including any control unit reset time and the power-up time for the detector to become operational for alarm, shall not exceed 30 seconds. (The balance of the section text is to remain unchanged).

UL—continued

***Add Section 55.2.9 as follows:**

Smoke detectors connected to an alarm verification feature shall not be used as releasing devices.

Exception: *Smoke detectors which operate their releasing function immediately upon alarm actuation independent of alarm verification feature.*

****Amend Section 89.1.10 as follows:***

The existing text of this section is to remain as printed with one editorial amendment as follows:

THE TOTAL DELAY (CONTROL UNIT PLUS SMOKE DETECTORS) SHALL NOT EXCEED 30 SECONDS.
(The balance of the section text is to remain unchanged).

884-05	*Underfloor Raceways and Fittings*	
913-02	*Intrinsically Safe Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations—with revisions through August 9, 2004*	
916-98	*Energy Management Equipment—with Revisions through February 10, 2004*	
924-95	*Emergency Lighting and Power Equipment—with Revisions through and including July 11, 2001*	
985-00	*Household Fire Warning System Units—with Revisions through April 29, 2004*	
1040-96	Fire Test of Insulated Wall Construction—with Revisions through April 2001	1407.10.3, 2603.4, 2603.9
1091-04	*Butterfly Valves for Fire Protection Service—with Revisions through August 5, 2005*	
1256-02	Fire Test of Roof Deck Construction	1508.1, 2603.3, 2603.4.1.5
1424-05	*Cables for Power-limited Fire Protective Signaling Circuits*	
1479-94	Fire Tests of Through-penetration Fire stops—with Revisions through August 2000	712.3.1.2, 712.4.1.1.2, 712.5
1480-03	*Speakers for Fire Protective Signaling Systems—with Revisions through April 8, 2005*	
1481-99	*Power Supplies for Fire Protective Signaling Systems*	
1482-98	Solid-fuel Type Room Heater—with Revisions through January 2000	2112.2, 2112.5
1484-00	*Residential Gas Detectors*	
1626-01	*Residential Sprinklers for Fire Protection Service—with Revisions through December 8, 2003*	
1711-99	*Amplifiers for Fire Protective Signaling Systems*	
1715-97	Fire Test of Interior Finish Material—with Revisions through October 2002	1407.10.2, 1407.10.3, 2603.4, 2603.9
1730-98	*Smoke Detector Monitors and Accessories (annunciators) for Individual Living Units of Multifamily Residences and Hotel/Motel Rooms—with Revisions through May 17, 1999*	
1777-04	Chimney Liners—with Revisions through July 1998	2113.11.1, 2113.19
1784-95	Air Leakage Tests of Door Assemblies	707.14.1, 710.5.2, 715.4.3.1, 715.4.5.1, 715.4.5.3
1897-98	Uplift Tests for Roof Covering Systems—with Revisions through November 2002	1504.3.1
1971-02	*Signaling Devices for the Hearing Impaired—with Revisions through July 20, 2004*	
1975-96	Fire Test of Foamed Plastics Used for Decorative Purposes	402.10, 402.11.1, 402.15.5
1994-04	*Low Level Path Marking and Lighting Systems—with Revisions through February 14, 2005*	
2017-2000	Standards for General-purpose Signaling Devices and Systems—with Revisions through June 2004	3109.4.1.8
2034-96	*Single and Multiple Station Carbon Monoxide Alarms—with Revisions through March 8, 2005*	
2079-*04*	*Tests for Fire Resistance of Building Joint Systems*	702.1, 713.3, 713.6
2200-98	Stationary Engine Generator Assemblies (Revisions through July 2004)	2702.1.1
2390-04	Test Method for Measuring the Wind Uplift Coefficients for Asphalt Shingles	1504.2.1, 1609.5.2

ULC

Underwriters Laboratories of Canada
7 Crouse Road
Scarborough, Ontario, Canada M1R3A9

Standard reference number	Title	Referenced in code section number
CAN/ULC S102.2-1988	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies with 2000 Revisions	719.4

USC

United States Code
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325

Standard reference number	Title	Referenced in code section number
18 USC Part 1, Ch.40	Importation, Manufacture, Distribution and Storage of Explosive Materials	307.2

WDMA

Window and Door Manufacturers Association
1400 East Touhy Avenue #470
Des Plaines, IL 60018

Standard reference number	Title	Referenced in code section number
101/I.S.2/A440-05	Specifications for Windows, Doors and Unit Skylights	1714.5.1, 2405.5

WRI

Wire Reinforcement Institute, Inc.
203 Loudon Street, S.W.
2nd Floor, Suite 203C
Leesburg, VA 22075

Standard reference number	Title	Referenced in code section number
WRI/CRSI-81	Design of Slab-on-ground Foundations—with 1996 Update.	1805.8.2

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
APPENDIX CHAPTER 1 – ADMINISTRATION

Adopting Agency		BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																				
Adopt Entire Chapter as amended (amended sections listed below)									X	X	X	X								
Adopt only those sections that are listed below			X	X			X	X												
Chapter / Section	Codes																			
102.1	IBC							X												
102.1.1	CA								X	X	X	X								
102.2	CA							X												
102.3	CA							X												
102.4	CA							X												
102.5	CA							X												
102.6	IBC		X																	
104.2	IBC		X																	
104.3	IBC		X																	
104.4	IBC		X																	
104.9	IBC		X																	
104.9	CA							X												
104.9.1	IBC		X																	
104.10	CA							X												
104.11	CA							X												
104.11.3	CA								X			X								
104.11.4	CA								X			X								
105.1	IBC		X																	
105.2 Building: 1 — 13	IBC			X																
105.2.1	IBC		X																	
105.2.2	IBC		X																	
105.3	IBC		X																	
105.3.1	IBC		X																	
105.4	IBC		X																	
105.6	IBC		X																	
105.7	IBC		X																	
106 – 106.5	IBC		X																	
109.1 – 109.2	IBC		X																	
109.3.4 – 109.3.6	IBC		X																	
109.3.5	IBC		X																	
109.3.6	IBC		X																	
109.3.8 – 109.3.10	IBC		X																	
109.3.9	IBC		X																	
109.3.10	IBC		X																	
109.4 – 109.6	IBC		X																	
109.5	IBC		X																	
109.6	IBC		X																	
110 – 110.4	IBC		X																	
110.2	IBC						X													
111 – 111.3	IBC		X																	
112-112.3	IBC		X																	
113-113.2	IBC		X																	
114 – 114.3	IBC		X																	
115 – 115.5	IBC		X																	

104.9.1 Used materials and equipment. The use of used materials which meet the requirements of this code for new materials is permitted. Used equipment and devices shall not be reused unless approved by the building official.

104.10 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the building official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's representative, provided the building official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

104.11.1 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

104.11.2 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the building official shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the building official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the building official for the period required for retention of public records.

104.11.3 Peer review. [OSHPD 1 & 4] *When peer review is required, it shall be performed pursuant to Section 3414A.*

104.11.4 [For OSHPD 1 & 4] Earthquake monitoring instruments. *The enforcement agency may require earthquake monitoring instruments for any building that receives approval of an alternative system for the Lateral Force Resisting System (LFRS). There shall be a sufficient number of instruments to characterize the response of the building during an earthquake and shall include at least one tri-axial free field instrument or equivalent. A proposal for instrumentation and equipment specifications shall be forwarded to the enforcement agency for review and approval. The owner of the building shall be responsible for the implementation of the instrumentation program. Maintenance of the instrumentation and removal/processing of the records shall be the responsibility of the enforcement agency or its designated agent.*

SECTION 105
PERMITS

105.1 Required. Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the building official and obtain the required permit.

105.1.1 Annual permit. In lieu of an individual permit for each alteration to an already approved electrical, gas, mechanical or plumbing installation, the building official is authorized to issue an annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified tradepersons in the building, structure or on the premises owned or operated by the applicant for the permit.

105.1.2 Annual permit records. The person to whom an annual permit is issued shall keep a detailed record of alterations made under such annual permit. The building official shall have access to such records at all times or such records shall be filed with the building official as designated.

105.2 Work exempt from permit. Exemptions from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction. Permits shall not be required for the following:

Building:

1. One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 120 square feet (11 m^2).
2. Fences not over 6 feet (1829 mm) high.
3. Oil derricks.
4. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge or impounding Class I, II or IIIA liquids.
5. Water tanks supported directly on grade if the capacity does not exceed 5,000 gallons (18 925 L) and the ratio of height to diameter or width does not exceed 2:1.
6. Sidewalks and driveways not more than 30 inches (762 mm) above adjacent grade, and not over any basement or story below and are not part of an accessible route.
7. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
8. Temporary motion picture, television and theater stage sets and scenery.
9. Prefabricated swimming pools accessory to a Group R-3 occupancy that are less than 24 inches (610 mm) deep, do not exceed 5,000 gallons (18 925 L) and are installed entirely above ground.

10. Shade cloth structures constructed for nursery or agricultural purposes, not including service systems.
11. Swings and other playground equipment accessory to detached one- and two-family dwellings.
12. Window awnings supported by an exterior wall that do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support of Group R-3 and U occupancies.
13. Nonfixed and movable fixtures, cases, racks, counters and partitions not over 5 feet 9 inches (1753 mm) in height.

Electrical:

Repairs and maintenance: Minor repair work, including the replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles.

Radio and television transmitting stations: The provisions of this code shall not apply to electrical equipment used for radio and television transmissions, but do apply to equipment and wiring for a power supply and the installations of towers and antennas.

Temporary testing systems: A permit shall not be required for the installation of any temporary system required for the testing or servicing of electrical equipment or apparatus.

Gas:

1. Portable heating appliance.
2. Replacement of any minor part that does not alter approval of equipment or make such equipment unsafe.

Mechanical:

1. Portable heating appliance.
2. Portable ventilation equipment.
3. Portable cooling unit.
4. Steam, hot or chilled water piping within any heating or cooling equipment regulated by this code.
5. Replacement of any part that does not alter its approval or make it unsafe.
6. Portable evaporative cooler.
7. Self-contained refrigeration system containing 10 pounds (5 kg) or less of refrigerant and actuated by motors of 1 horsepower (746 W) or less.

Plumbing:

1. The stopping of leaks in drains, water, soil, waste or vent pipe, provided, however, that if any concealed trap, drain pipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with the new material, such work shall be considered as new work and a permit shall be obtained and inspection made as provided in this code.
2. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

105.2.1 Emergency repairs. Where equipment replacements and repairs must be performed in an emergency situation, the permit application shall be submitted within the next working business day to the building official.

105.2.2 Repairs. Application or notice to the building official is not required for ordinary repairs to structures, replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles. Such repairs shall not include the cutting away of any wall, partition or portion thereof, the removal or cutting of any structural beam or load-bearing support, or the removal or change of any required means of egress, or rearrangement of parts of a structure affecting the egress requirements; nor shall ordinary repairs include addition to, alteration of, replacement or relocation of any standpipe, water supply, sewer, drainage, drain leader, gas, soil, waste, vent or similar piping, electric wiring or mechanical or other work affecting public health or general safety.

105.2.3 Public service agencies. A permit shall not be required for the installation, alteration or repair of generation, transmission, distribution or metering or other related equipment that is under the ownership and control of public service agencies by established right.

105.3 Application for permit. To obtain a permit, the applicant shall first file an application therefor in writing on a form furnished by the department of building safety for that purpose. Such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by construction documents and other information as required in Section 106.
5. State the valuation of the proposed work.
6. Be signed by the applicant, or the applicant's authorized agent.
7. Give such other data and information as required by the building official.

105.3.1 Action on application. The building official shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the construction documents do not conform to the requirements of pertinent laws, the building official shall reject such application in writing, stating the reasons therefor. If the building official is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the building official shall issue a permit therefor as soon as practicable.

105.3.2 Time limitation of application. An application for a permit for any proposed work shall be deemed to have been abandoned 180 days after the date of filing, unless such application has been pursued in good faith or a permit has been issued; except that the building official is authorized to grant one or more extensions of time for additional periods not exceeding 90 days each. The extension shall be requested in writing and justifiable cause demonstrated. *[OSHPD 1, 2 & 4] Time limitation shall be in accordance with Title 24, Part 1, Chapter 7, Section 7-129.*

105.4 Validity of permit. The issuance or granting of a permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of any other ordinance of the jurisdiction. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid. The issuance of a permit based on construction documents and other data shall not prevent the building official from requiring the correction of errors in the construction documents and other data. The building official is also authorized to prevent occupancy or use of a structure where in violation of this code or of any other ordinances of this jurisdiction.

105.5 Expiration. Every permit issued shall become invalid unless the work on the site authorized by such permit is commenced within 180 days after its issuance, or if the work authorized on the site by such permit is suspended or abandoned for a period of 180 days after the time the work is commenced. The building official is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

105.6 Suspension or revocation. The building official is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

105.7 Placement of permit. The building permit or copy shall be kept on the site of the work until the completion of the project.

SECTION 106
CONSTRUCTION DOCUMENTS

106.1 Submittal documents. Construction documents, statement of special inspections and other data shall be submitted in one or more sets with each permit application. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the building official is authorized to require additional construction documents to be prepared by a registered design professional.

Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.

106.1.1 Information on construction documents. Construction documents shall be dimensioned and drawn upon suitable material. Electronic media documents are permitted to be submitted when approved by the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.

106.1.1.1 Fire protection system shop drawings. Shop drawings for the fire protection system(s) shall be submitted to indicate conformance with this code and the construction documents and shall be approved prior to the start of system installation. Shop drawings shall contain all information as required by the referenced installation standards in Chapter 9.

106.1.2 Means of egress. The construction documents shall show in sufficient detail the location, construction, size and character of all portions of the means of egress in compliance with the provisions of this code. In other than occupancies in Groups R-2, R-3, and I-1, the construction documents shall designate the number of occupants to be accommodated on every floor, and in all rooms and spaces.

106.1.3 Exterior wall envelope. Construction documents for all buildings shall describe the exterior wall envelope in sufficient detail to determine compliance with this code. The construction documents shall provide details of the exterior wall envelope as required, including flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistive membrane and details around openings.

The construction documents shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the weather resistance of the exterior wall envelope. The supporting documentation shall fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used.

106.2 Site plan. The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and existing structures on the site, distances from lot lines, the established street grades and the proposed finished grades and, as applicable, flood hazard areas, floodways, and design flood elevations; and it shall be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The building official is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.

106.3 Examination of documents. The building official shall examine or cause to be examined the accompanying construction documents and shall ascertain by such examinations whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

106.3.1 Approval of construction documents. When the building official issues a permit, the construction documents shall be approved, in writing or by stamp, as "Reviewed for Code Compliance." One set of construction documents so reviewed shall be retained by the building official. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the building official or a duly authorized representative.

106.3.2 Previous approvals. This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

106.3.3 Phased approval. The building official is authorized to issue a permit for the construction of foundations or any other part of a building or structure before the construction documents for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such permit for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a permit for the entire structure will be granted.

106.3.4 Design professional in responsible charge.

106.3.4.1 General. When it is required that documents be prepared by a registered design professional, the building official shall be authorized to require the owner to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The building official shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties.

The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

Where structural observation is required by Section 1709, the statement of special inspections shall name the individual or firms who are to perform structural observation and describe the stages of construction at which structural observation is to occur (see also duties specified in Section 1704).

106.3.4.2 Deferred submittals. For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the building official within a specified period.

Deferral of any submittal items shall have the prior approval of the building official. The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the building official.

Documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and been found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the design and submittal documents have been approved by the building official. *[OSHPD 1, 2 & 4] Deterred submittals shall be in accordance with Title 24, Part 1, Chapter 7, Section 7-126.*

106.4 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents. *[OSHPD 1, 2 & 4] Change orders shall be in accordance with Title 24, Part 1, Chapter 7, Section 7-153.*

106.5 Retention of construction documents. One set of approved construction documents shall be retained by the building official for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

SECTION 107
TEMPORARY STRUCTURES AND USES

107.1 General. The building official is authorized to issue a permit for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The building official is authorized to grant extensions for demonstrated cause.

107.2 Conformance. Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this code as necessary to ensure public health, safety and general welfare.

107.3 Temporary power. The building official is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in the *California Electrical Code.*

107.4 Termination of approval. The building official is authorized to terminate such permit for a temporary structure or use and to order the temporary structure or use to be discontinued.

SECTION 108
FEES

108.1 Payment of fees. A permit shall not be valid until the fees prescribed by law have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

108.2 Schedule of permit fees. On buildings, structures, electrical, gas, mechanical, and plumbing systems or alterations requiring a permit, a fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

108.3 Building permit valuations. The applicant for a permit shall provide an estimated permit value at time of application. Permit valuations shall include total value of work, including materials and labor, for which the permit is being issued, such

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HISTORY NOTE APPENDIX
CALIFORNIA BUILDING CODE

Title 24, Part 2, California Code of Regulations (CCR)

For prior history, see the History Note Appendix to the California Building Code, 2001 Triennial Edition effective November 1, 2002.

1. (BSC 01/06, BSC 06/06, DSA-AC 01/06, DSA-AC 02/06, DSA-SS 01/06, DSA-SS 02/06, HCD 04/06, OSHPD 02/06, OSHPD 03/06, OSHPD 04/06, SFM 05/06) Adoption by reference of the 2006 *International Building Code* with necessary state amendments and repeal of the 1997 edition of the *Uniform Building Code*. Filed with the Secretary of State on February 15, 2007 and effective on January 1, 2008.
2. (SFM EF 02/07) Amend Chapter *7A*, Section *701A.3.2* to clarify the dates established for State Responsibility Areas as January 1, 2008 and Local Agency Very-High Fire Hazard Severity Zones as July 1, 2008 filed with Secretary of State on September 27, 2007, effective January 1, 2008.
3. Erratum to correct editorial errors in Chapter 1, Section 108.2.1.3. Chapter 1, Section 109.1.2.1. Chapter 2, Definitions - Matrix Adoption Table correction. Chapter 4, Section 430 - Article reference change. Chapter 5, Table 503. Chapter 5, Section 507.3. Chapter 11A, Section 1110A.2. Chapter 11A, Figure 11A-9D and 11A-9E out of order. Chapter 11A, Section 1121B.3.1 (8) (a), Chapter 11A, Section 1124A.3.2.1. Chapter 11A, Section 1143A.4. Chapter 11B, Section 1111B, 1115B.3, 1129B.4, 1133B.4.5.3, 1133B.7.1.3 and Figure 11B-11. Chapter 12, Matrix Adoption Table. Chapter 12, Section 1250.1 and 1250.4. Chapter 15, Section 1511.1. Chapter 16A, Section 1614A.1.13. Chapter 17A, Section 1714A.5.2. Chapter 18, Matrix Adoption Tables. Chapter 29, Fixture Table 2902.1. Chapter 31, Section 3109.4.4.2 through 3109.4.4.8. Chapter 31A - Clarify reference to Title 8 for provisions. Chapter 35, NFPA 13-02. Appendix Chapter 1, Section 101.4.2, 101.4.5, 102.6 and 103.3.
4. (OSHPD EF 01/07) Amend Chapters 16A, 17A, 18A, 22A, 34 and 34 A to incorporate theASCE 41-06, Seismic Rehabilitation of Existing Buildings as a referenced standard. Repeal FEMA 356, relocate necessary amendments of FEMA 356 into the ASCE 41-06. Amend by adopting the PTI-2004-4th edition. Incorporation of an advisory issued by AISG to require Steel Concentric Braced Frame (SCBF) based on Hollow Structural Steel Sections (HSS).
5. (SFM EF 01-08) Amend Title 24, Part 2, Chapters 2, 4, 7, 9 and 27. Approved as an emergency by the California Building Standards Commission on May 21, 2008. Filed with the Secretary of State on May 23, 2008.
6. (DSA-AC EF 01-08) Amend Title 24, Part 2, Chapter 11B, Figure 11B-18A, 11B-18-B and 11B-18C, Accessible Parking Stalls. Approved as an emergency by the California Building Standards Commission on May 21, 2008. Filed with Secretary of State on June 4, 2008, effective July 1, 2008.
7. (SFM 01-08, 02-08, 03-08, 04-08) Changes without regulatory effect to Sections 310, 445, 704, 903 and 1011. filed with the Secretary of State on July 14, 2008.
8. (BSC P 01/08, HCD 02/07, OSHPD 02/07, OSHPD 03/07, SFM 01/07, DSA/AC 01/07, DSA/AC EF 01/08) Amended California Building Code Vol. 1 & 2, California Chapter 1, Chapters 2, 3, 4, 5, 6, 7, 7*A*, 8, 9, 10, *11A, 11B, 11C,* 12, 16, 16*A*, 17, 19*A*, 21*A*, 23, 27, 30, 31*A*, 34, 35, and Appendix Ch. 1, filed with the Secretary of State on September 12, 2008 and effective August 1, 2009. Errata changes to Index for CBC, California Chapter 1, Chapters 3, 4, 7, 9, 10, 16*A*, 17, 31*A*, and 34.
9. (CSA 01/06) Amend Chapter 12 (formerly known as Chapter 4A, Section 460A) to add new language to Sections 1230.1.1, 1230.1.5 and 1230.1.10. Approved by the California Building Standards Commission on July 17, 2008. Filed with the Secretary of State on October 21, 2008 and effective 180 days after publication.
10. (SFM EF 01-08) Amend Title 24, Part 2, Chapters 2, 4, 7,9 and 27. Re-approved as an emergency by the California Building Standards Commission on September 11, 2008. Approved as permanent by the California Building Standards Commission on October 27, 2008. Filed with the Secretary of State on November 3, 2008.