ALTERNATE ALL HEIGHTS WIND DESIGN
and
Significant changes in 2009 International Building Codes affecting structural design.

2009 IBC/IRC Structural Changes

- Explain the Alternate All-Heights Method for wind design
- Highlight code changes that affect structural design

Wind Load Determination

Alternate All-Heights Method

Allowable wind design methods

- **ASCE 6.4 - Method 1 - Simplified Procedure**
- **ASCE 6.5 - Method 2 - Analytical Procedure**
- **ASCE 6.6 - Method 3 - Wind Tunnel Procedure**
- **NCSEA Alternate All-Heights Method (SEAoC, SEAO, SEAW)**

Why not use ASCE 7 Simplified Procedure?

- ASCE 7 Method 1 – Simplified Procedure has numerous restrictions.
- Alternate All-Heights Method applies to a broader range of buildings.
- Alternate All-Heights Method is simpler than ASCE Method 2 – Analytical Procedure, less likely to have errors.
- Alternate All-Heights Method will be in ASCE 7-10.

AA-HM vs. ASCE 7 Method 2

- Height < 75’
- Height-to-least-width ratio 4 or less, or fundamental frequency ≥ 1 Hz
- Must not be sensitive to dynamic affects
- Site without channeling effects or buffeting in wake

- All heights
- Fundamental frequency ≥ 1 Hz
- Must not be sensitive to dynamic affects
- Site without channeling effects or buffeting in wake

AA-HM vs. ASCE 7 Method 2

- Enclosed or partially enclosed buildings
- Simple diaphragm building only with flat roof.

- Enclosed, partially enclosed or open buildings.
- Buildings, walls, signs, towers, and multispan gable, stepped, domed, steeply sloped and stepped roofs, etc.

AA-HM vs. ASCE 7 Method 2

- One design equation
- Two design tables
- One gust factor (0.85)

- Multiple design equations
- Many design tables
- Variable gust factors (0.85 max)

ASCE 7 formulas for the MWFRS

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V_2\ I$ **Equation 6-15**

$p = q\ G\ C_p - q_i\ (GC_{pi})$ **Equation 6-17**

Combine the two equations to get

$$p = 0.00256\, K_z\, K_{zt}\, K_d\, V_2\, I\, G_{Cp} - 0.00256\, K_z\, K_{zt}\, K_d\, V_2\, I\, (GC_{pi})$$

or

$$p = (0.00256\, V_2)\, K_z\, K_d\, (G\, C_p - (GC_{pi}))[I\, K_{zt}]$$

with the following new terms

$$q_s = 0.00256\, V_2$$

$$C_{net} = K_d\, [GC_p - (GC_{pi})]$$

Then the pressure can be rewritten

$$P_{net} = q_s K_z C_{net} [I K_{zt}]$$

The simplification is in the C_{net} value combining the K_d, GC_p and GC_{pi} terms into a single value in Table 1609.6.2(2) with G conservatively taken as 0.85.

AA-HM Equation 16-34

$$P_{net} = q_s K_z C_{net} \, [I K_{zt}]$$

- C_{net} = Net-pressure coefficient based on K_d $[(G)\,(C_p) - (GC_{pi})]$, in accordance with Table 1609.6.2(2).
- G = Gust effect factor for rigid structures in accordance with ASCE 7 Section 6.5.8.1 taken as 0.85.

AA-HM Equation 16-34

- K_d = Wind directionality factor in accordance with 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 psf (kN/m2).
- q_s = Wind stagnation pressure in psf (kN/m2) in accordance with Table 1609.6.2(1).

TABLE 1609.6.2(1)

WIND VELOCITY PRESSURE (q_1) AT STANDARD HEIGHT OF 33 FEET[a]

BASIC WIND SPEED (mph)	85	90	100	105	110	120	125	130	140	150	160	170
PRESSURE, q_z(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

For SI: 1 foot = 304.8 mm, 1 mph = 0.44 m/s, 1 psf = 47.88 Pa.

a. For basic wind speeds not shown, use $q_s = 0.00256\ V^2$.

TABLE 1609.6.2(2)
NET PRESSURE COEFFICIENTS, Cnet [a,b]

STRUCTURE OR PART THEREOF	DESCRIPTION		Cnet FACTOR			
			Enclosed		Partially enclosed	
	Walls:		+ Internal pressure	- Internal pressure	+ Internal pressure	- Internal pressure
	Windward wall		0.43	0.73	0.11	1.05
	Leeward wall		-0.51	-0.21	-0.83	0.11
	Sidewall		-0.66	-0.35	-0.97	-0.04
	Parapet wall	**Windward**	1.28		1.28	
		Leeward	-0.85		-0.85	
	Roofs:		**Enclosed**		**Partially enclosed**	
	Wind perpendicular to ridge		+ Internal pressure	- Internal pressure	+ Internal pressure	- Internal pressure
	Leeward roof or flat roof		-0.66	-0.35	-0.97	-0.04
	Windward roof slopes:					
	Slope < 2:12 (10°)	Condition 1	-1.09	-0.79	-1.41	-0.47
		Condition 2	-0.28	0.02	-0.60	0.34
	Slope = 4:12 (18°)	Condition 1	-0.73	-0.42	-1.04	-0.11
		Condition 2	-0.05	0.25	-0.37	0.57
1. Main wind-force-resisting frames and systems	Slope = 5:12 (23°)	Condition 1	-0.58			
		Condition 2	0.03	0.34	-0.29	0.65
	Slope = 6:12 (27°)	Condition 1	-0.47	-0.16	-0.78	0.15
		Condition 2	0.06	0.37	-0.25	0.68
	Slope = 7:12 (30°)	Condition 1	-0.37	-0.06	-0.68	0.25
		Condition 2	0.07	0.37	-0.25	0.69
	Slope 9:12 (37°)	Condition 1	-0.27	0.04	-0.58	0.35
		Condition 2	0.14	0.44	-0.18	0.76
	Slope 12:12 (45°)		0.14	0.44	-0.18	0.76
	Wind parallel to ridge and flat roofs		-1.09	-0.79	-1.41	-0.47
	Nonbuilding Structures: Chimneys, Tanks and Similar Structures:					
				h/D		
				1	**7**	**25**
	Square (Wind normal to face)					
	Square (Wind on diagonal)					
	Hexagonal or Octagonal					
	Round					
	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

(continued)

NET PRESSURE COEFFICIENTS, Cnet[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		Cnet FACTOR	
2. Components and cladding not in areas of discontinuity—roofs and overhangs	**Roof elements and slopes**		Enclosed	Partially enclosed
	Gable of hipped configurations (Zone 1)			
	Flat < Slope < 6:12 (27°) See ASCE 7 Figure 6-11C Zone 1			
	Positive	10 square feet or less	0.58	0.89
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-1.00	-1.32
		100 square feet or more	-0.92	-1.23
	Overhang: Flat < Slope < 6:12 (27°) See ASCE 7 Figure 6-11B Zone 1			
	Negative	10 square feet or less	-1.45	
		100 square feet or more	-1.36	
		500 square feet or more	-0.94	
	6:12 (27°) < Slope < 12:12 (45°) See ASCE 7 Figure 6-11D Zone 1			
	Positive	10 square feet or less	0.92	1.23
		100 square feet or more	0 .83	1.15
	Negative	10 square feet or less	0.92	1.23
		100 square feet or more	0.83	1.15
	Monosloped configurations (Zone 1)		Enclosed	Partially enclosed
	Flat < Slope < 7:12 (30°) See ASCE 7 Figure 6-14B Zone 1			
	Positive	10 square feet or less		
		100 square feet or more		
	Negative	10 square feet or less		
		100 square feet or more		
	Tall flat-topped roofs h > 60'		Enclosed	Partially enclosed
	Flat < Slope < 2:12 (10°) (Zone 1) See ASCE 7 Figure 6-17 Zone 1			
	Negative	10 square feet or less	-1.35	-1.66
		500 square feet or more	-0.92	-1.23

(continued)

TABLE 1609.6.2(2)—continued

NET PRESSURE COEFFICIENTS, Cnet[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		Cnet FACTOR	
3. Components and cladding in areas of discontinuity—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°) See ASCE 7 Figure 6-11C Zone 2			
	Positive	10 square feet or less	0.58	0.89
		100 square feet or more	0.41	10.72
	Negative	10 square feet or less	-1.68	-2.00
		100 square feet or more	-1.17	-1.49
	Overhang: Flat < Slope < 6:12 (27°) See ASCE 7 Figure 6-11C Zone 2			
	Negative	10 square feet or less	-1.45	
		100 square feet or more	-1.36	
	6:12 (27°) < Slope < 12:12 (45°) See ASCE 7 Figure 6-11D			
	Positive	10 square feet or less	0.92	1.23
		100 square feet or more	0.83	1.15
	Negative	10 square feet or less	-1.17	-1.49
		100 square feet or more	-1.00	-1.32
	Overhang for 6:12 (27°) < Slope < 12:12 (45°) See ASCE 7 Figure 6-11D Zone 2			
	Negative	10 square feet or less	-1.70	
		500 square feet or less	-1.53	
	Monosloped configurations at ridges, eaves and rakes (Zone 2)			
	Flat < Slope < 7:12 (30°) See ASCE 7 Figure 6-14B Zone 2			
	Positive	10 square feet or less	0.49	0.81
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-1.51	-1.83
		100 square feet or more	-1.43	-1.74
	Tall flat topped roofs h > 60_		Enclosed	Partially enclosed
	Flat < Slope < 2:12 (10°) (Zone 2) See ASCE 7 Figure 6-17 Zone 2			
	Negative	10 square feet or less	-2.11	-2.42
		100 square feet or more	-1.51	-1.83
	Gable or hipped configurations at corners (Zone 3) See ASCE 7 Figure 6-11C Zone 3			
	Flat < Slope < 6:12 (27°)		Enclosed	Partially enclosed
	Positive	10 square feet or less	0.58	0.89
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-2.53	-2.85
		100 square feet or more	-1.85	-2.17

(continued)

TABLE 1609.6.2(2)—continued
NET PRESSURE COEFFICIENTS, Cnet[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION	Cnet FACTOR		
3. Components and cladding in areas of discontinuity—roofs and overhangs (continued)	Overhang for Slope Flat < Slope < 6:12 (27°) See ASCE 7 Figure 6-11C Zone 3			
	Negative	10 square feet or less	-3.15	
		100 square feet or more	-2.13	
	6:12 (27°) < 12:12 (45°) See ASCE 7 Figure 6-11D Zone 3			
	Positive	10 square feet or less	0.92	1.23
		100 square feet or more	0.83	1.15
	Negative	10 square feet or less	-1.17	-1.49
		100 square feet or more	-1.00	-1.32
	Overhang for 6:12 (27°) < Slope < 12:12 (45°)		Enclosed	Partially enclosed
	Negative	10 square feet or less	-1.70	
		500 square feet or less	-1.53	
	Monosloped Configurations at corners (Zone 3) See ASCE 7 Figure 6-14B Zone 3			
	Flat < Slope < 7:12 (30°)			
	Positive	10 square feet or less	0.49	0.81
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-2.62	-2.93
		100 square feet or more	-1.85	-2.17
	Tall flat topped roofs $h > 60$_		Enclosed	Partially enclosed
	Flat < Slope < 2:12 (10°) (Zone 3) See ASCE 7 Figure 6-17 Zone 3			
	Negative	10 square feet or less	-2.87	-3.19
		100 square feet or more	-2.11	-2.42
4. Components and cladding not in areas of discontinuity—walls and parapets	Wall Elements: $h = 60$_ (Zone 4) Figure 6-11A		Enclosed	Partially enclosed
	Positive	10 square feet or less	1.00	1.32
		500 square feet or more	0.75	1.06
	Negative	10 square feet or less	-1.09	-1.40
		500 square feet or more	-0.83	-1.15
	Wall Elements: $h > 60$_ (Zone 4) See ASCE 7 Figure 6-17 Zone 4			
	Positive	20 square feet or less	0.92	1.23
		500 square feet or more	0.66	0.98
	Negative	20 square feet or less	-0.92	-1.23
		500 square feet or more	-0.75	-1.06
	Parapet walls			
	Positive		2.87	3.19
	Negative		-1.68	-2.00

(continued)

TABLE 1609.6.2(2)—continued

NET PRESSURE COEFFICIENTS, C_{net}[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		Cnet FACTOR	
5. Components and cladding in areas of discontinuity — walls and parapets	Wall elements: $h \leq 60'$ (Zone 5) Figure 6-11A		Enclosed	Partially enclosed
	Positive	10 square feet or less	1.00	1.32
		500 square feet or more	0.75	1.06
	Negative	10 square feet or less	-1.34	-1.66
		500 square feet or more	-0.83	-1.15
	Wall elements: $h > 60'$ (Zone 5) See ASCE 7 Figure 6-17 Zone 4			
	Positive	20 square feet or less	0.92	1.23
		500 square feet or more	0.66	0.98
	Negative	20 square feet or less	-1.68	-2.00
		500 square feet or more	-1.00	-1.32
	Parapet walls			
	Positive		3.64	3.95
	Negative		-2.45	-2.67

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929m$_2$, 1 degree = 0.0175 rad.

a. Linear interpolation between values in the table is permitted.

b. Some C_{net} values have been grouped together. Less conservative results may be obtained by applying ASCE 7 provisions.

IBC Chapter 16

Structural Design

IBC Chapter 16

- New section 1614 requires new structural integrity details (progressive collapse prevention) for high rise buildings classified in Occupancy Categories III and IV.
- The allowable one-third stress increase for allowable stress design of handrails and guards was eliminated because of the use of new strength design methods.

IBC Chapter 16

- The definitions of Occupancy Category III and IV buildings were modified in Table 1604.5 to match the occupancy category definitions in non-structural parts of the code.
- The alternate all-heights wind design method was added.
- Other changes include the following:

IBC Chapter 16

Section 1604.8.2 —The requirement that concrete and masonry walls be anchored to floors and roofs to provide lateral support to resist a horizontal seismic force of 280 pounds per linear foot was replaced with the requirement that **all** walls be anchored for lateral stability for the minimum design strength required by ASCE 7-05 Section 11.7.3.

IBC Chapter 16

Section 1604.8.3 —The code now requires consideration of the load on a cantilevered portion of a deck span that could produce uplift at the back-span support. Snow loads must also be considered and attachment to the primary framing cannot be done with toenailing or nails subject to withdrawal.

IBC Chapter 16

Section 1605.1.1—The code permits soil resistance and strength reduction factors to be considered where strength design factored loads are used in foundation design, but for stability from soil resistance with strength design, the load factors used must be provided by a registered design professional. (Safety factor for stability of retaining walls must comply with 1807.2.3.)

IBC Chapter 16

Section 1605.3 —Roof live loads and roof snow loads of 30 pounds per square foot (psf) or less need not be combined with seismic loads.

IBC Chapter 16

Table 1607.1—Live loads on exterior balconies and decks are now the same live load as the occupancy they serve, and the previous distinction between decks and balconies was removed by deleting their definitions.

IBC Chapter 16

Section 1607.7.3—Loading of vehicle barrier systems for passenger vehicles was modified and a second loading condition was added based on bumper heights of modern passenger vehicles. (Barriers in garages accommodating trucks and buses must be designed by an approved method.)

IBC Chapter 16

Section 1607.9.1.1—A K_{LL} factor of 1 was added to Table 1607.9.1 for one-way slabs to match Table 4-2 of ASCE 7-05. The live load reduction requirements for one-way slabs is now allowed (except for heavy live loads) with a limit on the tributary area, A_T, to not more than 1.5 times the span to conform to Section 4.8.5 of ASCE 7-05.

IBC Chapter 16

Section 1609.1.2— Wood structural panels may be used in place of impact-resistant glazing or impact-resistant covering required for wind-borne debris resistance of buildings in Group R-3 and R-4 occupancies, in conformance with requirements of section 6.5.9.3 of ASCE 7-05.

IBC Chapter 16

Section 1609.1.1.1— Provisions of the new ICC—600 Standard for Residential Construction in High Wind Regions replaces the reference to the old ICC legacy Standard SSTD 10—99.

IBC Chapter 16

Section 1609.1.2.2— An approved method or compliance with ANSI/DASMA 115 Standard Method for Testing Garage Doors and Rolling Doors is now required for testing of windborne debris impact resistance of glazed openings in garage doors.

IBC Chapter 16

Section 1609.1.1.2 — The requirement for the lower limits on pressures determined by wind tunnel testing from Section 6.5 of ASCE 7-05 were incorporated directly into the code so they are now enforceable.

IBC Chapter 16

Section 1611.1, Figure 1611.1—Design for 100-year, 1 hour rainfall intensity maps and requirements to accommodate design requirements for rain loads from blocked primary roof drains were added.

IBC Chapter 16

Section 1607.11.2.2—Live load reduction for live loads of 100 psf or more at Special Purpose roofs classified as Group A occupancies is not permitted.

IBC Chapter 16

Section 1613 — Provisions of ASCE 7-05, including Supplement No. 2 but excluding Chapter 14 and Appendix 11A, are referenced in the 2009 IBC for structural loads, which revise the minimum base shear equation for both buildings and non-building structures where the equivalent lateral force procedure is used.

IBC Chapter 16

Section 1613.6.3 — Automatic sprinkler systems installed in accordance with NFPA 13 are deemed to comply with Section 13.6.8 of ASCE 7-05 requirements for seismic bracing provisions.

IBC Chapter 16

Section 1613.6.4—Seismic design coefficients and limitations for autoclaved aerated concrete (AAC) masonry (ordinary reinforced) shear wall systems were added that extend the use of these systems to seismic applications in Seismic Design Categories B and C.

IBC Chapter 16

Section 1613.6.6—The height of Special Steel Plate Shear Wall systems are permitted to exceed ASCE 7-05 Section 12.2.5.4 and be increased from 160 feet to 240 feet for structures in Seismic Design Categories D or E, and from 100 feet to 160 feet for structures in Seismic Design Category F.

IBC Chapter 16

Section 1613.6.7—Seismic separation requirements were not included in ASCE 7-05, so provisions for minimum separation distance between buildings which are not structurally connected are now included in the 2009 IBC.

IBC Chapter 16

Section 1613.6.8 — Exemptions to seismic bracing requirements of Section 13.6.7 of ASCE 7-05 for ducts with $I_p = 1.0$ is extended to include ducts with cross-sectional area of 6 square feet or less for $I_p = 1.5$.

IBC Chapter 16

Section 1613.7— Section 11.7.5 **Anchorage of Concrete or Masonry Walls** in ASCE 7-05 was amended to apply the minimum prescribed strength level horizontal seismic force as **Anchorage of walls**. **All** walls are designed for the factored loads in ASCE with the requirement that *E* be not less than 280 plf.

IBC Chapter 17

Structural Tests
and
Special Inspection

IBC Chapter 17

Section 1704.1— The exemption for special inspection of Group R-3 occupancies was deleted; R-3 occupancies often have structural elements requiring special inspection. Special inspector qualifications were clarified; the registered design professional in responsible charge or the engineer of record are allowed to act as the qualified agency for special inspection. (Some states, such as Mississippi, do not allow the EOR to be the SI.)

IBC Chapter 17

Sections 1704.3.4, 1704.6.2—These new sections require the special inspector to verify that temporary and permanent restraints and bracing are installed in accordance with the approved truss submittal package for cold-formed steel and wood trusses spanning 60 feet or greater.

IBC Chapter 17

Section 1704.4, Table 1704.4 —Special inspection is required of bolts to be installed in concrete prior to and during concrete placement where allowable loads have been increased for allowable stress design or where strength design is used. Special inspection is required for bolts installed in hardened concrete.

IBC Chapter 17

Section 1704.4.2 — NMCID changes the IBC to say, “Continuous concrete footings supporting walls of buildings three stories or less in height that are fully supported on earth or rock.”, substituting “in height” for “above grade plane.”

IBC Chapter 17

- **Section 1704.4.3** — NMCID changes the IBC to say, “Nonstructural concrete slabs supported directly on the ground, except pre-stressed slabs-on-grade.”, substituting “except pre-stressed slabs-on-grade” for “including prestressed slabs on grade, where the effective prestress in the concrete is less than 150 psi (1.03 MPa).”

IBC Chapter 17

- **Section 1704.4.4** — NMCID deletes this subsection , which says, “Concrete foundation walls constructed in accordance with Table 1807.1.6.2.”

IBC Chapter 17

- **Section 1704.5** — NMCID deletes this exception 2 , which excepts “Masonry foundation walls constructed in accordance with Table 1807.1.6.3(1), 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4).” from special inspection.

IBC Chapter 17

Section 1704.10—Continuous special inspection is now required for helical pile foundations. (Helical pile requirements have been included in Chapter 18.)

IBC Chapter 17

Section 1706—This new section now requires special inspection of wind-load resisting elements of light-framed wood and cold-formed steel buildings in high wind areas based on wind speed and exposure category.

IBC Chapter 17

Section 1707.4—Exemption from special inspection where the fastener spacing of the sheathing is more than 4 inches on center was extended to apply to cold-formed steel light frame construction as well as for wood.

IBC Chapter 18

Soils and Foundations

IBC Chapter 18

Chapter 18 was totally reorganized and reformatted.

The major changes to chapter 18 are noted below.

IBC Chapter 18

Section 1803—The term “geotechnical” is used throughout the chapter as it relates to geotechnical investigations and geotechnical reports in place of words like “foundations and soils”.

IBC Chapter 18

Section 1807.2.3—Determination of the safety factor against sliding and overturning of retaining walls was clarified. The safety factor against sliding and overturning for retaining walls shall be 1.5 where the load combinations of Section 1605 do not apply, but the load factor for seismic loads will be 0.7 and for nominal loads shall be 1.0. Exception to this is that, where earthwork loads are included, the factor of safety shall be not less than 1.1 for overturning and sliding.

IBC Chapter 18

Section 1808.3.1— Where the computation of seismic overturning effects is done by equivalent lateral force analysis or modal analysis, the proportioning of foundations shall be in accordance with Section 12.13.4 of ASCE 7.

IBC Chapter 18

Table 1809.7— NMCID changes the minimum width and thickness of prescriptive footings for walls of light-frame construction supporting 1 floor to 16 inches by 8 inches, respectively, and deletes prescriptive footings for light-framed walls supporting 2 or 3 floors.

IBC Chapter 18

Table 1809.7— NMCID changes footnote f to read, “Footings supporting roof only shall be as required for supporting one floor.”, and deletes footnote g.

IBC Chapter 18

Sections 1810.3.1.5, 1810.3.5.3.3 — New provisions for design of helical pile foundations were added to the deep foundation section for installation and service loads.

IBC Chapter 18

- **Section 1810.3.13**— Unless otherwise restrained by reinforced slabs, beams or by rock or dense soil, foundation seismic ties are required between individual pile caps, drilled piers, or caissons in Seismic Design Categories C through F. Likewise, ties are required between spread footings on Site Class E or F soils in Seismic Design Categories D through F.

IBC Chapter 19

Concrete

IBC Chapter 19

Most of the changes to chapter 19 were to coordinate with the 2008 final version of the American Concrete Institute's Building Code Requirements for Structural Concrete (ACI 318-08) standard.

IBC Chapter 19

Section 1908.1— Most of the modifications to ACI 318-05 in Section 1908 are not in the 2009 IBC as those provisions are now in the 2008 edition of the ACI 318 standard. Definitions of structural walls have been changed from terms found in ACI 318-08 to match those defined in ASCE 7-05.

IBC Chapter 19

Section 1908.1.9—Requirements of ACI 318-08 Appendix D for anchors designed to resist wall out-of-plane forces need not exceed the design forces determined in accordance with ASCE 7-05 Equations 12.11-1 or 12.14-10.

IBC Chapter 19

Sections 1909.6.1, 1909.6.3— Provisions for structural plain concrete now match the provisions given by ACI 318-08.

IBC Chapter 19

Section 1915.6.— NMCID deletes this section on approvals.

IBC Chapter 20

Aluminum

No changes were made to Chapter 20.

IBC Chapter 21

Masonry

IBC Chapter 21

Large portions of Chapter 21 were removed and replaced with references to the Building Code Requirements & Specification for Masonry Structures and Related Commentaries (TMS 402-08/ACI 530-08/ASCE 5-08), previously known as the Masonry Standards Joint Committee (MSJC) code. In addition to deleting many code sections, modifications were made to coordinate the requirements in Chapter 21 of the IBC with the provisions in that code.

IBC Chapter 21

Sections 2106 — Seismic design requirements for autoclaved aerated concrete (AAC) masonry shear wall systems adopt the provisions of TMS 402-08/ACI 530-08/ASCE 5-08.

IBC Chapter 21

Sections 2111.3, 2111.4, 2113.3, 2113.4— The requirements for seismic reinforcing and for anchorage at floor, ceiling and roof lines of masonry and concrete fireplaces and chimneys in Seismic Design Category D were extended to include structures in Seismic Design Category C.

IBC Chapter 21

Sections 2111.4.1 and 2113.4.1 — NMCID deletes these subsections and substitutes "Two 3/16-inch by 1-inch (4.8 mm by 25.4mm) straps shall be embedded a minimum of 12 inches (305 mm) into the chimney with a 180 degree bend with a 6-inch (152 mm) extension around the vertical reinforcing bars in the outer face of the chimney. Each strap shall be fastened to the structural framework of the building with two ½-inch (12.7 mm) diameter bolts per strap. Where the joists do not head into the chimney, the anchor strap shall be connected to 2-inch by 4-inch (51 mm by 102 mm) ties crossing a minimum of four joists. The ties shall be connected to each joist with two 16d nails. As an alternative to the to 2-inch by 4-inch (51 mm by 102 mm) ties, each anchor strap shall be connected to the structural framework by two ½-inch (12.7 mm) diameter bolts in an approved manner. "

IBC Chapter 22

Steel

IBC Chapter 22

Major changes were made to Chapter 22 to reference the 2007 editions of the American Iron and Steel Institute (AISI) standards for cold-formed steel framing. References to most other steel standards, such as to AISC 360, remain unchanged.

IBC Chapter 22

Section 2206.5—Steel joist manufacturers must now submit a *certificate of compliance* at completion of manufacturing stating that the joists were manufactured in accordance with *approved construction documents* and with SJI standard specifications.

IBC Chapter 22

Section 2208 — Design, testing and utilization of storage racks made of hot-rolled or cold-formed steel now refer to the Rack Manufacturers Institute latest standard (RMI/ANSI MH 16.1) that now more specifically covers seismic design. The provisions also consider how the requirements of section 15.5.3 of ASCE 7-05 apply to seismic design of racks.

IBC Chapter 22

Section 2209.2 — Design and construction of non-composite cold-formed steel floor decks and cold-formed roof decks are now allowed by the simpler (and more conservative) methods of ANSI/SDI-NC1.0, as modified in Section 2209.2.2.1, and ANSI/SDI-RD1.0, respectively, in place of the more exacting requirements of AISI S100.

IBC Chapter 22

Section 2210.3 — The code now references the North American Standard for Cold-Formed Steel Framing—Truss Design (AISI S214).

In the same manner as for wood trusses, cold-formed steel trusses spanning 60 feet or greater require design of temporary and permanent bracing for trusses by a *registered design professional* and require special inspection.

IBC Chapter 22

Section 2210.5— AISI S210 or AISI S100 have been adopted as the standards to be used for the design of cold-formed steel floor and roof framing.

IBC Chapter 23

Wood

IBC Chapter 23

Section 2301.2— Chapter 23 now references the ICC-400 Standard for the Design and Construction of Log Structures. This provides a code approved basis for the design, construction and inspection of log construction

IBC Chapter 23

Section 2303.4.3— Provisions were added for the design of temporary erection bracing and permanent bracing for wood trusses spanning 60 feet or greater. Also, wood trusses spanning 60 feet or greater now require special inspection. Submittal and alteration requirements for wood trusses have been clarified.

IBC Chapter 23

Section 2304.6.1, Table 2304.6.1—

A new table of allowable wind speeds for selecting wood structural panel wall sheathing and nailing pattern to resist component and cladding wind loads was added.

IBC Chapter 23

Section 2305 — Major portions of the general design requirements for lateral-force-resisting systems have been deleted by referring to the 2008 edition of the American National Standards Institute/American Forest & Paper Association National Design Standard (ANSI/AF&PA NDS) Supplement "Special Design Provisions for Wind and Seismic" (SDPWS) standard for lateral design of wood structures.

IBC Chapter 23

Sections 2306 and 2307 — Many portions of the general design provisions Section 2306, allowable stress design (ASD) of wood structures, have been deleted by reference to the AF&PA SDPWS standard. As the SDPWS is a dual standard (ASD/LRFD), reference to the SDPWS was added to Section 2307 for load and resistance factor design (LRFD) of wood structures.

IBC Chapter 23

Section 2304.9.5— The code clarifies the provisions for fasteners in preservative-treated and fire retardant-treated wood, and reduces confusion with the code language and manufacturer's recommendations.

IBC Chapter 23

Section 2304.9.5.1—Plain carbon steel fasteners used in SBX/DOT and zinc borate preservative-treated wood in an interior, dry environment are not required to be hot dipped galvanized.

IBC Chapter 23

Section 2304.11.2.5— The code now requires a minimum vertical clearance of 2 inches between wood siding and concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to weather.

IBC Chapter 23

Section 2306.6— Nailed fiberboard shear walls are to be designed in conformance with the provisions of AF&PA SDPWS. Allowable shear values in Table 2306.6 are now consistent with that standard.

IBC Chapter 23

Section 2306.7—The allowable shear value for 3/8-inch gypsum lath and 1/2-inch plaster with vertical joints staggered was increased to 180 pounds per linear foot (plf). The allowable shear value for the same materials without staggered joints remains at 100 plf as it was in previous editions of the code.

IBC Chapter 23

Section 2308.2— The code now clearly states that the floor-to-floor height in conventional light-frame construction shall not exceed eleven feet, seven inches and the stud height in bearing walls shall not exceed ten feet.

IBC Chapter 23

Section 2308.2—The exception for wind speeds up to 110 mph in Exposure Category B was removed for buildings located in the hurricane-prone regions.

IBC Chapter 23

Section 2308.3.2— Prescriptive wall bracing provisions were clarified to say that connection loads shall be considered applied to braced wall lines instead of to braced wall panel portions of braced wall lines.

IBC Chapter 23

Section 2308.8.3— NMCID deletes the first sentence and replaces it with "Trimmer and header joists shall be of sufficient size to support the load." instead of: "Trimmer and header joists shall be doubled, or of lumber of equivalent cross section, where the span of the header exceeds 4 feet (1219 mm)."

IBC Chapter 23

- **Section 2308.8.4**— NMCID deletes the first sentence and replaces it with “Bearing partitions parallel to joists shall be supported on beams, girders, built-up joists of sufficient size to carry the load, walls or other bearing partitions.” instead of “Bearing partitions parallel to joists shall be supported on beams, girders, doubled joists, walls or other bearing partitions.”

IBC Chapter 23

Sections 2308.6, 2308.12.8—The code now permits prescriptive sill plate anchorage to use strap anchors in place of anchor bolts in general and in high seismic regions for conventional construction is permitted.

IBC Chapter 23

Section 2308.9—Except for jack studs, trimmer studs and cripple studs at openings in walls, exterior wall and bearing wall studs are now required to be continuous from a support at the sole plate to a support at the top plate where the top plate provides support against lateral loads. (Therefore, those studs must extend to roof or floor framing or to bottom chords of trusses.)