S177–07/08
2103.2, 2103.8, Table 2103.8(2), 2103.13 (New), 2103.13.4, 2106.13.6, Chapter 35 (New)

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

1. Revise as follows:

2103.2 (Supp) Clay or shale masonry units. Clay or shale masonry units shall conform to the following standards: ASTM C 34 for structural clay load-bearing wall tile; ASTM C 56 for structural clay nonload-bearing wall tile; ASTM C 62 for building brick (solid masonry units made from clay or shale); ASTM C 1088 for solid units of thin veneer brick; ASTM C 126 for ceramic-glazed structural clay facing tile, facing brick and solid masonry units; ASTM C 212 for structural clay facing tile; ASTM C 216 for facing brick (solid masonry units made from clay or shale); ASTM C 652 for hollow brick (hollow masonry units made from clay or shale); ~~and~~ or ASTM C 1405 for glazed brick (single-fired solid brick units).

> **Exception:** Structural clay tile for nonstructural use in fireproofing of structural members and in wall furring shall not be required to meet the compressive strength specifications. The fire-resistance rating shall be determined in accordance with ASTM E 119 or UL 263 and shall comply with the requirements of Table 602.

2103.8 Mortar. Mortar for use in masonry construction shall conform to ASTM C 270 ~~and~~ or shall conform to the proportion specifications of Table 2103.8(1) or the property specifications of Table 2103.8(2). Type S or N mortar conforming to ASTM C 270 shall be used for glass unit masonry. The amount of water used in mortar for glass unit masonry shall be adjusted to account for the lack of absorption. Retempering of mortar for glass unit masonry shall not be permitted after initial set. Unused mortar shall be discarded within 2½ hours after initial mixing, except that unused mortar for glass unit masonry shall be discarded within 1½ hours after initial mixing.

TABLE 2103.8(2)
MORTAR PROPERTIES[a]

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895kPa.

a. This aggregate ratio (measured in damp, loose condition) shall not be less than 21/4 and not more than ~~3~~ 3½ times the sum of the separate volumes of cementitious materials.
b. Average of three 2-inch cubes of laboratory-prepared mortar, in accordance with ASTM C 270.
c. When structural reinforcement is incorporated in cement-lime or mortar cement mortars, the maximum air content shall not exceed 12 percent.
d. When structural reinforcement is incorporated in masonry cement mortar, the maximum air content shall not exceed 18 percent.

(Portions of table not shown remain unchanged)

2103.13 Self-consolidating grout. Materials used in self-consolidating grout shall conform to ASTM C 476. The minimum compressive strength of self-consolidating grout shall be 2,000 psi (13.79 MPa) at 28 days when tested in accordance with ASTM C 1019. Self-consolidating grout shall have a slump flow of 24 in. to 30 in. (610 mm to 762 mm) determined in accordance with ASTM C 1611. The Visual Stability Index (VSI) of self-consolidating grout shall be less than or equal to 1 when determined in accordance with ASTM C 1611, Appendix X.1. The addition of admixtures to self-consolidating grout in the field shall not be permitted. Self-consolidating grout shall not be used in AAC masonry construction unless the requirements of Article 1.6 E of TMS 602/ACI 530.1/ASCE 6 are met.

(Renumber subsequent sections)

~~2103.13.4~~ 2103.14.4 Welded wire fabric. Welded wire fabric shall conform to ASTM A 185 for plain steel-welded wire fabric for concrete reinforcement or ASTM A 497 for welded deformed steel wire fabric for concrete reinforcement.

~~2103.13.6~~ 2103.14.6 Prestressing tendons. Prestressing tendons shall conform to one of the following standards:

1. Wire ..... ASTM A 421
2. Low-relaxation wire ..... ASTM A 421
3. Strand ..... ASTM A 416
4. Low-relaxation strand ..... ASTM A 416
5. Bar ..... ASTM A 722

Exceptions:

1. Wire, strands and bars not specifically listed in ASTM A 421, ASTM A 416 or ASTM A 722 are permitted, provided they conform to the minimum requirements in ASTM A 421, ASTM A 416 or ASTM A 722 and are approved by the architect/engineer.
2. Bars and wires of less than 150 kips per square inch (ksi) (1034 MPa) tensile strength and conforming to ASTM A 82, ASTM A 510, ASTM A 615, ASTM A 996 or ASTM A 706 are permitted to be used as prestressed tendons, provided that:
   2.1. The stress relaxation properties have been assessed by tests according to ASTM E 328 for the maximum permissible stress in the tendon.
   ~~2.2. Other nonstress-related requirements of ACI 530/ASCE 5/TMS 402, Chapter 4, addressing prestressing tendons are met.~~

2. Add standard to Chapter 35 as follows:

ASTM

C 1611/C 1611M-05 Standard Test Method for Slump Flow of Self-Consolidating Concrete

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

The majority of these proposed revisions are editorial in nature. Specific substantive revisions proposed above include:

1) Replacing Table 2103.8(1). The existing table in the IBC is incorrect due apparently to a transcription error. The proposed Table 2103.8(1) correctly identifies the proportion requirements in accordance with ASTM C 270.

2) Self-consolidating grout is proposed to be added with requirements identical to those adopted by TMS 602/ACI 530.1/ASCE 6. Research documenting the performance of self-consolidating grout in masonry construction is available at:
http://www.ncma.org/research/reports/MR31.pdf
http://www.ncma.org/research/reports/MR29.pdf

3) The requirement stating "Other nonstress-related requirements of ACI 530/ASCE 5/TMS 402, Chapter 4, addressing prestressing tendons are met." is proposed for deletion as it was from the reference document. The MSJC felt that this statement was too vague to be consistently enforced and was effectively stipulated redundant corrosion protection requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM C 1611, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S178–07/08

2103.8, Table 2103.8(1), Table 2103.8(2)

Proponent: Phillip J. Samblanet, The Masonry Society

Revise as follows:

2103.8 Mortar. Except for mortars listed in Sections 2103.9, 2103.10, and 2103.11, mortar for use in masonry construction shall conform to ASTM C 270 and Articles 2.1 and 2.6 A of TMS 602/ACI 530.1/ASCE 6. ~~shall conform to the proportion specifications of Table 2103.8(1) or the property specifications of Table 2103.8(2). Type S or N mortar shall be used for glass unit masonry. The amount of water used in mortar for glass unit masonry shall be adjusted to account for the lack of absorption. Retempering of mortar for glass unit masonry shall not be permitted after initial set. Unused mortar shall be discarded within 21/2 hours after initial mixing, except that unused mortar for glass unit masonry shall be discarded within 11/2 hours after initial mixing.~~

Delete without substitution:

~~**TABLE 2103.8(1)**~~
~~**MORTAR PROPORTIONS**~~

~~**TABLE 2103.8(2)**~~
~~**MORTAR PROPERTIES**~~[a]

Reason: This change is intended to simplify and clarify the IBC, while correcting errors made in transcription of ASTM requirements into the IBC.

The provisions in this section are no longer consistent with those ASTM C 270 and TMS 602/ACI 530.1/ASCE 6 and are considered incorrect by masonry experts. For example, Tables 2103.8(2) was found to be in error by ICC Structural Masonry Special Inspectors Examination Committee recently, when someone taking the test appealed a question that is consistent with the IBC, but not ASTM C 270 (the issue in question is the amount of sand that is permitted. ASTM C270 allows 3 ½ parts while the IBC limits it to 3 parts). Because of this typographical error, the IBC inadvertently restricts the use of common mortar mixes.

Transcription of requirements is not needed as users already must understand the reference standards. Moreover the transcription causes confusion when inspectors, building officials, designers, and others must try to determine if minor differences occur between the IBC and the referenced standards, and whether these minor differences are intentional or accidental, and whether any differences are important. Because ASTM C 270 and TMS 402/ACI 530.1/ASCE 6 are already required, these transcribed provisions are proposed to be deleted for clarity and brevity, while avoiding confusion between the differences in the provisions.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S179–07/08
Table 2103.8(2)

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

Revise table as follows:

TABLE 2103.8(2)
MORTAR PROPERTIES[a]

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895kPa.

a. This aggregate ratio (measured in damp, loose condition) shall not be less than 2¼ and not more than ~~3~~ 3½ times the sum of the separate volumes of cementitious materials.

(Portions of table and footnotes not shown remain unchanged)

Reason: Footnote a in Table 2103.8(2) of the IBC is incorrect. The proposed revision provides the correct proportioning requirements for masonry sand and exactly matches the requirements contained in ASTM C 270, Standard Specification for Mortar for Unit Masonry, as was originally intended.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S180–07/08
Table 1708.1.2, Table 1708.1.4, 2103.12, Table 2103.12, 2105.2.2.1

Proponent: Phillip J. Samblanet, The Masonry Society

1. Revise tables as follows:

TABLE 1708.1.2
LEVEL 1 QUALITY ASSURANCE
MINIMUM TESTS AND SUBMITTALS

Certificates of compliance used in masonry construction.

Verification of f'_m and f'_{AAC} prior to construction, except where specifically exempted by this code.

Verification of slump flow and visual stability index of self-consolidating grout as delivered to the site in accordance with Article 1.5.B.1.b.3 of TMS 602/ACI 530.1/ASCE 6.

TABLE 1708.1.4
LEVEL 2 QUALITY ASSURANCE
MINIMUM TESTS AND SUBMITTALS

Certificates of compliance used in masonry construction.

Verification of f'_m and f'_{AAC} prior to construction and every 5,000 square feet during construction.

Verification of proportions of materials in premixed or preblended mortar prestressing grout and grout other than self-consolidating grout as delivered to the site.

Verification of slump flow and visual stability index of self-consolidating grout as delivered to the site in accordance with Article 1.5.B.1.b.3 of TMS 602/ACI 530.1/ASCE 6.

2103.12 Grout. Grout shall conform to ~~Table 2103.12~~ Articles 2.2, 2.6 B and 3.5 of TMS 602/ ACI 530.1/ASCE 6 or to ASTM C 476. ~~When grout conforms to ASTM C 476, the grout shall be specified by proportion requirements or property requirements.~~

2. Delete table without substitution:

~~**TABLE 2103.12**~~
~~**GROUT PROPORTIONS BY VOLUME FOR**~~
~~**MASONRY CONSTRUCTION**~~

3. Revise as follows:

2105.2.2.1.1 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 2105.2.2.1.1, 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 or Article 2.2 of TMS 602/ACI 530.1/ASCE 6.
   3.2. Minimum grout compressive strength equals or exceeds f'_m but not less than 2,000 psi (13.79MPa). The compressive strength of grout shall be determined in accordance with ASTM C 1019.

2105.2.2.1.2 Concrete masonry. The compressive strength of masonry shall be determined based on the strength of the unit and type of mortar specified using Table 2105.2.2.1.2, 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 or Article 2.2 of TMS 602/ACI 530.1/ASCE 6.
   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.

2105.2.2.1.3 AAC masonry. The compressive strength of AAC masonry shall be based on the strength of the AAC masonry unit only and the following shall be met:

1. Units conform to ASTM C 1386.
2. Thickness of bed joints does not exceed 1/8 inch (3.2 mm).
3. For grouted masonry, the grout meets one of the following requirements:
   3.1. Grout conforms to ASTM C 476 or Article 2.2 of TMS 602/ACI 530.1/ASCE 6.
   3.2. Minimum grout compressive strength equals or exceeds f'_{AAC} but not less than 2,000 psi (13.79 MPa). The compressive strength of grout shall be determined in accordance with ASTM C 1019.

Reason: Self consolidating grout is increasingly being used for reinforced masonry because of its exceptional flowing properties that allow the grout to flow through confined spaces easily, while maintaining the integrity of the mix. This change incorporates the use of self-consolidating grout when the requirements of TMS 602/ACI 530.1.ASCE 6 are met.

Other minor changes that are being made include:

- The second sentence of this Section 2103.12 is being proposed for deletion because it is not needed. ASTM C 476 only has two procedures to specify grout – by proportion and by property. Thus noting this here, is redundant.
- Table 2103.13 is also being proposed to be deleted because it is redundant with ASTM C 476, and leaving it here confusing inspectors and building officials as to the differences between the tables. This has been an issue for the ICC/TMS Structural Masonry Special Inspectors Examination Committee.

- While the change is focused on self-consolidating grout, the "Minimum Test and Submittal" requirements in Table 1708.1.4 are also being updated to:
    - include verification for proportions of prestressing grout as required by TMS 602/ACI 530.1/ASCE 6
    - clarify the requirements for mortar so that verification in this table is directed at proportions of premixed mortar because Table 1704.5.3 already requires verification of proportions of site mixed mortars.

The end result of this change is to update the IBC to permit the use of self consolidating grout but only when the requirements of TMS 602/ACI 530.1/ASCE 6 are met, while clarifying other portions of the Code related to grout materials and requirements. The resulting provisions simplify the Code for inspectors and building officials so they know what needs to be done for both traditional grout and for the increasingly used self-consolidating grout.

This proposal may in fact decrease the cost of construction by allowing the use of self-consolidating grout.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S181–07/08
2103.13.6

Proponent: Philip Brazil, PE, SE, Reid Middleton, Inc., representing himself

Revise as follows:

2103.13.6 Prestressing tendons. Prestressing tendons shall conform to one of the following standards:

a. Wire ..... ASTM A 421
b. Low-relaxation wire..... ASTM A 421
c. Strand ..... ASTM A 416
d. Low-relaxation strand ..... ASTM A 416
e. Bar ..... ASTM A 722

Exceptions:

1. Wire, strands and bars not specifically listed in ASTM A 421, ASTM A 416 or ASTM A 722 are permitted, provided they conform to the minimum requirements in ASTM A 421, ASTM A 416 or ASTM A 722 and are approved by the ~~architect/engineer~~ registered design professional.
2. Bars and wires of less than 150 kips per square inch (ksi) (1034 MPa) tensile strength and conforming to ASTM A 82, ASTM A 510, ASTM A 615, ASTM A 996 or ASTM A 706 are permitted to be used as prestressed tendons, provided that:
    2.1. The stress relaxation properties have been assessed by tests according to ASTM E 328 for the maximum permissible stress in the tendon.
    2.2. Other nonstress-related requirements of ACI 530/ASCE 5/TMS 402, Chapter 4, addressing prestressing tendons are met.

Reason: The change is proposed for consistency with the use of "registered design professional" elsewhere in the 2006 IBC (approximately 50 code sections). Section 2103.13.6 is the only instance of "architect/engineer" in the 2006 IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S182–07/08
2104.1

Proponent: Phillip J. Samblanet, The Masonry Society

1. Revise as follows:

2104.1.2 Placing mortar and units. Placement of ~~mortar and clay and concrete~~ units and mortar shall comply with TMS 602/ACI 530.1/ASCE 6 and Section 2104.1.2.1~~ Sections 2104.1.2.1, 2104.1.2.2, 2104.1.2.3 and 2104.1.2.5. Placement of mortar and glass unit masonry shall comply with Sections 2104.1.2.4 and 2104.1.2.5. Placement of thin-bed mortar and AAC masonry shall comply with Section 2104.1.2.6~~.

~~**2104.1.2.1 Bed and head joints.** Unless otherwise required or indicated on the construction documents, head and bed joints shall be 3/8 inch (9.5 mm) thick, except that the thickness of the bed joint of the starting course placed over foundations shall not be less than 1/4 inch (6.4 mm) and not more than 3/4 inch (19.1 mm).~~

2104.1.2.1.~~1~~ Open-end units. Open-end units with beveled ends shall be fully grouted. Head joints of open-end units with beveled ends need not be mortared. The beveled ends shall form a grout key that permits grouts within 5/8 inch (15.9 mm) of the face of the unit. The units shall be tightly butted to prevent leakage of the grout.

2. Delete without substitution:

~~**2104.1.2.2 Hollow units.** Hollow units shall be placed such that face shells of bed joints are fully mortared. Webs shall be fully mortared in all courses of piers, columns, pilasters, in the starting course on foundations where adjacent cells or cavities are to be grouted, and where otherwise required. Head joints shall be mortared a minimum distance from each face equal to the face shell thickness of the unit.~~

~~**2104.1.2.3 Solid units.** Unless otherwise required or indicated on the construction documents, solid units shall be placed in fully mortared bed and head joints. The ends of the units shall be completely buttered. Head joints shall not be filled by slushing with mortar. Head joints shall be constructed by shoving mortar tight against the adjoining unit. Bed joints shall not be furrowed deep enough to produce voids.~~

~~**2104.1.2.4 Glass unit masonry.** Glass units shall be placed so head and bed joints are filled solidly. Mortar shall not be furrowed. Unless otherwise required, head and bed joints of glass unit masonry shall be 1/4 inch (6.4 mm) thick, except that vertical joint thickness of radial panels shall not be less than 1/8 inch (3.2 mm). The bed joint thickness tolerance shall be minus 1/16 inch (1.6 mm) and plus 1/8 inch (3.2 mm). The head joint thickness tolerance shall be plus or minus 1/8 inch (3.2 mm).~~

~~**2104.1.2.5 Placement in mortar.** Units shall be placed while the mortar is soft and plastic. Any unit disturbed to the extent that the initial bond is broken after initial positioning shall be removed and relaid in fresh mortar.~~

~~**2104.1.2.6 Thin-bed mortar and AAC masonry units.** AAC masonry construction shall begin with a leveling course of masonry meeting the requirements of Section 2104.1.2. Subsequent courses of AAC masonry units shall be laid with thin-bed mortar using a special notched trowel manufactured for use with thin-bed mortar to spread the mortar so that it completely fills the bed joints. Unless otherwise specified, the head joints shall be similarly filled. Joints inAAC masonry shall be approximately 1/16 inch (1.5 mm) and shall be formed by striking on the ends and tops of AAC masonry units with a rubber mallet. Minor adjustments in unit position shall be made while the mortar is still soft and plastic by tapping it into the proper position. Minor sanding of the exposed faces of AAC masonry shall be permitted to provide a smooth and plumb surface.~~

~~**2104.1.2.7 Grouted masonry.** Between grout pours, a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with the grout stopping a minimum of 11/2 inches (38 mm) below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of 1/2 inch (12.7 mm) below the top of the masonry.~~

Reason: The provisions in Section 2104.1.2 contain some, but not all requirements for placement of units and mortar (for instance, requirements for filling collar joints are not included in the IBC). As such, a reference is needed to TMS 602/ACI 530.1/ASCE 6 in keeping with Section 2104.1.1.

In considering the entire section however, it seems reasonable to only show the modifications to the reference standard similar to what is done in Sections 2107 and 2108. As such, sections 2104.1.2.1, 2104.1.2.2, 2104.1.2.3, 2104.1.2.4, 2104.1.2.5, 2104.1.2.6, and 2107.1.2.7 are proposed to be deleted, while Section 2102.1.1.1 is proposed to be left in because it modifies the referenced standard. This will simplify things greatly for the inspector and building official as they can quickly see what is required and what the IBC modifications are.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S183–07/08
2104.1.2.7

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

Revise as follows:

2104.1.2.7 Grouted masonry. ~~Between grout pours, a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with the grout stopping a minimum of 11/2 inches (38 mm) below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of ½ inch (12.7 mm) below the top of the masonry.~~When grouting, form grout keys between grout pours in accordance with the following:

1. Form a grout key by terminating the grout a minimum of 1½ in. (38.1 mm) below a mortar joint at vertically grouted spaces.
2. Form a grout key between grout lifts when the first lift is permitted to set prior to placement of the subsequent lift.
3. At beams, terminate the grout pour in the course above or the course below the beam and form a grout key. Completely fill the beam except form a grout key at vertically reinforced cells.

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

Specific substantive revisions proposed above include:

Section 2104.1.2.7 is revised to reflect changes incorporated into the reference standard. The requirements are largely the same, but the proposed revision does not require a grout key to be formed when subsequent lifts are placed prior to the previous lifts setting. The resulting language is believed to be clearer and less problematic to enforce and interpret in the field.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S184–07/08
2102, 2104.3, 2104.4, Table 1704.5.1, Table 1704.5.3

Proponent: Phillip J. Samblanet, The Masonry Society

Delete without substitution:

SECTION 2102
DEFINITIONS AND NOTATIONS

~~**MEAN DAILY TEMPERATURE.** The average daily temperature of temperature extremes predicted by a local weather bureau for the next 24 hours.~~

~~**2104.3 Cold weather construction.** The cold weather construction provisions of ACI 530.1/ASCE 6/TMS 602, Article 1.8 C, or the following procedures shall be implemented when either the ambient temperature falls below 40°F (4°C) or the temperature of masonry units is below 40°F (4°C).~~

~~**2104.3.1 Preparation.** 1. Temperatures of masonry units shall not be less than 20°F (-7°C) when laid in the masonry. Masonry units containing frozen moisture, visible ice or snow on their surface shall not be laid. 2. Visible ice and snow shall be removed from the top surface of existing foundations and masonry to receive new construction. These surfaces shall be heated to above freezing, using methods that do not result in damage.~~

~~**2104.3.2 Construction.** The following requirements shall apply to work in progress and shall be based on ambient temperature.~~

2104.3.2.1Construction requirements for temperatures between 40°F (4°C) and 32°F (0°C). The following construction requirements shall be met when the ambient temperature is between 40°F (4°C) and 32°F (0°C): 1. Glass unit masonry shall not be laid. 2. Water and aggregates used in mortar and grout shall not be heated above 140°F (60°C). 3. Mortar sand or mixing water shall be heated to produce mortar temperatures between 40°F (4°C) and 120°F (49°C) at the time of mixing. When water and aggregates for grout are below 32°F(0°C), they shall be heated.

2104.3.2.2 Construction requirements for temperatures between 32°F (0°C) and 25°F (-4°C). The requirements of Section 2104.3.2.1 and the following construction requirements shall be met when the ambient temperature is between 32°F (0°C) and 25°F (-4°C): 1. The mortar temperature shall be maintained above freezing until used in masonry. 2. Aggregates and mixing water for grout shall be heated to produce grout temperature between 70°F (21°C) and 120°F (49°C) at the time of mixing. Grout temperature shall be maintained above 70°F (21°C) at the time of grout placement. 3. Heat AAC masonry units to a minimum temperature of 40°F (4°C) before installing thin-bed mortar.

2104.3.2.3 Construction requirements for temperatures between 25°F (-4°C) and 20°F (-7°C). The requirements of Sections 2104.3.2.1 and 2104.3.2.2 and the following construction requirements shall be met when the ambient temperature is between 25°F (-4°C) and 20°F (-7°C): 1. Masonry surfaces under construction shall be heated to 40°F (4°C). 2. Wind breaks or enclosures shall be provided when the wind velocity exceeds 15 miles per hour (mph) (24 km/h). 3. Prior to grouting, masonry shall be heated to a minimum of 40°F (4°C).

2104.3.2.4 Construction requirements for temperatures below 20°F (-7°C). The requirements of Sections 2104.3.2.1, 2104.3.2.2 and 2104.3.2.3 and the following construction requirement shall be met when the ambient temperature is below 20°F (-7°C): Enclosures and auxiliary heat shall be provided to maintain air temperature within the enclosure to above 32°F (0°C).

2104.3.3 Protection. The requirements of this section and Sections 2104.3.3.1 through 2104.3.3.5 apply after the masonry is placed and shall be based on anticipated minimum daily temperature for grouted masonry and anticipated mean daily temperature for ungrouted masonry.

2104.3.3.1 Glass unit masonry. The temperature of glass unit masonry shall be maintained above 40°F (4°C) for 48 hours after construction.

2104.3.3.2 AAC masonry. The temperature of AAC masonry shall be maintained above 32°F (0°C) for the first 4 hours after thin-bed mortar application.

2104.3.3.3 Protection requirements for temperatures between 40°F (4°C) and 25°F (-4°C). When the temperature is between 40°F (4°C) and 25°F (-4°C), newly constructed masonry shall be covered with a weather-resistive membrane for 24 hours after being completed.

2104.3.3.4 Protection requirements for temperatures between 25°F (-4°C) and 20°F (-7°C). When the temperature is between 25°F (-4°C) and 20°F (-7°C), newly constructed masonry shall be completely covered with weather-resistive insulating blankets, or equal protection, for 24 hours after being completed. The time period shall be extended to 48 hours for grouted masonry, unless the only cement in the grout is Type III Portland cement.

2104.3.3.5 Protection requirements for temperatures below20°F (-7°C). When the temperature is below20°F (-7°C), newly constructed masonry shall be maintained at a temperature above 32°F (0°C) for at least 24 hours after being completed by using heated enclosures, electric heating blankets, infrared lamps or other acceptable methods. The time period shall be extended to 48 hour for grouted masonry, unless the only cement in the grout is Type III portland cement.

2104.4 Hot weather construction. The hot weather construction provisions of ACI 530.1/ASCE 6/TMS 602, Article 1.8 D, or the following procedures shall be implemented when the temperature or the temperature and wind velocity limits of this section are exceeded.

2104.4.1 Preparation. The following requirements shall be met prior to conducting masonry work.

2104.4.1.1 Temperature. When the ambient temperature exceeds 100°F (38°C), or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (3.5 m/s): 1. Necessary conditions and equipment shall be provided to produce mortar having a temperature below 120°F (49°C). 2. Sand piles shall be maintained in a damp, loose condition.

2104.4.1.2 Special conditions. When the ambient temperature exceeds 115°F (46°C), or 105°F (40°C) with a wind velocity greater than 8 mph (3.5 m/s), the requirements of Section 2104.4.1.1 shall be implemented, and materials and mixing equipment shall be shaded from direct sunlight.

2104.4.2 Construction. The following requirements shall be met while masonry work is in progress.

2104.4.2.1 Temperature. When the ambient temperature exceeds 100°F (38°C), or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (3.5 m/s):

1. The temperature of mortar and grout shall be maintained below 120°F (49°C).
2. Mixers, mortar transport containers and mortar boards shall be flushed with cool water before they come into contact with mortar ingredients or mortar.
3. Mortar consistency shall be maintained by retempering with cool water.
4. Mortar shall be used within 2 hours of initial mixing.
5. Thin-bed mortar shall be spread no more than 4 feet (1219 mm) ahead of AAC masonry units.
6. AAC masonry units shall be placed within one minute after spreading thin-bed mortar.

2104.4.2.2 Special conditions. When the ambient temperature exceeds 115°F (46°C), or exceeds 105°F (40°C) with a wind velocity greater than 8 mph (3.5 m/s), the requirements of Section 2104.4.2.1 shall be implemented and cool mixing water shall be used for mortar and grout. The use of ice shall be permitted in the mixing water prior to use. Ice shall not be permitted in the mixing water when added to the other mortar or grout materials.

2104.4.3 Protection. When the mean daily temperature exceeds 100°F (38°C) or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (3.5 m/s), newly constructed masonry shall be fog sprayed until damp at least three times a day until the masonry is three days old.

2104.5 Wetting of brick. Brick (clay or shale) at the time of laying shall require wetting if the unit's initial rate of water absorption exceeds 30 grams per 30 square inches (19 355 mm2) per minute or 0.035 ounce per square inch (1 g/645mm^2) per minute, as determined by ASTM C 67.

TABLE 1704.5.1
LEVEL 1 SPECIAL INSPECTION

INSPECTION TASK	FREQUENCY OF INSPECTION		REFERENCE FOR CRITERIA		
	Continuous during task listed	Periodically during task listed	IBC section	ACI 530/ASCE 5/TMS 402a	ACI 530.1/ASCE 6/TMS 602a
1. As masonry construction begins, the following shall be verified to ensure compliance:					
a. Proportions of site-prepared mortar.	—	X	—	—	Art. 2.6A
b. Construction of mortar joints.	—	X	—	—	Art. 3.3B
c. Location of reinforcement, connectors, prestressing tendons and anchorages.	—	X	—	—	Art. 3.4, 3.6A
d. Prestressing technique.	—	X	—	—	Art. 3.6B
e. Grade and size of prestressing tendons and anchorages.	—	X	—	—	Art. 2.4B, 2.4H
2. The inspection program shall verify:					
a. Size and location of structural elements.	—	X	—	—	Art. 3.3G
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.	—	X	—	Sec. 1.2.2(e), 2.1.4, 3.1.6	—
c. Specified size, grade and type of reinforcement.	—	X	—	Sec. 1.13	Art. 2.4, 3.4
d. Welding of reinforcing bars.	X	—	—	Sec. 2.1.10.7.2, 3.3.3.4(b)	—
e. Protection of masonry during cold weather (temperature below 40□F) or hot weather (temperature above 90□F).	—	X	~~Sec. 2104.3, 2104.4~~	—	Art. 1.8C, 1.8D
f. Application and measurement of prestressing force.	—	X	—	—	Art. 3.6B
3. Prior to grouting, the following shall be verified to ensure compliance:					
a. Grout space is clean.	—	X	—	—	Art. 3.2D
b. Placement of reinforcement and connectors and prestressing tendons and anchorages.	—	X	—	Sec. 1.13	Art. 3.4
c. Proportions of site-prepared grout and prestressing grout for bonded tendons.	—	X	—	—	Art. 2.6B
d. Construction of mortar joints.	—	X	—	—	Art. 3.3B
4. Grout placement shall be verified to ensure compliance with code and construction document provisions.	X	—	—	—	Art 3.5
a. Grouting of prestressing bonded tendons.	X	—	—	—	Art. 3.6C
5. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X	—	Sec. 2105.2.2, 2105.3	—	Art. 1.4
6. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	—	X	—	—	Art. 1.5

(Portions of table not shown remain unchanged)

TABLE 1704.5.3
LEVEL 2 SPECIAL INSPECTION

INSPECTION TASK	FREQUENCY OF INSPECTION		REFERENCE FOR CRITERIA		
	Continuous during task listed	Periodically during task listed	IBC section	ACI 530/ ASCE 5/ TMS 402a	ACI 530.1/ ASCE 6/ TMS 602a
1. From the beginning of masonry construction, the following shall be verified to ensure compliance:					
a. Proportions of site-prepared mortar, grout and prestressing grout for bonded tendons.	—	X	—	—	Art. 2.6A
b. Placement of masonry units and construction of mortar joints.	—	X	—	—	Art. 3.3B
c. Placement of reinforcement, connectors and prestressing tendons and anchorages.	—	X	—	Sec. 1.13	Art. 3.4, 3.6A
d. Grout space prior to grouting.	X	—	—	—	Art. 3.2D
e. Placement of grout.	X	—	—	—	Art. 3.5
f. Placement of prestressing grout.	X	—	—	—	Art. 3.6C
2. The inspection program shall verify:					
a. Size and location of structural elements.	—	X	—	—	Art. 3.3G
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.	X	—	—	Sec. 1.2.2(e), 2.1.4, 3.1.6	—
c. Specified size, grade and type of reinforcement.		X	—	Sec. 1.13	Art. 2.4, 3.4
d. Welding of reinforcing bars.	X	—	—	Sec. 2.1.10.7.2, 3.3.3.4(b)	—
e. Protection of masonry during cold weather (temperature below 40□F) or hot weather (temperature above 90□F).	—	X	~~Sec. 2104.3, 2104.4~~	—	Art. 1.8C, 1.8D
f. Application and measurement of prestressing force.	X	—	—	—	Art. 3.6B
3. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X	—	Sec. 2105.2.2, 2105.3	—	Art. 1.4
4. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	—	X	—	—	Art. 1.5

(Portions of table not shown remain unchanged)

Reason: Section 2104 of the IBC is increasingly causing confusion and aggravation among contractors, inspectors and building officials because the leading section (2104.1) requires compliance with Section 2104 of the IBC AND the ACI 530.1/ASCE 6/TMS 602. The intent of this is appropriate because the referenced standard contains most of the needed construction requirements and then Section 2104 contains additional requirements for systems that are included in the IBC but not the referenced standard. However, this Section 2104 does not just add additional requirements, but it also contains some transcribed provisions from the referenced standard. As such, contractors, inspectors and building officials struggle with having to read similar and essentially identical requirements in both the referenced standard and the IBC to try to determine what are the differences (none for the sections proposed to be deleted in this section) between these requirements. There is no need to make them do this, and keeping the transcription only causes confusion, aggravation, and the potential for future conflict if the IBC is not kept updated with the referenced standard. This change simplifies the provisions for users while eliminating the risk of that IBC and the referenced standard become out of phase.

This proposal is essentially identical to a proposal submitted during the last supplement cycle for the IBC, which was recommended for approval by the IBC Structural Subcommittee, and which was narrowly overturned on the floor in Rochester. It is being brought back for reconsideration because as noted the change greatly simplifies the Code for contractors, building officials, and inspectors. Opposition to the change was procedural (globally), not technical. The primary opposition related to concerns about taking critical provisions out of the I-Codes. While this is a valid concern, and while the proponents share the goal to have building officials involved in the development of all provisions in, or referenced by the

I-Codes, the use of referenced standards are nevertheless widely used throughout the I-Codes for many good reasons (including reducing burdens on code officials in overseeing often esoteric, technical, or specialized provisions and instead rely on consensus forums to develop such provisions with experts on a balanced committee that properly considers all comments related to the provisions).

This change is proposed again with the hopes that those good reasons are still supported and with the intent of simplifying the Code for contractors, building officials, inspectors and designers. The proposed revisions will remove duplicate provisions, thus simplifying the IBC and reducing the chance that the provisions in the IBC and the referenced standard vary unnecessarily.

To the best of the proponents' knowledge, this change has no technical impact.

One final clarification. During the Rochester hearings, opposition to this change noted concerns with the high cost of having to purchase numerous referenced standards to be able to effectively use the IBC. The proponents share this concern, and note that this proposed change does not require an additional reference because Section 2104.1 already requires the referenced standard to determine appropriateness of tolerances, placement procedures, and other aspects of masonry construction. Thus this change will not increase the cost of construction because it is simply removing redundant provisions), nor does it increase the cost of references that contractors, inspectors, building officials, and designers need.

We are hopeful that this change will be approved as it will simplify and streamline the code, making application easier for contractors, building officials, inspectors and inspectors.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S185–07/08

2105.2.2.1.1, Table 2105.2.2.1.1, 2105.2.2.1.2, 2105.2.2.1.3

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

Revise as follows:

2105.2.2.1.1 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 2105.2.2.1.1, provided:

1. Units ~~conform to~~ are sampled and tested to verify conformance with 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~~ Article 2.2 of TMS 602/ACI 530.1/ASCE 6.
   3.2. Minimum grout compressive strength equals or exceeds f'_m but not less than 2,000 psi (13.79MPa). The compressive strength of grout shall be determined in accordance with ASTM C 1019.

TABLE 2105.2.2.1.1
COMPRESSIVE STRENGTH OF CLAY MASONRY

NET AREA COMPRESSIVE STRENGTH OF CLAY MASONRY UNITS (psi)		NET AREA COMPRESSIVE STRENGTH OF MASONRY
Type M or S mortar	**Type N mortar**	**(psi)**
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~~ 11,500	—	4,000

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

2105.2.2.1.2 Concrete masonry. The compressive strength of masonry shall be determined based on the strength of the unit and type of mortar specified using Table 2105.2.2.1.2, provided:

1. Units ~~conform to~~ are sampled and tested to verify conformance with 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~~ Article 2.2 of TMS 602/ACI 530.1/ASCE 6.

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.

2105.2.2.1.3 AAC masonry. The compressive strength of AAC masonry shall be based on the strength of the AAC masonry unit only and the following shall be met:

1. Units conform to ASTM C 1386.
2. Thickness of bed joints does not exceed 1/8 inch (3.2 mm).
3. For grouted masonry, the grout meets one of the following requirements:
   3.1. Grout conforms ~~to ASTM C 476~~ Article 2.2 of TMS 602/ACI 530.1/ASCE 6.
   3.2. Minimum grout compressive strength equals or exceeds f'_{AAC} but not less than 2,000 psi (13.79 MPa). The compressive strength of grout shall be determined in accordance with ASTM C 1019.

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

The majority of these proposed revisions are editorial in nature. Specific substantive revisions proposed above include:

1) The minimum unit compressive strength for clay masonry construction in Table 2105.2.2.1.1 is changed from 13,200 psi to 11,500 psi. The value of 13,200 psi was found to be an error in the unit strength method of verifying the masonry compressive strength. As detailed in the MSJC commentary, the equation derived for the unit strength correlation table is:

$$f_u = \frac{f'_m / 1.22 - 400}{B}$$

Where B =0.2 for Type N mortar and B=0.25 for Type S or M mortar. For an f'_m value of 4,000 psi, the unit strength using a Type M or S mortar is indeed 11,500 psi.

2) Changing the reference from ASTM C 476 to Article 2.2 of the MSJC standard will help to ensure that subsequent restrictions on the use of the unit strength method in grouted masonry construction that are imposed by the referenced standard are in inadvertently overlooked.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S186–07/08
2106, 2102

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

1. Revise as follows:

2106.1 Seismic design requirements for masonry. Masonry structures and components shall comply with the requirements in Section 1.17~~14.2.2 and Section 1.14.3, 1.14.4, 1.14.5, 1.14.6 or 1.14.7~~ of ~~ACI 530/ASCE 5/~~TMS 402/ACI 530/ASCE 5 depending on the structure's seismic design category as determined in Section 1613. All masonry walls, unless isolated on three edges from in-plane motion of the basic structural systems, shall be considered to be part of the seismic-force-resisting system. In addition, the following requirements shall be met.

Delete Section 2106.1.1 Basic seismic-force-resisting system through Section 2106.6 Additional requirements for structures in Seismic Design Category E or F without substitution.

2. Delete without substitution:

SECTION 2102
DEFINITIONS AND NOTATIONS

NOTATIONS.

~~*Lw* = Length of wall, inches (mm).~~
~~*Vn* = Nominal shear strength, pounds (N).~~
~~ρ*n* = Ratio of distributed shear reinforcement on plane perpendicular to plane of *Amv*.~~

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

While on the surface this change may appear quite substantive, it actually employs little technical change. Over the course of the 2008 update cycle for the MSJC the entire seismic design and detailing requirements for masonry were rewritten for clarity and the modifications included in Section 2106 were reviewed and their intent incorporated into the MSJC.

The deletion of notations for L_w, V_n, and ρ_n are proposed as well. With the removal of Equation 21-1 currently in Section 2106, these terms are no longer used in Chapter 21.

Through the consolidation of these requirements into a single location, the use and enforcement of these provisions will be simplified.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S187–07/08

2102, 2106.1 through 2106.1.1.3, 2106.3 through 2106.4, 2106.5 through 2106.6

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

Revise as follows:

SECTION 2102
DEFINITIONS AND NOTATIONS

NOTATIONS

M_n = nominal moment strength, in.-lb (N-mm)

~~L_w = Length of wall, inches (mm).~~

~~ρ_n = Ratio of distributed shear reinforcement on plane perpendicular to plane of A_{mv}.~~

2106.1 Seismic design requirements for masonry. Masonry structures and components shall comply with the requirements in Section ~~1.14.2.2~~ 1.17.2 and 1.17.3 and Section ~~1.14.3~~ 1.17.4.1, ~~1.14.4~~ 1.17.4.2, ~~1.14.5~~ 1.17.4.3, ~~1.14.6~~ 1.17.4.4 or ~~1.14.7~~ 1.17.4.5 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 depending on the structure's seismic design category as determined in Section 1613. All masonry walls, unless isolated on three edges from in-plane motion of the basic structural systems, shall be considered to be part of the seismic-force-resisting system. In addition, the following requirements shall be met.

2106.1.1 Basic seismic-force-resisting system. Buildings relying on masonry shear walls as part of the basic seismic-force-resisting system shall comply with Section ~~1.14.2.2~~ 1.17.3.2 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 or with Section 2106.1.1.1, 2106.1.1.2 or 2106.1.1.3.

2106.1.1.1 Ordinary plain prestressed masonry shear walls. Ordinary plain prestressed masonry shear walls shall comply with the requirements of Chapter 4 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5.

2106.1.1.2 Intermediate prestressed masonry shear walls. Intermediate prestressed masonry shear walls shall comply with the requirements of Section ~~1.14.2.2.4~~ 1.17.3.2.11 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 and shall be designed by Chapter 4, Section 4.4.3, of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 for flexural strength and by Section 3.3.4.1.2 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 for shear strength. Sections ~~1.14.2.2.5~~ 1.17.3.2.6(a), 1.17.3.2.6(b), 3.3.3.5 or 3.3.6.5, and ~~3.3.4.3.2(c)~~ 3.3.4.2.3(c) of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 shall be applicable for reinforcement. Flexural elements subjected to load reversals shall be symmetrically reinforced. The nominal moment strength at any section along a member shall not be less than one-fourth the maximum moment strength. The cross-sectional area of bonded tendons shall be considered to contribute to the minimum reinforcement in Section ~~1.14.2.2.4~~ 1.17.3.2.3.1, 1.17.3.2.6(a), and 1.17.3.2.6(b) of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5. Tendons shall be located in cells that are grouted the full height of the wall.

2106.1.1.3 Special prestressed masonry shear walls. Special prestressed masonry shear walls shall comply with the requirements of Section ~~1.14.2.2.5~~ 1.17.3.2.12 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 and shall be designed by Chapter 4, Section 4.4.3, of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 for flexural strength

and by Section ~~3.3.4.1.2~~ 4.6 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 for shear strength. Sections ~~1.14.2.2.5(a)~~ 1.17.3.2.6(a), 1.17.3.2.6(b), 3.3.3.5 or 3.3.6.5, and ~~3.3.4.3.2(c)~~ 3.3.4.2.3(c) of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 shall be applicable for reinforcement. Flexural elements subjected to load reversals shall be symmetrically reinforced. The nominal moment strength at any section along a member shall not be less than one-fourth the maximum moment strength. The cross-sectional area of bonded tendons shall be considered to contribute to the minimum reinforcement in Section ~~1.14.2.2.5~~ 1.17.3.2.3.1, 1.17.3.2.6(a), and 1.17.3.2.6(b) of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5.

2106.3 Seismic Design Category B. Structures assigned to Seismic Design Category B shall conform to the requirements of Section ~~1.14.4~~ 1.17.4.2 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 ~~and to the additional requirements of this section~~.

~~**2106.3.1 Masonry walls not part of the lateral-force-resisting system.** Masonry partition walls, masonry screen walls and other masonry elements that are not designed to resist vertical or lateral loads, other than those induced by their own mass, shall be isolated from the structure so that the vertical and lateral forces are not imparted to these elements. Isolation joints and connectors between these elements and the structure shall be designed to accommodate the design story drift.~~

2106.4 Additional requirements for structures in Seismic Design Category C. Structures assigned to Seismic Design Category C shall conform to the requirements of Section 2106.3, Section ~~1.14.5~~ 1.17.4.3 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 and the additional requirements of this section.

2106.5 Additional requirements for structures in Seismic Design Category D. Structures assigned to Seismic Design Category D shall conform to the requirements of Section 2106.4, Section ~~1.14.6~~ 1.17.4.4 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 and the additional requirements of this section.

2106.5.1 Loads for shear walls designed by the allowable stress design method. When calculating in-plane shear or diagonal tension stresses by the allowable stress design method in accordance with Section 2107, special reinforced masonry, shear walls that resist seismic forces shall be designed to resist 1.5 times the seismic forces required by Chapter 16. The 1.5 multiplier need not be applied to the overturning moment.

2106.5.2 Shear wall shear strength. ~~For a shear wall whose nominal shear strength exceeds the shear corresponding to development of its nominal flexural strength, two shear regions exist.~~

~~For all cross sections within a region defined by the base of the shear wall and a plane at a distance *Lw* above the base of the shear wall, the nominal shear strength shall be determined by Equation 21-1.~~

~~$V_n = A_n \rho_n f_y$ **(Equation 21-1)**~~

~~The required shear strength for this region shall be calculated at a distance $L_w/2$ above the base of the shear wall, but not to exceed one-half story height.~~

~~For the other region, the nominal shear strength of the shear wall shall be determined from Section 2108.~~ Where designing special reinforced masonry shear walls in accordance with Section 3.3 or A.3 or Chapter 4 of TMS 402/ACI 530/ASCE 5, the design shear strength, ϕV_n, shall exceed the shear corresponding to the development of 1.25 times the nominal flexural strength, M_n, of the element, except that the nominal shear strength, V_n, need not exceed 2.5 times required shear strength, V_u.

2106.6 Additional requirements for structures in Seismic Design Category E or F. Structures assigned to Seismic Design Category E or F shall conform to the requirements of Section 2106.5 and Section ~~1.14.7~~ 1.17.4.5 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5.

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

The majority of the changes proposed simply update section numbers that have changed in the reference standard. Substantive revisions include:

1) Section 2106.3.1 is proposed to be deleted as it conflicts with Section 2106.1. Section 2106.1 requires that all masonry elements that are not part of the seismic force-resisting system be isolated, regardless of SDC. Section 2106.3.1, conversely, triggers this requirement for SDC B and higher. Language similar to that in Section 2106.3.1 in included in the reference standard for all SDCs.

2) Section 2106.5.2 is proposed to be replaced with the corresponding design provisions from the 2008 MSJC. The language is also clarified that this design check is applicable to the strength design of masonry, which isn't clear in the original IBC language. In reviewing the design provisions of Section 2106.5.2, the MSJC did not think it was appropriate to ignore the contribution of the masonry to the nominal shear strength of a

shear wall. The MSJC did agree, however, that encouraging flexural limit states in masonry shear walls was preferable over shear controlled failures, and as such, incorporated the shear capacity check proposed to be included in Section 2106.5.2.

3) The deletion of notations for L_w and ρ_n are proposed as well. With the removal of Equation 21-1 currently in Section 2106, these terms are no longer used in Chapter 21. The revised Section 2106.5.2 introduces the term M_n, nominal moment strength. As such, a corresponding definition is proposed.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S188–07/08
2102, 2107

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

Revise as follows:

SECTION 2102
DEFINITIONS AND NOTATIONS

NOTATIONS

~~p_{max} = Maximum reinforcement ratio.~~

2107.1 General. The design of masonry structures using allowable stress design shall comply with Section 2106 and the requirements of Chapters 1 and 2 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5 except as modified by Sections 2107.2 through ~~2107.8~~ 2107.5.

2107.2 ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5, Section 2.1.2, load combinations. Delete Section 2.1.2.1.

~~**2107.3 ACI 530/ASCE 5/TMS 402, Section 2.1.3, design strength.** Delete Sections 2.1.3.4 through 2.1.3.4.3.~~

~~**2107.4 ACI 530/ASCE 5/TMS 402, Section 2.1.6, columns.** Add the following text to Section 2.1.6:~~
~~2.1.6.6 Light-frame construction. Masonry columns used only to support light-frame roofs of carports, porches, sheds or similar structures with a maximum area of 450 square feet (41.8 m2) assigned to Seismic Design Category A, B or Care permitted to be designed and constructed as follows:~~

~~1. Concrete masonry materials shall be in accordance with Section 2103.1 of the *International Building Code*. Clay or shale masonry units shall be in accordance with Section 2103.2 of the *International Building Code*.~~
~~2. The nominal cross-sectional dimension of columns shall not be less than 8 inches (203 mm).~~
~~3. Columns shall be reinforced with not less than one No. 4 bar centered in each cell of the column.~~
~~4. Columns shall be grouted solid.~~
~~5. Columns shall not exceed 12 feet (3658 mm) in height.~~
~~6. Roofs shall be anchored to the columns. Such anchorage shall be capable of resisting the design loads specified in Chapter 16 of the *International Building Code*.~~
~~7. Where such columns are required to resist uplift loads, the columns shall be anchored to their footings with two No. 4 bars extending a minimum of 24 inches (610 mm) into the columns and bent horizontally a minimum of 15 inches (381 mm) in opposite directions into the footings. One of these bars is permitted to be the reinforcing bar specified in Item 3 above. The total weight of a column and its footing shall not be less than 1.5 times the design uplift load.~~

~~2107.5~~ 2107.3 ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5, Section 2.1.~~10~~9.7.1.1, lap splices. Modify Section 2.1.~~10~~9.7.1.1 as follows:

2.1.~~10~~9.7.1.1 The minimum length of lap splices for reinforcing bars in tension or compression, l_d, shall be

$l_d = 0.002dbfs$ **(Equation 21-2)**

For SI: $l_d = 0.29d_bf_s$ but not less than 12 inches (305 mm). In no case shall the length of the lapped splice be less than 40 bar diameters.

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, *Fs*, 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.

~~2107.6~~ 2107.4 ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5, Section ~~2.1.10.7~~ 2.1.9.7, splices of reinforcement. Modify Section ~~2.1.10.7~~ 2.1.9.7 as follows:
~~2.1.10.7~~ 2.1.9.7 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. Welded splices shall be of ASTM A 706 steel reinforcement. Reinforcement larger than No. 9 (M #29) shall be spliced using mechanical connections in accordance with Section 2.1.10.7.3.

~~2107.7~~ 2107.5 ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5, 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-eighth of the nominal wall thickness and shall not exceed one-quarter of the least dimension of the cell, course or collar joint in which it is placed.

~~**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. Special reinforced masonry shearwalls having a shear span ratio, *M/Vd*, equal to or greater than 1.0 and having an axial load, *P*, greater than 0.05 $f'_m A_n$ that are subjected to in-plane forces shall have a maximum reinforcement ratio, ρmax, not greater than that computed as follows:~~

$$\rho_{\max} = \frac{n f'_m}{2 f_y \left(n + \frac{f_y}{f'_m} \right)} \quad \text{~~(Equation 21-3)~~}$$

~~The maximum reinforcement ratio does not apply in the out-of-plane direction.~~

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

Specific revisions proposed above include:

1) Section 2107.3 is proposed to be deleted without replacement. This section deleted Sections 2.1.3.4 through 2.1.3.4.3 of the 2005 MSJC, which contained a pseudo-strength design procedure for masonry whereby allowable stresses were scaled-up to corresponding strength-levels. These provisions have been removed from the 2008 edition of the MSJC. As such, there is no longer a need to delete these provisions.

2) Section 2107.4 is proposed to be deleted without replacement. This section included an alternative design and construction option for lightly loaded columns. Nearly identical provisions have been incorporated into the 2008 MSJC, and as such, are proposed for deletion from the IBC. There are, however, two substantive differences between the IBC provisions and those adopted into the 2008 MSJC:

a) The 450 ft^2 trigger for the maximum supported area was changed to a maximum load of 2,000 pounds (service level). Because design loads can vary significantly for a given tributary area (for example, a design snow load of 10 psf versus 60 psf), the MSJC opted to be more clear in the limits of this alternative. The axial load limit of 2,000 pounds was developed based on the flexure capacity of a nominal 8 inch by 8 inch by 12 foot high column with one No. 4 reinforcing bar in the center and f'_m of 1350 psi. An axial load of 2,000 pounds at the edge of the member will result in a moment that is approximately equal to the moment capacity of this member.

b) The MSJC language clarifies that such elements must still be designed using the strength design or allowable stress design procedures and comply with all design and modeling assumptions and inherent load path requirements. The IBC language has been interpreted by some as a deemed-to-comply, prescriptive detailing option that if met, does not require engineering analysis. The MSJC disagreed with this interpretation and instead opted to clarify that such elements be designed as if they were any other part of the structure.

3) Section 2107.6 (Section 2107.4 as proposed above) introduces a requirement that welded splices use ASTM A 706 reinforcement intended for such applications. This material limitation mirrors that required in Section 2108.3 of the IBC for the strength design of masonry.

4) Section 2107.8 is proposed to be deleted without replacement. An identical requirement for limiting the amount of reinforcement for the allowable stress design of special reinforced shear walls has been incorporated into the 2008 MSJC. As such, this modification is no longer required.

5) The definition for ρ_{max} is proposed to be deleted, as with the removal of Equation 21-3 the term is no longer used in Chapter 21.

The remaining changes editorially update the section references.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S189–07/08
2108

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

Revise as follows:

SECTION 2108
STRENGTH DESIGN OF MASONRY

2108.1 General. The design of masonry structures using strength design shall comply with Section 2106 and the requirements of Chapters 1 and 3 of TMS 402/ACI 530/ASCE 5~~/TMS 402~~, except as modified by Sections 2108.2 through 2108.3~~4~~.

Exception: AAC masonry shall comply with the requirements of Chapter 1 and Appendix A of TMS 402/ACI 530/ASCE 5~~/TMS 402~~.

2108.2 TMS 402/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 72 d_b.

2108.3 TMS 402/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.

~~**2108.4 ACI 530/ASCE 5/TMS 402, Section 3.3.3.5, maximum areas of flexural tensile reinforcement.** Add the following text to Section 3.3.3.5:~~

~~3.3.3.5.5 For special prestressed masonry shearwalls, strain in all prestressing steel shall be computed to be compatible with a strain in the extreme tension reinforcement equal to five times the strain associated with the reinforcement yield stress, f_y. The calculation of the maximum reinforcement shall consider forces in the prestressing steel that correspond to these calculated strains.~~

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

Specific revisions proposed above include:

IBC Section 2108.4 introduces maximum reinforcement limitations for special prestressed masonry shear walls. An identical set of requirements has been incorporated into the 2008 MSJC. As such, this modification is no longer required.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S190–07/08

1704.5.1, 1704.5.2, 1705.3, 1708.1.1, 1708.1.2, 1708.1.3, 1708.1.4, 2104.4, 2101.2.5, 2101.2.5.1 (New), 2101.2.7 (New), 2101.2.8 (New), 2109, 2109.1, 2109.1.1, 2110

Proponent: Phillip J. Samblanet, The Masonry Society

1. Revise as follows:

2101.2.4 Empirical design. Masonry designed by the empirical design method shall comply with the provisions of ~~Sections 2106 and 2109 or~~ Chapter 5 of ACI 530/ASCE 5/TMS 402. In buildings that exceed one or more of the limitations in Section 5.1.2 of ACI 530/ASCE 5/TMS 402, masonry shall be designed in accordance with the engineered design provisions of Section 2101.2.1, 2101.2.2, 2101.2.3 or the foundation wall provisions of Section 1805.5.

2101.2.5 Glass unit masonry. Glass unit masonry shall comply with the provisions of ~~Section 2110 or~~ Chapter 7 of ACI 530/ASCE 5/ TMS 402 and this section.

2. Add new text as follows:

2101.2.5.1 Limitations. Solid or hollow approved glass block shall not be used in fire walls, party walls, fire barriers, fire partitions, or smoke barriers, or for load-bearing construction. Such blocks shall be erected with mortar and reinforcement in metal channel-type frames, structural frames, masonry or concrete recesses, embedded panel anchors as provided for both exterior and interior walls or other approved joint materials. Wood strip framing shall not be used in walls required to have a fire-resistance rating by other provisions of this code.

Exceptions:

1. Glass-block assemblies having a fire protection rating of not less than 3/4 hour shall be permitted as opening protectives in accordance with Section 715 in fire barriers, fire partitions and smoke barriers that have a required fire-resistance rating of 1 hour or less and do not enclose exit stairways, exit ramps, or exit passageways.
2. Glass-block assemblies as permitted in Section 404.5, Exception 2.

2101.2.7 Surface-bonded masonry. Dry-stacked, surface-bonded masonry shall comply with the provisions of Section 2109.

2101.2.8 Adobe masonry. Adobe masonry shall comply with the provisions of Section 2110.

3. Revise as follows:

SECTION 2109
~~EMPIRICAL DESIGN OF MASONRY~~ SURFACE-BONDED MASONRY

2109.1 General. ~~Empirically designed~~ Dry-stacked, surface-bonded masonry shall conform ~~to this chapter or~~ Chapter 5 of ACI 530/ASCE 5/TMS 402 except as modified in this section.

2109.1.1 Limitations. The use of ~~empirical design~~ of dry-stacked, surface-bonded masonry shall be limited as ~~follows:~~ noted in Section 5.1.2 of ACI 530/ASCE 5/TMS 402. The use of dry-stacked, surface-bonded masonry shall be prohibited in Occupancy Category IV structures.

~~1. Empirical design shall not be used for buildings assigned to Seismic Design Category D, E or F as specified in Section 1613, nor for the design of the seismic force-resisting system for buildings assigned to Seismic Design Category B or C.~~
~~2. Empirical design shall not be used for masonry elements that are part of the lateral-force-resisting system where the basic wind speed exceeds 110 mph (79 m/s).~~
~~3. Empirical design shall not be used for interior masonry elements that are not part of the lateral force-resisting system in buildings other than enclosed buildings as defined in Chapter 6 of ASCE 7 in:~~
~~3.1. Buildings over 180 feet (55 100 mm) in height.~~
~~3.2. Buildings over 60 feet (18 400 mm) in height where the basic wind speed exceeds 90 mph (40 m/s).~~
~~3.3. Buildings over 35 feet (10 700 mm) in height where the basic wind speed exceeds 100 mph (45 m/s).~~
~~3.4. Where the basic wind speed exceeds 110 mph (79 m/s).~~

4. ~~Empirical design shall not be used for exterior masonry elements that are not part of the lateral force-resisting system and that are more than 35 feet (10 700 mm) above ground:~~
   ~~4.1. Buildings over 180 feet (55 100 mm) in height.~~
   ~~4.2. Buildings over 60 feet (18 400 mm) in height where the basic wind speed exceeds 90 mph (40 m/s).~~
   ~~4.3. Buildings over 35 feet (10 700 mm) in height where the basic wind speed exceeds 100 mph (45 m/s).~~
5. ~~Empirical design shall not be used for exterior masonry elements that are less than or equal to 35 feet (10 700 mm) above ground where the basic wind speed exceeds 110 mph (79 m/s).~~
6. ~~Empirical design shall only be used when the resultant of gravity loads is within the center third of the wall thickness and within the central area bounded by lines at one-third of each cross-sectional dimension of foundation piers.~~
7. ~~Empirical design shall not be used for AAC masonry.~~

In buildings that exceed one or more of the ~~above~~ limitations in Section 5.1.2 of ACI 530/ASCE 5/TMS 402, masonry shall be designed in accordance with the engineered design provisions of Section ~~2107 or 2108~~ 2101.2.1, 2101.2.2, 2101.2.3 or the foundation wall provisions of Section 1805.5.

4. Delete without substitution:

~~**2109.2 Lateral stability.**~~

~~**2109.2.1 Shear walls.** Where the structure depends upon masonry walls for lateral stability, shear walls shall be provided parallel to the direction of the lateral forces resisted.~~

~~**2109.2.2 Roofs.** The roof construction shall be designed so as not to impart out-of-plane lateral thrust to the walls under roof gravity load.~~

~~**2109.2.3 Surface-bonded walls.** Dry-stacked, surface-bonded concrete masonry walls shall comply with the requirements of this code for masonry wall construction, except where otherwise noted in this section.~~

5. Revise as follows:

~~**2109.2.3.1**~~ **2109.2 Strength.** Dry-stacked, surface-bonded concrete masonry walls shall be of adequate strength and proportions to support all superimposed loads without exceeding the allowable stresses listed in Table ~~2109.2.3.1~~ 2109.2. Allowable stresses not specified in Table ~~2109.2.3.1~~ 2109.2 shall comply with the requirements of ACI 530/ASCE 5/TMS 402.

TABLE ~~2109.2.3.1~~ 2109.2
ALLOWABLE STRESS GROSS CROSS-SECTIONAL AREA FOR DRY-STACKED, SURFACE-BONDED CONCRETE MASONRY WALLS

(Portions of table not shown remain unchanged)

~~**2109.2.3.2**~~ **2109.3 Construction.** Construction of dry-stacked, surface-bonded masonry walls, including stacking and leveling of units, mixing and application of mortar and curing and protection shall comply with ASTM C 946.

6. Delete without substitution:

~~**2109.3 Compressive stress requirements.**~~
~~**2109.3.1 Calculations.** Compressive stresses in masonry due to vertical dead plus live loads, excluding wind or seismic loads, shall be determined in accordance with Section 2109.3.2.1. Dead and live loads shall be in accordance with Chapter 16, with live load reductions as permitted in Section 1607.9.~~

~~**2109.3.2 Allowable compressive stresses.** The compressive stresses in masonry shall not exceed the values given in Table 2109.3.2. Stress shall be calculated based on specified rather than nominal dimensions.~~

~~**2109.3.2.1 Calculated compressive stresses.** Calculated compressive stresses for single wythe walls and for multiwythe composite masonry walls shall be determined by dividing the design load by the gross cross-sectional area of the member. The area of openings, chases or recesses in walls shall not be included in the gross cross-sectional area of the wall.~~

~~**2109.3.2.2 Multiwythe walls.** The allowable stress shall be as given in Table 2109.3.2 for the weakest combination of the units used in each wythe.~~

2109.4 Lateral support.

2109.4.1 Intervals. Masonry walls shall be laterally supported in either the horizontal or vertical direction at intervals not exceeding those given in Table 2109.4.1.

TABLE 2109.4.1
WALL LATERAL SUPPORT REQUIREMENTS

2109.4.2 Thickness. Except for cavity walls and cantilever walls, the thickness of a wall shall be its nominal thickness measured perpendicular to the face of the wall. For cavity walls, the thickness shall be determined as the sum of the nominal thicknesses of the individual wythes. For cantilever walls, except for parapets, the ratio of height-to-nominal thickness shall not exceed 6 for solid masonry or 4 for hollow masonry. For parapets, see Section 2109.5.4.

2109.4.3 Support elements. Lateral support shall be provided by crosswalls, pilasters, buttresses or structural frame members when the limiting distance is taken horizontally, or by floors, roofs acting as diaphragms or structural frame members when the limiting distance is taken vertically.

2109.5 Thickness of masonry. Minimum thickness requirements shall be based on nominal dimensions of masonry.

2109.5.1 Thickness of walls. The thickness of masonry walls shall conform to the requirements of Section 2109.5.

2109.5.2 Minimum thickness.

2109.5.2.1 Bearing walls. The minimum thickness of masonry bearing walls more than one story high shall be 8 inches (203 mm). Bearing walls of one-story buildings shall not be less than 6 inches (152 mm) thick.

2109.5.2.2 Rubble stone walls. The minimum thickness of rough, random or coursed rubble stone walls shall be 16 inches (406 mm).

2109.5.2.3 Shear walls. The minimum thickness of masonry shear walls shall be 8 inches (203 mm).

2109.5.2.4 Foundation walls. The minimum thickness of foundation walls shall be 8 inches (203 mm) and as required by Section 2109.5.3.1.

TABLE 2109.3.2
ALLOWABLE COMPRESSIVE STRESSES FOR EMPIRICAL DESIGN OF MASONRY

2109.5.2.5 Foundation piers. The minimum thickness of foundation piers shall be 8 inches (203 mm).

2109.5.2.6 Parapet walls. The minimum thickness of parapet walls shall be 8 inches (203 mm) and as required by Section 2109.5.4.1.

2109.5.2.7 Change in thickness. Where walls of masonry of hollow units or masonry bonded hollow walls are decreased in thickness, a course or courses of solid masonry shall be interposed between the wall below and the thinner wall above, or special units or construction shall be used to transmit the loads from face shells or wythes above to those below.

2109.5.3 Foundation walls. Foundation walls shall comply with the requirements of Section 2109.5.3.1 or 2109.5.3.2.

2109.5.3.1 Minimum thickness. Minimum thickness for foundation walls shall comply with the requirements of Table 2109.5.3.1. The provisions of Table 2109.5.3.1 are only applicable where the following conditions are met:

1. The foundation wall does not exceed 8 feet (2438 mm) in height between lateral supports;
2. The terrain surrounding foundation walls is graded to drain surface water away from foundation walls;
3. Backfill is drained to remove ground water away from foundation walls;
4. Lateral support is provided at the top of foundation walls prior to backfilling;
5. The length of foundation walls between perpendicular masonry walls or pilasters is a maximum of three times the basement wall height;
6. The backfill is granular and soil conditions in the area are nonexpansive; and
7. Masonry is laid in running bond using TypeMor S mortar.

~~TABLE 2109.5.3.1~~
~~FOUNDATION WALL CONSTRUCTION~~

~~2109.5.3.2 Design requirements.~~ ~~Where the requirements of Section 2109.5.3.1 are not met, foundation walls shall be designed in accordance with Section 1805.5.~~

~~2109.5.4 Parapet walls.~~

~~2109.5.4.1 Minimum thickness.~~ ~~The minimum thickness of unreinforced masonry parapets shall meet Section 2109.5.2.6 and their height shall not exceed three times their thickness.~~

~~2109.5.4.2 Additional provisions.~~ ~~Additional provisions for parapet walls are contained in Sections 1503.2 and 1503.3.~~

~~2109.6 Bond.~~

~~2109.6.1 General.~~ ~~The facing and backing of multiwythe masonry walls shall be bonded in accordance with Section 2109.6.2, 2109.6.3 or 2109.6.4.~~

~~2109.6.2 Bonding with masonry headers.~~

~~2109.6.2.1 Solid units.~~ ~~Where the facing and backing (adjacent wythes) of solid masonry construction are bonded by means of masonry headers, no less than 4 percent of the wall surface of each face shall be composed of headers extending not less than 3 inches (76 mm) into the backing. The distance between adjacent full-length headers shall not exceed 24 inches (610 mm) either vertically or horizontally. In walls in which a single header does not extend through the wall, headers from the opposite sides shall overlap at least 3 inches (76 mm), or headers from opposite sides shall be covered with another header course overlapping the header below at least 3 inches (76 mm).~~

~~2109.6.2.2 Hollow units.~~ ~~Where two or more hollow units are used to make up the thickness of a wall, the stretcher courses shall be bonded at vertical intervals not exceeding 34 inches (864 mm) by lapping at least 3 inches (76 mm) over the unit below, or by lapping at vertical intervals not exceeding 17 inches (432 mm) with units that are at least 50 percent greater in thickness than the units below.~~

~~2109.6.2.3 Masonry bonded hollow walls.~~ ~~In masonry bonded hollow walls, the facing and backing shall be bonded so that not less than 4 percent of the wall surface of each face is composed of masonry bonded units extending not less than 3 inches (76 mm) into the backing. The distance between adjacent bonders shall not exceed 24 inches (610 mm) either vertically or horizontally.~~

~~2109.6.3 Bonding with wall ties or joint reinforcement.~~

~~2109.6.3.1 Bonding with wall ties.~~ ~~Except as required by Section 2109.6.3.1.1, where the facing and backing (adjacent wythes) of masonry walls are bonded with wire size W2.8 (MW18) wall ties or metal wire of equivalent stiffness embedded in the horizontal mortar joints, there shall be at least one metal tie for each 41/2 square feet (0.42 m^2) of wall area. The maximum vertical distance between ties shall not exceed 24 inches (610 mm), and the maximum horizontal distance shall not exceed 36 inches (914 mm). Rods or ties bent to rectangular shape shall be used with hollow masonry units laid with the cells vertical. In other walls, the ends of ties shall be bent to 90-degree (1.57 rad) angles to provide hooks no less than 2 inches (51 mm) long. Wall ties shall be without drips. Additional bonding ties shall be provided at all openings, spaced not more than 36 inches (914 mm) apart around the perimeter and within 12 inches (305 mm) of the opening.~~

~~2109.6.3.1.1 Bonding with adjustable wall ties.~~ ~~Where the facing and backing (adjacent wythes) of masonry are bonded with adjustable wall ties, there shall be at least one tie for each 1.77 square feet (0.164 m^2) of wall area. Neither the vertical nor horizontal spacing of the adjustable wall ties shall exceed 16 inches (406 mm). The maximum vertical offset of bed joints from one wythe to the other shall be 11/4 inches (32 mm). The maximum clearance between connecting parts of the ties shall be 1/16 inch (1.6 mm). When pintle legs are used, ties shall have at least two wire size W2.8 (MW18) legs.~~

~~2109.6.3.2 Bonding with prefabricated joint reinforcement.~~ ~~Where the facing and backing (adjacent wythes) of masonry are bonded with prefabricated joint reinforcement, there shall be at least one cross wire serving as a tie for each 22/3 square feet (0.25m^2) of wall area. The vertical spacing of the joint reinforcing shall not exceed 24 inches (610 mm). Cross wires on prefabricated joint reinforcement shall not be less than W1.7 (MW11) and shall be without drips. The longitudinal wires shall be embedded in the mortar.~~

~~**2109.6.4 Bonding with natural or cast stone.**~~

~~**2109.6.4.1 Ashlar masonry.** In ashlar masonry, bonder units, uniformly distributed, shall be provided to the extent of not less than 10 percent of the wall area. Such bonder units shall extend not less than 4 inches (102 mm) into the backing wall.~~

~~**2109.6.4.2 Rubble stone masonry.** Rubble stone masonry 24 inches (610 mm) or less in thickness shall have bonder units with a maximum spacing of 36 inches (914 mm) vertically and 36 inches (914 mm) horizontally, and if the masonry is of greater thickness than 24 inches (610 mm), shall have one bonder unit for each 6 square feet (0.56 m^2) of wall surface on both sides.~~

~~**2109.6.5 Masonry bonding pattern.**~~

~~**2109.6.5.1 Masonry laid in running bond.** Each wythe of masonry shall be laid in running bond, head joints in successive courses shall be offset by not less than one-fourth the unit length or the masonry walls shall be reinforced longitudinally as required in Section 2109.6.5.2.~~

~~**2109.6.5.2 Masonry laid in stack bond.** Where unit masonry is laid with less head joint offset than in Section 2109.6.5.1, the minimum area of horizontal reinforcement placed in mortar bed joints or in bond beams spaced not more than 48 inches (1219 mm) apart, shall be 0.0003 times the vertical cross-sectional area of the wall.~~

~~**2109.7 Anchorage.**~~

~~**2109.7.1 General.** Masonry elements shall be anchored in accordance with Sections 2109.7.2 through 2109.7.4.~~

~~**2109.7.2 Intersecting walls.** Masonry walls depending upon one another for lateral support shall be anchored or bonded at locations where they meet or intersect by one of the methods indicated in Sections 2109.7.2.1 through 2109.7.2.5.~~

~~**2109.7.2.1 Bonding pattern.** Fifty percent of the units at the intersection shall be laid in an overlapping masonry bonding pattern, with alternate units having a bearing of not less than 3 inches (76 mm) on the unit below.~~

~~**2109.7.2.2 Steel connectors.** Walls shall be anchored by steel connectors having a minimum section of 1/4 inch (6.4 mm) by 11/2 inches (38 mm), with ends bent up at least 2 inches (51 mm) or with cross pins to form anchorage. Such anchors shall be at least 24 inches (610 mm) long and the maximum spacing shall be 48 inches (1219 mm).~~

~~**2109.7.2.3 Joint reinforcement.** Walls shall be anchored by joint reinforcement spaced at a maximum distance of 8 inches (203 mm). Longitudinal wires of such reinforcement shall be at least wire size W1.7 (MW 11) and shall extend at least 30 inches (762 mm) in each direction at the intersection.~~

~~**2109.7.2.4 Interior nonload-bearing walls.** Interior nonload-bearing walls shall be anchored at their intersection, at vertical intervals of not more than 16 inches (406 mm) with joint reinforcement or 1/4-inch (6.4 mm) mesh galvanized hardware cloth.~~

~~**2109.7.2.5 Ties, joint reinforcement or anchors.** Other metal ties, joint reinforcement or anchors, if used, shall be spaced to provide equivalent area of anchorage to that required by this section.~~

~~**2109.7.3 Floor and roof anchorage.** Floor and roof diaphragms providing lateral support to masonry shall comply with the live loads in Section 1607.3 and shall be connected to the masonry in accordance with Sections 2109.7.3.1 through 2109.7.3.3. Roof loading shall be determined in accordance with Chapter 16 and, when net uplift occurs, uplift shall be resisted entirely by an anchorage system designed in accordance with the provisions of Sections 2.1 and 2.3, Sections 3.1 and 3.3 or Chapter 4 of ACI 530/ASCE 5/TMS 402.~~

~~**2109.7.3.1Wood floor joists.** Wood floor joists bearing on masonry walls shall be anchored to the wall at intervals not to exceed 72 inches (1829 mm) by metal strap anchors. Joists parallel to thewall shall be anchored with metal straps spaced not more than 72 inches (1829 mm) o.c. extending over or under and secured to at least three joists. Blocking shall be provided between joists at each strap anchor.~~

~~**2109.7.3.2 Steel floor joists.** Steel floor joists bearing on masonry walls shall be anchored to the wall with 3/8-inch (9.5 mm) round bars, or their equivalent, spaced not more than 72 inches (1829 mm) o.c. Where joists are parallel to the wall, anchors shall be located at joist bridging.~~

~~**2109.7.3.3 Roof diaphragms.** Roof diaphragms shall be anchored to masonry walls with 1/2-inch-diameter (12.7 mm) bolts, 72 inches (1829 mm) o.c. or their equivalent. Bolts shall extend and be embedded at least 15 inches (381 mm) into the masonry, or be hooked or welded to not less than 0.20 square inch (129 mm2) of bond beam reinforcement placed not less than 6 inches (152 mm) from the top of the wall.~~

~~**2109.7.4 Walls adjoining structural framing.** Where walls are dependent upon the structural frame for lateral support, they shall be anchored to the structural members with metal anchors or otherwise keyed to the structural members. Metal anchors shall consist of 1/2 inch (12.7 mm) bolts spaced at 48 inches (1219 mm) o.c. embedded 4 inches (102 mm) into the masonry, or their equivalent area.~~

7. Revise as follows:

SECTION 2110
ADOBE MASONRY

~~**2109.8**~~ **2110.1 Adobe construction.** Adobe construction shall comply with this section and shall be subject to the requirements of this code for Type V construction and Chapter 5 of ACI 530/ASCE 5/TMS 402.

8. Add new text as follows:

2110.1.1 Limitations. The use of adobe masonry shall be limited as noted in Section 5.1.2 of ACI 530/ASCE 5/TMS 402. The use of adobe masonry shall be prohibited in Occupancy Category IV structures.

In buildings that exceed one or more of the limitations in Section 5.1.2 of ACI 530/ASCE 5/TMS 402, masonry shall be designed in accordance with the engineered design provisions of Section 2101.2.1, 2101.2.2, 2101.2.3 or the foundation wall provisions of Section 1805.5.

Renumber remainder of Section 2109.8

9. Delete Section 2110.1 Scope through Section 2110.7 Reinforcement without substitution.

10. Revise as follows:

1704.5 Masonry construction. Masonry construction shall be inspected and evaluated in accordance with the requirements of Sections 1704.5.1 through 1704.5.3, depending on the classification of the building or structure or nature of the occupancy, as defined by this code.

Exception: Special inspections shall not be required for:

1. Empirically designed masonry, glass unit masonry, ~~or~~ masonry veneer, surface-bonded masonry or adobe masonry designed by Section ~~2109, 2110 or Chapter 14, respectively, or by Chapter 5, 7 or 6 of ACI 530/ASCE 5/TMS 402~~ 2101.2.4, 2101.2.5, 2101.2.6, 2101.2.7, or 2101.2.8, respectively, when they are part of structures classified as Occupancy Category I, II or III in accordance with Section 1604.5.
2. Masonry foundation walls constructed in accordance with Table 1805.5(1), 1805.5(2), 1805.5(3) or 1805.5(4).
3. Masonry fireplaces, masonry heaters or masonry chimneys installed or constructed in accordance with Section 2111, 2112 or 2113, respectively.

1704.5.1 Empirically designed masonry, glass unit masonry and masonry veneer in Occupancy Category IV. The minimum special inspection program for empirically designed masonry, glass unit masonry or masonry veneer designed by Section ~~2109, 2110 or Chapter 14, respectively, or by Chapter 5, 7 or 6 of ACI 530/ASCE 5/TMS 402~~ 2101.2.4, 2101.2.5, or 2101.2, respectively, in structures classified as Occupancy Category IV, in accordance with Section 1604.5, shall comply with Table 1704.5.1.

1704.5.2 Engineered masonry in Occupancy Category I, II or III. The minimum special inspection program for masonry designed by Section ~~2107 or 2108 or by chapters other than Chapters 5, 6 or 7 of ACI 530/ASCE 5/TMS 402~~ 2101.2.1, 2101.2.2 or 2101.2 in structures classified as Occupancy Category I, II or III, in accordance with Section 1604.5, shall comply with Table 1704.5.1.

1704.5.3 Engineered masonry in Occupancy Category IV. The minimum special inspection program for masonry designed by Section ~~2107 or 2108 or by chapters other than Chapters 5, 6 or 7 of ACI 530/ASCE 5/TMS 402~~ 2101.2.1, 2101.2.2 or 2101.2 in structures classified as Occupancy Category IV, in accordance with Section 1604.5, shall comply with Table 1704.5.3.

1708.1.1 Empirically designed masonry, ~~and~~ glass unit masonry, surface-bonded masonry and adobe masonry in Occupancy Category I, II or III. For masonry designed by Section ~~2109 or 2110 or by Chapter 5 or 7 of ACI 530/ASCE 5/TMS 402~~ 2101.2.4, 2101.2.5, 2101.2.7, or 2101.2.8 in structures classified as Occupancy Category I, II or III, in accordance with Section 1604.5, certificates of compliance used in masonry construction shall be verified prior to construction.

1708.1.2 Empirically designed masonry and glass unit masonry in Occupancy Category IV. The minimum testing and verification prior to construction for masonry designed by Section ~~2109 or 2110 or by Chapter 5 or 7 of ACI 530/ASCE 5/TMS 402~~ 2101.2.4 or 2101.2.5 in structures classified as Occupancy Category IV, in accordance with Section 1604.5, shall comply with the requirements of Table 1708.1.2.

1708.1.3 Engineered masonry in Occupancy Category I, II or III. The minimum testing and verification prior to construction for masonry designed by Section ~~2107 or 2108 or by chapters other than Chapter 5, 6 or 7 of ACI 530/ASCE 5/TMS 402~~ 2101.2.1, 2101.2.2 or 2101.2.3 in structures classified as Occupancy Category I, II or III, in accordance with Section 1604.5, shall comply with Table 1708.1.2.

1708.1.4 Engineered masonry in Occupancy Category IV. The minimum testing and verification prior to construction for masonry designed by Section ~~2107 or 2108 or by chapters other than Chapter 5, 6 or 7 of ACI 530/ASCE 5/TMS 402~~ 2101.2.1, 2101.2.2 or 2101.2.3 in structures classified as Occupancy Category IV, in accordance with Section 1604.5, shall comply with Table 1708.1.4.

Reason: This proposal is essentially identical to a proposal submitted during the last supplement cycle for the IBC, which was recommended for approval as modified by the IBC Structural Subcommittee, and which was narrowly overturned on the floor in Rochester. It is being brought back for reconsideration because the change greatly simplifies the Code for building officials, designers, and inspectors. Opposition to the change was procedural (globally), not technical. The primary opposition related to concerns about taking critical provisions out of the I-Codes. While this is a valid concern, and while the proponents share the goal to have building officials involved in the development of all provisions in, or referenced by the I-Codes, the use of referenced standards are nevertheless widely used throughout the I-Codes for many good reasons (including having experts, overseen by consensus procedures for adequate balance and consideration of all issue, focusing on issues of interest, and reducing burdens on code officials in overseeing often esoteric, technical, or specialized provisions).

This change is proposed again with the hopes that those good reasons are still supported and with the intent of simplifying the Code for building officials, designers, contractors and inspectors. The proposed revisions will remove duplicate provisions, thus simplifying the IBC and reducing the chance that the provisions in the IBC and the referenced standard vary unnecessarily. In addition, for clarity, the provisions for Surface-bonded masonry and Adobe Masonry are proposed to be moved to separate chapters.

To maintain a clear and logical inspection path, section references are updated in Chapter 17 to be consistent with proposed revisions in Chapter 21. With the exceptions noted below, these revisions do not change the application of the inspection provisions, but rather more clearly and easily identify which requirements apply to which design method.

To the best of the proponents' knowledge, this change has no technical impact with one exception. Currently, it could be interpreted that the IBC permits the use of surface bonded masonry and adobe masonry in essential facilities classified as Occupancy Category IV. The proponents are not sure this was truly the intent of the IBC and thus have proposed prohibiting the use of these methods from Occupancy Category IV.

If this change is not approved, revisions made to TMS 402-08/ACI 530-08/ASCE 5-08 should be considered if these provisions are to remain consistent with the referenced standard. If not, the IBC may conflict the referenced standard causing design construction and inspection confusion.

In this change is approved, future updates to empirical requirements and glass unit masonry provisions will be balloted in the consensus Masonry Standards Joint Committee, which is charged with updating the TMS 402/ACI 530/ASCE 5. This forum welcomes input from all segments of the design and construction community, and would appreciate active participation by building officials interested in masonry. In addition, public comment forums are open to the general public by TMS, ACI and ASCE and provide building officials and others an opportunity to view and comment on proposed changes. All such comments must be considered before the next version of the provisions are finalized. Those interested in working with the committee or reviewing proposed changes to these consensus standards are encouraged to contact the proponents to be added to the committee contact list.

One final clarification. During the Rochester hearings, opposition to this change noted concerns with the high cost of having to purchase numerous referenced standards to be able to effectively use the IBC. The proponents share this concern, and note that this proposed change does not require a building official, inspector, designer, or anyone else using the I-Code to have any additional references above those already required.

We are hopeful that this change will be approved as it will simplify and streamline the code, making application easier for designers, contractors, building officials and inspectors.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S191–07/08

2109.1, 2109.2.3.1, Table 2109.3.2, 2109.4.1, Figure 2109.4.1, 2109.4.2, 2109.6.2.1, 2109.6.2.2, 2109.6.3.1, 2106.3.1.1, 2109.6.3.2, 2109.7.3.2, 2109.7.3.3, 2109.7.3.4 (New), 2109.8.4.7

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

1. Revise as follows:

2109.1 General. Empirically designed masonry shall conform to this chapter or Chapter 5 of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5.

2109.2.1.1 Cumulative length of shear walls. In each direction in which shear walls are required for lateral stability, shear walls shall be positioned in at least two separate planes. The minimum cumulative length of shear walls provided shall be 0.4 ~~times~~ multiplied by the long dimension of the building. Cumulative length of shear walls shall not include openings or any element with a length that is less than one-half its height.

2109.2.3.1 Strength. Dry-stacked, surface-bonded concrete masonry walls shall be of adequate strength and proportions to support all superimposed loads without exceeding the allowable stresses listed in Table 2109.2.3.1. Allowable stresses not specified in Table 2109.2.3.1 shall comply with the requirements of ~~ACI 530/ASCE 5/TMS 402~~ TMS 402/ACI 530/ASCE 5.

TABLE 2109.3.2
ALLOWABLE COMPRESSIVE STRESSES FOR EMPIRICAL DESIGN OF MASONRY

CONSTRUCTION; COMPRESSIVE STRENGTH OF UNIT GROSS AREA (psi)	ALLOWABLE COMPRESSIVE STRESSES[a] GROSS CROSS-SECTIONAL AREA (psi)	
	Type M or S mortar	Type N mortar
Solid masonry of brick and other solid units of clay or shale; sand-lime or concrete brick:		
8,000 or greater	350	300
4,500	225	200
2,500	160	140
1,500	115	100
Grouted masonry, of clay or shale; sand-lime or concrete:		
4,500 or greater	225	200
2,500	160	140
1,500	115	100
Solid masonry of solid concrete masonry units:		
3,000 or greater	225	200
2,000	160	140
1,200	115	100
Masonry of hollow load-bearing units of clay or shale:		
2,000 or greater	140	120
1,500	115	100
1,000	75	70
700	60	55
Masonry of hollow load bearing concrete masonry units, up to and including 8 in. nominal thickness:		
2000 or greater	140	120
1500	115	100
1000	75	70
700	60	55
Masonry of hollow load bearing concrete masonry units, greater than 8 and up to 12 in. nominal thickness:		
2000 or greater	125	110
1500	105	90
1000	65	60
700	55	50

CONSTRUCTION; COMPRESSIVE STRENGTH OF UNIT GROSS AREA (psi)	ALLOWABLE COMPRESSIVE STRESSES[a] GROSS CROSS-SECTIONAL AREA (psi)	
	Type M or S mortar	Type N mortar
Masonry of hollow load bearing concrete masonry units, 12 in. nominal thickness and greater:		
2000 or greater	115	100
1500	95	85
1000	60	55
700	50	45
Hollow walls (noncomposite masonry bonded)[b]		
Solid units:		
2,500 or greater	160	140
1,500	115	100
Hollow units of clay or shale	75	70
Hollow units of concrete masonry of nominal thickness		
up to and including 8 in.	75	70
greater than 8 and up to 12 in.	70	65
12 in.and greater:	60	55
Stone ashlar masonry:		
Granite	720	640
Limestone or marble	450	400
Sandstone or cast stone	360	320
Rubble stone masonry		
Coursed, rough or random	120	100

For SI: 1 pound per square inch = 0.006895MPa.

a. Linear interpolation for determining allowable stresses for masonry units having compressive strengths which are intermediate between those given in the table is permitted.

b. Where floor and roof loads are carried upon one wythe, the gross cross-sectional area is that of the wythe under load; if both wythes are loaded, the gross cross-sectional area is that of the wall minus the area of the cavity between the wythes. Walls bonded with metal ties shall be considered as noncomposite walls unless collar joints are filled with mortar or grout.

2109.4.1 ~~Intervals~~ Maximum *l/t* and *h/t*. Masonry walls without openings shall be laterally supported in either the horizontal or vertical direction such that *l/t* or *h/t* does ~~at intervals~~ not exceeding ~~those~~ the values given in Table 2109.4.1. Masonry walls with single or multiple openings shall be laterally supported in either the horizontal or vertical direction such that *l/t* or *h/t* does not exceed the values given in Table 2109.4.1 divided by $\sqrt{W_T/W_S}$.

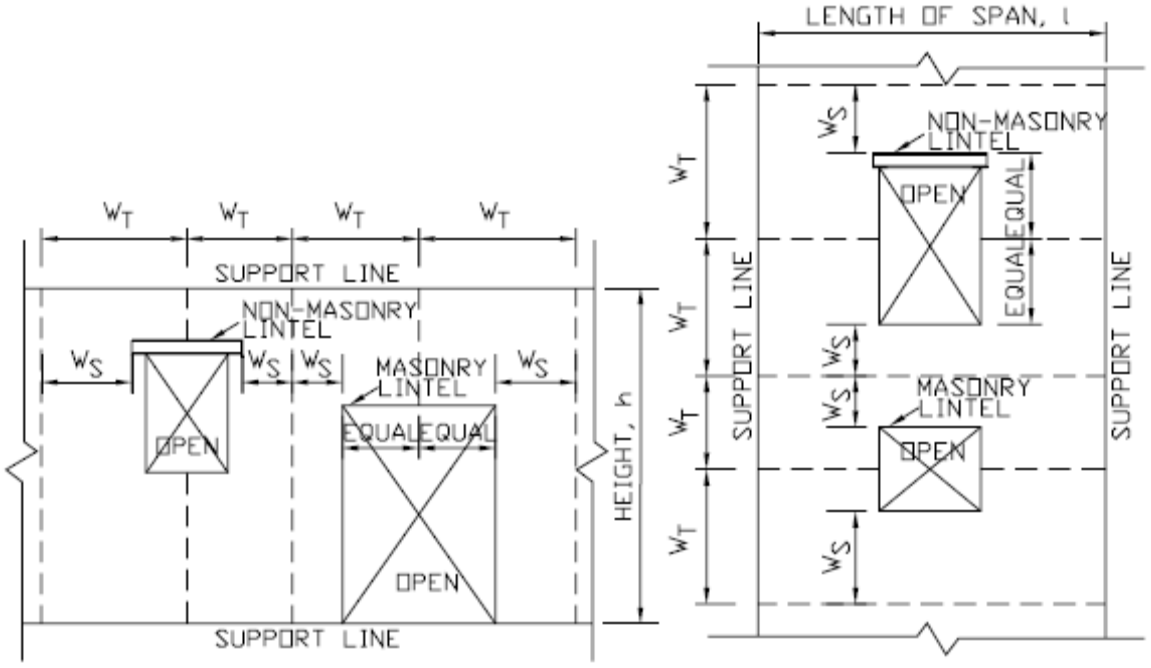
W_S is the dimension of the structural wall strip measured perpendicular to the span of the wall strip and perpendicular to the thickness as shown in Figure 2109.4.1. W_S is measured from the edge of the opening. W_S shall be no less than 3*t* on each side of each opening. Therefore, at walls with multiple openings, jambs shall be no less than 6*t* between openings. For design purposes, the effective W_S shall not be assumed to be greater than 6*t*. At non-masonry lintels, the edge of the opening shall be considered the edge of the non-masonry lintel. W_S shall occur uninterrupted over the full span of the wall.

W_T is the dimension, parallel to W_S, from the center of the opening to the opposite end of W_S as shown in Figure 2109.4.1. Where there are multiple openings perpendicular to W_S, W_T shall be measured from the center of a virtual opening that encompasses such openings. Masonry elements within the virtual opening must be designed in accordance with Section 2107 or 2108.

For walls with openings that span no more than 4 feet (1219 mm), parallel to W_S, if W_S is no less than 4 feet (1219 mm), then it shall be permitted to ignore the effect of those openings.

The span of openings, parallel to W_S, shall be limited such that the span divided by *t* does not exceed the values given in Table 2109.4.1.

In addition to these limitations, lintels shall be designed for gravity loads in accordance with Section 2109.8.4.7



W_S and W_T for Walls Spanning Vertically

W_S and W_T for Walls Spanning Horizontally

FIGURE 2109.4.1
GRAPHICAL REPRESENTATION OF W_S AND W_T

TABLE 2109.4.1
WALL LATERAL SUPPORT REQUIREMENTS

CONSTRUCTION	MAXIMUM WALL LENGTH TO THICKNESS OR WALL HEIGHT TO THICKNESS
Bearing walls	
Solid units or fully grouted	
Other than solid units or fully grouted ~~All other~~	20
	18
Nonbearing walls	
Exterior	18
Interior	36

2109.4.2 Thickness. ~~Except for cavity walls and cantilever walls, the thickness of a wall shall be its nominal thickness measured perpendicular to the face of the wall. For cavity walls, the thickness shall be determined as the sum of the nominal thicknesses of the individual wythes.~~ For cantilever walls, except for parapets, the ratio of height-to-nominal thickness shall not exceed 6 for solid masonry or 4 for hollow masonry. For parapets, see Section 2109.5.4.

2109.6.2.1 Solid units. Where ~~the facing and backing (~~adjacent wythes~~)~~ of solid masonry ~~construction~~ walls are bonded by means of masonry headers, no less than 4 percent of the wall surface area of each face shall be composed of headers extending not less than 3 inches (76 mm) into ~~the backing~~ each wythe. The distance between adjacent full-length headers shall not exceed 24 inches (610 mm) either vertically or horizontally. In walls in which a single header does not extend through the wall, headers from the opposite sides shall overlap at least 3 inches (76 mm), or headers from opposite sides shall be covered with another header course overlapping the header below at least 3 inches (76 mm).

2109.6.2.2 Hollow units. Where two or more wythes are constructed using hollow units ~~are used to make up the thickness of a wall~~, the stretcher courses shall be bonded at vertical intervals not exceeding 34 inches (864 mm) by lapping at least 3 inches (76 mm) over the unit below, or by lapping at vertical intervals not exceeding 17 inches (432 mm) with units that are at least 50 percent greater in thickness than the units below.

2109.6.3.1 Bonding with wall ties. Except as required by Section 2109.6.3.1.1, where ~~the facing and backing (~~adjacent wythes~~)~~ of masonry walls are bonded with wire size W2.8 (MW18) wall ties or metal wire of equivalent stiffness embedded in the horizontal mortar joints, there shall be at least one metal tie for each 4 1/2 square feet (0.42

m_2) of wall area. The maximum vertical distance between ties shall not exceed 24 inches (610 mm), and the maximum horizontal distance shall not exceed 36 inches (914 mm). Rods or ties bent to rectangular shape shall be used with hollow masonry units laid with the cells vertical. In other walls, the ends of ties shall be bent to 90-degree (1.57 rad) angles to provide hooks no less than 2 inches (51 mm) long. Wall ties shall be without drips. Additional bonding ties shall be provided at all openings, spaced not more than 36 inches (914 mm) apart around the perimeter and within 12 inches (305 mm) of the opening.

2109.6.3.1.1 Bonding with adjustable wall ties. Where ~~the facing and backing (~~adjacent wythes~~)~~ of masonry are bonded with adjustable wall ties, there shall be at least one tie for each 1.77 square feet (0.164 m_2) of wall area. Neither the vertical nor horizontal spacing of the adjustable wall ties shall exceed 16 inches (406 mm). The maximum vertical offset of bed joints from one wythe to the other shall be 1¼ inches (32 mm). The maximum clearance between connecting parts of the ties shall be $1/16$ inch (1.6 mm). When pintle legs are used, ties shall have at least two wire size W2.8 (MW18) legs.

2109.6.3.2 Bonding with prefabricated joint reinforcement. Where ~~the facing and backing (~~adjacent wythes~~)~~ of masonry are bonded with prefabricated joint reinforcement, there shall be at least one cross wire serving as a tie for each 2 2/3 square feet ($0.25m^2$) of wall area. The vertical spacing of the joint reinforcing shall not exceed 24 inches (610 mm). Cross wires on prefabricated joint reinforcement shall not be less than W1.7 (MW11) and shall be without drips. The longitudinal wires shall be embedded in the mortar.

2109.7.3.2 Steel ~~floor~~ joists. Steel ~~floor~~ joists ~~bearing on~~ masonry walls shall bear on and be connected to steel bearing plates. Maximum joist spacing shall be 6 ft (1829 mm) on center. Each bearing plate shall be anchored to the wall with ~~3/8 inch (9.5 mm) round bars~~ a minimum of two ½ in. (12.7 mm) diameter bolts, or their equivalent~~, spaced not more than 72 inches (1829 mm) o.c.~~ Where steel joists are parallel to the wall, anchors shall be located ~~at~~ where joist bridging terminates at the wall and additional anchorage shall be provided to comply with Section 2109.7.3.3.

2109.7.3.3 Roof and floor diaphragms. Roof and floor diaphragms shall be anchored to masonry walls with ~~1/2-inch-diameter~~ a minimum of ½ in. (12.7 mm) bolts, at a maximum spacing of 72 inches (1829 mm) o.c. or their equivalent. ~~Bolts shall extend and be embedded at least 15 inches (381 mm) into the masonry, or be hooked or welded to not less than 0.20 square inch (129 mm2) of bond beam reinforcement placed not less than 6 inches (152 mm) from the top of the wall.~~

2109.7.3.4 Bolts and anchors. Bolts and anchors required by Sections 2109.7.3.2 and 2109.7.3.3 shall comply with the following:

1. Bolts and anchors at steel floor joists and floor diaphragms shall be embedded in the masonry at least 6 in. (152 mm) or shall comply with Section 2109.7.3.4, item 3.
2. Bolts at steel roof joists and roof diaphragms shall be embedded in the masonry at least 15 in. (381 mm) or shall comply with Section 2109.7.3.4, item 3.
3. In lieu of the embedment lengths listed in Sections 21097.3.4, item 1 and 2109.7.3.4, item 2, bolts shall be permitted to be hooked or welded to not less than 0.20 in.2 (129 mm^2) of bond beam reinforcement placed not less than 6 in. (152 mm) below joist bearing or bottom of diaphragm.

2109.8.4.7 Lintels. Lintels shall be considered structural members and shall be designed in accordance with the applicable provisions of Chapter 16 and Sections 2107 or 2108.

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

Specific revisions proposed above include:

Section 2109 has undergone significant revisions during the 2008 Code Cycle. The IBC contains these same provisions transcribed from the MSJC and these sections of the IBC need to have the same revisions made to them to avoid a conflict between the code and the standard. The most significant of these changes serves to place additional limitations on the use of empirical design for walls with openings.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S192–07/08
2110.3.3, Figure 2110.3.1

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards

Revise as follows:

2110.3.3 Interior panels. Where the wind pressure does not exceed 10 psf (480 Pa), ~~T~~the maximum area of each individual standard-unit panel shall be 250 square feet (23.2 m^2)~~. The~~ and the maximum area of each thin-unit panel shall be 150 square feet (13.9 m^2). The maximum dimension between structural supports shall be 25 feet (7620 mm) in width or 20 feet (6096 mm) in height. Where the wind pressure exceeds 10 psf (480 Pa), standard-unit panels shall be designed in accordance with Section 2110.3.1 and thin-unit panels shall be designed in accordance with Section 2110.3.2.

FIGURE 2110.3.1
GLASS UNIT MASONRY DESIGN WIND LOAD RESISTANCE

(Portions of figure not shown remain unchanged)

Reason: The revisions proposed in this code change reflect editorial and substantive revisions incorporated into the 2008 edition of the Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5), commonly referred to as the Masonry Standard Joint Committee (MSJC) Code. This code change proposal is one of several to harmonize the design and construction requirements for masonry within the IBC with those in the reference standard. A complete list of revisions incorporated into the reference standard is available for download at www.masonrystandards.org.

Specific revisions proposed above include:

Section 2110 has had minor revisions during the 2008 Code Cycle. The IBC contains these same provisions transcribed from the MSJC and these sections of the IBC need to have the same revisions made to them to avoid a conflict between the code and the standard.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S193–07/08
2111.3, 2111.4, 2113.3, 2113.4

Proponent: Jim W. Sealy, FAIA, and Perry A. Haviland, FAIA, Building Seismic Safety Council of the National Institute of Building Sciences, representing FEMA/BSSC Code Resource Support Committee

Revise as follows:

2111.3 Seismic reinforcing. Masonry or concrete fireplaces shall be constructed, anchored, supported and reinforced as required in this chapter. In Seismic Design Category C or D, masonry and concrete fireplaces shall be reinforced and anchored as detailed in Sections 2111.3.1, 2111.3.2, 2111.4 and 2111.4.1 for chimneys serving fireplaces. In Seismic Design Category A, or B ~~or C~~, reinforcement and seismic anchorage is not required. In Seismic Design Category E or F, masonry and concrete chimneys shall be reinforced in accordance with the requirements of Sections 2101 through 2108.

2111.4 Seismic anchorage. Masonry and concrete chimneys in Seismic Design Category C or D shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade, except where constructed completely within the exterior walls. Anchorage shall conform to the following requirements.

2113.3 Seismic reinforcing. Masonry or concrete chimneys shall be constructed, anchored, supported and reinforced as required in this chapter. In Seismic Design Category C or D, masonry and concrete chimneys shall be reinforced and anchored as detailed in Sections 2113.3.1, 2113.3.2 and 2113.4. In Seismic Design Category A, or B ~~or C~~, reinforcement and seismic anchorage is not required. In Seismic Design Category E or F, masonry and concrete chimneys shall be reinforced in accordance with the requirements of Sections 2101 through 2108.

2113.4 Seismic anchorage. Masonry and concrete chimneys and foundations in Seismic Design Category C or D shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade, except where constructed completely within the exterior walls. Anchorage shall conform to the following requirements.

Reason: The purpose of this change is to extend the IBC provisions for reinforcing and anchorage of masonry and concrete fireplaces and chimneys to Seismic Design Category C. Many unreinforced masonry chimneys have been damaged during moderate earthquakes that have occurred in Seismic Design Category C locations such as the Nisqually Washington Earthquake (2001), Borah Peak Idaho Earthquake (1983) and the Coalinga California Earthquake (1983), damaged many unreinforced chimneys. In the case of the Borah Peak earthquake, a loss of life occurred due to the collapse of a masonry chimney at a dwelling ("The Boarah Peak, Idaho, Earthquake of October 18, 1983," *Earthquake Spectra* 2, No. 1, November 1985: 1-248).

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S194–07/08
2111.8; IRC R1001.8

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards (MACS) & Clay Flue Lining Institute (CFLI)

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Revise as follows:

2111.8 Smoke chamber walls. Smoke chamber walls shall be constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete. The total minimum thickness of front, back and side walls shall be 8 inches (203 mm) of solid masonry. The inside surface shall be parged smooth with refractory mortar conforming to ASTM C 199. ~~Corbeling of masonry units shall not leave unit cores exposed to the inside of the smoke chamber. The inside surface of corbeled masonry shall be parged smooth. Where no lining is provided, the total minimum thickness of front, back and sidewalls shall be 8 inches (203 mm) of solid masonry.~~ When a lining of firebrick at least 2 inches (51 mm) thick, or a lining of vitrified clay at least 5/8 inch (15.9 mm) thick, is provided, the total minimum thickness of front, back and sidewalls shall be 6 inches (152 mm) of solid masonry, including the lining. Firebrick shall conform to ASTM ~~C 27 or~~ ASTM C 1261 and shall be laid with refractory mortar conforming to ASTM C 199. Vitrified clay linings shall conform to ASTM C 315.

PART II – IRC BUILDING/ENERGY

Revise as follows:

R1001.8 Smoke chamber. Smoke chamber walls shall be constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete. The total minimum thickness of front, back and side walls shall be 8 inches (203 mm) of solid masonry. The inside surface shall be parged smooth with refractory mortar conforming to ASTM C 199. ~~Corbelling of masonry units shall not leave unit cores exposed to the inside of the smoke chamber.~~ When a lining of firebrick at least 2 inches (51 mm) thick, or a lining of vitrified clay at least 5/8 inch (16 mm) thick, is provided, the total minimum thickness of front, back and side walls shall be 6 inches (152 mm) of solid masonry, including the lining. Firebrick shall conform to ASTM ~~C 27 or~~ C 1261 and shall be laid with medium duty refractory mortar conforming to ASTM C 199. Vitrified clay linings shall conform to ASTM C 315. ~~Where no lining is provided, the total minimum thickness of front, back and side walls shall be 8 inches (203 mm) of solid masonry. When the inside surface of the smoke chamber is formed by corbeled masonry, the inside surface shall be parged smooth.~~

Reason: To require at least some liner able to withstand 1800 degrees F as required of all the other fireplace and chimney lining materials. Cores in corbelled masonry will be covered if the smoke chamber is required to be parged with refractory mortar anyway. Also to reference appropriate ASTM standards.

Cost Impact: The code change proposal will increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S195–07/08
2113.1; IRC R1003.1

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards (MACS) & Clay Flue Lining Institute (CFLI)

PART I – IBC STRUCTURAL

Revise as follows:

2113.1 Definition. A masonry chimney is a chimney constructed of ~~concrete or masonry~~ solid masonry units, hollow masonry units grouted solid, stone or concrete, hereinafter referred to as "masonry." Masonry chimneys shall be constructed, anchored, supported and reinforced as required in this chapter.

PART II – IRC BUILDING/ENERGY

Revise as follows:

R1003.1 Definition. A masonry chimney is a chimney constructed of ~~concrete or masonry~~ solid masonry units, hollow masonry units grouted solid, stone or concrete, hereinafter referred to as masonry. Masonry chimneys shall be constructed, anchored, supported and reinforced as required in this chapter.

Reason: To make language same as fireplaces and smoke chambers.

Cost Impact: The code change proposal will not increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S196–07/08
2113.19; IRC R1003.18

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards (MACS) & Clay Flue Lining Institute (CFLI)

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Revise as follows:

2113.19 Chimney clearances. Any portion of a masonry chimney located in the interior of the building or within the exterior wall of the building shall have a minimum airspace clearance to combustibles of 2 inches (51 mm). Chimneys located entirely outside the exterior walls of the building, including chimneys that pass through the soffit or cornice, shall have a minimum airspace clearance of 1 inch (25 mm). The airspace shall not be filled, except to provide fireblocking in accordance with Section 2113.20.

Exceptions:

1. Masonry chimneys equipped with a chimney lining system listed and labeled for use in chimneys in contact with combustibles in accordance with UL 1777, and installed in accordance with the manufacturer's instructions, are permitted to have combustible material in contact with their exterior surfaces.
2. Where masonry chimneys are constructed as part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete wall less than ~~12 inches (305 mm)~~ 8 inches (203 mm) from the inside surface of the nearest flue lining.
3. Exposed combustible trim and the edges of sheathing materials, such as wood siding, are permitted to abut the masonry chimney sidewalls, in accordance with Figure 2113.19, provided such combustible trim or sheathing is a minimum of ~~12 inches (305 mm)~~ 8 inches (203 mm) from the inside surface of the nearest flue lining. Combustible material and trim shall not overlap the corners of the chimney by more than 1 inch (25 mm).

PART II – IRC BUILDING/ENERGY

Revise as follows:

R1003.18 Chimney clearances. Any portion of a masonry chimney located in the interior of the building or within the exterior wall of the building shall have a minimum air space clearance to combustibles of 2 inches (51 mm). Chimneys located entirely outside the exterior walls of the building, including chimneys that pass through the soffit or cornice, shall have a minimum air space clearance of 1 inch (25 mm). The air space shall not be filled, except to provide fire blocking in accordance with Section R1003.19.

Exceptions:

1. Masonry chimneys equipped with a chimney lining system listed and labeled for use in chimneys in contact with combustibles in accordance with UL 1777 and installed in accordance with the manufacturer's installation instructions are permitted to have combustible material in contact with their exterior surfaces.
2. When masonry chimneys are constructed as part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete wall less than ~~12 inches (305 mm)~~ 8 inches (203 mm) from the inside surface of the nearest flue lining.
3. Exposed combustible trim and the edges of sheathing materials, such as wood siding and flooring, shall be permitted to abut the masonry chimney side walls, in accordance with Figure R1003.18, provided such combustible trim or sheathing is a minimum of ~~12 inches (305 mm)~~ 8 inches (203 mm) from the inside surface of the nearest flue lining. Combustible material and trim shall not overlap the corners of the chimney by more than 1 inch (25 mm).

Reason: To be consistent and proportional to the 8" firebox walls and 4" chimneys wall requirements. 12" thickness is excessive for chimney walls as demonstrated by fire safety testing.

Cost Impact: The code change proposal will not increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S197–07/08
2113.9; IRC R1003.9.1 (New), R1003.9.3 (New), R1003.9.4 (New)

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards (MACS) & Clay Flue Lining Institute (CFLI)

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

1. Revise as follows:

2113.9.1 Chimney caps. Masonry chimneys shall have a concrete, metal or stone cap, sloped to shed water, a drip edge and caulked bond break around any flue liners in accordance with ASTM C 1283.

~~**2113.9.1**~~ **2113.9.2 Spark arrestors.** Where a spark arrestor is installed on a masonry chimney, the spark arrestor shall meet all of the following requirements:

1. The net free area of the arrestor shall not be less than four times the net free area of the outlet of the chimney flue it serves.
2. The arrestor screen shall have heat and corrosion resistance equivalent to 19-gage galvanized steel or 24-gage stainless steel.
3. Openings shall not permit the passage of spheres having a diameter greater than 1/2 inch (13 mm) nor block the passage of spheres having a diameter less than 3/8 inch (11 mm).
4. The spark arrestor shall be accessible for cleaning and the screen or chimney cap shall be removable to allow for cleaning of the chimney flue.

2113.9.3 Rain caps. Where a masonry or metal rain cap is installed on a masonry chimney, the net free area under the cap shall not be less than four times the net free area of the outlet of the chimney flue it serves.

2113.9.4 Clay chimney pots. Where a clay chimney pot is installed on a masonry chimney, the chimney pot shall comply with the requirements of ASTM C 315.

PART II – IRC BUILDING/ENERGY

2. Revise as follows:

R1003.9.1 Chimney Caps. Masonry chimneys shall have a concrete, metal or stone cap, sloped to shed water, a drip edge and caulked bond break around any flue liners in accordance with ASTMC 1283.

~~**R1103.9.1**~~ **R1003.9.2 Spark arrestors.** Where a spark arrestor is installed on a masonry chimney, the spark arrestor shall meet all of the following requirements:

1. The net free area of the arrestor shall not be less than four times the net free area of the outlet of the chimney flue it serves.
2. The arrestor screen shall have heat and corrosion resistance equivalent to 19-gage galvanized steel or 24-gage stainless steel.
3. Openings shall not permit the passage of spheres having a diameter greater than 1/2 inch (13 mm) nor block the passage of spheres having a diameter less than 3/8 inch (10 mm). 4. The spark arrestor shall be accessible for cleaning and the screen or chimney cap shall be removable to allow for cleaning of the chimney flue.

R1003.9.3 Rain caps. Where a masonry or metal rain cap is installed on a masonry chimney, the net free area under the cap shall not be less than four times the net free area of the outlet of the chimney flue it serves.

R1003.9.4 Clay chimney pots. Where a clay chimney pot is installed on a masonry chimney, the chimney pot shall comply with the requirements of ASTM C 315.

Reason: New language to include provision for commonly used chimney caps, rain caps and clay chimney pots. This language will reference and be consistent with ASTM C1283 and C315.

Cost Impact: The code change proposal will not increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S198–07/08
2113.11.1; IRC R1003.11.1

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards (MACS) & Clay Flue Lining Institute (CFLI)

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Revise as follows:

2113.11.1 Residential-type appliances (general). Flue lining systems shall comply with one of the following:

1. Clay flue lining complying with the requirements of ASTM C 315~~, or equivalent~~.
2. Listed chimney lining systems complying with UL 1777.
3. Factory-built chimneys or chimney units listed for installation within masonry chimneys.
4. Other approved materials that will resist corrosion, erosion, softening or cracking from flue gases and condensate at temperatures up to 1,800°F (982°C).

PART II – IRC BUILDING/ENERGY

Revise as follows:

R1003.11.1 Residential-type appliances (general). Flue lining systems shall comply with one of the following:

1. Clay flue lining complying with the requirements of ASTM C 315 ~~or equivalent~~.
2. Listed chimney lining systems complying with UL 1777.
3. Factory-built chimneys or chimney units listed for installation within masonry chimneys.
4. Other approved materials that will resist corrosion, erosion, softening or cracking from flue gases and condensate at temperatures up to 1,800°F (982°C)

Reason: What's "equivalent"? Just meet the standard.

Cost Impact: The code change proposal will not increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S199–07/08
2113.12; IRC R1003.12

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards (MACS) & Clay Flue Lining Institute (CFLI)

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Revise as follows:

2113.12 Clay flue lining (installation). Clay flue liners shall be installed in accordance with ASTM C 1283 and extend from a point not less than 8 inches (203 mm) below the lowest inlet or, in the case of fireplaces, from the top of the smoke chamber to ~~a point above~~ the top of the enclosing walls. The lining shall be carried up vertically, with a maximum slope no greater than 30 degrees (0.52 rad) from the vertical.

Clay flue liners shall be laid in medium-duty non-water soluble refractory mortar conforming to ASTM C 199 with tight mortar joints left smooth on the inside and installed to maintain an air space or insulation not to exceed the thickness of the flue liner separating the flue liners from the interior face of the chimney masonry walls. Flue lining shall be supported on all sides. Only enough mortar shall be placed to make the joint and hold the liners in position.

PART II – IRC BUILDING/ENERGY

Revise as follows:

R1003.12 Clay flue lining (installation). Clay flue liners shall be installed in accordance with ASTM C 1283 and extend from a point not less than 8 inches (203 mm) below the lowest inlet or, in the case of fireplaces, from the top of the smoke chamber to ~~a point above~~ the top of the enclosing walls. The lining shall be carried up vertically, with a maximum slope no greater than 30 degrees (0.52 rad) from the vertical.

Clay flue liners shall be laid in medium-duty non-water soluble refractory mortar conforming to ASTM C 199 with tight mortar joints left smooth on the inside and installed to maintain an air space or insulation not to exceed the thickness of the flue liner separating the flue liners from the interior face of the chimney masonry walls. Flue liners shall be supported on all sides. Only enough mortar shall be placed to make the joint and hold the liners in position.

Reason: Make consistent with change in ASTM C1283 and to add the requirement that mortar be non-water soluble since it will be exposed to weather.

Cost Impact: The code change proposal will not increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S200–07/08
2202

Proponent: Kirk Grundahl, WTCA, representing the Structural Building Components Industry

Add new definitions as follows:

SECTION 2202
DEFINITIONS

DIAGONAL BRACING. A structural member installed at an angle to a truss chord or web member and intended to temporarily and/or permanently stabilize truss member(s) and/or truss(es)

FRAMING STRUCTURAL SYSTEM. The completed combination of structural elements, trusses, connections and other systems, that serve to support the building's self-weight and the specified loads.

LATERAL RESTRAINT. A structural member installed at right angles to a chord or web member of a truss to reduce the laterally unsupported length of the truss member. Also known as continuous lateral brace or CLB.

PERMANENT INDIVIDUAL TRUSS MEMBER RESTRAINT. Restraint that is used to prevent local bucking of an individual truss cord or web member due to axial forces in the individual truss member.

TRUSS PLACEMENT DIAGRAM. An Illustration identifying the assumed location of each truss.

TRUSS SUBMITTAL PACKAGE. The Package consisting of each individual truss design drawing, and, as applicable, the truss placement diagram, the cover/truss index sheet, lateral restraint and diagonal bracing details designed in accordance with generally accepted engineering practice, applicable standard industry defined lateral restraint and diagonal bracing details, and any other structural details germane to the trusses.

Reason: Purpose: To include definitions of key terms used in Section 2210.3 and harmonize with state of the art industry terminology.
Justification and Substantiation: The proposed definitions add clarity and understanding to the key terms used in Section 2210.3 regarding the design process involving wood trusses.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S201–07/08
2203

Proponent: Bonnie Manley, American Iron and Steel Institute, representing American Institute of Steel Construction

1. Revise as follows:

2203.1 Identification. Identification of structural steel members shall comply with the requirements contained in AISC 360. Other steel furnished for structural load-carrying purposes shall be properly identified for conformity to the ordered grade in accordance with the specified ASTM standard or other specification and the provisions of this chapter. Steel that is not readily identifiable as to grade from marking and test records shall be tested to determine conformity to such standards.

2203.2 Protection. Painting of structural steel members shall comply with the requirements contained in AISC 360. Individual structural members and assembled panels of cold-formed steel construction, except where fabricated of approved corrosion-resistant steel or of steel having a corrosion-resistant or other approved coating, shall be protected against corrosion with an approved coat of paint, enamel or other approved protection.

Reason: *Section 2203.1:* This modification, similar to the first sentence of Section 2203.2, clarifies that the identification of structural steel members should be in accordance with the requirements of AISC 360*, Specification for Structural Steel Buildings*. In particular, AISC 360, Section M5.5 addresses the identification of steel.

Section 2203.2: This modification clarifies that it is the defined term, "structural steel members," that is to be in accordance with AISC 360. The term is defined in Section 2202.1 and includes rolled steel structural shapes other than cold-formed steel or steel joist members. The remainder of the paragraph is unchanged.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S202–07/08
2203

Proponent: Bonnie Manley, American Iron and Steel Institute, representing American Iron and Steel Institute

Revise as follows:

2203.1 Identification. Identification of cold-formed steel members shall comply with the requirements contained in AISI S100. Identification of cold-formed steel light frame construction shall also comply with the requirements contained in AISI S200. Other s~~S~~teel furnished for structural load-carrying purposes shall be properly identified for conformity to the ordered grade in accordance with the specified ASTM standard or other specification and the provisions of this chapter. Steel that is not readily identifiable as to grade from marking and test records shall be tested to determine conformity to such standards.

2203.2 Protection. Painting of structural steel shall comply with the requirements contained in AISC 360. Individual structural members and assembled panels of cold-formed steel construction~~, except where fabricated of approved corrosion-resistant steel or of steel having a corrosion-resistant or other approved coating, shall be protected against corrosion with an approved coat of paint, enamel or other approved protection~~ in accordance with the requirements contained in AISI S100. Protection of cold-formed steel light frame construction shall also comply with the requirements contained in AISI S200.

Reason: *Section 2203.1:* This modification clarifies that the identification of cold-formed steel members should be in accordance with the requirements of AISI S100. In particular, AISI S100, Section A addresses the identification of cold-formed steel. This change also clarifies that cold-formed steel light frame construction should be identified in accordance with the additional requirements of AISI S200, Section A5.

Section 2203.2: This modification clarifies that the protection of cold-formed steel members should be in accordance with the general requirements of AISI S100. In particular, AISI S100, Section A addresses the protection of cold-formed steel from corrosion. This change also clarifies that cold-formed steel light frame construction should be protected in accordance with the additional requirements of AISI S200, Section A4

The primary reason for making these recommendations is to clarify right upfront in Chapter 22 that there are accepted consensus standards that govern the identification and protection of cold formed steel and cold-formed steel light frame construction.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S203–07/08
2203.2, 2203.2.1, 2203.2.2 (New)

Proponent: Michael C. Kerner, Dietrich Industries Inc., representing Dietrich Industries Inc.

1. Revise as follows:

2203.2 Protection. Protection of steel shall be in accordance with Sections 2203.2.1 and 2203.2.2.

2203.2.1 Protection of structural steel members. Painting of structural steel shall comply with the requirements contained in AISC 360. Individual structural members ~~and assembled panels of cold-formed steel construction~~, except where fabricated of approved corrosion-resistant steel or of steel having a corrosion-resistant or other approved coating, shall be protected against corrosion with an approved coat of paint, enamel or other approved protection.

2. Add new text as follows:

2203.2.2 Protection of cold-formed steel members. Individual cold-formed steel structural members and assembled panels of cold-formed steel construction shall be protected against corrosion.

Load-bearing members shall have a metallic coating complying with one of the following:

A minimum of G-60 coating in accordance with ASTM A653.
A minimum of AZ-50 coating in accordance with ASTM A792.
A minimum of GF-60 coating in accordance with ASTM A875.

Nonload-bearing members shall have a metallic coating complying with one of the following:

A minimum of G-40 coating in accordance with ASTM A653.
A minimum of AZ-50 coating in accordance with ASTM A792.
A minimum of GF-30 coating in accordance with ASTM A875.

Reason: The proposed change is to clarify the code.

The current language in the code combines the required protection for both hot-rolled steel and cold-formed steel. The proposed change is intended to separate the protection requirements for hot-rolled steel and cold-formed steel so that each type of steel has its own protection provision since the type of protective coating is different for each type of steel. The cold-formed steel protection provision is then further clarified by separating load-bearing members and nonload-bearing members.

The proposed change is superior to the current provisions since the type or magnitude of protection for cold-formed members was not previously defined. The proposed change specifies the different weights and types of acceptable corrosion resistant protection. Furthermore, the coating types for the loadbearing members are in alignment with the provisions of the IRC 2006 requirements for load-bearing floor, wall and roof-ceiling members (IRC 2006 references: paragraphs R505.2.3, R603.2.3, and R804.2.3).

The current provisions in the code for cold-formed steel members neither require any specific protective coating weight nor inform the user of the code what specification requirements must be satisfied. The proposed revision will improve the code by specifying what coatings are acceptable and in addition it coordinates these proposed requirements with those currently in the IRC 2006 code.

Cost Impact: The code change proposal will not increase the cost of construction

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S204–07/08

1604.3.3, 2203.2, 2206.1, 2206.5, Chapter 35 (New)

Proponent: Bonnie Manley, American Iron and Steel Institute, representing Steel Joist Institute

1. Revise as follows:

1604.3.3 Steel. The deflection of steel structural members shall not exceed that permitted by AISC 360, AISI-NAS, AISI-General, AISI-Truss, ASCE 3, ASCE 8, SJI CJ-1.0, SJI JG-1.1, SJI K-1.1 or SJI LH/DLH-1.1, as applicable.

2203.2 Protection. Painting of structural steel shall comply with the requirements contained in AISC 360. Painting of open-web steel joists and joist girders shall comply with the requirements of SJI CJ-1.0, SJI JG-1.1, SJI K-1.1, and SJI LH/DLH-1.1. Individual structural members and assembled panels of cold-formed steel construction, except where fabricated of approved corrosion-resistant steel or of steel having a corrosion-resistant or other approved coating, shall be protected against corrosion with an approved coat of paint, enamel or other approved protection.

2206.1 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 CJ-1.0
2~~1~~. SJI K-1.1
3~~2~~. SJI LH/DLH-1.1
4~~3~~. SJI JG-1.1

Where required, the seismic design of buildings shall be in accordance with the additional provisions of Section 2205.2 or 2210.5.

2206.5 Certification. At completion of manufacture ~~fabrication~~, the steel joist manufacturer shall submit a certificate of compliance in accordance with Section 1704.2.2 stating that work was performed in accordance with approved construction documents and with SJI standard specifications.

2. Add standard to Chapter 35 as follows:

Steel Joist Institute

CJ-1.0 —06 Standard Specification for Composite Steel Joists, CJ-Series

Reason: Published in May 2006 as an ANSI standard, this new specification covers the load and resistance factor design (LRFD), manufacture, and use of simply-supported open web composite steel joists, CJ-Series. Specifically, this standard includes the following requirements on the limits of deflection for composite steel joists:

SJI CJ-1.0:
104.10 DEFLECTION

The deflection due to the design live load shall not exceed the following:

Floors: 1/360 of span.
Roofs: 1/360 of span where a plaster ceiling is attached or suspended.
1/240 of span for all other cases.

The specifying professional shall give due consideration to the effects of deflection, both short and long term, and vibration in the selection of composite joists. All deflection calculations should account for the inherent flexibility of the open web configuration.

This code change adds a new reference document to IBC Section 2206.1. Published in May 2006 as an ANSI standard, this new SJI specification covers the load and resistance factor design (LRFD), manufacture, and use of simply-supported open web composite steel joists, CJ-Series.

The modification in IBC Section 2206.5 corrects the terminology. SJI prefers not to use the word "fabrication" in regard to joist products. They are a manufactured product.

Currently, Section 2203.2 does not address the "protection" of joists and joist girders. Since the SJI specifications cover this topic for each type of joist and joist girder, references to the SJI specifications have been added to this section to aid the user.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, SJI CJ-1.0, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

S205–07/08
2208.1, Chapter 35

Proponent: Victor D. Azzi, PhD, PE, Consulting Structural Engineer, representing Rack Manufacturers Institute

Revise as follows:

2208.1 Storage racks. The design, testing and utilization of industrial steel storage racks shall be in accordance with the *RMI/ANSI MH 16.1 Specification for the Design, Testing and Utilization of Industrial Steel Storage Racks*. Racks in the scope of this specification include industrial pallet racks, movable shelf racks and stacker racks made of cold-formed or hot-rolled steel structural members. Such rack types also include push-back rack, pallet-flow rack, case-flow rack pick modules, rack supported platforms, and the storage rack portion of any rack structure that acts as support for the exterior walls and roof, except as noted; and ~~does~~ not ~~apply to~~ other types of racks, such as drive-in and drive-through racks, cantilever racks, or portable racks ~~or rack buildings~~. Where required, the seismic design of storage racks shall be in accordance with the provisions of Section 15.5.3 of ASCE 7.

Revise Chapter 35 as follows:

Rack Manufacturing Institute

RMI/ANSI MH 16.1-07~~(2000)~~ Specification for Industrial Steel Storage Racks

Reason: *RMI/ANSI MH 16.1-2007, Specification for the Design, Testing, and Utilization of Industrial Steel Storage Racks,* is designed to be a stand-alone Standard to be adopted by reference. For a number of years and several provision- and code-change cycles, the Rack Manufacturers Institute has worked to harmonize its Specification with the model codes and with the code-resource and seismic-provision documents. Working with the Non-Building Structures committees of the FEMA/BSSC TS-8 and ASCE 7, and the Task Group on *FEMA/BSSC 460(2005), Seismic Considerations for Steel Storage Racks Located in Areas Open to the Public,* the seismic provisions have been developed and stated to be self-sufficient, incorporating the results of the work of those efforts. For those who abide by *RMI/ANSI MH 16.1-2007*, there is no longer a need for the qualifying remarks and amendments as expressed in Section 15.4 and Section 15.5.1 of Section 15.5.3 of ASCE 7.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

S206–07/08
2209.1

Proponent: Bonnie Manley, American Iron and Steel Institute, representing American Iron and Steel Institute

Revise as follows:

2209.1 General. The design of cold-formed carbon and low-alloy steel structural members shall be in accordance with ~~AISI NAS~~ AISI S100. The design of cold-formed stainless-steel structural members shall be in accordance with ASCE 8. Cold-formed steel light-frame~~d~~ construction shall also comply with Section 2210.

Reason: This code change proposal updates the reference to AISI's *North American Specification for the Design of Cold-Formed Steel Structural Members*, 2007 edition, which has been given the new number designation of AISI S100. This edition of AISI S100, as its name implies, is intended for use throughout Canada, Mexico, and the United States, and supersedes the 2001 edition with the 2004 supplement. AISI S100-07 was developed by a joint effort of the American Iron and Steel Institute's Committee on Specifications, the Canadian Standards Association's Technical Committee on Cold Formed Steel Structural Members (S136), and Camara Nacional de la Industria del Hierro y del Acero (CANACERO) in Mexico.

Since AISI S100-07 is intended for use in Canada, Mexico, and the United States, it uses a format that allows for requirements particular to each country. This results in a main document – Chapters A through G and Appendix 1 and 2 – that is intended for use in all three countries, and two country-specific appendices (A and B). Appendix A is required for use in both the United States and Mexico, and Appendix B is required for use in Canada.

Reflecting its North American scope, AISI S100-07 provides an integrated treatment of Allowable Strength Design (ASD), Load and Resistance Factor Design (LRFD), and Limit States Design (LSD). This is accomplished by including the appropriate resistance factors (ϕ) for use with LRFD and LSD and the appropriate factors of safety (Ω) for use with ASD. It should be noted that the use of LSD is limited to Canada and the use of LRFD and ASD is limited to the United States and Mexico.

AISI S100-07 provides well-defined procedures for the design of load-carrying cold-formed steel members in buildings, as well as other applications, provided that proper allowances are made for dynamic effects. The provisions reflect the results of continuing research to develop new and improved information on the structural behavior of cold-formed steel members. The major changes made in this edition of AISI S100, compared to the previous edition, are summarized as follows:

Reorganization

- The design provisions are reorganized according to their applicability to wall studs and wall stud assemblies (Section D4), floor, roof, or wall steel diaphragm construction (Section D5), and metal roof and wall systems (Section D6). Accordingly, provisions under Chapters C and D of previous editions are relocated.

Definitions

- Country specific terms are indicated in Section A1.3, "Definitions"
- This edition of AISI S100 utilizes terminology jointly defined by AISC and AISI.

Materials

- Provisions for applications of other steels (Section A2.2) have been rewritten.

Strength

- Strength reduction provisions (Section A2.3.2) are introduced for high-strength and low-ductility closed-box section members.

Elements

- The effective width equation (Eq. B2.2-2) for uniformly compressed stiffened elements with circular holes has been revised.
- New provisions for unstiffened elements and edge stiffeners with stress gradient (Section B3.2) are introduced.
- The provisions for determining the effective width of uniformly compressed elements with one intermediate stiffener (previously in Section B4.1) have been replaced by the provisions of B5.1.

Members

- Provisions for distortional buckling for beams (Section C3.1.4) and columns (C4.2) are introduced.
- The design provisions for bearing stiffeners (previously termed "transverse stiffeners") have been revised.
- Provisions for the web crippling strength for C- or Z-members with an overhang are added in Section C3.4.1.
- The equations for members subjected to combined bending and web crippling have been recalibrated.
- Provisions for considering combined bending and torsional loading (Section C3.6) are added.

Member Bracing

- Explicit equations for determining the required bracing force for members having neither flange connected to sheathing are provided.
- Provisions for determining the required bracing force and stiffness of a compression member are introduced.

Wall Stud and Wall Stud Assemblies

- The sheathing braced design provisions have been removed.
- New framing standards are referenced.

Floor, Roof, or Wall Steel Diaphragm Construction

- The safety factors and the resistance factors for diaphragms (Section D5) have been revised.

Metal Roof and Wall System

- New provisions for Z-section compression members having one flange fastened to a standing seam roof (Section D6.1.4) are added for the United States and Mexico.
- For standing seam roof panel systems, a load reduction is permitted in the United States and Mexico for load combinations that include wind uplift.
- The provisions for determining the anchorage forces and required stiffness for a purlin roof system under gravity load with the top flange connected to metal sheathing have been revised.

Connections

- Provisions for shear strength determination of welded sheet-to-sheet connections are added.
- An interaction check for screws subjected to combined shear and pull-over is added.
- The design provisions for block shear rupture (Section E5.3) have been revised.

Appendix B

- The section for delivered minimum thickness for Canada is deleted.

- The specified loads (Section A3.1) and the load factors and load combinations for LSD (Section A6.1.2) for Canada have been revised.

New Appendices

- Appendix 1, Direct Strength Design for Cold-Formed Steel Structural Members, is added. The Direct Strength Method provides alternative design provisions for several sections of Chapters C and D.
- Appendix 2, Second Order Analysis, is added. Appendix 2 provides alternative method for considering the second order effect in members subjected to compression and bending.

This code change also makes an editorial change from "light-framed" to "light-frame", which is preferred by the industry. This editorial change should be made throughout the IBC. The addition of "also" is intended to clarify that AISI S100 is to be used in conjunction with the AISI standards adopted in IBC Section 2210.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S207–07/08

2209.2, Chapter 35 (New)

Proponent: Bonnie Manley, American Iron and Steel Institute, representing Steel Deck Institute

1. Revise as follows:

2209.2 Steel decks. The design and construction of cold-formed steel decks shall be in accordance with this section.

2209.2.1 Composite slabs on steel decks. Composite slabs of concrete and steel deck shall be permitted to be designed and constructed in accordance with ASCE 3 or ANSI/SDI-C1.0.

2209.2.2 Non-composite steel floor decks. Non-composite steel floor decks shall be permitted to be constructed in accordance with ANSI/SDI-NC1.0.

2209.2.3 Steel roof deck. Steel roof decks shall be permitted to be designed and constructed in accordance with ANSI/SDI-RD1.0.

2. Add standards to Chapter 35 as follows:

Steel Deck Institute

C1.0–06	Standard for Composite Steel Floor Deck
NC1.0–06	Standard for Non-Composite Steel Floor Deck
RD1.0–06	Standard for Steel Roof Deck

Reason: This code change proposal introduces three new SDI standards on cold-formed steel decks. It is intended that users be permitted to use these documents in lieu of the more formal approach of AISI S100, *North American Specification for the Design of Cold-Formed Steel Structural Members.* The scope of the documents are as follows:

ANSI/SDI C1.0: "This Specification for Composite Steel Deck shall govern the materials, design, and erection of cold formed steel deck which acts as a permanent form and as positive reinforcement for a structural concrete slab."

ANSI/SDI NC1.0: "This Specification for Non-Composite Steel Floor Deck shall govern the materials, design, and erection of cold formed non-composite steel deck used as a form for reinforced concrete slabs."

ANSI/SDI RD1.0: "This Specification for Steel Roof Deck shall govern the materials, design, and erection of cold formed steel deck used for the support of roofing materials, design live loads and SDI construction loads."

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, SDI C1.0, NC1.0, RD1.0, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S208–07/08
2210, 2210.5 (New), 2210.6, Chapter 35 (New)

Proponent: Bonnie Manley, American Iron and Steel Institute

1. Revise as follows:

SECTION 2210
COLD-FORMED STEEL
LIGHT-FRAMED CONSTRUCTION

2210.1 General. ~~The design, installation and construction of cold-formed carbon or low-alloy steel, structural and nonstructural steel framing shall be in accordance with AISI-General and AISI-NAS.~~ The design and installation of structural members and non-structural members utilized in cold-formed steel light frame construction where the specified minimum base steel thickness is between 0.0179 inches (0.455 mm) and 0.1180 inches (2.997 mm) shall be in accordance with AISI S200 and Sections 2210.2 through 2210.7, as applicable.

2210.2 ~~Headers~~ Header design. ~~The design and installation of cold-formed steel box headers, back-to-back headers and single and double L-headers used in single-span conditions for load-carrying purposes shall be in accordance with AISI-Header, subject to the limitations therein.~~ Headers, including box and back-to-back headers, and double and single L-headers shall be designed in accordance with AISI S212 or in accordance with AISI S100.

2210.3 ~~Trusses~~ Truss design. ~~The design, quality assurance, installation and testing of cold-formed steel trusses shall be in accordance with AISI-Truss, subject to the limitations therein.~~ Trusses shall be designed in accordance with AISI S214.

2210.4 Wall stud design. ~~The design and installation of cold-formed steel studs for structural and nonstructural walls shall be in accordance with AISI-WSD.~~ Wall studs shall be designed in accordance with AISI S211 or in accordance with AISI S100.

2. Add new text as follows:

2210.5 Floor and roof system design. Framing for floor and roof systems in buildings shall be designed in accordance with AISI S210 or in accordance with AISI S100.

3. Revise as follows:

~~**2210.5 Lateral design.** The design of light-framed cold-formed steelwalls and diaphragms to resist wind and seismic loads shall be in accordance with AISI-Lateral.~~ **2210.6 Lateral design**. Light-framed shear walls, diagonal strap bracing that is part of a structural wall and diaphragms to resist wind, seismic and other in-plane lateral loads shall be designed in accordance with AISI S213.

~~**2210.6**~~ **2210.7 Prescriptive framing**. Detached one- and two-family dwellings and townhouses, ~~up to two~~ less than or equal to three stories in height, shall be permitted to be constructed in accordance with AISI-~~PM~~ S230 subject to the limitations therein.

4. Add standard to Chapter 35 as follows:

AISI

S210-07 North American Standard for Cold-formed Steel Framing – Floor and Roof System Design

Reason: In this code change proposal, IBC Sections 2210.1 thru 2210.5 are recommended for deletion and the language from the 2007 edition of AISI S100, Section D4 is inserted with only minor editorial modifications. This new language adopts the 2007 editions of all the AISI Standards for Cold-Formed Steel Framing and provides the appropriate charging language. A brief summary of the changes to the AISI standards is provided below. A more extensive summary can be obtained on the AISI website: www.steel.org.

This code change also makes an editorial change from "light-framed" to "light-frame", which is preferred by the industry. This editorial change should be made throughout the IBC.

Summary of Changes to AISI Standards:

The 2007 editions of the AISI standards for cold-formed steel framing have just been completed. This work by the AISI Committee on Framing Standards includes the revision of six current standards and the issuing two new standards:

Revised Standards:

AISI S200-07: North American Standard for Cold-Formed Steel Framing – General Provisions
AISI S211-07: North American Standard for Cold-Formed Steel Framing – Wall Stud Design
AISI S212-07: North American Standard for Cold-Formed Steel Framing – Header Design

AISI S213-07: North American Standard for Cold-Formed Steel Framing – Lateral Design
AISI S214-07: North American Standard for Cold-Formed Steel Framing – Truss Design
AISI S230-07: Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings

New Standards:

AISI S201-07: North American Standard for Cold-Formed Steel Framing – Product Data
AISI S210-07: North American Standard for Cold-Formed Steel Framing – Floor and Roof System Design

This summary presents a brief summary of major changes made in the revised standards, and an overview of the new standards.

It should be noted that a new numeric ANSI designation system was initiated with these 2007 edition AISI standards. It is hoped that this will simplify the referencing of the documents in this growing series of design and installation standards.

It should also be noted that the words "North American" are now in the titles of many of these standards. This was done to emphasize that these documents are intended for adoption and use not just in the United States, but also throughout North America. In all such documents, provisions applicable to Canada were added. AISI S200-07: North American Standard for Cold-Formed Steel Framing – General Provisions (Revision of AISI/COFS/GP-2004):

A2 Definitions: Definitions for most of the terms in the various AISI standards for cold-formed steel framing were centralized in this standard to assure consistency and better facilitate maintenance of the series of standards. Definitions for the terms diaphragm, required strength, shear wall and yield strength were revised for consistency with the Standard Definitions for Use in the Design of Steel Structures (AISI, 2004). The term base metal thickness was revised to base steel thickness. Definitions for the terms non-structural stud and structural stud were replaced with non-structural member and structural member. The definition for the term ridge was revised for consistency and use in all the cold-formed steel framing standards. Definitions for the truss related terms chord splice and pitch break were added.

A4 Corrosion Protection: Language was added to clarify that a dissimilar metal may be used in direct contact with steel framing members if approved for that application, and commentary language was added to provide guidance on when such applications might not be a problem along with a reference regarding the use of stainless steel brick ties (CSA, 2004).

A5 Products: The minimum base metal thickness table was removed and the thickness requirements now defer to an approved design or recognized product standard, such as AISI S201. A statement was added to clarify that the standard designator is intended to be the same when using either U.S. Customary or SI Metric units. A requirement was added that when specifying material for use in structural applications, the material used in design is identified on the contract documents and when ordering the material. Product identification requirements were modified to allow 96-inch spacing of identification in accordance with AISI S201 or ASTM A1003 (ASTM, 2005a) rather than the former 48-inch spacing.

A6 Referenced Documents: The referenced document listing was updated to include AISI S100 (AISI, 2007) and AISI S201. ASTM references were updated. ASTM C954 (ASTM, 2004a) and C1002 (ASTM, 2004b) for screw fasteners for gypsum board attachment were added to the listing.

C1 In-Line Framing: Commentary language was added to provide guidance on the use of load bearing top track assemblies, based on testing programs at the NAHB Research Center (NAHB, 2003) and the University of New Brunswick (Dawe, 2005).

C3 Installation Tolerances: Commentary language was added to provide guidance on the wall stud gap tolerance, based on a testing program at the University of Missouri-Rolla (Findlay, 2005).

D1 Screw Connections: In Section D1.6, requirements were added to reference the applicable ASTM standards for screw fasteners for gypsum board attachment.

AISI S201-07: North American Standard for Cold-Formed Steel Framing – Product Data (New Standard, not intended for direct adoption in the IBC.):

A General: This standard is intended to establish and encourage the production and use of standardized products in the United States, Canada and Mexico. It provides criteria, including material and product requirements for cold-formed steel C-shape studs, joists, track, U-channels, furring channels and angles intended to be utilized in structural and non-structural framing applications.

B. Materials: This standard defines standard material grades and specifications, minimum base steel and design thickness, and coatings for corrosion protection.

C. Products: This standard defines standard product designator, shapes, inside bend radius, lip length, punchouts, marking and manufacturing tolerances.

D. Quality Assurance: This standard requires a properly documented quality control program and the proper application of quality assurance procedures.

AISI S210-07: North American Standard for Cold-Formed Steel Framing – Floor and Roof System Design (New Standard):

A. General: This standard is intended for the design and installation of cold-formed steel framing for floor and roof systems in buildings. The standard defers to AISI S100 (AISI, 2007), except when modified by the standard. Designing solely in accordance with AISI S100 is cited as an alternative to the standard.

B. Design: This standard provides requirements for floor joists, ceiling joists and roof rafters are provided for both a discretely braced design; i.e., neglecting the structural bracing and/or composite-action contribution of attached sheathing or deck, or a continuously braced design. Provisions are provided for clip angle bearing stiffeners, based on a recent testing program at the University of Waterloo (Fox, 2006); and for bracing, based on available research, field experience and the requirements of AISI S100.

C. Installation: This standard has no specific installation requirements beyond those of AISI S200.

AISI S211-07: North American Standard for Cold-Formed Steel Framing – Wall Stud Design (Revision of AISI/COFS/WSD-2004):

A1 Scope: A sentence was added to clarify that designing solely in accordance with AISI S100 (AISI, 2007) is an alternative to this standard.

A2 Definitions: Definitions for terms used in this standard were removed from this section and centralized in AISI S200.

A3 Loads and Load Combinations: For consistency with the other AISI standards for cold-formed steel framing, the requirements of former Section B on Loading were moved to this new section. Former Sections C and D were renamed Sections B and C, accordingly. Wind loading considerations were separated into Subsection A3.1 for clarity, since these provisions are not intended for use in Canada.

A4 Referenced Documents: The referenced document listing was updated to include AISI S100 (AISI, 2007) and AISI S200. The ASCE 7 (ASCE, 2006) reference was updated.

B Design: Former requirements for materials and corrosion protection, which merely referred the user to AISI S200, were deemed unnecessary and were deleted. A statement was added to emphasize that unless modified or supplemented in this standard, strength determinations are to be made in accordance with AISI S100.

B2 Connection Design: Section B2.3 was revised to clarify that web crippling the stud must be evaluated in accordance with AISI S100 and requirements on bearing length were added. In Section B2.3, additional limitations on the methodology were added that are consistent with the original testing.

AISI S212-07: North American Standard for Cold-Formed Steel Framing – Header Design (Revision of AISI/COFS/HEADER-2004):

A1 Scope: For consistency with the other AISI standards for cold-formed steel framing, the requirements of former Section A1.1 were moved to the appropriate portions of Sections B and C. Commentary language was added to emphasize the limited scope of this standard and to provide guidance on the broader subject of opening design, including a reference to the Cold-Formed Steel Framing Design Guide (AISI, 2002).

A2 Definitions: This new section was added to clarify that definitions for terms used in this standard are listed in AISI S200.
A4 Referenced Documents: The referenced document listing was updated to include AISI S100 (AISI, 2007) and AISI S200. The ASCE 7 (ASCE, 2006) reference was updated.
B1 Back-to-Back Headers: In Sections B1.2 and B1.4, requirements for evaluating shear in accordance with AISI S100 were added.
B2 Box Headers: In Sections B2.2 and B2.4, requirements for evaluating shear in accordance with AISI S100 were added.
B3 Double L-Headers: Limitations, from former Section A1.1, were added.
B4 Single L-Headers: Limitations, from former Section A1.1, were added.
B5 Inverted L-Header Assemblies: This new section was added to provide provisions for designing inverted L-header assemblies, based on rational engineering judgment, as a means to provide improved capacity for double and single L-headers.
C1 Back-to-Back and Box Headers: Installation requirements for back-to-back and box headers, from former Section A1.1, were included in this new section.
C2 Double and Single L-Headers: Installation requirements for double and single L-headers, from former Section A1.1, were included in this new section.
C3 Inverted L-Header Assemblies: This new section was added to provide provisions for installing inverted L-header assemblies.

AISI S213-07: North American Standard for Cold-Formed Steel Framing – Lateral Design (Revision of AISI/COFS/LATERAL-2004):
A1 Scope: The scope was expanded to include shear walls and diaphragms resisting other in-plane lateral loads (i.e., other than wind or seismic) and provisions for such were added throughout the standard.
A2 Definitions: Definitions for most of the terms used in this standard were removed from this section and centralized in AISI S200.
A4 Loads and Load Combinations: This section, previously B2, was moved and expanded for consistency with the other AISI standards.
A5 Referenced Documents: The referenced document listing was updated to include AISI S100 (AISI, 2007) and AISI S200. The ASCE 7 (ASCE, 2006) and various ASTM and other references were updated. References for the applicable standards for gypsum board (ASTM, 2006), fiberboard (AHA, 1995 and ASTM, 2001), screw fasteners (ASTM, 2004b; ASTM, 2004c) and cyclic testing (ASTM, 2005b) were added.
C2 Available Shear Strength: The provisions regarding openings in and aspect ratios of Type I shear walls and wall piers in Type II shear walls were clarified. The equation for design deflection was revised to include the vertical deformation rather than the deflection of anchorage/attachment details. A correction was made to the tabulated maximum aspect ratio (h/w) for 0.027" steel sheet, one side in Table C2.1-1. Provisions for 15/32" Structural 1 sheathing (4-ply), one side with 68-mil framing were added. Provisions for fiberboard sheathed shear walls were added, based on tests at the NAHB Research Center (NAHB, 2005). Limitations to section C2.2 to specify the minimum size of framing screws were added. The requirement for the attachment of sheathing edges was clarified. The minimum requirements for flat strapping when used as blocking in a Type I shear wall were defined. A requirement was added that for other than steel sheathing, the screws be installed through the sheathing to the blocking. Commentary was added to clarify that the standard permits the use of studs with standard punchouts and anchor bolts with standard cut washers. Commentary was also added to warn against the overdriving of sheathing screws.
C5 Special Seismic Requirements: The anchorage requirement was clarified as being applicable to uplift only. A special requirement for shear walls that perimeter members at openings be provided and detailed to distribute the shearing stresses was deemed redundant for Type I shear walls and incorrect for Type II walls and was deleted. Provisions for shear walls and diagonal strap bracing were separated into Sections C5.1 and C5.2. Additional special seismic requirements for diagonal strap bracing were introduced based largely on research at McGill University (Al-Kharat and Rogers, 2005, 2006, 2007), other available research and engineering judgment. Factors for the expected yield strength and tensile strength of diagonal strap bracing members were added, based in part on similar values published for hot-rolled structural steel materials (AISC, 2005). Provisions for seismic forces contributed by masonry and concrete walls, and other than concrete or masonry construction were added to new Sections C5.3 and C5.4. These requirements were patterned after provisions in the Special Design Provisions for Wind and Seismic (AFPA, 2005).
D2 Diaphragm Design: A requirement was added that for other than steel sheathing, the screws be installed through the sheathing to the blocking. Commentary was added to justify diaphragm values in light of changes to the recognized screw connection strength calculation methodology.

AISI S214-07: North American Standard for Cold-Formed Steel Framing – Truss Design (Revision of AISI/COFS/TRUSS-2004):
A2 Definitions: Definitions for terms used in this standard were removed from this section and centralized in AISI S200.
A4 Referenced Documents: The referenced document listing was updated to include AISI S100 (AISI, 2007) and AISI S200. The ASCE 7 (ASCE, 2006) reference was updated.
D4 Member Design: Sections D4.2, D4.3, D4.4 and D4.5 were revised to clarify when members are to be evaluated for axial load alone, bending alone, and combined axial load and bending using the provisions of AISI S100. Section D4.4 was revised and Commentary language was added to clarify the requirements for trusses with C-shaped chord and web members.
D5 Gusset Plate Design: This new section was added to provide provisions for designing gusset plates, based on based on a testing program at the University of Missouri-Rolla (Lutz, 2004).
G3 Full-Scale Structural Performance Load Test: In Section G3.2, the required minimum number of test specimens was changed from two to three. In Section G3.7, the special Beta-factors for trusses were deleted and the user is deferred instead to Chapter F1 of AISI S100.

AISI S230-07: Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings (Revision of AISI/COFS/PM-2006):
A1 Scope: The allowable number of stories was increased from two to three stories and provisions for such were added throughout the standard. The maximum story height was defined. Language was added to better describe how to handle an irregularity in a high seismic or high wind area that is isolated to a portion of a building.
A2 Definitions: Definitions for most terms used in this standard were removed from this section and centralized in AISI S200. Definitions for seismic design category D0 and wind exposures B, C and D were added and the definition for seismic design category D1 was revised, in accordance with the building code.
A3 Referenced Documents: The referenced document listing was updated to include AISI S100 (AISI, 2007), AISI S200, AISI S201 and AISI S214. The ASCE 7 (ASCE, 2006) and various ASTM and other references were updated. Reference for the applicable standard for anchor bolts (ASTM, 2004d) was added.
A4 Limitations of Framing Members: Language was updated to reflect the new AISI S201 and ASTM A1003 (ASTM, 2005a) standards. Provisions for hole reinforcing were added and provisions for hole patching were revised, based on available research and engineering judgment.
B2 Bearing Stiffeners: Requirements for C-shaped and track bearing stiffeners were revised, based on available research and engineering judgment. Provisions were added for clip angle bearing stiffeners, based on a recent testing program at the University of Waterloo (Fox, 2006).
B4 Anchor Bolts: Provisions were added regarding anchor bolt washers in high wind areas and high seismic areas.
D2 Floor to Foundation or Structural Wall Connection: Provisions were added to allow a single joist with bearing stiffeners in lieu of double joists on foundation walls parallel to the joist span.

E2: Wall to Foundation or Floor Connection: Provisions were added for anchoring gable endwalls, based on a study at the University of Missouri-Rolla (Downey, Stephens and LaBoube, 2005).
E3: Wall Stud Sizes: Tables were updated to the latest editions of AISI S100 (AISI, 2007), AISI S211 and ASCE 7 (ASCE, 2006). Provisions were added for sizing wall studs in gable endwalls, based on a study at the University of Missouri-Rolla.
E7 Headers: Tables were updated to the latest editions of AISI S100, AISI 212 and ASCE 7. Tables were added for grade 50 members. Provisions were added for single L-headers and inverted L-header assemblies. Clarification was made that provisions for head tracks also apply to sill tracks. Provisions were added for sizing and installing headers in gable endwalls, based on a study at the University of Missouri-Rolla.
E11 Braced Walls In High Wind Areas and High Seismic Areas: Provisions were revised to clarify that braced wall length adjustment factors based upon edge screw spacing less than 4 inches are not applicable to type II braced walls.
F3 Roof Rafters: Tables were updated to the latest editions of AISI S100, AISI S210 and ASCE 7. Tables were added for grade 50 members. Limits were set on the rake overhang in gable endwalls, based on a study at the University of Missouri-Rolla.
F4 Hip Framing: A new section was added to address hip framing, based on a study at the University of Missouri-Rolla (Waldo, Stephens and LaBoube, 2006).
F6 Ceiling and Roof Diaphragms: Ceiling diaphragm design and installation requirements were added for gable endwalls, based on a study at the University of Missouri-Rolla.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AISI S210, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

Public Hearing:				
	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S209–07/08
2210.3

Proponent: Edwin Huston, National Council of Structural Engineers Association (NCSEA), representing NCSEA Code Advisory Committee – General Engineering Subcommittee

1. Revise as follows:

2210.3 Trusses. ~~The design, quality assurance, installation and testing of cold-formed steel trusses shall be in accordance with AISI-Truss, subject to the limitations therein.~~ Cold-formed steel trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by screws, pins, rivets, bolts, clinching, welding, or other approved connecting devices.

2. Add new text as follows:

2210.3.1 Truss design drawings. The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. The truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Slope or depth, span and spacing;
2. Location of all joints and support locations;
3. Number of plies if greater than one;
4. Required bearing widths;
5. Design loads as applicable, including;
   - 5.1. Top chord live load (including snow loads);
   - 5.2. Top chord dead load;
   - 5.3. Bottom chord live load;
   - 5.4. Bottom chord dead load;
   - 5.5. Additional loads and locations;
   - 5.6. Environmental design criteria and loads (wind, snow, seismic, etc.); and
   - 5.7. Other lateral loads, including drag strut loads.
6. Maximum reaction force and direction, including maximum uplift reaction forces where applicable;
7. All truss joint connections, information and details;
8. Member sizes, properties and details;
9. Truss- to- truss connections and truss field assembly requirements.
10. Calculated span to deflection ratio and maximum vertical and horizontal deflection for live and total load as applicable;
11. Maximum axial tension and compression in the truss members; and

12. Required permanent individual truss member restraint locations and the method and details of restraint/bracing to be used in accordance with Section 2210.3.2.

2210.3.2 Permanent individual truss member restraint/bracing. Where permanent restraint/bracing of truss members is specified on the truss design drawings, it shall be accomplished by one of the following methods:

1. Permanent individual truss member restraint/bracing shall be installed using standard industry lateral restraint/bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.
2. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.
3. A project specific permanent individual truss member restraint/bracing design shall be permitted to be specified by any registered design professional.

2210.3.3 Trusses spanning 60 feet or greater. The owner shall contract with a registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing for trusses with clear spans 60 feet (18 288mm) or greater.

2210.3.4 Truss designer. The individual or organization responsible for the design of the trusses.

2210.3.5 Truss design drawings. Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions:

1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.
2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.

2210.3.6 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams that serve only as a guide for installation and do not deviate from the permit submittal drawings shall not be required to bear the seal or signature of the truss designer.

2210.3.7 Truss submittal package. The truss submittal package shall consist of each individual truss design drawing; the truss placement diagram; the permanent individual truss member restraint/bracing method and details; any other structural details germane to the trusses as applicable; and the cover/truss index sheet.

2210.3.8 Anchorage. The design for the transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the registered design professional.

2210.3.9 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (i.e. HVAC equipment, piping, additional roofing or insulation, etc.) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2210.3.10 AISI specification. In addition to Sections 2210.3 through 2210.3.9, the design, manufacture, installation, testing and quality assurance of cold formed steel trusses shall be in accordance with AISI S214. Job-site inspections shall be in compliance with Section 109 as applicable.

2210.3.11 Truss quality assurance. Trusses not part of a manufacturing process in accordance with Section 2210.3.10 or in accordance with a standard listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Sections 1704.2 and 1704.3 as applicable.

Reason: This language is proposed to be added in order for cold formed steel trusses to have compatible criteria as the requirements for wood trusses specified in Section 2303.4. The current Section does not provide the necessary criteria and delineation of responsibilities.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

S210–07/08
2210.3

Proponent: Kirk Grundahl, PE, WTCA, representing the Structural Building Components Industry

1. Revise as follows:

2210.3 Trusses. ~~The design, quality assurance, installation and testing of cold-formed steel trusses shall be in accordance with AISI-Truss, subject to the limitations therein.~~ Cold-formed steel trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by screws, pins, rivets, bolts, clinching, welding, or other approved connecting devices.

2. Add new text as follows:

2210.3.1 Truss design drawings. The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the following information:

1. Building code used for design, unless specified on cover/truss Index sheet.
2. Slope or depth, span and spacing;
3. Location of all joints and support locations.
4. Number of plys if greater than one.
5. Required bearing widths;
6. Design loads as applicable, including:
   - 6.1. Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load);
   - 6.2. Top chord dead load;
   - 6.3. Bottom chord live load;
   - 6.4. Bottom chord dead load;
   - 6.5. Additional loads and locations;
   - 6.6. Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and
   - 6.7. Other lateral loads, including drag strut loads.
7. Maximum reaction force and direction, including maximum uplift reaction forces where applicable.
8. Truss member to member connection type;
9. Fastener type, size, and member to member connection details
10. Shape and material specification for steel members;
11. Truss-to-truss connection and truss field assembly requirements.
12. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load as applicable.
13. Maximum axial tension and compression in the truss members; and
14. Required permanent individual truss member restraint location and the method of restraint/bracing to be used in accordance with Section 2210.3.2.

2210.3.2 Requirements for the permanent member restraint/bracing of truss systems. The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:

1. Standard industry lateral restraint and diagonal bracing details.
2. Permanent individual truss member restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling prevention by scab reinforcement, etc.).
3. A project specific truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any registered design professional.

2210.3.2.1 Method specified by any registered design professional. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any registered design professional.

2210.3.2.2 Absence of truss restraint/bracing method or details. Where a specific truss member permanent bracing design for the roof or floor framing structural system is not provided by the owner or any registered design professional, the method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be in accordance with standard industry lateral restraint and diagonal bracing details.

2210.3.2.3 Trusses spanning 60 feet or greater. Trusses with clear spans 60 feet (18 288mm) or greater, shall be in accordance with Sections 2210.3.2.3.1 and 2210.3.2.3.2.

2210.3.2.3.1 Restraint/bracing design. In all cases where a truss clear span is 60 feet (18 288 mm) or greater, the owner shall contract with any registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing.

2210.3.2.3.2 Special inspection. In all cases where a truss clear span is 60 feet (18 288 mm) or greater, the owner shall contract with any registered design professional to provide special inspections to assure that the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing are installed properly.

2210.3.3 Truss designer. The truss designer is the person responsible for the preparation of the truss design drawings.

2210.3.3.1 Truss design drawings seal and signature. Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

> **Exception:** When a cover/truss index sheet is used, it is the only document required to be signed and sealed by the truss designer.

2210.3.4 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

2210.3.5 Truss submittal package. Package consisting of each individual truss design drawing, and, as applicable, the truss placement diagram, the cover/truss index sheet, lateral restraint and diagonal bracing details designed in accordance with generally accepted engineering practice, standard industry lateral restraint and diagonal bracing details, and any other structural details germane to the trusses.

2210.3.6 Anchorage. The design for the transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the registered design professional.

2210.3.7 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (i.e. mechanical equipment, piping, additional roofing or insulation, etc.) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2210.3.8 Manufactured cold-formed steel trusses. In addition to Sections 2210.3 through 2210.3.7, the design, manufacture and quality assurance of cold-formed steel trusses shall be in accordance with AISI S214. Job-site inspections shall be in compliance with Section 109 as applicable.

2210.3.9 Truss quality assurance. Trusses not part of a manufacturing process in accordance with Section 2210.3.8 or in accordance with a standard, listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Sections 1704.2 and 1704.3 as applicable.

Reason: Purpose: The goal of this proposed code change is to provide new language in section 2210.3 that is harmonized and consistent with IBC 2303.4. There is a great deal of value to the building construction community and in particular structural building component manufacturers who design, manufacture and deliver both wood and steel based trusses. Uniform terminology in IBC 2303.4, ANSI/TPI 1 and within the standard industry steel and wood bracing details has implementation value. Consistency in approach will lead to better understanding, design, application and life-safety. By implementing this code language, we believe this change will markedly improve the construction process as it relates to steel and wood trusses.
Justification and Substantiation: This code change will update the language to the most current and technically comprehensive language being used within the truss industry today. Please see appendix A for an easy to follow comparison to the proposed IBC section 2303.4 and ANSI/TPI 1 Chapter 2.

Appendix A

ANSI/TPI 1 Chapter 2 Provisions	2009 IBC Code Change Proposal for 2303.4 MPC Trusses	2009 IBC Code Change Proposal for 2210.3 CFS Trusses
	2303.4 Trusses.	**2210.3 Trusses.**
	2303.4.1 Design. Wood trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved ~~framing~~ connecting devices.	**2210.3.1 Design.** Cold-formed steel trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by screws, pins, rivets, bolts, clinching, welding, or other approved connecting devices.
Truss Design Drawing: Written, graphic and pictorial depiction of an individual Truss that includes the information required in Sections 2.3.5.5 and 2.4.5.4.	**2303.4.1.1 Truss design drawings.** The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:	**2210.3.1.1 Truss design drawings.** The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:
2.3.5.5 Information on Truss Design Drawings. Truss Design Drawings shall include, at a minimum, the information specified below:		
	1. Building Code used for Design, unless specified on Cover/Truss Index Sheet.	1. Building Code used for Design, unless specified on Cover/Truss Index Sheet.
(a) Building Code used for Design, unless specified on Cover/Truss Index Sheet.		
(b) Slope or depth, span and spacing.	2. ~~1.~~ Slope or depth, span and spacing;	2. Slope or depth, span and spacing;
(c) Location of all joints and support locations.	3. ~~2.~~ Location of all joints and support locations;	3. Location of all joints and support locations.
(d) Number of plys if greater than one.	4. Number of plys if greater than one.	4. Number of plys if greater than one.
(e) Required bearing widths.	5. ~~3~~. Required bearing widths;	5. Required bearing widths;
(f) Design loads as applicable, including:	6. ~~4.~~ Design loads as applicable, including;	6. Design loads as applicable, including:
(1) Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load);	6.~~4.~~ 1. Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load); ~~(including snow loads);~~	6.1 Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load);
(2) Top chord dead load**;**	6.~~4.~~ 2. Top chord dead load;	6.2 Top chord dead load**;**
(3) Bottom chord live load;	6.~~4.~~ 3. Bottom chord live load;	6.3 Bottom chord live load;
(4) Bottom chord dead load;	6.~~4.~~ 4. Bottom chord dead load;	6.4 Bottom chord dead load;
(5) Additional loads and locations;	6.~~4.~~ 5. Additional loads and locations; ~~Concentrated loads and their points of application as applicable; and~~	6.5 Additional loads and locations;
(6) Environmental Load Design Criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and	6.~~4.~~ 6. Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and ~~Controlling wind and earthquake loads as applicable.~~	**6.6** Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and

(7) Other lateral loads, including drag strut loads.	6.7 Other lateral loads, including drag strut loads.	6.7 Other lateral loads, including drag strut loads.
(g) Adjustments to wood member and metal connector plate design values for conditions of use.	7. ~~5.~~ Adjustments to wood member and ~~metal connector plate~~ connecting device design values for conditions of use;	
(h) Maximum reaction force and direction, including maximum uplift reaction forces where applicable**.**	8. ~~6. Each~~ Maximum-reaction force and direction, including maximum uplift reaction forces where applicable;	**7.** Maximum reaction force and direction, including maximum uplift reaction forces where applicable**.**
(i) Metal connector plate type, manufacturer, size, and thickness or gauge, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface.	9. ~~7. Metal connector plate~~ Connecting device type, size, and thickness or gage, and the dimensioned location of each ~~metal~~ connecting device ~~or plate~~ except where symmetrically located relative to the joint interface;	8. Truss member to member connection type; 9. Fastener type, size, and member to member connection details
(j) Size, species and grade for each wood member.	10. ~~8.~~ Size, species and grade for each wood member;	10. Shape and material specification for steel members;
(k) Truss-to-Truss connection and Truss field assembly requirements.	11. Truss-to-truss connection and truss field assembly requirements. ~~9. Specific connection capacities or connection capacities required for:~~ ~~9.1. Truss to truss girder;~~ ~~9.2. Truss ply to ply; and~~ ~~9.3. Field assembly of a truss when the truss shown on the individual truss design drawing is supplied in separate pieces that will be field connected.~~	11. Truss-to-truss connection and truss field assembly requirements.
(l) Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and K_{CR} as applicable.	12~~0~~. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and creep as applicable;	12. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load as applicable.
(m) Maximum axial tension and compression forces in the Truss members.	13~~1~~. Maximum axial tension and compression forces in the truss members; and	13. Maximum axial tension and compression forces in the Truss members; and
(n) Fabrication Tolerance per Section 6.4.10.		
(o) Required Permanent Individual Truss Member Restraint location and the method of Restraint/Bracing to be used per Section 2.3.3.	14~~2~~. Required permanent individual truss member restraint location and the method of restraint/bracing to be used per Section 2303.4.1.2~~, unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.~~	14. Required permanent individual truss member restraint location and the method of restraint/bracing to be used per Section 2210.3.1.2.
2.3.3 REQUIREMENTS FOR THE PERMANENT MEMBER RESTRAINT/ BRACING OF TRUSS SYSTEMS	**2303.4.1.2 Requirements for the permanent member restraint/bracing of truss systems**	**2210.3.1.2 Requirements for the permanent member restraint/bracing of truss systems**
2.3.3.1 Method of Restraint. The method of Permanent Individual Truss Member Restraint/Bracing and the method of anchoring or restraining to prevent lateral movement of all Truss members acting together as a system shall be accomplished by:	**2303.4.1.2.1 Method of restraint**. The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:	**2210.3.1.2.1 Method of restraint**. The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:
2.3.3.1.1 Standard Industry Details. Standard industry Lateral Restraint and Diagonal Bracing details in accordance with *BCSI-B3: Permanent Restraint/Bracing of Chords and Web Members and/or BCSI-B7: Temporary & Permanent Restraint/Bracing for Parallel Chord Trusses* of the Building Component Safety Information (*BCSI*).	**1. Standard industry details.** Standard industry lateral restraint and diagonal bracing details. **2 Substitution with reinforcement.** Permanent individual truss member restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).	**1. Standard industry details.** Standard industry lateral restraint and diagonal bracing details. **2 Substitution with reinforcement.** Permanent individual truss member restraint

2.3.3.1.2 Substitution with Reinforcement. Permanent Individual Truss Member Restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).

2.3.3.1.3 Project Specific Design. A project specific Truss member permanent lateral restraint/bracing design for the roof or floor Framing Structural System shall be permitted to be specified by any Registered Design Professional.

2.3.3.2 Method Specified by any Registered Design Professional. The method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be permitted to be specified by any Registered Design Professional.

2.3.3.3 Absence of Truss Restraint/Bracing Method or Details. If a specific Truss member permanent bracing design for the roof or floor Framing Structural System is not provided by the Owner or any Registered Design Professional, the method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be in accordance with *BCSI-B3 or BCSI-B7*.

2.3.3.4 Trusses Spanning 60 Feet (18 m) or Greater. For trusses with clear spans 60 ft. (18 m) or greater, see Section 2.3.1.6.

2.3.1.6 Long Span Truss Requirements.

2.3.1.6.1 Restraint/Bracing Design. In all cases where a Truss clear span is 60 ft. (18 m) or greater, the Owner shall contract with any Registered Design Professional for the design of the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint and Diagonal Bracing.

2.3.1.6.2 Special Inspection. In all cases where a Truss clear span is 60 ft. (18 m) or greater, the Owner shall contract with any Registered Design Professional to provide special inspections to assure that the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint and Diagonal Bracing are installed properly.

3 Project specific design. A project specific truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any registered design professional.

2303.4.1.2.2 Method specified by any registered design professional. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any registered design professional.

2303.4.1.2.3 Absence of truss restraint/bracing method or details. If a specific truss member permanent bracing design for the roof or floor framing structural system is not provided by the owner or any registered design professional, the method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be in accordance with standard industry lateral restraint and diagonal bracing details.

2303.4.1.2.4 Trusses spanning 60 feet (18 m) or greater. Trusses with clear spans 60 ft. (18 m) or greater, shall:

1. Restraint/Bracing design. In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing.

2 Special inspection. In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional to provide special inspections to assure that the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing are installed properly.

~~**Permanent individual truss member restraint.** Where permanent restraint of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:~~
~~1. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T-reinforcement or L-reinforcement, etc.). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details~~ shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling prevention by scab reinforcement, etc.).

3 Project specific design. A project specific truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any registered design professional.

2210.3.1.2.2 Method specified by any registered design professional. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any registered design professional.

2210.3.1.2.3 Absence of truss restraint/bracing method or details. If a specific truss member permanent bracing design for the roof or floor framing structural system is not provided by the owner or any registered design professional, the method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be in accordance with standard industry lateral restraint and diagonal bracing details.

2210.3.1.2.4 Trusses spanning 60 feet (18 m) or greater. Trusses with clear spans 60 ft. (18 m) or greater, shall:

1. Restraint/Bracing design. In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing.

2 Special inspection. In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional to provide special inspections to assure that the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing are installed properly.

~~provided by the truss designer.~~

~~2. Permanent individual truss member restraint and diagonal bracing shall be installed using standard industry lateral restraint and diagonal bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.~~

2303.4.1.3 Truss designer. Person responsible for the preparation of the truss design drawings. ~~The individual or organization responsible for the design of trusses.~~

Truss Designer: Person responsible for the preparation of the Truss Design Drawings.

2303.4.1.3.1 Truss design drawings ~~seal~~ & signature. Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

2210.3.1.3 Truss Designer: Person responsible for the preparation of the truss design drawings.

2.3.5.3 Truss Design Drawing Seal and Signature. Each individual Truss Design Drawing shall bear the seal and signature of the Truss Design Engineer.

Exceptions~~:~~
~~1. Where~~ When a cover/ ~~sheet and~~ truss index sheet is used it ~~are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet~~ is the only document required to be signed and sealed by the truss designer.

2210.3.1.3.1 Truss design drawings seal & signature. Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exception: When a cover/truss index sheet is used, it is the only document required to be signed and sealed by the truss designer.

Exception: When a Cover/Truss Index Sheet is used, it is the only document required to be signed and sealed by the Truss Design Engineer.

~~2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.~~

2.3.5.4 Truss Placement Diagram. When the Truss Placement Diagram serves only as a guide for Truss installation, it does not require the seal of the Truss Design Engineer.

Exception: When the Truss Placement Diagram is prepared by or under the responsible charge of any Registered Design Professional, it is required to be signed and sealed.

2303.4.2 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

2210.3.2 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

2.3.6.4 Truss Placement Diagram. Where required by the Construction Documents or Contract, the Truss Manufacturer shall prepare the Truss Placement Diagram that identifies the assumed location for each individually designated Truss and references the corresponding Truss Design Drawing. The Truss Placement Diagram shall be permitted to include identifying marks for other products including Structural Elements, so that they may be more easily identified by the Contractor during field erection. When the Truss Placement Diagram serves only as a guide for Truss installation and requires no engineering input, it does not require the seal of any Truss Design Engineer or Registered Design Professional.

Exception: When the Truss Placement

~~**Exception:** When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.~~

Diagram is prepared by or under the responsible charge of any Registered Design Professional, it is required to be signed and sealed.

Truss Submittal Package: Package consisting of each individual Truss Design Drawing, and, as applicable, the Truss Placement Diagram, the Cover/Truss Index Sheet, Lateral Restraint and Diagonal Bracing details designed in accordance with generally accepted engineering practice, applicable *BCSI* defined Lateral Restraint and Diagonal Bracing details, and any other structural details germane to the trusses.

2303.4.3 Truss submittal package. Package consisting of each individual truss design drawing, and, as applicable, the truss placement diagram, the cover/truss index sheet, lateral restraint and diagonal bracing details designed in accordance with generally accepted engineering practice, standard industry lateral restraint and diagonal bracing details, and any other structural details germane to the trusses. ~~The truss submittal package shall consist of each individual truss design drawing,~~
~~the truss placement diagram, the truss member permanent~~ individual truss member restraint ~~bracing details and, as applicable, the cover/truss index sheet.~~

2210.3.3 Truss submittal package. Package consisting of each individual truss design drawing, and, as applicable, the truss placement diagram, the cover/truss index sheet, lateral restraint and diagonal bracing details designed in accordance with generally accepted engineering practice, standard industry lateral restraint and diagonal bracing details, and any other structural details germane to the trusses.

2.3.2.4 Required Information in the Construction Documents. The Registered Design Professional for the Building, through the Construction Documents, shall provide ……..:

(e) All anchorage designs required to resist uplift, gravity, and lateral loads,
(f) Truss to Structural Element connections, but not Truss-to-Truss connections.
(g) Permanent Building Stability Bracing; including Truss anchorage connections to the Permanent Building Stability Bracing.

2303.4.4 Anchorage. The design for the ~~T~~ transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the Registered Design Professional.

2210.3.4 Anchorage. The design for the transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the Registered Design Professional.

2.3.4.6 Pre-Installation Check. The Contractor shall examine the Trusses delivered to the job site for:

(a) Dislodged or missing connectors,

(b) Cracked, dislodged or broken members, or

(c) Any other damage that may impair the structural integrity of the Truss.

2.3.4.7 Post-Installation Check. The Contractor shall examine the Trusses after they are erected and installed for:

(a) Dislodged or missing connectors,

(b) Cracked, dislodged or broken members, or

(c) Any other damage that may impair the structural integrity of the Truss.

2303.4.5 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (i.e. mechanical equipment, piping, additional roofing or insulation, etc.) ~~e.g., HVAC equipment, water heater)~~ shall not be permitted without verification that the truss is capable of supporting such additional loading.

2210.3.5 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (i.e. mechanical equipment, piping, additional roofing or insulation, etc.) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2.3.6.10 Manufacturer Quality Criteria: The Truss Manufacturer shall manufacture the Trusses in accordance with the final Truss Design Drawings, using the quality criteria required by this Standard unless more stringent quality criteria is provided by the Owner in writing or through the Construction Documents.

2303.4.6 Metal-plate-connected trusses. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 109 ~~.4~~ as applicable.

2210.3.6 Manufactured cold-formed steel trusses. In addition to Sections 2210.3.1 through 2210.3.5, the design, manufacture and quality assurance of cold-formed steel trusses shall be in accordance with AISI S214. Job-site inspections shall be in compliance with Section 109 as applicable.

2303.4.7 Truss quality assurance. Trusses not part of a manufacturing process in

2210.3.7 Truss quality assurance. Trusses not part of a manufacturing process in

2.3.6.11 In-Plant Truss Inspections. Truss inspections, as required by the Jurisdiction, shall be performed at the manufacturer's facility using the manufacturer's in-plant quality control program monitored by an inspection agency approved by the Jurisdiction.	accordance with 2303.4.6 or in accordance with a standard, listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Section 1704.2 and 1704.6 as applicable.	accordance with 2210.3.6 or in accordance with a standard, listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Section 1704.2 and 1704.3 as applicable.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

S211–07/08
2202, 2211 (New)

Proponent: W. Lee Shoemaker, PhD, PE**,** Thomas Associates, Inc., representing Metal Building Manufacturers Association

Add new text as follows:

SECTION 2202
DEFINITIONS

METAL BUILDING SYSTEM. An integrated set of components and assemblies, including but not limited to moment frames that are built-up structural steel members, secondary members that are cold-formed steel or steel joists, and cladding components, specifically designed by a manufacturer to support and transfer loads and provide a complete or partial building shell.

SECTION 2211
METAL BUILDING SYSTEMS

2211.1 General. The steel members and components of a metal building system shall be designed to the requirements in this section. All bolted and welded connections shall be in accordance with Section 2204. All other members and components not specifically listed in this section shall be designed in accordance with the applicable sections of the code.

2211.2 Moment frames. The design of built-up structural steel members and structural shapes used for moment frames shall be in accordance with AISC 360. Where required, seismic design shall be in accordance with the additional provisions of Section 2205.2.

2211.3 Cold-formed steel. The design of all cold-formed steel used in a metal building system, including but not limited to roof purlins, wall girts, end wall framing, metal panel roof system, and metal wall cladding shall be in accordance with AISI-NAS.

2211.4 Steel joists. The design of steel joists used in a metal building system shall be in accordance with the provisions of Section 2206.

2211.5 Bracing. Cross bracing in a metal building system shall be designed to the appropriate specification.

2211.5.1 Rod bracing. Steel rod bracing shall be designed in accordance with AISC 360.
2211.5.2 Angle bracing. Steel angle bracing shall be designed in accordance with AISC 360.
2211.5.3 Cable bracing. Steel cable bracing shall be designed in accordance with Section 2207.

Reason: This proposed addition to Chapter 22 does not change any current requirements for the design of metal building systems. However, it is felt that this will be beneficial in clarifying the appropriate design requirements for this common building construction type. In fact, metal building systems account for over 40% of the low-rise nonresidential construction in the U.S., by square footage. A common misconception is that the Metal Building Manufacturers Association (MBMA) promulgates design standards for metal buildings. This proposal will make the building code requirements for the design of metal buildings clear.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

S212–07/08
2302

Proponent: Kirk Grundahl, WTCA, representing the Structural Building Components Industry

Add new definitions as follows:

SECTION 2302
DEFINITIONS

DIAGONAL BRACING. A structural member installed at an angle to a truss chord or web member and intended to temporarily and/or permanently stabilize truss member(s) and/or truss(es)

FRAMING STRUCTURAL SYSTEM. The completed combination of structural elements, trusses, connections and other systems, which serve to support the building's self-weight and the specified loads.

LATERAL RESTRAINT. A structural member installed at right angles to a chord or web member of a truss to reduce the laterally unsupported length of the truss member. Also known as continuous lateral brace or CLB.

PERMANENT INDIVIDUAL TRUSS MEMBER RESTRAINT. Restraint that is used to prevent local bucking of an individual truss cord or web member due to axial forces in the individual truss member.

TRUSS PLACEMENT DIAGRAM. An Illustration identifying the assumed location of each truss.

TRUSS SUBMITTAL PACKAGE. The package consisting of each individual truss design drawing, and, as applicable, the truss placement diagram, the cover/truss index sheet, lateral restraint and diagonal bracing details designed in accordance with generally accepted engineering practice, applicable standard industry defined lateral restraint and diagonal bracing details, and any other structural details germane to the trusses.

Reason: To include definitions of key terms used in Section 2303.4 and harmonize with state of the art industry terminology. Justification and Substantiation: The proposed definitions add clarity and understanding to the key terms used in Section 2303.4 regarding the design process involving wood trusses.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S213–07/08
2302, 2303.1, 2303.1.12 (New), Chapter 35 (New)

Proponent: John Woestman, The Kellen Company, representing Composite Lumber Manufacturers Association

1. Add new text as follows:

SECTION 2302
DEFINITIONS

WOOD PLASTIC COMPOSITE. A composite material made primarily from wood or cellulose-based materials and plastic.

2303.1.12 Wood plastic composites. Wood plastic composites used in exterior deck boards, stair treads, handrails and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032, and shall be installed in accordance with the manufacturer's instructions.

2. Revise as follows:

2303.1 General. Structural sawn lumber; end-jointed lumber; prefabricated wood I-joists; structural glued-laminated timber; wood structural panels, fiberboard sheathing (when used structurally); hardboard siding (when used structurally); particleboard; preservative-treated wood; structural log members; structural composite lumber; round timber poles and piles; fire-retardant-treated wood; hardwood plywood; wood trusses; wood plastic composites, joist hangers; nails; and staples shall conform to the applicable provisions of this section.

3. Add standard to Chapter 35 as follows:

ASTM

D 7032-07 Standard Specification for Establishing Performance Ratings For Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)

Reason: This proposal adds a new requirement to IBC that wood plastic composites increasingly used as exterior decks boards, stair treads, handrails, and guards be rated for performance criteria. This proposal also adds a definition for wood plastic composites and adds the appropriate ASTM reference standard to the code. The IBC is currently silent on these materials despite their growing acceptance for deck construction.

The addition of labeling requirements for wood plastic composites will ensure safe application of these materials in exterior deck systems. The referenced standard, ASTM D7032, includes performance evaluations such as flexural tests, ultraviolet resistance tests, freeze-thaw resistance tests, bio-deterioration tests, fire performance tests, creep recovery tests, mechanical fastener holding tests, and slip resistance tests. The standard also includes considerations of the effects of temperature and moisture, concentrated loads, and fire-propagation tests.

Wood plastic composite material manufacturers who seek to provide quality materials currently demonstrate compliance with the intent of code requirements in the IBC through the use of evaluation reports. Requiring these materials to be approved through testing to the ASTM standard by approved laboratories and labeling by approved quality assurance entities will ensure that the code requirements for structural and fire safety issues are met. This code proposal also provides the industry with additional options for demonstrating compliance.

Text from the scope of ASTM D 7032 is included below for additional background information:

1.1 This specification covers the procedures to establish a performance rating for wood-plastic composite (WPC) deck boards. This specification also defines the procedures to establish a performance rating for WPC guards and handrails. The purpose of this specification is to establish the basis for code recognition of these products or systems in exterior applications where combustible construction is allowed.

1.2 Deck boards, guards, and handrails covered by this specification are permitted to be of any code compliant shape and thickness (solid or non-solid).

1.3 A deck board, and a deck board used as a stair tread, are assigned a span rating indicating its ability to comply with model code specified functions identified for its specific end use. A guard or handrail is recognized for its ability to meet minimum code requirements specified in the appropriate model building code.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM D 7032, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S214–07/08

2303.2.1 (New), 2303.2.2 (New), 2303.2.3 (New); IRC R802.1.3.1 (New), R802.1.3.2 (New), R802.1.3.3 (New)

Proponent: Joseph T. Holland, III, Hoover Treated Wood Products, representing Hoover Treated Wood Products

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Add new text as follows:

2303.2 (Supp) Fire-retardant-treated wood. Fire-retardant-treated wood is any wood product which, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E 84 or UL 723, a listed flame spread index of 25 or less and show no evidence of significant progressive combustion when the test is continued for an additional 20-minute period. In addition, the flame front shall not progress more than 10.5 feet (3200 mm) beyond the centerline of the burners at any time during the test.

2303.2.1 Pressure process. For wood products impregnated with chemicals by a pressure process, the process shall be performed in closed vessels under pressures considerably above atmospheric.

2303.2.2 Other means during manufacture. For wood products produced by other means during manufacture the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product.

2303.2.3 Testing. For wood products produced by other means during manufacture, other than a pressure process, all sides of the wood product shall be tested in accordance with and produce the results required in Section 2303.2. Wood structural panels shall be permitted to test only the front and back faces.

(Renumber subsequent sections)

PART II – IRC BUILDING/ENERGY

Add new text as follows:

R802.1.3 Fire-retardant-treated wood. Fire-retardant treated wood (FRTW) is any wood product which, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E 84, a listed flame spread index of 25 or less and shows no evidence of significant progressive combustion when the test is continued for an additional 20-minute period. In addition, the flame front shall not progress more than 10.5 feet (3200 mm) beyond the center line of the burners at any time during the test.

R802.1.3.1 Pressure process. For wood products impregnated with chemicals by a pressure process, the process shall be performed in closed vessels under pressures considerably above atmospheric.

R802.1.3.2 Other means during manufacture. For wood products produced by other means during manufacture the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product.

R802.1.3.3 Testing. For wood products produced by other means during manufacture, other than a pressure process, all sides of the wood product shall be tested in accordance with and produce the results required in Section R802.1.3. Wood structural panels shall be permitted to test only the front and back faces.

(Renumber subsequent sections)

Reason: Purpose: Clarify the meaning of the phrase "pressure process or other means during manufacture" and provide testing requirements of treatments not impregnated by a pressure process in accordance with 2303.2 (R802.1.3 IRC).

Fire-retardant-treated wood is permitted for applications where noncombustible materials are required. It is a building and life safety issue. It is essential that any product used for such applications meet rigorous requirements insuring it will perform as expected. Equivalent performance from all sides insures installation is not a factor or which direction a fire is supposed to come from does not become an issue.

Cost Impact: The code change proposal will not increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S215–07/08

2303.4.1.1, 2303.4.1.2, 2303.4.1.2.1, 2303.4.1.2.2, 2303.4.1.2.3, 2303.4.1.2.4, 2303.4.1.3, 2303.4.1.3.1, 2303.4.2, 2303.4.3, 2303.4.4, 2303.4.5, 2303.4.6, 2303.4.7; IRC R502.11, 502.11.1, 502.11.2, 503.11.3, 502.11.4, 502.11.4.1, 502.11.5, 502.11.6, 507.11.7, 502.11.8, 502.10.9, 502.11.10, R802.10

Proponent: Kirk Grundahl, PE, WTCA, representing the Structural Building Components Industry

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL, AND IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

1. Revise as follows:

2303.4.1.1 (Supp) Truss design drawings. The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Building Code used for Design, unless specified on Cover/Truss Index Sheet.
~~1.~~2. Slope or depth, span and spacing;
~~2.~~3. Location of all joints and support locations;;
4. Number of plys if greater than one.
~~3.~~5. Required bearing widths;
~~4.~~6. Design loads as applicable, including;
   ~~4.1.~~ 6.1. Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load); ~~(including snow loads);~~
   ~~4.2.~~ 6.2. Top chord dead load;
   ~~4.3.~~ 6.3. Bottom chord live load;
   ~~4.4.~~ 6.4. Bottom chord dead load;
   ~~4.5.~~ 6.5. Additional loads and locations; ~~concentrated loads and their points of application as applicable; and~~
   ~~4.6.~~ 6.6. Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and ~~Controlling wind and earthquake loads as applicable.~~
   6.7. Other lateral loads, including drag strut loads.
~~5.~~7. Adjustments to wood member and ~~metal connector plate~~ connecting device design value for conditions of use;
~~6.~~8. ~~Each~~ Maximum reaction force and direction, including maximum uplift reaction forces where applicable;
~~7.~~9. ~~Metal connector plate~~ Connecting device type, size, and thickness or gage, and the dimensioned location of each ~~metal~~ connecting device ~~connector plate~~ except where symmetrically located relative to the joint interface;
~~8.~~10. Size, species and grade for each wood member;
11. Truss-to-truss connection and truss field assembly requirements.
~~9.~~ 10. ~~Specific connection capacities or connection capacities required for:~~
   ~~9.1. Truss to truss girder;~~
   ~~9.2. Truss ply to ply; and~~
   ~~9.3. Field assembly of a truss when the truss shown on the individual truss design drawing is supplied in separate pieces that will be field connected.~~
~~10.~~ 12. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and creep as applicable;
~~11.~~ 13. Maximum axial tension and compression forces in the truss members; and
~~12.~~ 14. Required permanent individual truss member restraint location and the method of restraint/bracing to be used per Section 2303.4.1.2~~, unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional~~.

2. Delete and substitute as follows:

~~**2303.4.1.2 (Supp) Permanent individual truss member restraint.** Where permanent restraint of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:~~

~~1. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T-reinforcement or L-reinforcement). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.~~
~~2. Permanent individual truss member restraint and diagonal bracing shall be installed using standard industry lateral restraint and diagonal bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.~~

2303.4.1.2 Requirements for the permanent member restraint/bracing of truss systems

2303.4.1.2.1 Method of restraint. The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:

1. **Standard industry details.** Standard industry lateral restraint and diagonal bracing details.
2. **Substitution with reinforcement.** Permanent individual truss member restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).
3. **Project specific design.** A project specific truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any registered design professional.

2303.4.1.2.2 Method specified by any registered design professional. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any registered design professional.

2303.4.1.2.3 Absence of truss restraint/bracing method or details. If a specific truss member permanent bracing design for the roof or floor framing structural system is not provided by the owner or any registered design professional, the method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be in accordance with standard industry lateral restraint and diagonal bracing details.

2303.4.1.2.4 Trusses spanning 60 feet (18 m) or greater. Trusses with clear spans 60 ft. (18 m) or greater, shall:

1. **Restraint/Bracing design.** In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing.
2. **Special inspection.** In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional to provide special inspections to assure that the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing are installed properly.

3. Revise as follows:

2303.4.1.3 (Supp) Truss designer. Person responsible for the preparation of the truss design drawings. ~~The individual or organization responsible for the design of trusses.~~

2303.4.1.3.1 (Supp) Truss design drawings seal and signature. Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions:

1. ~~Where~~ When a cover/ ~~sheet and~~ truss index sheet is used it ~~are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet~~ is the only document required to be signed and sealed by the truss designer.
2. ~~When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.~~

2303.4.2 (Supp) Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

~~**Exception:** When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.~~

2303.4.3 (Supp) Truss submittal package. ~~The truss submittal package shall consist of each individual truss design drawing, the truss placement diagram, the truss member permanent bracing details and, as applicable, the cover/truss index sheet~~. Package consisting of each individual truss design drawing, and, as applicable, the truss placement diagram, the cover/truss index sheet, lateral restraint and diagonal bracing details designed in accordance with generally accepted engineering practice, standard industry lateral restraint and diagonal bracing details, and any other structural details germane to the trusses.

2303.4.4 (Supp) Anchorage. The design for the transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the registered design professional.

2303.4.5 (Supp) Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (i.e. mechanical equipment, piping, additional roofing or insulation, etc.) ~~(e.g., HVAC equipment, water heater)~~ shall not be permitted without verification that the truss is capable of supporting such additional loading.

2303.4.6 (Supp) Metal-plate-connected trusses. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 109.4 as applicable.

4. Add new text as follows:

2303.4.7 Truss quality assurance. Trusses not part of a manufacturing process in accordance with 2303.4.6 or in accordance with a standard, listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Sections 1704.2 and 1704.6 as applicable.

PART II – IRC BUILDING/ENERGY

1. Revise as follows:

R502.11 Wood trusses.

R502.11.1 Design. Wood trusses shall be designed in accordance with the provisions of this code and ~~approved~~ accepted engineering practice. ~~The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1~~. Members are permitted to be joined by nails, glue, bolts, timber connectors, or other approved connecting devices.

2. Delete without substitution:

~~**R502.11.2 Bracing.** Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.~~

~~**R502.11.3 Alterations to trusses.** Truss members and components shall not be cut, notched, spliced or otherwise altered in anyway without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater, etc.), that exceed the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.~~

3. Revise as follows:

~~**R502.11.4**~~ **R502.11.2 Truss design drawings.** Truss design drawings~~, prepared in compliance with Section R502.11.1,~~ shall be provided ~~submitted~~ to the building official for ~~and~~ approval ~~approved~~ prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Building code used for design, unless specified on cover/truss index sheet.
2~~1~~. Slope or depth, span and spacing.
3~~2~~. Location of all joints~~.~~ and support locations.
4. Number of plys if greater than one.
5~~3~~. Required bearing widths.
6 ~~4~~. Design loads as applicable, including:
   - 6.1 ~~4.1~~ Top chord live load;
   - 6.2 ~~4.2~~. Top chord dead load;
   - 6.3 ~~4.2~~. Bottom chord live load;
   - 6.4 ~~4.4~~ Bottom chord dead load;
   - 6.5 ~~4.5~~ Additional loads and locations; ~~Concentrated loads and their points of application; and~~
   - 6.6 ~~4.6~~ Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and ~~Controlling wind and earthquake loads.~~
   - 6.7. ~~6.5~~ Other lateral loads, including drag strut loads.
7~~5~~. Adjustments to ~~lumber~~ wood member and ~~joint~~ ~~connector~~ connecting device design values for conditions of use.
8~~6~~. ~~Each~~ Maximum reaction force and direction, including maximum uplift reaction forces where applicable.

9~~7~~. ~~Joint connector~~ Connecting device type, manufacturer, ~~and description, e.g.,~~ size, and thickness or gauge, and the dimensioned location of each ~~joint connector~~ connecting device except where symmetrically located relative to the joint interface.

10~~8~~. ~~Lumber~~ size, species and grade for each wood member.

11~~9~~. Truss-to-truss connection and truss field assembly requirements.
~~Connection requirements for:~~
~~9.1. Truss-to-girder-truss;~~
~~9.2. Truss ply-to-ply; and~~
~~9.3. Field splices~~.

12~~10~~. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection ~~description~~ for live and total load and creep as applicable.

13~~11~~. Maximum axial tension and compression forces in the truss members. ~~to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss drawing or on supplemental documents.~~

14~~12~~. Required permanent individual truss member ~~bracing~~ restraint location and the method of restraint/bracing to be used per Section R502.11.3

4. Add new text as follows:

R502.11.3 Requirements for the permanent member restraint/bracing of truss systems. Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses. The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:

1. **Standard industry details.** Standard industry lateral restraint and diagonal bracing details in accordance with principles contained in *BCSI-B3: Permanent Restraint/Bracing of Chords and Web Members and/or BCSI-B7: Temporary & Permanent Restraint/Bracing for Parallel Chord Trusses* of the Building Component Safety Information (*BCSI*).
2. **Substitution with reinforcement.** Permanent individual truss member restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).
3. **Project specific design.** A project specific truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any building designer.

R502.11.3.1 Method specified by any building designer. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any building designer.

In the absence of specific bracing requirements, trusses shall be braced in accordance with the principles contained in Building Component Safety Information (BCSI ~~1-03~~) Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.

R502.11.4 Preparation of truss design drawings. The truss designer is responsible for the preparation of the truss design drawings based on the truss design criteria and requirements set forth in the Construction Documents. The truss design drawings shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.

R502.11.4.1 Single truss component design. The truss designer shall be responsible for the single truss component design depicted on the truss design drawing.

R502.11.5 Truss placement diagram. The truss manufacturer, when required by contract, shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

502.11.6 Truss submittal package. Where required by the construction documents or contract, legal requirements or the building official, the truss manufacturer shall provide the appropriate truss submittal package to one or more of the following: building official; building designer and/or contractor for review and/or approval.

R502.11.7 Truss to building anchorage. The building designer shall provide the following:

1. All anchorage designs required to resist uplift, gravity, and lateral loads,
2. Adequate truss to structural element connections, but not truss-to-truss connections.
3. Permanent building stability bracing; including truss anchorage to the permanent building stability bracing.

R502.11.8 Alterations to trusses. Truss members and components shall not be cut, notched, spliced or otherwise altered in anyway without the approval of a registered design professional. Alterations resulting in the addition of load i.e. mechanical equipment, piping, additional roofing or insulation, etc.), that exceed the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.

R502.11.9 Metal plate connected trusses. In addition to Sections 502.11.1 through R502.11.8, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 109 as applicable.

R502.11.10 Truss quality assurance. Where trusses are not part of a manufacturing process in accordance with R502.11.9 or in accordance with a standard listed in Chapter 43, which provides requirements for quality control done under the supervision of a third party quality control agency, the building official shall be permitted to require the owner to employ a special inspector during construction and installation.

5. Add new text as follows:

R802.10.1 Design. Wood trusses shall be designed in accordance with the provisions of this code and with accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, or other approved connection devices.

R802.10.1.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist rafter or truss span, not greater than two stories in height with each story not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). Roof snow load is to be computed as: 0.7 p_g.

6. Revise as follows:

R802.10.~~1~~2 Truss design drawings. Truss design drawings, ~~prepared in conformance to Section R802.10.1,~~ shall be provided to the building official for ~~and approved~~ approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the jobsite. Truss design drawings shall include, at a minimum, the information specified below. ~~Truss design drawing shall be provided with the shipment of trusses delivered to the jobsite.~~

1. Building Code used for design unless specified on cover/truss Index Sheet.
~~1~~2. Slope or depth, span and spacing.
~~2~~3. Location of all joints and support locations.
4. Number of plys if greater than one.
~~3~~5. Required bearing widths.
~~4~~6. Design loads as applicable~~.~~, including:
   6~~4~~.1. Top chord live load. ~~(as determined from Section R301.6)~~(for roof trusses, this shall be the controlling case of live load or snow load);
   6~~4~~.2. Top chord dead load.
   6~~4~~.3. Bottom chord live load.
   6~~4~~.4. Bottom chord dead load.
   6~~4~~.5. ~~Concentrated loads and their points of application~~ Additional loads and locations.
   6~~4~~.6. ~~Controlling wind and earthquake loads.~~ Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads).
   6.7. Other lateral loads, including drag strut loads.
7~~5~~. Adjustments to ~~lumber~~ wood member and ~~joint connector~~ connecting device design values for conditions of use.
8~~6~~. ~~Each~~ Maximum reaction force and direction~~.~~, including maximum uplift reaction forces where applicable;

9~~7~~. ~~Joint connector~~ Connecting device type, manufacturer, ~~and description (e.g., size, thickness or gage)~~ and the dimensioned location of each connecting device, ~~joint connector~~ except where symmetrically located relative to the joint interface.

10~~8~~. ~~Lumber~~ Size, species and grade for each wood member.

11~~9~~. Truss-to-truss connection and truss field assembly requirements. ~~Connection requirements for:~~

~~9.1. Truss to girder truss.~~

~~9.2. Truss ply to ply.~~

~~9.3. Field splices.~~

12~~10~~. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection ~~description~~ for live and total load.

13~~11~~. Maximum axial tension and compression forces in the truss members. ~~to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss design drawing or on supplemental documents.~~

14~~12~~. Required permanent individual truss member ~~bracing~~ restraint location and the method of restraint/bracing to be used per section 802.10.3.

7. Delete without substitution:

~~**R802.10.2 Design.** Wood trusses shall be designed in accordance with accepted engineering practice. The design and manufacture of metal-plate-connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.~~

~~**R802.10.2.1 Applicability limits.** The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist span or truss, not greater than two stories in height with each story not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). Roof snow load is to be computed as: 0.7 p_g.~~

8. Revise as follows:

R802.10.3 ~~Bracing~~ Requirements for the permanent member restraint/bracing of truss systems. Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. ~~In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.~~ The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:

1. **Standard industry details.** Standard industry lateral restraint and diagonal bracing details in accordance with principles contained in *BCSI-B3: Permanent Restraint/Bracing of Chords and Web Members and/or BCSI-B7: Temporary & Permanent Restraint/Bracing for Parallel Chord Trusses* of the Building Component Safety Information (*BCSI*).
2. **Substitution with reinforcement.** Permanent individual truss member restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).
3. **Project Specific Design.** A project specific truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any building designer.

9. Add new text as follows:

R802.10.3.1 Method specified by any building designer. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any building designer.

In the absence of specific bracing requirements, trusses shall be braced in accordance with the principles contained in Building Component Safety Information (BCSI) Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.

R802.10.4 Preparation of truss design drawings. The truss designer is responsible for the preparation of the truss design drawings based on the truss design criteria and requirements set forth in the construction documents. The truss design drawings shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.

R802.10.4.1 Single truss component design. The truss designer shall be responsible for the single truss component design depicted on the truss design drawing.

R802.10.5 Truss placement diagram. The truss manufacturer, when required by contract, shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

R802.10.6 Truss submittal package. Where required by the construction documents or contract, legal requirements or the building official, the truss manufacturer shall provide the appropriate truss submittal package to one or more of the following: building official; building designer and/or contractor for review and/or approval.

R802.10.7 Truss to building anchorage. The building designer shall provide the following:

1. All anchorage designs required to resist uplift, gravity, and lateral loads,
2. Adequate truss to structural element connections, but not truss-to-truss connections.
3. Permanent building stability bracing; including truss anchorage to the permanent building stability bracing.

10. Revise as follows:

R802.10.84 Alterations to trusses. Truss members shall not be cut, notched, drilled, spliced or otherwise altered in any way without the approval of a registered design professional. Alterations resulting in the addition of load (~~e.g., HVAC equipment, water heater~~ i.e mechanical equipment, piping, additional roofing or insulation, etc.) that exceeds the design load for the truss shall not be permitted without verification that the truss is capable of supporting such additional loading.

11. Delete without substitution:

~~**R802.10.5 Truss to wall connection.** Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds (779 N) and shall be installed in accordance with the manufacturer's specifications. For roof assemblies subject to wind uplift pressures of 20 pounds per square foot (960 Pa) or greater, as established in TableR301.2(2), adjusted for height and exposure per Table R301.2(3), see section R802.11.~~

12 Add new text as follows:

R802.10.9 Metal plate connected trusses. In addition to Sections R802.10.1 through R802.10.8, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section R109 as applicable

R802.10.10 Truss quality assurance. Where trusses are not part of a manufacturing process in accordance with R802.10.9 or in accordance with a standard listed in Chapter 43, which provides requirements for quality control done under the supervision of a third party quality control agency, the building official shall be permitted to require, the owner to employ a special inspector during construction and installation.

Reason: Part I - IBC. The goal of this proposed code change is to update the language in 2303.4 to be harmonized with the current language that is being used in most recent ANSI/TPI 1 consensus standard. There is a great deal of value to have common and uniform terminology in 2303.4, ANSI/TPI 1 and within the standard industry bracing details. Consistency in approach will lead to better understanding, design, application and life-safety. By implementing this code language, we believe this change will markedly improve the construction process as it relates to trusses.

This code change will update the language to the most current and technically comprehensive language being used within the truss industry today. Please see appendix A for an easy to follow comparison to the 2007 IBC Supplement and ANSI/TPI 1 Chapter 2.

Appendix A

ANSI/TPI 1 Chapter 2 Provisions	2007 2303.4 MPC Trusses	2009 IBC Code Change Proposal for 2303.4 MPC Trusses
	2303.4 Trusses.	**2303.4 Trusses.**
	2303.4.1 Design. Wood trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved framing devices.	**2303.4.1 Design.** Wood trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved ~~framing~~ connecting devices.
Truss Design Drawing: Written, graphic and pictorial depiction of an individual Truss that includes the information required in Sections 2.3.5.5 and 2.4.5.4.	**2303.4.1.1 Truss design drawings.** The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:	**2303.4.1.1 Truss design drawings.** The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:
2.3.5.5 Information on Truss Design Drawings. Truss Design Drawings shall include, at a minimum, the information specified below:		
		1. Building Code used for Design, unless specified on Cover/Truss Index Sheet.
(a) Building Code used for Design, unless specified on Cover/Truss Index Sheet.		
(b) Slope or depth, span and spacing.	1. Slope or depth, span and spacing;	2. ~~1.~~ Slope or depth, span and spacing;
(c) Location of all joints and support locations.	2. Location of all joints;	3. ~~2.~~ Location of all joints and support locations;
(d) Number of plys if greater than one.		4. Number of plys if greater than one.
(e) Required bearing widths.	3. Required bearing widths;	5. ~~3~~. Required bearing widths;
(f) Design loads as applicable, including:	4. Design loads as applicable;	6. ~~4.~~ Design loads as applicable, including;
(1) Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load);	4.1. Top chord live load (including snow loads);	6.~~4.~~ 1. Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load); ~~(including snow loads);~~
(2) Top chord dead load**;**	4.2. Top chord dead load;	6.~~4.~~ 2. Top chord dead load;
(3) Bottom chord live load;	4.3. Bottom chord live load;	6.~~4.~~ 3. Bottom chord live load;
(4) Bottom chord dead load;	4.4. Bottom chord dead load;	6.~~4.~~ 4. Bottom chord dead load;
(5) Additional loads and locations;	4. 5. Concentrated loads and their points of application as applicable; and	6.~~4.~~ 5. Additional loads and locations; ~~Concentrated loads and their points of application as applicable; and~~
(6) Environmental Load Design Criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and	4. 6.Controlling wind and earthquake loads as applicable.	6.~~4.~~ 6. Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and ~~Controlling wind and earthquake loads as applicable.~~
(7) Other lateral loads, including drag strut loads.		6.7 Other lateral loads, including drag strut loads.
(g) Adjustments to wood member and metal connector plate design values for conditions of	5. Adjustments to wood member and metal connector plate design value for conditions of	7. ~~5.~~ Adjustments to wood member and ~~metal connector plate~~ connecting device design

use.	use;	values for conditions of use;
(h) Maximum reaction force and direction, including maximum uplift reaction forces where applicable**.**	6. Each reaction force and direction;	8. ~~6. Each~~ Maximum reaction force and direction, including maximum uplift reaction forces where applicable;
(i) Metal connector plate type, manufacturer, size, and thickness or gauge, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface.	7. Metal connector plate type, size, and thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface;	9. ~~7.~~ ~~Metal connector plate~~ Connecting device type, size, and thickness or gage, and the dimensioned location of each ~~metal~~ connecting device ~~or plate~~ except where symmetrically located relative to the joint interface;
(j) Size, species and grade for each wood member.	8. Size, species and grade for each wood member;	10. ~~8.~~ Size, species and grade for each wood member;
(k) Truss-to-Truss connection and Truss field assembly requirements.	9. Specific connection capacities or connection capacities required for: 9.1. Truss to truss girder; 9.2. Truss ply to ply; and 9.3. Field assembly of a truss when the truss shown on the individual truss design drawing is supplied in separate pieces that will be field connected.	11. Truss-to-truss connection and truss field assembly requirements. ~~9. Specific connection capacities or connection capacities required for:~~ ~~9.1. Truss to truss girder;~~ ~~9.2. Truss ply to ply; and~~ ~~9.3. Field assembly of a truss when the truss shown on the individual truss design drawing is supplied in separate pieces that will be field connected.~~
(l) Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and K_{CR} as applicable.	10. Calculated deflection ratio and maximum vertical and horizontal deflection for live and total load as applicable;	12~~0~~. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and creep as applicable;
(m) Maximum axial tension and compression forces in the Truss members.	11. Maximum axial tension and compression forces in the truss members; and	13~~4~~. Maximum axial tension and compression forces in the truss members; and
(n) Fabrication Tolerance per Section 6.4.10. **(o)** Required Permanent Individual Truss Member Restraint location and the method of Restraint/Bracing to be used per Section 2.3.3.	12. Required permanent individual truss member restraint and method per Section 2303.4.1.2, unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.	14~~2~~. Required permanent individual truss member restraint location and the method of restraint/bracing to be used per Section 2303.4.1.2, ~~unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.~~
2.3.3 REQUIREMENTS FOR THE PERMANENT MEMBER RESTRAINT/ BRACING OF TRUSS SYSTEMS	**Permanent individual truss member restraint.** Where permanent restraint of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:	**2303.4.1.2 Requirements for the permanent member restraint/bracing of truss systems**
2.3.3.1 Method of Restraint. The method of Permanent Individual Truss Member Restraint/Bracing and the method of anchoring or restraining to prevent lateral movement of all Truss members acting together as a system shall be accomplished by:	1. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T-reinforcement or L-reinforcement, etc.). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.	**2303.4.1.2.1 Method of restraint**. The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:
2.3.3.1.1 Standard Industry Details. Standard industry Lateral Restraint and Diagonal Bracing details in accordance with *BCSI-B3: Permanent Restraint/Bracing of Chords and Web Members and/or BCSI-B7: Temporary & Permanent Restraint/Bracing for Parallel Chord Trusses* of the Building Component Safety Information (*BCSI*).	2. Permanent individual truss member restraint and diagonal bracing shall be installed using standard industry lateral restraint and diagonal bracing details in	**1. Standard industry details.** Standard industry lateral restraint and diagonal bracing details.
2.3.3.1.2 Substitution with Reinforcement.		**2 Substitution with reinforcement.** Permanent individual truss member restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).
		3 Project specific design. A project specific

Permanent Individual Truss Member Restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).

2.3.3.1.3 Project Specific Design. A project specific Truss member permanent lateral restraint/bracing design for the roof or floor Framing Structural System shall be permitted to be specified by any Registered Design Professional.

2.3.3.2 Method Specified by any Registered Design Professional. The method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be permitted to be specified by any Registered Design Professional.

2.3.3.3 Absence of Truss Restraint/Bracing Method or Details. If a specific Truss member permanent bracing design for the roof or floor Framing Structural System is not provided by the Owner or any Registered Design Professional, the method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be in accordance with *BCSI-B3 or BCSI-B7*.

2.3.3.4 Trusses Spanning 60 Feet (18 m) or Greater. For trusses with clear spans 60 ft. (18 m) or greater, see Section 2.3.1.6.

2.3.1.6 Long Span Truss Requirements.

2.3.1.6.1 Restraint/Bracing Design. In all cases where a Truss clear span is 60 ft. (18 m) or greater, the Owner shall contract with any Registered Design Professional for the design of the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint and Diagonal Bracing.

2.3.1.6.2 Special Inspection. In all cases where a Truss clear span is 60 ft. (18 m) or greater, the Owner shall contract with any Registered Design Professional to provide special inspections to assure that the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint and Diagonal Bracing are installed properly.

accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.

truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any registered design professional.

2303.4.1.2.2 Method specified by any registered design professional. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any registered design professional.

2303.4.1.2.3 Absence of truss restraint/bracing method or details. If a specific truss member permanent bracing design for the roof or floor framing structural system is not provided by the owner or any registered design professional, the method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be in accordance with standard industry lateral restraint and diagonal bracing details.

2303.4.1.2.4 Trusses spanning 60 feet (18 m) or greater. Trusses with clear spans 60 ft. (18 m) or greater, shall:

1. Restraint/Bracing design. In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing.

2 Special inspection. In all cases where a truss clear span is 60 ft. (18 m) or greater, the owner shall contract with any registered design professional to provide special inspections to assure that the temporary installation restraint/bracing and the permanent individual truss member restraint and diagonal bracing are installed properly.

~~**Permanent individual truss member restraint.** Where permanent restraint of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:~~

~~1. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T-reinforcement or L-reinforcement, etc.). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.~~

~~2. Permanent individual truss member restraint and diagonal bracing shall be~~

		~~installed using standard industry lateral restraint and diagonal bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.~~
Truss Designer: Person responsible for the preparation of the Truss Design Drawings.	**2303.4.1.3 Truss designer.** The individual or organization responsible for the design of trusses.	**2303.4.1.3 Truss designer.** Person responsible for the preparation of the truss design drawings. ~~The individual or organization responsible for the design of trusses.~~
2.3.5.3 Truss Design Drawing Seal and Signature. Each individual Truss Design Drawing shall bear the seal and signature of the Truss Design Engineer.	**2303.4.1.3.1 Truss design drawings.** Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.	**2303.4.1.3.1 Truss design drawing~~s~~ seal & signature.** Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.
Exception: When a Cover/Truss Index Sheet is used, it is the only document required to be signed and sealed by the Truss Design Engineer.	**Exceptions:** 1. Where a cover/ sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer. 2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.	**Exception~~s~~:** ~~1. Where~~ When a cover/ ~~sheet and~~ truss index sheet is used it ~~are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet~~ is the only document required to be signed and sealed by the truss designer. ~~2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.~~
2.3.5.4 Truss Placement Diagram. When the Truss Placement Diagram serves only as a guide for Truss installation, it does not require the seal of the Truss Design Engineer. **Exception:** When the Truss Placement Diagram is prepared by or under the responsible charge of any Registered Design Professional, it is required to be signed and sealed**.** **2.3.6.4 Truss Placement Diagram.** Where required by the Construction Documents or Contract, the Truss Manufacturer shall prepare the Truss Placement Diagram that identifies the assumed location for each individually designated Truss and references the corresponding Truss Design Drawing. The Truss Placement Diagram shall be permitted to include identifying marks for other products including Structural Elements, so that they may be more easily identified by the Contractor during field erection. When the Truss Placement Diagram serves only as a guide for Truss installation and requires no engineering input, it does not require the seal of any Truss Design Engineer or Registered Design Professional. **Exception:** When the Truss Placement Diagram is prepared by or under the responsible charge of any Registered Design Professional, it is required to be signed and sealed.	**2303.4.2 Truss placement diagram.** The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer. **Exception:** When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.	**2303.4.2 Truss placement diagram.** The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer. ~~**Exception:** When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.~~

Truss Submittal Package: Package consisting of each individual Truss Design Drawing, and, as applicable, the Truss Placement Diagram, the Cover/Truss Index Sheet, Lateral Restraint and Diagonal Bracing details designed in accordance with generally accepted engineering practice, applicable *BCSI* defined Lateral Restraint and Diagonal Bracing details, and any other structural details germane to the trusses.

2303.4.3 Truss submittal package. The truss submittal package shall consist of each individual truss design drawing,
the truss placement diagram, the truss member permanent individual truss member bracing details and, as applicable, the cover/truss index sheet.

2303.4.3 Truss submittal package. Package consisting of each individual truss design drawing, and, as applicable, the truss placement diagram, the cover/truss index sheet, lateral restraint and diagonal bracing details designed in accordance with generally accepted engineering practice, standard industry lateral restraint and diagonal bracing details, and any other structural details germane to the trusses. ~~The truss submittal package shall consist of each individual truss design drawing,~~
~~the truss placement diagram, the truss member permanent individual truss member restraint bracing details and, as applicable, the cover/truss index sheet.~~

2.3.2.4 Required Information in the Construction Documents. The Registered Design Professional for the Building, through the Construction Documents, shall provide …….:

(e) All anchorage designs required to resist uplift, gravity, and lateral loads,
(f) Truss to Structural Element connections, but not Truss-to-Truss connections.
(g) Permanent Building Stability Bracing; including Truss anchorage connections to the Permanent Building Stability Bracing.

2303.4.4 Anchorage. Transfer of loads and anchorage of each truss to the supporting structure is the responsibility of
the registered design professional.

2303.4.4 Anchorage. The design for the ~~T~~ transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the Registered Design Professional.

2.3.4.6 Pre-Installation Check. The Contractor shall examine the Trusses delivered to the job site for:

(a) Dislodged or missing connectors,

(b) Cracked, dislodged or broken members, or

(c) Any other damage that may impair the structural integrity of the Truss.

2.3.4.7 Post-Installation Check. The Contractor shall examine the Trusses after they are erected and installed for:

(a) Dislodged or missing connectors,

(b) Cracked, dislodged or broken members, or

(c) Any other damage that may impair the structural integrity of the Truss.

2303.4.5 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (e.g., HVAC equipment, water heater) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2303.4.5 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (i.e. mechanical equipment, piping, additional roofing or insulation, etc.) ~~e.g., HVAC equipment, water heater)~~ shall not be permitted without verification that the truss is capable of supporting such additional loading.

2.3.6.10 Manufacturer Quality Criteria: The Truss Manufacturer shall manufacture the Trusses in accordance with the final Truss Design Drawings, using the quality criteria required by this Standard unless more stringent quality criteria is provided by the Owner in writing or through the Construction Documents.

2.3.6.11 In-Plant Truss Inspections. Truss inspections, as required by the Jurisdiction, shall be performed at the manufacturer's facility using the manufacturer's in-plant quality control program monitored by an inspection agency approved by the Jurisdiction.

2303.4.6 Metal-plate-connected trusses. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections
shall be in compliance with Section 109 .4 as applicable.

2303.4.6 Metal-plate-connected trusses. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 109 ~~.4~~ as applicable.

2303.4.7 Truss quality assurance. Trusses not part of a manufacturing process in accordance with 2303.4.6 or in accordance with a standard, listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Section 1704.2 and 1704.6 as applicable.

Part II – IRC. The goal of this proposed code change is to update the language in 502.11 to be harmonized with the current language that is being used in most recent ANSI/TPI 1 consensus standard and the proposed language in IBC 2303.4. There is a great deal of value to have common and uniform terminology in 502.11, IBC 2303.4, ANSI/TPI 1 and within BCSI (Building Component Safety Information) *Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.* Consistency in approach will lead to better understanding, design, application and life-safety. By implementing this code language, we believe this change will markedly improve the construction process as it relates to trusses

This code change will update the language to the most current and technically comprehensive language being used within the truss industry today. Please see appendix A for an easy to follow comparison to the proposed IRC section 502.11, 2006 IRC 502.11, 2303.4 and ANSI/TPI 1 Chapter 2.

The goal of this proposed code change is to update the language in 802.10 to be harmonized with the current language that is being used in most recent ANSI/TPI 1 consensus standard and the proposed language in IBC 2303.4. There is a great deal of value to have common and uniform terminology in 802.10, IBC 2303.4, ANSI/TPI 1 and within BCSI (Building Component Safety Information) *Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.* Consistency in approach will lead to better understanding, design, application and life-safety. By implementing this code language, we believe this change will markedly improve the construction process as it relates to trusses

This code change will update the language to the most current and technically comprehensive language being used within the truss industry today. Please see appendix A for an easy to follow comparison to the proposed IRC section 802.10, 2006 IRC 802.10, 2303.4 and ANSI/TPI 1 Chapter 2.

Appendix A

ANSI/TPI 1 Chapter 2 Provisions	**2009 IBC Code Change Proposal for 2303.4 MPC Trusses 2303.4 Trusses.**	**2006 and 2007 Supplement IRC 502.11 IRC Floor Section R502.11 Wood trusses.**	**2009 IRC Proposed R502.11 R502.11 Wood trusses.**
	2303.4.1 Design. Wood trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved ~~framing~~ connecting devices.	**R502.11.1 Design.** Wood trusses shall be designed in accordance with approved engineering practice. The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1	**R502.11.1 Design.** Wood trusses shall be designed in accordance with the provisions of this code and ~~approved~~ accepted engineering practice. ~~The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.~~ Members are permitted to be joined by nails, glue, bolts, timber connectors, or other approved connecting devices.
2.3.5.5 Information on Truss Design Drawings. Truss Design Drawings shall include, at a minimum, the information specified below:	**2303.4.1.1 Truss design drawings.** The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:	**R502.11.4 Truss design drawings.** Truss design drawings, prepared in compliance with Section R502.11.1, shall be submitted to the building official and approved prior to installation. Truss design drawings shall be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:	**R502.11.4~~.~~2 Truss design drawings.** Truss design drawings~~, prepared in compliance with Section R502.11.1,~~ shall be ~~submitted~~ provided to the building official for ~~and~~ approval ~~ed~~ prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:
(a) Building Code used for Design, unless specified on Cover/Truss Index Sheet.	1. Building Code used for Design, unless specified on Cover/Truss Index Sheet.	1. Slope or depth, span and spacing.	1. Building code used for design, unless specified on cover/truss index sheet.
(b) Slope or depth, span and spacing.	2. ~~1.~~ Slope or depth, span and spacing;	2. Location of all joints.	2~~1~~. Slope or depth, span and spacing.
(c) Location of all joints and support locations.	3. ~~2.~~ Location of all joints and support locations;		3~~2~~. Location of all joints~~.~~ and support locations.
(d) Number of plys if greater than one.	4. Number of plys if greater than one.	3. Required bearing widths.	4. Number of plys if greater than one.
(e) Required bearing widths.	5. ~~3~~. Required bearing widths;	4. Design loads as applicable:	5~~3~~. Required bearing widths.
(f) Design loads as applicable, including:	6. ~~4.~~ Design loads as applicable, including;	4.1. Top chord live load;	6 ~~4~~. Design loads as applicable, including:

(1) Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load);	6.~~4.~~ 1. Top chord live load (for roof trusses, this shall be the controlling case of live load or snow load); ~~(including snow loads);~~		6.1 ~~4.1~~ Top chord live load;
		4.2. Top chord dead load;	
		4.3. Bottom chord live load;	
	6.~~4.~~ 2. Top chord dead load;		6.2 ~~4.2~~. Top chord dead load;
(2) Top chord dead load**;**	6.~~4.~~ 3. Bottom chord live load;	4.4. Bottom chord dead load;	6.3 ~~4.2~~. Bottom chord live load;
(3) Bottom chord live load;	6.~~4.~~ 4. Bottom chord dead load;		6.4 ~~4.4~~ Bottom chord dead load;
(4) Bottom chord dead load;		4.5. Concentrated loads and their points of application; and	6.5 ~~4.5~~ Additional loads and locations; ~~Concentrated loads and their points of application; and~~
(5) Additional loads and locations;	6.~~4.~~ 5. Additional loads and locations; ~~Concentrated loads and their points of application as applicable; and~~	4.6. Controlling wind and earthquake loads.	
(6) Environmental Load Design Criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and	6.~~4.~~ 6. Environmental Load Design Criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and ~~Controlling wind and earthquake loads as applicable.~~		6.6 ~~4.6~~ Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads); and ~~Controlling wind and earthquake loads.~~
(7) Other lateral loads, including drag strut loads.	6.7 Other lateral loads, including drag strut loads.	5. Adjustments to lumber and joint connector design values for conditions of use.	6.7. ~~6.5~~ Other lateral loads, including drag strut loads.
(g) Adjustments to wood member and metal connector plate design values for conditions of use.	8. ~~5.~~ Adjustments to wood member and metal connector plate design value for conditions of use;		7 ~~5~~. Adjustments to ~~lumber~~ wood member and ~~joint~~ ~~connector~~ connecting device design values for conditions of use.
(h) Maximum reaction force and direction, including maximum uplift reaction forces where applicable**.**	9. ~~6. Each~~ Maximum~~-~~reaction force and direction, including maximum uplift reaction forces where applicable;	6. Each reaction force and direction.	8~~6~~. ~~Each~~ Maximum reaction force and direction, including maximum uplift reaction forces where applicable.
(i) Metal connector plate type, manufacturer, size, and thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface.	10. ~~7.~~ Metal connector plate type, size, and thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface;	7. Joint connector type and description, e.g., size, thickness or gauge, and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.	9~~7~~. ~~Joint~~ ~~connector~~ Connecting device type, manufacturer, ~~and description, e.g.,~~ size, and thickness or gauge, and the dimensioned location of each ~~joint~~ ~~connector~~ connecting device except where symmetrically located relative to the joint interface.
	11. ~~8.~~ Size, species and grade for each wood member;	8. Lumber size, species and grade for each member.	10~~8~~. ~~Lumber~~ Size, species and grade for each wood member.
(j) Size, species and grade for each wood member.	**12.** Truss-to-Truss connection and Truss field assembly requirements. ~~9. Specific connection capacities or connection capacities required for:~~	9. Connection requirements for: 9.1. Truss-to-girder-truss; 9.2. Truss ply-to-ply; and 9.3. Field splices.	11~~9~~. Truss-to-truss connection and truss field assembly requirements. ~~Connection requirements for:~~
(k) Truss-to-Truss connection and Truss field assembly requirements.	~~9.1. Truss to truss girder;~~ ~~9.2. Truss ply to ply; and~~ ~~9.3. Field assembly of a truss when the truss shown on the individual truss design drawing is supplied in separate pieces that will be field connected.~~		~~9.1. Truss-to-girder-truss;~~ ~~9.2. Truss ply-to-ply; and~~ ~~9.3. Field splices~~.
	13~~0~~. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load as applicable;	10. Calculated deflection ratio and/or maximum description for live and total load.	12~~10~~. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection ~~description~~ for live and total load and creep as applicable.

(l) Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and K_{CR} as applicable.

(m) Maximum axial tension and compression forces in the Truss members.

(n) Fabrication Tolerance per Section 6.4.10. Not used

(o) Required Permanent Individual Truss Member Restraint location and the method of Restraint/Bracing to be used per Section 2.

2.4.3 REQUIREMENTS FOR THE PERMANENT MEMBER RESTRAINT/ BRACING OF TRUSS SYSTEMS

2.4.3.1 Method of Restraint. The method of Permanent Individual Truss Member Restraint/Bracing and the method of anchoring or restraining to prevent lateral movement of all Truss members acting together as a system shall be accomplished by:

2.4.3.1.1 Standard Industry Details. Standard industry Lateral Restraint and Diagonal Bracing details in accordance with *BCSI-B3: Permanent Restraint/Bracing of Chords and Web Members and/or BCSI-B7: Temporary & Permanent Restraint/Bracing for Parallel Chord Trusses* of the Building Component Safety Information (*BCSI*).

2.4.3.1.2 Substitution with Reinforcement. Permanent Individual Truss Member Restraint shall be permitted to be replaced with reinforcement designed to prevent buckling

1~~4~~1. Maximum axial tension and compression forces in the truss members; and

1~~5~~2. Required permanent individual truss member restraint location and the method of restraint/bracing to be used per Section 2303.4.1.2, ~~unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.~~

2303.4.1.2 Requirements for the permanent member restraint/bracing of truss systems

2303.4.1.2.1 Method of Restraint. The method of Permanent Individual Truss Member Restraint/Bracing and the method of anchoring or restraining to prevent lateral movement of all Truss members acting together as a system shall be accomplished by one or more of the following:

1. Standard Industry Details. Standard industry Lateral Restraint and Diagonal Bracing details.

2 Substitution with Reinforcement. Permanent Individual Truss Member Restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).

3 Project Specific Design. A project specific Truss member permanent lateral restraint/bracing design for the roof or floor Framing Structural System shall be permitted to be specified by any Registered Design Professional.

11. Maximum axial compression forces in the truss members to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss drawing or on supplemental documents.

12. Required permanent truss member bracing location.

R502.11.2 Bracing. Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings.

13~~11~~. Maximum axial tension and compression forces in the truss members. ~~to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss drawing or on supplemental documents.~~

14~~12~~. Required permanent individual truss member ~~bracing~~ restraint location and the method of restraint/bracing to be used per Section R502.11.3

R502.11.3~~2~~ ~~Bracing~~. Requirements for the permanent member restraint/bracing of truss systems

Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings.

The method of permanent individual truss member restraint/bracing and the method of anchoring or restraining to prevent lateral movement of all truss members acting together as a system shall be accomplished by one or more of the following:

1. Standard industry details. Standard industry lateral restraint and diagonal bracing details in accordance with principles contained in *BCSI-B3: Permanent Restraint/Bracing of Chords and Web Members and/or BCSI-B7: Temporary & Permanent Restraint/Bracing for Parallel Chord Trusses* of the Building Component Safety Information (*BCSI*).

2 Substitution with reinforcement. Permanent individual truss member restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).

3 Project specific design. A project specific truss member permanent lateral restraint/bracing design for the roof or floor framing structural system shall be permitted to be specified by any building designer.

R502.11.3.1 Method specified by

(e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).

2.4.3.1.3 Project Specific Design. A project specific Truss member permanent lateral restraint/bracing design for the roof or floor Framing Structural System shall be permitted to be specified by any Building Designer.

2.4.3.2 Method Specified by any Building Designer. The method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be permitted to be specified by any Building Designer.

2.4.3.3 Absence of Truss Restraint/Bracing Method or Details. If a specific Truss member permanent bracing design for the roof or floor Framing Structural System is not provided by the Owner or any Building Designer, the method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be in accordance with *BCSI-B3 or BCSI-B7*.

2.4.5.1 Preparation of Truss Design Drawings. The Truss Designer is responsible for the preparation of the Truss Design Drawings based on the Truss design criteria and requirements set forth in the Construction Documents or as otherwise set forth in writing by the Building Designer as supplied to the Truss Designer by the Truss Manufacturer.

2.4.5.2 Single Truss Component Design. The Truss Designer shall be responsible for the single Truss component design depicted on the Truss Design Drawing.

2303.4.1.2.2 Method Specified by any Registered Design Professional. The method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be permitted to be specified by any Registered Design Professional.

2303.4.1.2.3 Absence of Truss Restraint/Bracing Method or Details. If a specific Truss member permanent bracing design for the roof or floor Framing Structural System is not provided by the Owner or any Registered Design Professional, the method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss top chord, bottom chord, and web members shall be in accordance with Standard industry Lateral Restraint and Diagonal Bracing details.

2303.4.1.3.1 Truss design drawings ~~s~~ seal & signature. Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exception~~s~~:

1. ~~Where~~ When a cover~~/~~ ~~sheet and~~ truss index sheet is used it ~~are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet~~ is the only document required to be signed and sealed by the truss designer.

~~2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.~~

2303.4.2 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

~~Exception:~~ ~~When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to~~

In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.

R502.11.1 Design. Wood trusses shall be designed in accordance with approved engineering practice. The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.

any building designer. The method of permanent individual truss member restraint and diagonal bracing for the truss top chord, bottom chord, and web members shall be permitted to be specified by any building designer.

In the absence of specific bracing requirements, trusses shall be braced in accordance with the principles contained in Building Component Safety Information (BCSI ~~1-03~~) Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.

R502.11.4 Preparation of truss design drawings. The truss designer is responsible for the preparation of the truss design drawings based on the truss design criteria and requirements set forth in the Construction Documents. The truss design drawings shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.

R502.11.4.1 Single truss component design. The truss designer shall be responsible for the single truss component design depicted on the truss design drawing.

R502.11.5 Truss placement diagram

The truss manufacturer, when required by contract, shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

~~be signed and sealed.~~

2.4.5.3 Truss Placement Diagram. When the Truss Placement Diagram serves only as a guide for Truss installation, it does not require the seal of the Truss Design Engineer.

2303.4.3 Truss submittal package. Package consisting of each individual Truss Design Drawing, and, as applicable, the Truss Placement Diagram, the Cover/Truss Index Sheet, Lateral Restraint and Diagonal Bracing details designed in accordance with generally accepted engineering practice, Standard industry Lateral Restraint and Diagonal Bracing details, and any other structural details germane to the trusses. ~~The truss submittal package shall consist of each individual truss design drawing, the truss placement diagram, the truss member permanent individual truss member restraint bracing details and, as applicable, the cover/truss index sheet.~~

502.11.6 Truss submittal package. Where required by the construction documents or contract, legal requirements or the building official, the truss manufacturer shall provide the appropriate truss submittal package to one or more of the following: building official; building designer and/or contractor for review and/or approval.

Truss Submittal Package: Package consisting of each individual Truss Design Drawing, and, as applicable, the Truss Placement Diagram, the Cover/Truss Index Sheet, Lateral Restraint and Diagonal Bracing details designed in accordance with generally accepted engineering practice, applicable *BCSI* defined Lateral Restraint and Diagonal Bracing details, and any other structural details germane to the trusses.

2303.4.4 Anchorage. The design for the ~~T~~ transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the registered design professional.

R502.11.7 Truss to building anchorage. The building designer shall provide the following:
(1) All anchorage designs required to resist uplift, gravity, and lateral loads,

(2) Adequate truss to structural element connections, but not truss-to-truss connections.

(3) Permanent building stability bracing; including truss anchorage to the permanent building stability bracing.

2.4.6.7 Truss Submittal Packages. Where required by the Construction Documents or Contract, Legal Requirements or the Building Official, the Truss Manufacturer shall provide the appropriate Truss Submittal Package to one or more of the following: Building Official; Building Designer and/or Contractor for review and/or approval per Section 2.4.4.2.

2.4.2.4 Required Information in the Construction Documents. The Building Designer, through the Construction Documents, shall provide information sufficiently accurate and reliable to be used for facilitating the supply of the Structural Elements and other information for developing the design of the Trusses for the Building, and shall provide the following:……..

(e) All anchorage designs required to resist uplift, gravity, and lateral loads,

2303.4.5 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (i.e. mechanical equipment, piping, additional roofing or insulation, etc.) ~~e.g., HVAC equipment, water heater)~~ shall not be permitted without verification that the truss is capable of supporting such additional loading.

R502.11.3 Alterations to trusses. Truss members and components shall not be cut, notched, spliced or otherwise altered in anyway without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater, etc.), that exceed the design

R502.11.8 ~~3~~ Alterations to trusses. Truss members and components shall not be cut, notched, spliced or otherwise altered in anyway without the approval of a registered design professional. Alterations resulting in the addition of load (~~e.g., HVAC equipment, water heater, etc~~. i.e mechanical equipment, piping, additional roofing or insulation, etc.), that exceed the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.

(f) Adequate Truss to Structural Element connections, but not Truss-to-Truss connections.

(g) Permanent Building Stability Bracing; including Truss anchorage to the Permanent Building Stability Bracing.

2.3.4.6 Pre-Installation Check. The Contractor shall examine the Trusses delivered to the job site for:

(a) Dislodged or missing connectors,

(b) Cracked, dislodged or broken members, or

(c) Any other damage that may impair the structural integrity of the Truss.

2.3.4.7 Post-Installation Check. The Contractor shall examine the Trusses after they are erected and installed for:

(a) Dislodged or missing connectors,

(b) Cracked, dislodged or broken members, or

(c) Any other damage that may impair the structural integrity of the Truss.

2.3.6.11 In-Plant Truss Inspections. Truss inspections, as required by the Jurisdiction, shall be performed at the manufacturer's facility using the manufacturer's in-plant quality control program monitored by an inspection agency approved by the Jurisdiction, and shall satisfy any quality control/quality assurance requirements for the Trusses, and shall satisfy any designated in-plant special inspection requirements for the Trusses.

2303.4.6 Metal-plate-connected trusses. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 109~~.4~~ as applicable.

2303.4.7 Truss Quality Assurance. Trusses not part of a manufacturing process in accordance with 2303.4.6 or in accordance with a standard, listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Section 1704.2 and 1704.6 as applicable.

load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.

R502.11.9 Metal plate connected trusses. In addition to Sections 502.11.1 through R502.11.8, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 109 as applicable.

R502.11.10 Truss quality assurance. Where trusses are not part of a manufacturing process in accordance with R502.11.9 or in accordance with a standard listed in Chapter 43, which provides requirements for quality control done under the supervision of a third party quality control agency, the building official shall be permitted to require the owner to employ a special inspector during construction and installation.

Cost Impact: The code change proposal will not increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S216–07/08

2303.4.1.1, 2303.4.1.2, 2303.4.1.3, 2303.4.1.4, 2303.4.1.4.1, 2303.4.2, 2303.4.3, 2303.4.4, 2303.4.5, 2303.4.6, 2303.4.7

Proponent: Edwin T. Huston, Smith & Huston, Inc., representing the National Council of Structural Engineering Associations

Revise as follows:

2303.4.1.1 (Supp)Truss design drawings. The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Slope or depth, span and spacing;
2. Location of all joints and support locations;
3. Number of plies if greater than one;
~~3.~~ 4. Required bearing widths;
~~4.~~ 5. Design loads as applicable, including;
   - ~~4.1.~~ 5.1. Top chord live load (for roof trusses, this shall be the controlling case of live load or ~~including~~ snow loads);
   - ~~4.2.~~ 5.2. Top chord dead load;
   - ~~4.3.~~ 5.3. Bottom chord live load;
   - ~~4.4.~~ 5.4. Bottom chord dead load;
   - ~~4.5.~~ 5.5. Additional loads and locations ~~Concentrated loads and their points of application as applicable; and~~
   - ~~4.6.~~ 5.6. Environmental design criteria and loads (wind, snow, seismic, etc.) ~~Controlling wind and earthquake loads as applicable.~~
6. Other lateral loads, including drag strut loads.
~~5.~~ 7. Adjustments to wood member and metal connector plate design value for conditions of use;
~~6.~~ 8. ~~Each~~ Maximum reaction force and direction, including maximum uplift reaction forces where applicable;
~~7.~~ 9. Metal connector plate type, size, and thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface;
~~8.~~10. Size, species and grade for each wood member;
~~9.~~11. Truss-to-truss connections and truss field assembly requirements
   ~~Specific connection capacities or connection capacities required for:~~
   - ~~9.1. Truss to truss girder;~~
   - ~~9.2. Truss ply to ply; and~~
   - ~~9.3. Field assembly of a truss when the truss shown on the individual truss design drawing is supplied in separate pieces that will be field connected.~~
~~10.~~ 12. Calculated span to deflection ratio and maximum vertical and horizontal deflection for live and total load as applicable;
~~11.~~ 13. Maximum axial tension and compression forces in the truss members; and
~~12.~~ 14. Required permanent individual truss member restraint location and the method and details of restraint/bracing to be used per Section 2303.4.1.2, ~~unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.~~

2303.4.1.2 (Supp) Permanent individual truss member restraint. Where permanent restraint of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:

~~1. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T reinforcement or L reinforcement). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.~~
~~2. Permanent individual truss member restraint and diagonal bracing shall be installed using standard industry lateral restraint and diagonal bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.~~

1. Permanent individual truss member restraint/bracing shall be installed using standard industry lateral restraint/bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.

2. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T-reinforcement or L-reinforcement). , proprietary reinforcement, etc.) The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.
3. A project specific permanent individual truss member restraint/bracing design shall be permitted to be specified by any registered design professional.

2303.4.1.3 Trusses spanning 60 feet or greater. The owner shall contract with any qualified registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing for all trusses with clear spans 60 feet (18 288 mm) or greater.

~~2303.4.1.3~~ 2303.4.1.4 (Supp) Truss designer. The individual or organization responsible for the design of trusses.

~~2303.4.1.3.1~~ 2303.4.1.4.1 (Supp) Truss design drawings. Where required by the registered design professional, the building official, or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions:

1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.
2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.

2303.4.2 (Supp) Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams that serve only as a guide for installation and do not deviate from the permit submittal drawings shall not be required to bear the seal or signature of the truss designer.

~~Exception:~~ ~~When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.~~

2303.4.3 (Supp) Truss submittal package. The truss submittal package provided by the truss manufacturer shall consist of each individual truss design drawing, the truss placement diagram, the permanent individual truss member ~~permanent~~ restraint/bracing method and details and, any other structural details germane to the trusses; as applicable, the cover/truss index sheet.

2303.4.4 (Supp) Anchorage. The design for the transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the registered design professional.

2303.4.5 (Supp) Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (e.g., HVAC equipment, piping, additional roofing or insulation, etc. ~~water heater~~) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2303.4.6 (Supp) ~~Metal-plate-connected trusses~~ TPI 1 Specifications. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 109~~.4~~ as applicable.

2303.4.7 Truss quality assurance. Trusses not part of a manufacturing process in accordance with Section 2303.4.6 or in accordance with a standard listed in Chapter 35, which provides requirements for quality control done under the supervision of a third party quality control agency, shall be manufactured in compliance with Section 1704.2 and 1704.6 as applicable.

Reason: This section has been modified to replicate the requirements of the Chapter 35 referenced standard ANSI/TPI 1–2007, National Design Standard for Metal Plate Connected Wood Trusses.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S217–07/08
2303.4.2

Proponent: Edwin Huston, National Council of Structural Engineers Associations (NCSEA), representing NCSEA Code Advisory Committee – General Engineering Subcommittee

Revise as follows:

2303.4.2 (Supp) Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

~~**Exception:** When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.~~

Reason: The truss placement diagram is an erection diagram that replicates the information on the approved construction documents per Section 106.3. As it requires no engineering input, direct supervision and the signature and seal of a registered design professional is not required.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S218–07/08
2304.9.5.1

Proponent: R. Scott Douglas**,** DCI Engineers, representing himself

Revise as follows:

2304.9.5.1 (Supp) Fasteners for preservative-treated wood. Fasteners for preservative-treated wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Fasteners other than nails, and timber rivets, wood screws and lag screws shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

Exception: Fasteners in SBX/DOT and zinc borate preservative-treated wood in an interior, dry environment need not be hot dipped galvanized.

Fastenings for wood foundations shall be as required in AF&PA Technical Report No. 7.

Reason: There is no documented evidence of any detrimental fastener corrosion when plain steel fasteners are used in SBX/DOT or zinc borate preservative treated wood in interior, dry environments; particularly when compared to other preservative wood treatments in identical environments. Tests by Simpson Strong-Tie have verified this field performance.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S219–07/08
2304.9.5, 2304.9.5.5 (New); IRC R319.3, R319.3.5 (New)

Proponent: Greg Greenlee, PE, USP Structural Connectors, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Revise as follows:

2304.9.5 (Supp) Fasteners and connectors in contact with preservative-treated and fire-retardant-treated wood. Fasteners and connectors ~~for~~ in contact with preservative treated and fire-retardant-treated wood shall be in accordance with Sections 2304.9.5.1 through 2304.9.5.4. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A 153. Connectors in contact with preservative-treated wood that are used in exterior applications shall be in accordance to the manufacturer's recommendations. In the absence of manufacturer's recommendation a minimum of ASTM A 653 type G185 zinc-coated galvanized steel, or equivalent, shall be used.

2304.9.5.1 (Supp) Fasteners for preservative-treated wood. Fasteners for preservative-treated wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Fasteners other than nails, timber rivets, wood screws and lag screws shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

2304.9.5.2 (Supp) Fastenings for wood foundations. Fastenings for wood foundations shall be as required in AF&PA Technical Report No. 7.

2304.9.5.3 (Supp) Fasteners for fire-retardant-treated wood used in exterior applications or wet or damp locations. Fasteners for fire-retardant-treated wood used in exterior applications or wet or damp locations shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Fasteners other than nails, timber rivets, wood screws and lag screws shall be permitted to be of mechanically deposited zinc coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

2304.9.5.4 (Supp) Fasteners for fire-retardant-treated wood used in interior applications. Fasteners for fire-retardant treated wood used in interior locations shall be in accordance with the manufacturer's recommendations. In the absence of manufacturer's recommendations, Section 2304.9.5.3 shall apply.

2304.9.5.5 Fasteners and connectors subject to exposure and located within 300 feet of the shoreline. Fasteners and connectors used in exterior applications that are located within 300 feet (91440 mm) of the shoreline shall be stainless steel grade 304 or 316 or an approved alternative.

PART II – IRC BUILDING/ENERGY

Revise as follows:

R319.3 (Supp) Fasteners and connectors in contact with preservative-treated and fire-retardant-treated wood. Fasteners and connectors in contact with preservative-treated wood and fire-retardant-treated wood shall be in accordance with this section. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A 153. Connectors in contact with preservative-treated wood that are used in exterior applications shall be in accordance to the manufacturer's recommendations. In the absence of manufacturer's recommendation a minimum of ASTM A 653 type G185 zinc-coated galvanized steel, or equivalent, shall be used.

R319.3.1 (Supp) Fasteners for preservative treated wood. Fasteners for preservative-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper.

Exceptions:

1. One-half-inch (12.7 mm) diameter or greater steel bolts.
2. Fasteners other than nails, timber rivets, wood screws and lag screws shall be permitted to be of mechanically deposited zinc coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

R319.3.2 (Supp) Fastenings for wood foundations. Fastenings for wood foundations shall be as required in AF&PA Technical Report No. 7.

R319.3.3 (Supp) Fasteners for fire-retardant-treated wood used in exterior applications or wet or damp locations. Fasteners for fire-retardant-treated wood used in exterior applications or wet or damp locations shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper.

R319.3.4 (Supp) Fasteners for fire-retardant-treated wood used in interior applications. Fasteners for fire-retardant treated wood used in interior locations shall be in accordance with the manufacturer's recommendations. In the absence of the manufacturer's recommendations, Section R319.3.3 shall apply.

R319.3.5 Fasteners and connectors subject to exposure and located within 300 feet of the shoreline. Fasteners and connectors used in exterior application that are located within 300 feet (91440mm) of the shoreline shall be stainless steel grade 304 or 316 or an approved alternative.

Reason: The added language in this proposal will accomplish two things. First, it will clarify the minimum coating requirements for connectors used in exterior applications and in contact with preservative treated wood. Currently connector manufacturers are recommending at a minimum a G185 coating for connectors in contact with preservative treated wood in exterior applications. This recommendation is based on accelerated corrosion testing conducted by USP Structural Connectors and others in the industry. Second, it will add specific requirements for connectors and fasteners in costal areas. Both of these items were proposed during the last code cycle, but needed to be coordinated further with the proponents. As stated in the last code cycle, the extra hazard to fasteners and connectors installed in an environment of regular exposure to salt spray has been seen to promote their premature failure leading to the collapse of the decks constructed with currently code compliant fasteners and connectors. By requiring grade 304 or 316 stainless steel or an equivalent approved by the building official the usable expectant life of these fasteners and connectors will be extended to equal those installed in less hazardous environments.

Cost Impact: The code change proposal will increase the cost of construction.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S220–07/08
2304.9.5.1, 2304.9.5.3

Proponent: David Rochester, Plating Systems & Technologies, Inc., representing Mechanical Galvanizers

Revise as follows:

2304.9.5.1 (Supp) Fasteners for preservative-treated wood. Fasteners for preservative-treated wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Fasteners other than nails~~,~~ and timber rivets~~, wood screws and lag screws~~ shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

2304.9.5.3 (Supp) Fasteners for fire-retardant-treated wood used in exterior applications or wet or damp locations. Fasteners for fire-retardant-treated wood used in exterior applications or wet or damp locations shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Fasteners other than nails~~,~~ and timber rivets~~, wood screws and lag screws~~ shall be permitted to be of mechanically deposited zinc coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

Reason: The IRC (R319.3) only excludes nails and timber rivets, at a minimum that is all that should be excluded by the IBC. Since many of the powder actuated pins being used in preservative treated lumbers are mechanically galvanized (Example: Remington), and Desa has done a significant amount of work getting approved by the ICC-ES, the restriction should be deleted. After all, one (1) ounce per square foot of zinc coating is a weighted coating and when it is applied by either the mechanical galvanizing process or the hot-dip galvanizing process, yields the same amount of zinc coating. In theory, both should provide equal amounts of corrosion protection, but in actuality, mechanical galvanizing provides significantly more corrosion protection in neutral salt spray testing. A true measure of a coating's viability should be the coating thickness followed by the corrosion protection given from such coating. Since mechanical galvanizing can equal hot-dip galvanizing in coating weight, and can exceed it in corrosion protection, the "wood screws" and "lag screws" exception should be removed. By making this change both versions of the Code – IBC and IRC will be the same.
Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S221–07/08
2304.11.2.1, 2308.10.1

Proponent: Philip Brazil, PE, SE, Reid Middleton, Inc., representing himself

Revise as follows:

2304.11.2.1 Joists, girders and subfloor. Where wood joists or the bottom of a wood structural floor without joists are closer than 18 inches (457 mm), or wood girders are closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated areas located within the perimeter of the building foundation, the floor ~~assembly~~ construction (including posts, girders, joists and subfloor) shall be of naturally durable or preservative-treated wood.

2308.10.1 Wind uplift. The roof ~~assemblies~~ construction shall have rafter and truss ties to the wall below. Resultant uplift loads shall be transferred to the foundation using a continuous load path. The rafter or truss to wall connection shall comply with Tables 2304.9.1 and 2308.10.1.

Reason: The changes are proposed to avoid potential conflicts with the use of "floor assembly" and "roof assembly" elsewhere in the 2006 IBC. These terms are used extensively in the fire safety provisions in conjunction with the fire resistance of assemblies incorporating floors and roofs (i.e., horizontal assemblies). "Roof assembly" is also defined in Chapter 15 and is used extensively with those provisions. The sections above contain the only instances of "floor assembly(ies)" and "roof assembly(ies)" in the structural chapters of the 2006 IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S222–07/08
Table 2306.3.2

Proponent: Edward L. Keith, APA – the Engineered Wood Association

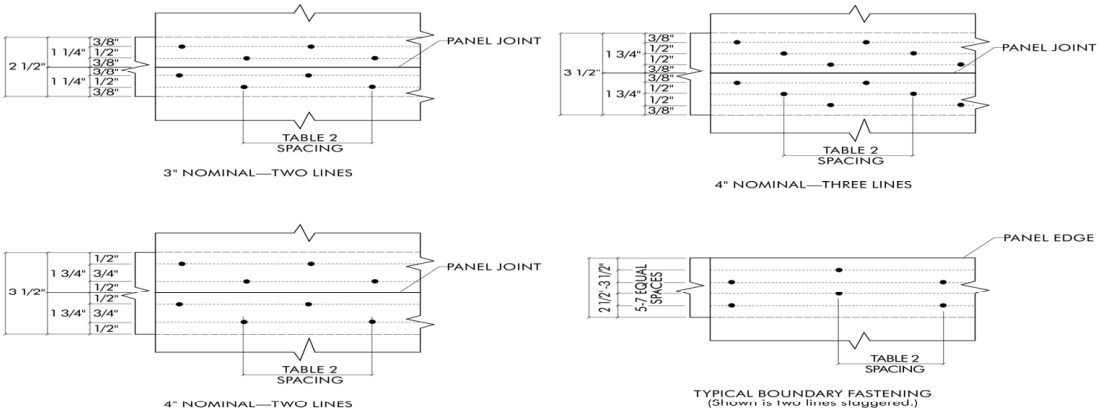
Add figure to able as follows:

TABLE 2306.3.2
ALLOWABLE SHEAR (POUNDS PER FOOT) FOR WOOD STRUCTURAL PANEL BLOCKED DIAPHRAGMS UTILIZING MULTIPLE ROWS OF FASTENERS (HIGH LOAD DIAPHRAGMS) WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE [a] FOR WIND OR SEISMIC LOADING [b, g, h]

(Portions of table not shown remain unchanged)

Reason: The purpose is to clarify the code.

When the table was added to the IBC, the figures at the bottom of the table were inadvertently left out. The figures give diagrams of the various multi-row nail applications showing required spacing and staggering. These construction details provide clarity to the table and are essential to develop the values listed in the table. These figures have been part of this table for over two decades.



NOTE: SPACE PANEL END AND EDGE JOINT 1/8-INCH. REDUCE SPACING BETWEEN LINES OF NAILS AS NECESSARY TO MAINTAIN MINIMUM 38-INCH FASTENER EDGE MARGINS, MINIMUM SPACING BETWEEN LINES IS 3/8-INCH

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S223–07/08
2308.2

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders, representing National Association of Home Builders

Revise as follows:

2308.2 (Supp) Limitations. Buildings are permitted to be constructed in accordance with the provisions of conventional light-frame construction, subject to the following limitations, and to further limitations of Sections 2308.11 and 2308.12.

1. Buildings shall be limited to a maximum of three stories above grade plane. For the purposes of this section, for buildings in Seismic Design Category D or E as determined in Section 1613, cripple stud walls shall be considered to be a story.

   Exception: Solid blocked cripple walls not exceeding 14 inches (356 mm) in height need not be considered a story.

2. Maximum floor-to-floor height shall not exceed 11 feet 7 inches (3531 mm). Bearing wall height shall not exceed a stud height of 10 feet (3048 mm).
3. Loads as determined in Chapter 16 shall not exceed the following:
   3.1. Average dead loads shall not exceed 15 psf (718 N/m^2) for combined roof and ceiling, exterior walls, floors and partitions.

   Exceptions:

   1. Subject to the limitations of Sections 2308.11.2 and 2308.12.2, stone or masonry veneer up to the lesser of 5 inches (127 mm) thick or 50 psf (2395 N/m^2) and installed in accordance with Chapter 14 is permitted to a height of 30 feet (9144 mm) above a noncombustible foundation, with an additional 8 feet (2438 mm) permitted for gable ends.
   2. Concrete or masonry fireplaces, heaters and chimneys shall be permitted in accordance with the provisions of this code.

   3.2. Live loads shall not exceed 40 psf (1916 N/m^2) for floors.
   3.3. Ground snow loads shall not exceed 50 psf (2395 N/m^2).
4. Wind speeds shall not exceed 100 miles per hour (mph) (44 m/s) (3-second gust).

   Exception: Wind speeds shall not exceed 110 mph (48.4 m/s) (3-second gust) for buildings in Exposure Category B ~~that are not located in a hurricane prone region~~.

5. Roof trusses and rafters shall not span more than 40 feet (12 192 mm) between points of vertical support.
6. The use of the provisions for conventional light-frame construction in this section shall not be permitted for Occupancy Category IV buildings assigned to Seismic Design Category B, C, D, E or F, as determined in Section 1613.
7. Conventional light-frame construction is limited in irregular structures in Seismic Design Category D or E, as specified in Section 2308.12.6.

Reason: This proposal seeks to restore the wind limitations for conventional light-framed construction using the IBC to the 2006 IBC language. The previous proponent's change (S101-06/07) was based solely on coordinating the IBC with the IRC and not on any technical justification that the conventional construction provisions of Section 2308 were inadequate for construction in regions of 100mph basic wind speed.

The IRC limit came from an IBHS proposal (RB31-04/05) which questioned the adequacy of the IRC's roof sheathing and framing attachment and wall bracing requirements. No technical documentation was submitted to the committee or assembly justifying the proponent's claims. However, in the wake of the 2004 Florida hurricanes and Hurricane Katrina there was strong political and emotional pressure to implement a change to the IRC.

The 2004/2005 change raises questions regarding the age of the damaged structures used for justifying the code change. The FEMA Summary Reports on Building Performance from the 2004 hurricane season and from Hurricane Katrina in 2005 indicated that structures built to the 2000 and 2003 IRC performed extremely well. The 2004 hurricane report stated (p.13), "no structural failures were observed to structures designed and constructed to the wind design requirements of…the 2000 IBC/IRC…" The Hurricane Katrina report stated (p.4-8), "Most structural failures observed by the MAT appeared to be the result of inadequate design and construction methods commonly used before IBC 2000 and IRC 2000 were adopted and enforced." In addition, a study conducted by the Texas Windstorm Insurance Association after Hurricane Rita showed there was substantially less damage and substantially fewer insurance claims in those areas where the 2000 or 2003 IBC and IRC were adopted and enforced.

It is important to note that there are substantial differences between the Section 2308 provisions of the IBC and the prescriptive requirements of the IRC. The roof sheathing attachment requirements are higher and the uplift connection requirements essentially mandate hurricane clips or straps. The wall bracing section is limited to 35 foot spacing, with heavy limits on cripple walls. The requirements also mandate full-depth blocking or continuous rim boards at both floor and roof members. Basically, the Section 2308 provisions are consistent with a fully-engineered, conservative design approach as would be expected in the IBC, as opposed to the conventional practice and testing-based provisions of the IRC.

Therefore, there was no technical justification for adding the limit for hurricane prone areas, and none was ever provided to the IBC Structural Committee or the assembly. Therefore, the original limits, which are structurally adequate and performing as desired, should be restored. NAHB asks for your support of this proposal.

References:
FEMA, *Summary Report on Building Performance, 2004 Hurricane Season*, FEMA 490, Washington, DC, March 2005.
FEMA, *Summary Report on Building Performance, Hurricane Katrina*, FEMA 548, Washington, DC, April 2006.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:				
	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S224–07/08
2308.3.2

Proponent: James E. Russell, Building Codes Consultant, representing himself.

Revise as follows:

2308.3.2 Braced wall line ~~panel~~ connections. Wind and seismic lateral f~~F~~orces shall be transferred from the roofs and floors to braced wall lines ~~panels~~ and from the braced wall lines ~~panels~~ in upper stories to the braced wall lines ~~panels~~ in the story below by the following:

1. ~~1.~~ Braced wall line ~~panel~~ top ~~and bottom~~ plates shall be fastened to joists, rafters or full-depth blocking above in accordance with Table 2304.9.1 items 11, 12, 15 or 19 as applicable based on the orientation of the joists or rafters to the braced wall line. Braced wall line bottom plates shall be connected to joists or blocking below in accordance with Table 2304.9.1 item number 6, or to foundations in accordance with Section 2308.3.3. At exterior gable end walls b~~B~~raced wall panel~~s~~ sheathing in the top story shall be extended and fastened to roof framing ~~at intervals not to exceed~~ where the spacing between parallel exterior braced wall lines is greater than 50 feet (15240 mm) ~~between parallel braced wall lines~~.

   Exception: Where roof trusses are used and are installed perpendicular to an exterior braced wall line, lateral forces shall be transferred from the roof diaphragm to the braced wall by blocking of the ends of the trusses or by other approved methods providing equivalent lateral force transfer. Blocking shall be minimum 2 inch (51 mm) nominal thickness and equal to the depth of the truss at the wall line and shall be fastened to the braced wall line top plate as specified in Table 2304.9.1 item number 11.

~~2. Bottom plate fastening to joist of blocking below shall be with not less than 3-16d nails at 16 inches (406 mm) o.c.~~
~~3. Blocking shall be nailed to the top plate below with not less than 3-8d toenails per block~~
~~4. Joists parallel to the top plate shall be nailed to the top plate with not less than 8d toenails at 6 inches (152 mm) o.c.~~

~~In addition, top plate laps shall be nailed with not less than 8-16d face nails on each side of each break in the top plate.~~

Reason: The purpose of this code change is to improve the understanding of current code section 2308.3.2 regarding connections required along braced wall lines, and to eliminate redundant information specified elsewhere in the code, by:
1. Editorially clarifying in the first paragraph that the "*forces*" to be transferred are "*wind and seismic lateral"* forces.
2. Clarifying in the first paragraph and in current item number 1, that Section 2308.3.2 applies to braced wall *lines,* instead of only to the braced wall *panel* portion of a braced wall line. For example, the connection between blocking or floor framing and a braced wall line top plate does not occur ONLY at the braced wall panel location, nor does the connection of the wall bottom plate to the foundation occur ONLY at the braced wall panel location. The connections between top plate and other framing above that are currently specified in items number 3 and 4 of Section 2308.3.2 are

applicable to the entire length of a braced wall line, not just at braced wall panels, because those connections are identically specified in Table 2304.9.1. The term braced wall *panel* would only be correct IF the section was specifying special or additional connections at the braced wall panel portion of a wall, however, the current section does not specify any connections that are different or in addition to those already in the code.
3. Adding new wording in current item number 1 to identify where each of the required connections is already specified in the code. This better informs the code user regarding where to locate the specifics for each connection being considered in this section.

4. Modifying the wording in the final sentence of current item number 1 to apply only to exterior gable end walls, because that is the only location where braced wall panels can be practically extended and attached to the roof framing. Also the phrase "*braced wall panel shall be extended*" is clarified to state "braced wall panel *sheathing in the top story* shall be extended" to provide a clearer description of what is to be done. When rafters (or trusses) are perpendicular to a exterior braced wall line there is no practical method of "extending and attaching" the wall panel (or panel sheathing) to roof framing oriented at 90 degrees to the wall direction. When rafters and ceiling joists are perpendicular to a braced wall line, conventional construction has traditionally relied on the connections specified in items number 11, 15 and 19 of Table 2304.9.1 to provide a load path to transfer wind and seismic lateral forces. ALSO, at interior braced wall lines, there has never been a conventional construction provision in the legacy codes or the IRC that specifies extending *interior* braced wall line panels above the top plate to attach to roof framing (rafter/ceiling joist system, or a truss). Further, the maximum spacing of parallel braced wall lines is 35 feet (Sec. 2308.3), therefore a distance of 50 feet between parallel braced wall lines can only occur when the interior braced wall line spacing is ignored.
5. Clarifying the exception by adding the words "*and are installed perpendicular to an exterior braced wall line*" to identify the orientation of trusses to the braced wall where the blocking at the ends of the trusses would occur. Roof trusses installed parallel to a braced wall is not a configuration that was envisioned by the current section's wording "*blocking of the ends of trusses*". For example, where trusses are oriented parallel to, but NOT directly above a braced wall line, blocking providing a lateral load path from the roof to the braced wall would not be provided at truss ends. Instead multiple blocks would occur perpendicular to the truss bottom chord at some specific interval measured along the braced wall line.
6. Modifying the end of the first sentence of the exception to include the words "*providing equivalent lateral force transfer*" provides the building official with a basis for judging the acceptability of a method other than blocking between ends of trusses. This also informs truss manufactures regarding what will be considered when approving methods other than blocking.
7. Adding a sentence at the end of the exception to specify the required minimum blocking size and the connection of the blocking to the braced wall top plate, because that information is currently not specified in the exception.
8. Deletion of the redundant connection information in existing items 2, 3, and 4, and in the existing final paragraph, because all of that information is currently identically specified in Table 2304.9.1 or Section 2308.9.2.1.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S225–07/08

2308.12.6, 2308.3.2, 2308.3.2.1 (New), 2308.3.2.2 (New)

Proponent: Robert W. Rice, Josephine County, OR, representing Josephine County Building Safety and Southern Oregon Chapter of ICC

1. Revise as follows:

2308.12.6 Irregular structures. Conventional light-frame construction shall not be used in irregular portions of structures in Seismic Design Category D or E. Such irregular portions of structures shall be designed to resist the forces specified in Chapter 16 to the extent such irregular features affect the performance of the conventional framing system. A portion of a structure shall be considered to be irregular where one or more of the conditions described in Items 1 through 6 below are present.

1. Where exterior braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required, the structure shall be considered to be irregular [see Figure 2308.12.6(1)].

   Exception: Floors with cantilevers or setbacks not exceeding four times the nominal depth of the floor joists [see Figure 2308.12.6(2)] are permitted to support braced wall panels provided:

   1. Floor joists are 2 inches by 10 inches (51mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) o.c.
   2. The ratio of the back span to the cantilever is at least 2:1.
   3. Floor joists at ends of braced wall panels are doubled.
   4. A continuous rim joist is connected to the ends of cantilevered joists. The rim joist is permitted to be spliced using a metal tie not less than 0.058 inch (1.47 mm) (16 galvanized gage) and 11/2 inches (38 mm) wide fastened with six 16d common nails on each side. The metal tie shall have a minimum yield of 33,000 psi (227 MPa).
   5. Joists at setbacks or the end of cantilevered joists shall not carry gravity loads from more than a single story having uniform wall and roof loads, nor carry the reactions from headers having a span of 8 feet (2438 mm) or more.

2. Where a section of floor or roof diaphragm is not connected to and laterally supported by braced wall lines on all edges in accordance with 2308.3.2, the structure shall be considered to be irregular [see Figure 2308.12.6(3)].

   Exception: Portions of roofs or floors that do not support braced wall panels above are permitted to extend up to 6 feet (1829 mm) beyond a braced wall line [see Figure 2308.12.6(4)].

3. Where the end of a required braced wall panel extends more than 1 foot (305 mm) over an opening in the wall below, the structure shall be considered to be irregular. This requirement is applicable to braced wall panels offset in plane and to braced wall panels offset out of plane as permitted by the exception to Item 1 above in this section [see Figure 2308.12.6(5)].

   Exception: Braced wall panels are permitted to extend over an opening not more than 8 feet (2438 mm) in width where the header is a 4-inch by 12-inch (102 mm by 305 mm) or larger member.

4. Where portions of a floor level are vertically offset such that the framing members on either side of the offset cannot be lapped or tied together in an approved manner, the structure shall be considered to be irregular [see Figure 2308.12.6(6)].

   Exception: Framing supported directly by foundations need not be lapped or tied directly together.

5. Where braced wall lines are not perpendicular to each other, the structure shall be considered to be irregular [see Figure 2308.12.6(7)].
6. Where openings in floor and roof diaphragms having a maximum dimension greater than 50 percent of the distance between lines of bracing or an area greater than 25 percent of the area between orthogonal pairs of braced wall lines are present, the structure shall be considered to be irregular [see Figure 2308.12.6(8)].

2308.3.2 Braced wall panel connections. Lateral ~~F~~forces shall be transferred from the roofs and floors to braced wall panels and from the braced wall panels in upper stories to the braced wall panels in the story below ~~by the following:~~ in accordance with Sections 2308.3.2.1 and 2308.3.2.2.

2308.3.2.1 Braced wall panel connections to floors and ceilings. Braced wall panels shall be connected to floor framing as follows:

1. Braced wall panel top and bottom plates shall be fastened to joists, rafters or full-depth blocking. Braced wall panels shall be extended and fastened to roof framing at intervals not to exceed 50 feet (15 240 mm) between parallel braced wall lines.

   ~~**Exception:** Where roof trusses are used, lateral forces shall be transferred from the roof diaphragm to the braced wall by blocking of the ends of the trusses or by other approved methods.~~

2. Bottom plate fastening to joist or blocking below shall be with not less than 3-16d nails at 16 inches (406 mm) o.c.
3. Blocking shall be nailed to the top plate below with not less than 3-8d toenails per block.
4. Joists parallel to the top plates shall be nailed to the top plate with not less than 8d toenails at 6 inches (152mm) o.c.

In addition, top plate laps shall be nailed with not less than 8-16d face nails on each side of each break in the top plate.

2. Add new text as follows:

2308.3.2.2 Braced wall panel connections to roof framing. Braced wall panels shall be connected to roof framing as follows:

1. A parallel framing member or partial-height solid blocking between perpendicular trusses or rafters shall be provided and extend from the top plate to within 2 inches of the bottom side of the roof sheathing. Blocking shall be nailed to the top plate below with not less than 3-8d toenails per block.

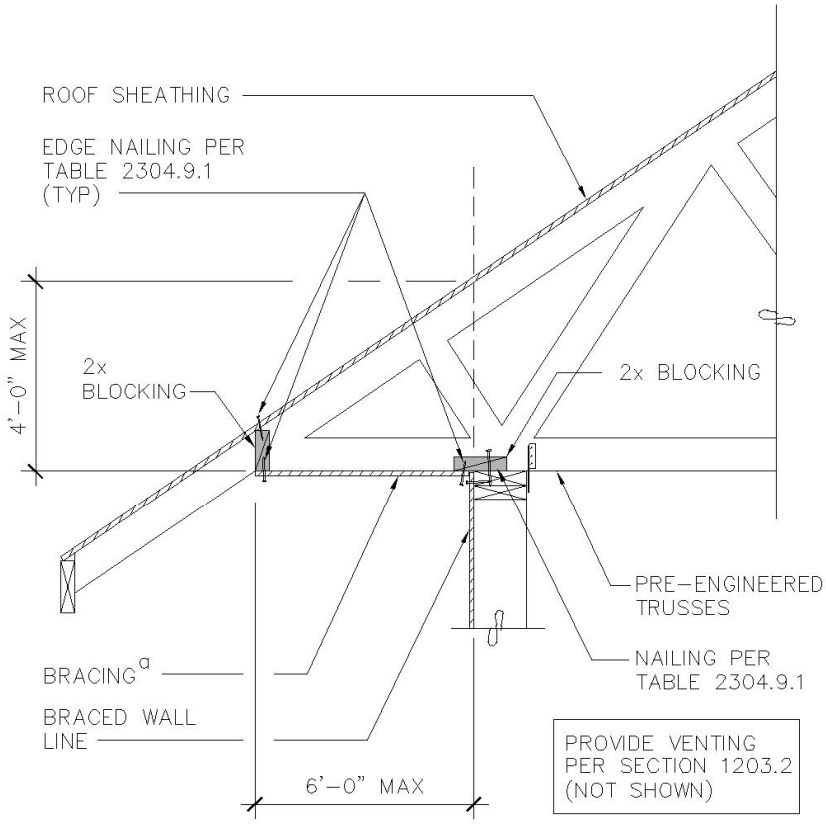
   Exceptions:

   1. In buildings assigned to Seismic Design Category C and where the basic wind speed is less than 100 mph;

Where the framing members are perpendicular to the wall line below solid, full-height blocking need not be provided when the perpendicular framing members or a parallel member such as a continuous rim joist or header is attached to the wall line in accordance with Table 2304.9.1

2. Where the roof sheathing is greater than 9-1/4 inches (235 mm) above the top plate exterior braced wall panel top plates are to be connected in accordance with one of the following methods:
   - 2.1. In accordance with Figure 2308.3.2 (1)
   - 2.2. In accordance with Figure 2308.3.2 (2)
   - 2.3. With full height engineered blocking panels designed for values listed in American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM). Roof or floor sheathing above shall be attached to the blocking panels and the blocking panels shall be attached to top of wall in accordance with Table 2304.9.1
   - 2.4. Designed in accordance with accepted engineering methods.

In addition, top plate laps shall be nailed with not less than 8-16d face nails on each side of each break in the top plate.

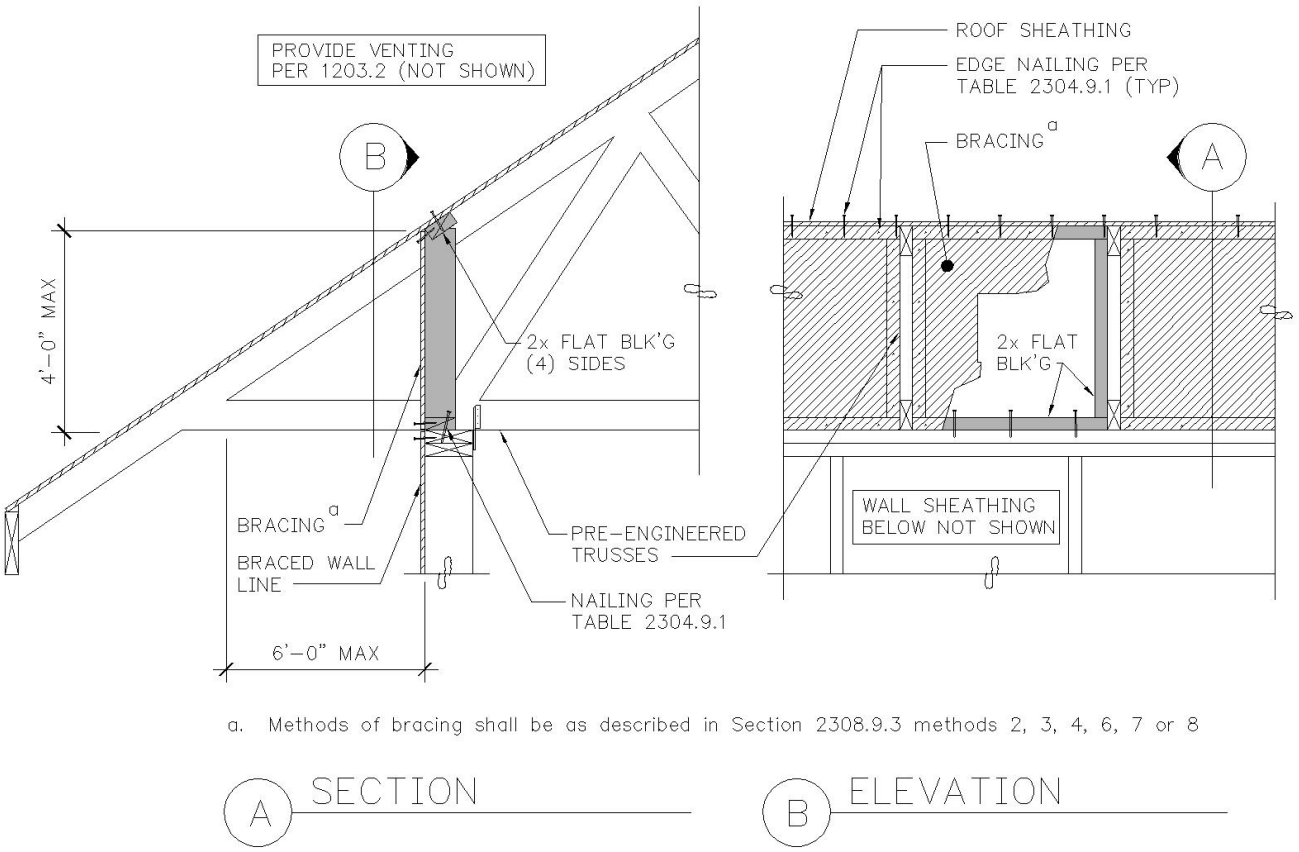


a. Methods of bracing shall be as described in Section 2308.9.3 method 2, 3, 4, 6, 7 or 8

A SECTION

For SI: 1 inch = 25.4 mm

FIGURE 2308.3.2 (1)
BRACED WALL PANEL TOP PLATE CONNECTION.



For SI: 1 inch = 25.4 mm

FIGURE 2308.3.2 (2)
BRACED WALL PANEL TOP PLATE CONNECTION.

Reason: The current code text (IBC) states the intention of connecting the braced wall line to the roof or floor diaphragm above in section 2308.3.2 but, it is not clearly stated in 2308.12.6. This proposal adds a couple words to 2308.12.6 to clarify the intent.

In addition to the re-wording of 2308.12.6, Section 2308.3.2 is re-formatted. The existing text of modified to address floors and ceilings. Item 1, Exception (roof framing connections) is deleted and the roof connection provisions are placed in the new section 2308.3.2.2. This new section provides options for accomplishing the connection without engineering when solid blocking is not possible

This proposal interjects language into the existing description of an "irregular" condition to more clearly state the intention of the text. Per accepted engineering practice for lateral design loads, the floor and roof diaphragms transmit wind and seismic loads into the braced walls (engineered shearwalls or prescriptive braced panels). The fact that the diaphragm needs to be connected to the braced wall line is often not fully understood by plans examiners, inspectors and contractors. The typical requirement that is intended by the code is that full height solid blocking occur at this connection with edge nailing to the blocking and the blocking connected to the top plate of the wall to transfer the diaphragm (plf) force to the wall top plates. This is evidenced in the IBC by the exception to irregular structures stating, ". Lateral forces shall be transferred from the roof diaphragm to the braced wall by blocking of the ends of the trusses..". In order for the forces to be transferred there has to be a connection capable of transferring the diaphragm shear evenly to the top plates.

The condition that occurs at an increasing rate that brings this issue up is with cantilevered or stub-heel trusses. At this condition, solid blocking (either with 2x or engineered wood products) is often not possible due to the height of the diaphragm above the top plate of the wall.

Without this clarification of the text it is a connection that may or may not occur based on what I have seen in the field and have discussed with code officials. The blocking that is called for in the code serves three functions. It provides closure to prevent animals, birds, etc. from entering the attic space, it prevents the trusses or rafters from "rolling over" and it transfers the diaphragm forces to the wall. Most code officials, inspectors and contractors understand the first two objectives. However, the latter is a concept that is not often fully understood. This needs to be perceived, understood and implemented in a uniform way.

In addition, rather than identify a problem without providing a solution, my proposal includes two ways to simply accomplish this connection. The solutions are, in principle, fundamentally extending the roof diaphragm sheathing to the wall top plates either vertically in the truss bays or horizontally through the soffit. No engineering or testing is required since it is just completing the load path with the already defined sheathing and nailing.

Without prescriptive provisions in the current code this condition would require engineering or, as stated in 2308.3.2, Exception to item 1 "by other approved methods." would be left up to the Authority Having Jurisdiction to determine what is acceptable without any guidance or uniformity between jurisdictions.

Typically, the engineering solution would provide details similar to those included in this proposal. Currently, without a prescriptive provision to accomplish load path, engineering would be required. This proposal would provide a prescriptive solution without requiring engineering costs and delays. This would result in reduced costs.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S226–07/08
2308.8.5

Proponent: Bill Nagel, City of Redding, CA, representing Shasta Cascade ICC

Revise as follows:

2308.8.5 Lateral support. Floor, attic and roof framing with a nominal depth-to-thickness ratio greater than or equal to 5:1 shall have ~~one~~ the compression edge held in line for the entire span. Where the nominal depth-to-thickness ratio of the framing member exceeds 6:1, there shall be one line of bridging for each 8 feet (2438 mm) of span, unless both edges of the member are held in line. The bridging shall consist of not less than 1-inch by 3-inch (25 mm by 76 mm) lumber, double nailed at each end, of equivalent metal bracing of equal rigidity, full-depth solid blocking or other approved means. A line of bridging shall also be required at supports where equivalent lateral support is not otherwise provided.

Reason: The purpose of this code change is to provide edge restraint where it will be effective in restraining horizontal bending members from lateral torsional buckling. Edge restraint on the tension edge of horizontal bending members is not an effective means of restraint. NDS Section 4.4.1 recognizes this fact by requiring edge restraint at the compression edge of horizontal bending members. This change would make the edge restraint provisions for conventional framing more consistent with the requirements of the NDS for engineered horizontal bending members.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S227–07/08
2308.9.1; IRC R602.3

Proponent: Robert Rice, Josephine County, OR, representing Josephine County Building Safety and Southern Oregon Chapter International Code Council.

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Revise as follows:

2308.9.1 Size, height and spacing. The size, height and spacing of studs shall be in accordance with Table 2308.9.1 except that utility-grade studs shall not be spaced more than 16 inches (406 mm) o.c., or support more than a roof and ceiling, or exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls. Studs shall be continuous from a support at the bottom to a support at the top to resist loads perpendicular to wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

PART II – IRC BUILDING/ENERGY

Revise as follows:

R602.3 Design and construction. Exterior walls of wood-frame construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). Exterior

walls covered with foam plastic sheathing shall be braced in accordance with Section R602.10. Structural sheathing shall be fastened directly to structural framing members.

Studs shall be continuous from a support at the bottom to a support at the top to resist loads perpendicular to wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

Reason: The prescriptive provisions of the IBC intentionally parallel the prescriptive provisions of the IRC. The prescriptive provisions of the IRC are based on platform or balloon framing as stated in section, "**R301.1.2 Construction Systems**. The requirements of this code are based on platform and balloon-frame construction……"

With platform or balloon framing, the walls are supported at top and bottom to resist wind or seismic loads that are applied to the face of the wall ("out of plane loads"). The bottom is fastened to the floor system (diaphragm) or directly to the foundation. The top of the wall is supported by ceiling or roof diaphragms. The diaphragm is the ceiling or roof sheathing and defined in the code as

IBC: *"A horizontal or sloped system acting to transmit lateral forces to the vertical resisting elements. When the term "diaphragm" is used, it includes horizontal bracing systems.*"

IRC:*"A horizontal or nearly horizontal system acting to transmit lateral forces to the vertical resisting elements. When the term "diaphragm" is used, it includes horizontal bracing systems."*

In the common condition where vaulted trusses are used, the gable end truss should be vaulted as well and the wall should be framed up to the bottom of the vaulted truss. Another option would be to not install a truss at the end-wall and frame the exterior wall up to the roof sheathing (i.e. "Balloon Framed"). In either case, the studs are supported at top and bottom.

This is consistent with BCSI 1-03, **"Guide to good practice for handling, installing & bracing of metal plate connected wood trusses"**, by the Wood Truss Council of America and the Truss Plate Institute, October 1, 2003 which states,

"Important Note: Scissor truss applications must not be framed with flat bottom chord gable end frames as this creates a hinge in the wall/gable interface that is below the bottom chord plane diaphragm. Adequate bracing of this condition is difficult and sometimes impossible."

An article in the December 2004 Building Safety Journal, by Gregg Shea, P.E., Ted Osterberger, P.E. and Frank E Woeste, PhD, P.E. titled "Evaluating Tall Residential Walls for Code Conformance" addresses the issue of tall gable end walls. The article speaks in detail about the condition that my proposal addresses. In the article they state,

"DON'T create a hinge with stacked framing. The use of platform framing without a diaphragm for support results in a hinge at the center …."
"Hinges in tall walls caused by inappropriate platform framing, lack of continuous vertical members or a gable end truss profile different from the adjacent roof trusses create structural instabilities."

In summary, if the wall is not supported at the top by a ceiling or roof diaphragm it is not prescriptive and an engineered design should be provided describing adequate support through multiple top plates, horizontal beam at top of wall, perpendicular interior walls, or other approved methods to resist out-of-plane lateral loads.

Bibliography:

BCSI 1-03, "Guide *to good practice for handling, installing & bracing of metal plate connected wood trusses*", by the Wood Truss Council of America and the Truss Plate Institute, October 1, 2003

Evaluating Tall Residential Walls for Code Conformance, *December 2004* Building Safety Journal, *by Gregg Shea, P.E., Ted Osterberger, P.E. and Frank E Woeste, PhD, P.E.*

Cost Impact: The code change proposal will not increase the cost of construction.

Part I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

Part II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S228–07/08
2308.9.2.3

Proponent: Frank J. Linhart, SE, representing California Building Officials Association - Seismic Safety Committee

Revise as follows:

2308.9.2.3 Nonbearing walls and partitions. In nonbearing walls and partitions, studs shall be spaced not more than ~~28~~ 24 inches (~~711~~ 609 mm) o.c. ~~and are permitted to be set with the long dimension parallel to the wall~~. Interior nonbearing partitions shall be capped with no less than a single top plate installed to provide overlapping at corners and at intersections with other walls and partitions. The plate shall be continuously tied at joints by solid blocking at least 16 inches (406 mm) in length and equal in size to the plate or by 1/2-inch by 11/2-inch (12.7 mm by 38 mm) metal ties with spliced sections fastened with two 16d nails on each side of the joint.

Exception: In nonbearing walls and partitions, 2x4 studs shall be permitted to be oriented with their long dimension parallel to the wall provided the stud height is limited to 10 feet (3048 mm) in height and the spacing does not exceed 16" (406 mm) o.c.

Reason: In previous versions of the Uniform Building Code, section 1605 indicated that non-bearing partitions should be able to withstand a uniform pressure of 5.0 psf perpendicular to the surface of the wall. This is still the industry standard.

Assuming 28" o.c. spacing and 14' wall height with the long dimension of the stud perpendicular to the wall the moment from 5 psf of pressure is computed to be 286 lb-ft. With a section modulus of 3.5 in^3 the stress f'b is found to be 976 psi. If we use DF#1 we can use an allowable stress F'b of 900 psi which is less than the required f'b value. Rarely will we find anything as good as DF No. 2 used even in tall studs.

The deflection of this member is .91" under this loading and this yields a ratio of L/184. Combining this with the fact that a 2x4 studs that are 14' long will rarely be straight this real deflection (or out of plane bowing) can easily be over 1.5".

If the stud is oriented with its long direction parallel to the wall there is no way to justify this wall construction for bending stresses or actual deflections.

Looking at the gypboard spanning 28 inches we perceive additional problems. On a practical level I have observed many cases where gypsum walls that have large holes in them caused by minor scuffles between family members as one person is pushed into the partition walls where studs are 16 inches on center. Increasing this spacing to 28 inches will greatly increase this potential for damage.

Taking a more quantitative look the Gypsum Association tests indicate that gypboard has an approximate allowable bending stress of 58 psi (even though we all call this a non-structural material). The moment derived from a 28" simple span is 3.4 lb-ft which will induce a bending stress of 57 psi. This is dangerously close to the allowable bending stress. The gypsum association also indicates the E*I value of 1/2" thick gypboard is as ranging from 1500 lb-in^2 to 3500 lb-in^2 per inch of width. This would become 18,000 lb-in^2 per foot of width at the lower end. Using this value in the deflection equation would yield deflection at mid span of 0.20 inches. They also state that this predicted value of E*I will be lower in high humidity areas.

In conclusion it is not prudent to allow studs to be 28" on center even in non-bearing walls. This will be an even worse situation where the studs are not perpendicular to the surface of the wall.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:				
	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S229–07/08
2308.11.2

Proponent: Jim W. Sealy, FAIA, and Kelly Cobeen, Building Seismic Safety Council of the National Institute of Building Sciences, representing FEMA/BSSC Code Resource Support Committee

Revise as follows:

2308.11.2 (Supp) Concrete or masonry. Concrete or masonry walls and stone or masonry veneer shall not extend above the basement.

Exceptions:

1. Stone and masonry veneer is permitted to be used in the first two stories above grade plane or the first three stories above grade plane where the lowest story has concrete or masonry walls in Seismic Design Category B, provided that structural use panel wall bracing is used and the length of bracing provided is one- and one half times the required length as determined in Table 2308.9.3(1).
2. Stone and masonry veneer is permitted to be used in the first story above grade plane or the first two stories above grade plane where the lowest story has concrete or masonry walls in Seismic Design Category B or C.
3. Stone and masonry veneer is permitted to be used in <u>both stories of buildings with</u> ~~the first~~ two stories above grade ~~plane~~ in Seismic Design Categories B and C, provided the following criteria are met:
   - 3.1. Type of brace per Section 2308.9.3 shall be Method 3 and the allowable shear capacity in accordance with Table 2306.4.1 shall be a minimum of 350 plf (5108 N/m).
   - 3.2. ~~The bracing of the top story shall be located at each end and at least every 25 feet (7620 mm) o.c. but not less than 40 percent of the braced wall line. The bracing of the first story shall be located at each end and at least every 25 feet (7620 mm) o.c. but not less than 35 percent of the braced wall line.~~<u>Braced wall panels in the second story shall be located in accordance with Section 2308.9.3 and not more than 25 feet (7620 mm) on center, and the total length of braced wall panels shall be not less than 25% of the braced wall line length. Braced wall panels in the first story shall be located in accordance with Section 2308.9.3 and not more than 25 feet (7620 mm) on center, and the total length of braced wall panels shall be not less than 45% of the braced wall line length.</u>
   - 3.3. Hold-down connectors shall be provided at the ends of <u>each</u> braced wall~~s~~ <u>panel</u> for the second <u>story</u> ~~floor~~ to first <u>story connection</u> ~~floor wall assembly~~ with an allowable design of 2,000 pounds (8896 N). Hold-down connectors shall be provided at the ends of each ~~wall segment of the~~ braced wall~~s~~ <u>panel</u> for the first <u>story</u> ~~floor~~ to foundation <u>connection</u> with an allowable design of 3,900 pounds (17 347 N). In all cases, the hold-down connector force shall be transferred to the foundation.
   - 3.4. Cripple walls shall not be permitted.

Reason: As printed in the 2006 IBC, the required bracing percentages in Exception 3.2 appear to be in error as more bracing is required in the second story than the first story while the first story will have higher seismic loads. This code change proposes to correct this error in Exception 3.2 by including bracing percentages similar to those required by IRC Table R703.7(1). Additional editorial changes are made to clarify the intent of Exception 3.3. Further, in the first paragraph, the word "plane" is struck out of the term "two stories above grade plane" to avoid hillside walk-out basement configurations. Using the current grade plane wording essentially allows the basement story level walk-out facing exterior wall line and portions of the two perpendicular exterior walls to include veneer while only being braced for a two-story condition. The existing Exception 3 provisions are predicated on only two story levels of veneer. Exceptions 1 and 2 do not require the deletion of the grade plane wording because those provisions will allow a basement walk-out condition.

The code change corrects an error but will increase costs, although not substantially.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S230–07/08
2407.1.4 (New), 2407.1.4.1 (New), 2407.1.4.2 (New)

Proponent: William E. Koffel, PE, Koffel Associates, Inc., representing Glazing Industry Code Committee

Add new text as follows:

2407.1.4 Glazing in wind-borne debris regions. Glazing installed in in-fill panels or balusters in wind-borne debris regions shall comply with the following:

2407.1.4.1 Ballusters and infill panels. Glass installed in exterior railing in-fill panels or balusters shall be laminated glass complying with Category II of CPSC 16 CFR 1201 or Class A of ANSI Z97.1

2407.1.4.2 Glass supporting top rail. When the top rail is supported by glass, the assembly shall be tested according to the impact requirements of Section 1609.1.2. The top rail shall remain in place after impact.

Reason: The proposal enhances the code by helping to minimize the glass debris in a windstorm. Laminated glass installed in in-fill panels or balusters of exterior railings will remain integral after breakage occurs. In the case of all-glass type railings, structural integrity can be maintained by incorporating impact resistant glass. According to the Miami-Dade County Building Department, a dangerous situation resulted after the 2005 hurricanes in South Florida where top handrails fell off the buildings. It was noted that rails located in the small missile areas of the building that disengaged from the building become large missile debris in those areas. This proposal serves to qualify the glass railing system that can provide retention and structural integrity to support the rail after the glass has been impacted.

It is the intent of proposed 2407.1.4.2 to only require the missile impact test and not the cycling test requirements contained in the ASTM test standard.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S231–07/08
2409

Proponent: William E. Koffel, PE, Koffel Associates, Inc., representing Glazing Industry Code Committee

1. Revise as follows:

SECTION 2409
GLASS IN ELEVATOR HOISTWAYS AND ELEVATOR CARS

2409.1 Glass in elevator hoistway enclosures. Glass in elevator hoistway enclosures and hoistway doors shall be laminated glass conforming to ANSI Z97.1 or 16 CFR Part 1201. ~~Markings as specified in the applicable standard shall be on each separate piece of glass and shall remain visible after installation.~~

2. Add new text as follows:

2409.1.1 Fire-rated hoistways. Glass installed in hoistways and hoistway doors where the hoistway is required to have a fire resistance rating shall also comply with Section 715.

2409.1.2 Glass hoistway doors. The glass in glass hoistway doors shall be not less than 60 percent of the total visible door panel surface area as seen from the landing side.

2409.2 Glass visions panels. Glass in vision panels in elevator hoistway doors shall be permitted to be any transparent glazing material not less than 0.25 inches (0.64 mm) in thickness conforming to ANSI Z97.1 or 16CFR Part 1201. The area of any single vision panel shall not be less than 24 square inches (15484 mm^2) and the total area of one or more vision panels in any hoistway door shall be not more than 85 square inches (54839 mm^2).

2409.3 Glass in elevator cars. Glass in elevator car enclosures, glass elevator car doors, and glass used for lining walls and ceilings of elevator cars shall be laminated glass conforming to ANSI Z97.1 or 16CFR Part 1201.

Exception: Tempered glass shall be permitted to be used for lining walls and ceilings of elevator cars provided:

1. The glass is bonded to a nonpolymeric coating, sheeting, or film backing having a physical integrity to hold the fragments when the glass breaks.
2. The glass is not subjected to further treatment such as sandblasting; etching; heat treatment; or painting that could alter the original properties of the glass.
3. The glass is tested to the acceptance criteria for laminated glass as specified in ANSI Z97.I or 16CFR Part 1201.

The glass in glass elevator car doors shall be not less than 60 percent of the total visible door panel surface area as seen from the car side of the doors.

Reason: The intent of Section 2409 was to include the requirements of ASME A17.1 in the Building Code. However, only a portion of the glass requirements contained in ASME A17.1 are currently included in the IBC. As such, there is considerable confusion regarding the glass requirements for elevator cars and elevator hoistways. The purpose of this proposal is to more fully incorporate the provisions of ASME A17.1 in the IBC. The proposed revisions are consistent with ASME A17.1 except as follows:

1. ASME A17.1 permits wired glass to be installed in visions panels in hoistway doors. The proposal does not permit the use of wired glass consistent with the requirements for glazing in hazardous locations.
2. ASME A171 permits the use of Type 3C film reinforced silvered mirror glass that conforms to a Canadian standard to be used in jurisdictions enforcing the National Building Code of Canada.

The language regarding marking of the glass has been deleted since Section 2406 already contains requirements for marking safety glazing. If the text proposed to be deleted is retained, the text will also need to be added in about five locations of the proposed text.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S232–07/08
Table 2506.2, Chapter 35 (New); IRC R702.3.1, Chapter 43 (New)

Proponent: George Shortreed, Georgia-Pacific Gypsum LLC, representing Georgia-Pacific Gypsum LLC

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRCBUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

1. Revise table as follows:

TABLE 2506.2 (Supp)
GYPSUM BOARD MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum board	ASTM C 1047
Adhesives for fastening gypsum wallboard	ASTM C 557
Elastomeric joint sealants	ASTM C 920
Exterior soffit board	ASTM C 931
Fiber-reinforced gypsum panels	ASTM C 1278
Glass mat gypsum backing panel	ASTM C 1178
Glass mat gypsum panel	ASTM C 1658
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

2. Add standard to Chapter 35 as follows:

ASTM
ASTM C 1658/C 1658M-06 Standard Specification for Glass Mat Gypsum Panels.

PART II – IRC BUILDING/ENERGY

1. Revise as follows:

R702.3.1 Materials. All gypsum board materials and accessories shall conform to ASTM C 36, C 79, C 475, C 514, C 630, C 931, C 960, C 1002, C 1047, C 1177, C 1178, C 1278, C 1395, ~~or~~ C 1396 or C 1658 and shall be installed in accordance with the provisions of this section. Adhesives for the installation of gypsum board shall conform to ASTM C 557.

2. Add standard to Chapter 43 as follows:

ASTM
ASTM C 1658/C 1658M-06 Standard Specification for Glass Mat Gypsum Panels.

Reason: The purpose of this proposal is to add ASTM specifications for glass mat gypsum materials to the list of gypsum board materials presently in the code. These specifications have been developed by the ASTM consensus process and are comparable to other specifications listed. This includes a glass mat gypsum panel suitable for interior use.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM C 1658, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S233–07/08
2509, 2509.3, Chapter 35 (New)

Proponent: William Sothern, MS, CIH, Microecologies, Inc., representing West Harlem Environmental Action and Northern Manhattan Improvement Corp.

1. Revise as follows:

SECTION 2509
GYPSUM BOARD IN SHOWERS, ~~AND~~ WATER CLOSETS, AND OTHER AREAS LIKELY TO BE SUBJECT TO WATER OR MOISTURE DAMAGE

2509.3 Limitations. Regular gypsum wallboard or water-resistant gypsum backing board shall not be used in the following locations:

1. Over a vapor retarder in shower or bathtub compartments.
2. Where there will be direct exposure to water or in areas subject to continuous high humidity, including:
   - 2.1. walls of basements and other below grade rooms,
   - 2.2. walls of mechanical rooms and closets housing air conditioning equipment,
   - 2.3. rear walls of fan coil/unit ventilator type HVAC units,
   - 2.4. ceilings beneath cold water pipes,
   - 2.5. ceilings beneath air handlers in ceiling plenums,
   - 2.6. ceilings of bathrooms,
   - 2.7. walls of plumbing and electrical chases,
   - 2.8. walls of laundry rooms, and
   - 2.9. walls beneath kitchen sinks.

In these areas, walls and ceilings must be constructed of materials that are rated as mold resistant (rating of 10) in accordance with ASTM D 3273 and ASTM D 3274.

3. On ceilings where frame spacing exceeds 12 inches (305 mm) o.c. for 1/2-inch-thick (12.7 mm) water-resistant gypsum backing board and more than 16 inches (406 mm) o.c. for 5/8-inch-thick (15.9 mm) water-resistant gypsum backing board.

2. Add standards to Chapter 35 as follows:

ASTM

D 3273-00 (2005)	Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings an Environmental Chamber
D 3274-95 (2002)	Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation

Reason: The purpose of the amendment is to update the International Building Code to reflect the current state of knowledge regarding the prevention of fungal growth in buildings. Fungi, commonly known as mold, grow readily on building materials that contain organic matter when those building materials become wet as a result of floods, plumbing leaks, condensation, water infiltration through building facades, firefighting efforts or sprinkler system activation. The refined cellulose content of the paper covering of regular gypsum wallboard and water-resistant gypsum backing board (i.e. greenboard) provides ideal nutrient to support the rapid growth of fungi. Certain areas of buildings have a high probability of

being subjected to water damage over their expected useful lives, and those areas have been listed in the proposed change to Point 2 of Section 2509.3. In our experience as certified industrial hygienists, we have performed more than 1500 inspections in response to water damage and mold complaints over the past 14 years where we found that professional mold remediation was necessary. In greater than 75% of those cases, the professional mold remediation was necessitated by the presence of mold contaminated paper faced gypsum wallboard in the areas listed in the proposed change to Point 2 of Section 2509.3. In accordance with good practice for mold remediation, as described in the most recent authoritative guidance documents prepared by the US EPA[1], the Centers for Disease Control (CDC)[2], and the NYC Department of Health and Mental Hygiene (DOHMH)[3], regular gypsum wallboard (frequently referred to as "drywall" or "Sheetrock™") that is supporting significant mold growth must be removed and replaced. The costs associated with the removal of moldy paper faced gypsum board are staggering (in the range of $8-$10 per square foot of floor space based on our experience, with substantially higher costs being cited by other experts[4,5]), largely because the standard work practices used in mold remediation projects are similar to those required for asbestos abatement and lead-based paint abatement projects. The breadth of the mold problem is also staggering, with 55 % of respondents to a survey conducted by Opinion Research Corporation reporting concerns about mold growth in their homes.[6] The insurance industry has responded by either increasing premiums or by excluding mold remediation costs from their residential and commercial coverages.[7,8,9,10]

Of equal if not greater cause for concern than the structural issues related to mold growth on paper-faced gypsum board are the health issues. Inhalation exposure to mold in contaminated indoor environments has recently been conclusively determined to cause and exacerbate allergic sensitivity and asthma. In 2004, two epidemiological studies were published that are widely considered to be definitive. One study, conducted by the Institute of Medicine entitled "Damp Indoor Spaces and Health" (2004), concluded that there is "sufficient evidence of association between mold and asthma in sensitized asthmatic people".[11] The other study, by the University of Connecticut Health Center entitled "Guidance for Clinicians on the Recognition and Management of Health Effects Related to Mold Exposure and Moisture Indoors" (2004), concluded that "the most common types of illnesses directly related to mold are the type I responses of allergic rhinitis and asthma".[12] In 2006, a CDC report entitled "Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods" takes the health issue one step further by concluding that "exposure to mold can sensitize persons, who then might experience symptoms when re-exposed to the same mold species. For sensitized persons, hay fever symptoms and asthma exacerbations are prominent manifestations of mold allergy".[13] On the basis of the foregoing, mold is now recognized as a major cause of asthma, together with other major environmental factors such as dust mites and cockroaches. The breadth of the asthma problem is regarded as a health catastrophe. According to the American Lung Association of the City of New York, "One million NYC residents, including 300,000 children, have asthma" and, "asthma is leading cause of school absenteeism and hospitalization for children 14 and younger".[14,15]

The major US gypsum board manufacturers have recognized the need to develop gypsum board products that are highly mold resistant and that receive high scores on the ASTM D3273-00 mold resistance standard test method. These materials are now readily available, and their erection and finishing require no additional costs compared to regular paper faced gypsum wallboard. These alternative products include DensArmor Plus™ Type X Gypsum board, manufactured by Georgia Pacific, and Sheetrock™ brand MoldTough™ Type X Gypsum board, manufactured by US Gypsum. These substitute products have been coming down in price since their introduction several years ago, and the US Gypsum's MoldTough™ is now priced at $10.88 for 5/8" thick, 4 ft by 8 ft board, contrasted to $6.71 for their paper faced sheetrock product for 5/8" thick, 4 ft by 8 ft board. This cost differential of $4.17 equates to $0.13 per square foot. For a two thousand square foot house with no finished basement we would estimate the materials cost increase for construction would be less than $100 and for a similar house with a finished basement, the materials cost increase for construction would be $300 - $400. These costs may be more than offset by the additional costs associated with mold remediation over the useful life of the structure without even taking into account the health related costs.

This proposed change to the building code is the single most important step that can be taken to reduce the prevalence of mold growth problems in residential and commercial buildings.

Footnotes:

1. Table 2: Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water (*Mold Remediation in Schools and Commercial Buildings*, US EPA)
2. "Remove all porous items that have been wet for >48 hours and that cannot be thoroughly cleaned and dried… These items can remain a source of mold growth and should be removed from the home or building. Porous, non-cleanable items include carpeting and carpet padding, upholstery, wallpaper, drywall, ceiling tiles, insulation material, some clothing, leather, paper, some wood and wood products, and food. Removal and cleaning are important because even dead mold can cause allergic reactions." (*Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods* ,2006, CDC)
3. "Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination should be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible." (*Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, NYC DOHMH)
4. "One of the reasons may be the high cost of mold remediation, which should be done only by trained and experienced professionals. Some studies have shown that proper remediation and removal of contaminated building materials is about 10 times as expensive as regular tear-out and replacement. In some cases the remediation cost is more than $150 per square foot." (Herndon, Everette Lee and Yang, Chin S.*: Mold and Mildew a Creeping Catastrophe*, 2000 Claims Magazine. Article found at http://www.jurispro.com/uploadArticles/Herndon-Mildew.pdf)
5. "It is estimated that mold remediation costs an average of $35,000 to $50,000 per home when the structure is involved." (Gulf Coast Mold Prevention Inc. website: http://www.gcmpinc.com/mold.htm)
6. "Now the latest home invader is mold and, in a national survey released by CertainTeed Corporation and conducted for them by Opinion Research Corporation, 55 percent of the 1,040 respondents expressed concern about mold in the home." ("Got Mold? Survey Says Consumer Concern Increases Regarding Mold in the Home", 2005, Insurance Journal website: http://www.insurancejournal.com/news/national/2005/03/16/52637.htm)
7. "Mold claims filed with insurance companies have taken off in just the past few years. Farmers Insurance Group had 11 mold claims filed in 1999 and 10,813 in 2001. The average cost of cleaning up mold also grew eight times between 2000 and 2001, going from $17.09 per policyholder in the first part of 2000 to $147.68 in the second quarter of this year, according to the top three insurance companies in Texas." (International Risk Management Institute website: http://www.irmi.com/Expert/Articles/2004/Holland04.aspx)
8. "Across the country, annual homeowner policy premiums have already risen 7 to 8 percent this year from last year, to around $500, on average, according to Robert P. Hartwig, chief economist for the Insurance Information Institute. He blamed mold claims for a large portion of the increase and said premiums were expected to rise a few more percentage points next year as more claims are expected." And "In Texas, which has the nation's highest average homeowners premium - just under $1,000 a year - residents can expect premiums to increase, on average, by 40 to 60 percent this year, according to the Texas Department of Insurance. People with previous water damage claims, and mold problems, may face even higher rates. Some insurers, though, have been trying to get out of mold coverage altogether. Over the last six months, major companies - from Allstate to Nationwide to State Farm - have been petitioning state insurance regulatory agencies to let them exclude mold from homeowners policies. So far, 35 states have approved some sort of mold exclusions, like eliminating coverage for water problems caused by a lack of maintenance on the part of homeowners." ("Mold is an Insurance Nightmare*",* 2003, MoldHelp.org Website: http://www.mold-help.org/content/view/59)

9. “Before 2000, the few mold-related claims that insurers did see were generally handled for a few thousand dollars. In only two years, claims costs have skyrocketed. Today, homeowners claims can reach $100,000 or more and the cost of some commercial claims can run well into the millions. The typical homeowners mold claim now costs $15,000 to$30,000 to handle, compared with $3,000 to $4,000 for the average homeowners claim not involving mold” and “While many factors affect the cost of homeowners insurance, growth in the frequency and severity of mold claims has had a significant impact and this is threatening the terms of homeowners coverage, the widespread availability and affordability of which has helped propel homeownership rates to record highs in recent years.” and “In many states, availability of homeowners coverage has also become a problem, as several insurers have announced new restrictions on the sale of homeowners insurance due to the mold problem. For example, in Texas the number of insurers writing homeowners coverage has been declining steadily and fell to 128 in 2001, down from 162 in 1997 and 276 in 1990 (Exhibit 12).” and “Insurance departments in 39 states have already approved mold exclusions in homeowners insurance policies (Exhibit 17). Mold exclusions are also becoming
increasingly common in commercial property and liability policies.” (*Mold and Insurance*, 2003, Insurance Information Institute)
10. “The next round of insurance coverage exclusions to arrive at your community association will be a “Fungus or Spore Exclusion.” This exclusion will be attached to the Commercial General Liability Policy in States where the insurance department has approved use of such an exclusion. This exclusion effectively removes coverage for bodily injury and property damage, as well as personal injury and advertising liability caused directly or indirectly, in whole or in part, by a fungus or spore. Property insurance exclusions are also being developed that will limit coverage caused by a covered water damage claim to the repair and replacement of covered property, but will exclude cleanup and remediation of any mold damage caused by the water damage.” (“Mold Claims and Insurance Coverage”, 2002, Virginia Community Association Network)
11. *Damp Indoor Spaces and Health* (2004) Institute of Medicine & Board on Health Promotion and Disease Prevention, darwin.nap.edu
12. *Guidance for Clinicians on the Recognition and Management of Health Effects Related to Mold Exposure and Moisture Indoor*s (2004) University of Connecticut Health Center
13. *Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods* ,2006, CDC
14. American Lung Association of the City of New York, http://www.alany.org/site/c.ehLNK5PHLoF/b.2352101/k.BC83/Home.htm
15. “Do more to fight growing scourge of asthma in city” (2007) New York Daily News
http://www.nydailynews.com/boroughs/brooklyn/2007/06/10/2007-06-10_do_more_to_fight_growing_scourge_of_asth.html

Bibliography:
Mold Remediation in Schools and Commercial Buildings (2001) US EPA www.epa.gov/mold/mold_remediation.html

Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods (2006) Centers for Disease Control and Prevention www.bt.cdc.gov/disasters/mold/report/

Guidelines on Assessment and Remediation of Fungi in Indoor Environments NYC DOHMH www.nyc.gov/html/doh/html/epi/moldrpt1.shtml

Guidance for Clinicians on the Recognition and Management of Health Effects Related to Mold Exposure and Moisture Indoors (2004) University of Connecticut Health Center oehc.uchc.edu/clinser/MOLD%20GUIDE.pdf

Damp Indoor Spaces and Health (2004) Institute of Medicine & Board on Health Promotion and Disease Prevention, darwin.nap.edu

Herndon, Everette Lee and Yang, Chin S. “Mold and Mildew: A Creeping Catastrophe” (2000) Claims Magazine (http://www.jurispro.com/uploadArticles/Herndon-Mildew.pdf)

“Standards Needed for Mold Exposure, Testing, and Remediation” (2004) International Risk Management Institute, http://www.irmi.com/Expert/Articles/2004/Holland04.aspx)

“The Problems with Mold” (2006) Gulf Coast Mold Prevention Inc. http://www.gcmpinc.com/mold.htm

“Got Mold? Survey Says Consumer Concern Increases Regarding Mold in the Home” (2005) Insurance Journal website: http://www.insurancejournal.com/news/national/2005/03/16/52637.htm

“Mold Claims and Insurance Coverage” (2002) Virginia Community Association Network http://webapp.dpor.state.va.us/articles/mold_claims.htm

“Mold is an insurance nightmare” (2003) Mold Help.org Website: http://www.mold-help.org/content/view/59

Mold and Insurance Insurance Information Institute (iii) (2003) http://server.iii.org/yy_obj_data/binary/774885_1_0/moldwhitepaper.pdf

“Do more to fight growing scourge of asthma in city” (2007) New York Daily News http://www.nydailynews.com/boroughs/brooklyn/2007/06/10/2007-06- 10_do_more_to_fight_growing_scourge_of_asth.html

American Lung Association of the City of New York http://www.alany.org/site/c.ehLNK5PHLoF/b.2352101/k.BC83/Home.htm

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM D 3273 and D 3274, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S234–07/08
Chapter 35 (New)

Proponent: Mike Moore, Newport Partners LLC, representing Dietrich Industries, Inc.

Add new text as follows:

CHAPTER 35
PROTECTION AGAINST TERMITE DAMAGE

SECTION 3501
GENERAL

3501.1 Scope. Provisions in this chapter shall apply to all buildings types where termite infestation probability is very heavy as determined by Figure 2603.8 in Chapter 26 of this code. These provisions are in addition to other requirements in this code for protection of specific materials against decay or corrosion.

SECTION 3502
CONTROL METHODS AND LOCATIONS

3502.1 Methods. Protection against termite damage shall be by one of the following methods or a combination of these methods:

1. Soil and/or field applied wood treatment using a chemical termiticide applied in accordance with the termiticide label.
2. Termite baiting system installed and maintained in accordance with the label.
3. Pressure-preservative-treated wood in accordance with AWPA U1. Field cuts, notches or holes shall be treated in accordance with AWPA M4.
4. Naturally durable termite resistant wood.
5. Approved physical barriers. Shields placed at the top of a foundation wall shall be used in combination with another method of protection.
6. Cold formed steel framing.

(Renumber Chapter 35)

Reason: The purpose of this proposal is to add text that recognizes options for protecting building elements from termites and to create a specific location in the code for this critical structural durability issue.

Currently, the IBC does not provide a comprehensive list of options for protection against termites, but rather addresses it in part in several material sections scattered throughout the code. This proposal offers a superior approach because it creates a prominent location (a stand alone chapter) for termite protection and offers more choices for the user than in the current text of the code. The proposed text adds multiple methods and materials successfully used to protect against termites that the code does not currently address.

This proposal will also bring more consistency between the IBC and IRC, which is important since the coverage of the two codes overlaps for some residential buildings. The IRC already recognizes methods other than treated or naturally durable wood for termite control in Section R320.1. The proposed change incorporates all of the IRC requirements not already covered in the IBC and also defines geographical limits of applicability by reference to a map already included in the IBC.

Termites don't discriminate by building type. Further, the USDA Forest Service estimates prevention and damage repair costs due to termites at $2 Billion each year in the United States, not including damage from the more aggressive Formosan termite (see Forest Services website at http://www.srs.fs.usda.gov/termites/research.htm for specific article). Others place the estimate as high as $11 Billion. Termite protection as part of the construction process is particularly critical with homes built under the IBC, since homeowners do not typically provide the same types of routine maintenance or inspection as seen in other building types.

In most areas, this proposal will not increase the cost of construction. Rather, it could reduce costs because it offers multiple options to meet what is already required by the code. Further, this language will help to mitigate the billions of dollars spent on termite damage each year.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S235–07/08
Chapter 35

Proponent: James A. Rossberg, PE, Structural Engineering Institute of ASCE, representing Structural Engineering Institute of ASCE

Revise as follows:

CHAPTER 35
REFERENCED STANDARDS

ASCE/SEI

7—05 Minimum Design Loads for Buildings and Other Structures including Supplement No.1 and Supplement No. 2 and excluding Chapter 14 and Appendix 11A.

Reason: The purpose of this change is to adopt Supplement No. 2 to the 2005 edition of ASCE/SEI 7 which is shown below in its entirety. Supplement No. 2 revises the minimum base shear equations for both buildings and non-building structures. The need for this change was indicated by the results from the 75% Draft of *ATC-63, Quantification of Building System Performance and Response Parameters,* which indicate that tall buildings may fail at an unacceptably low seismic level and therefore the minimum base shear equation for buildings is being restored to that which appeared in the 2002 edition of ASCE 7.

Because nonbuilding structures not similar to buildings have low R-values compared to the special reinforced concrete moment frames studied in ATC-63, the ASCE 7 standards committee chose not to restore the high minimum base shears for nonbuilding structures not similar to buildings found in ASCE 7-02. In many cases, these previous minimum base shears gave many nonbuilding structures not similar to buildings effective R-values less than 1.0. Therefore, the Seismic Subcommittee believes that the minimum base shear equation of $0.044S_{DS}I$ used for buildings should also be applied to nonbuilding structures not similar to buildings.

Supplement No. 2 was approved by the ASCE 7 standards committee in the summer of 2007 and will be opened for public review and comment in the fall of 2007. It is expected that Supplement No. 2 will have fully completed the ASCE consensus process prior to the 2008 spring ICC hearings.

Supplement No. 2 will be distributed via the SEI website, newsletters and assorted other media. Upon the next printing of ASCE 7-05 it will be included directly in the text of the document. The complete text of Supplement No. 2 is as follows:

Supplement No. 2 to ASCE 7-05:

Revise Equation 12.8-5 of Section 12.8.1.1 of ASCE 7-05 as shown below:

12.8.1.1 Calculation of Seismic Response Coefficient. The seismic response coefficient, C_s, shall be determined in accordance with Eq. 12.8-2.

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I}\right)} \qquad \text{(Eq. 12.8-2)}$$

where:

S_{DS} = the design spectral response acceleration parameter in the short period range as determined from Section 11.4.4
R = the response modification factor in Table 12.2-1, and
I = the occupancy importance factor determined in accordance with Section 11.5.1

The value of C_s computed in accordance with Eq. 12.8-2 need not exceed the following:

$$C_s = \frac{S_{D1}}{T\left(\frac{R}{I}\right)} \qquad for \quad T \le T_L \qquad \text{(Eq. 12.8-3)}$$

$$C_s = \frac{S_{D1}T_L}{T^2\left(\frac{R}{I}\right)} \qquad for \quad T > T_L \qquad \text{(Eq. 12.8-4)}$$

C_s shall not be less than
C_s = ~~0.01~~ $0.044S_{DS}I \ge 0.01$ (Eq. 12.8-5)

In addition, for structures located where S_1 is equal to or greater than 0.6g, C_s shall not be less than

$$C_s = \frac{0.5S_1}{\left(\frac{R}{I}\right)} \qquad \text{(Eq. 12.8-6)}$$

where *I* and *R* are as defined in Section 12.8.1.1 and

S_{D1} = the design spectral response acceleration parameter at a period of 1.0 sec, as determined from Section 11.4.4
T = the fundamental period of the structure (sec) determined in Section 12.8.2
T_L = long-period transition period (sec) determined in Section 11.4.5
S_1 = the mapped maximum considered earthquake spectral response acceleration parameter determined in accordance with Section 11.4.1

Revise Equations 15.4-1 and 15.4-2 of Section 15.4.1, item 2, as shown below:

2. For nonbuilding systems that have an *R* value provided in Table 15.4-2, the seismic response coefficient (C_s) shall not be taken less than

C_s = ~~0.03~~ 0.044S_{DS}I ≥ 0.03 (15.4-1)

and for nonbuilding structures located where $S_1 \geq 0.6g$, C_s shall not be taken less than

$$C_s = \frac{0.8 S_1}{\left(\frac{R}{I}\right)} \quad (15.4\text{-}2)$$

EXCEPTION: Tanks and vessels that are designed to AWWA D100, AWWA D103, API 650 Appendix E, and API 620 Appendix L as modified by this standard, shall be subject to the larger of the minimum base shear values defined by the reference document or the following equations:

C_s = ~~0.01~~ 0.044S_{DS}I ≥ 0.01 (15.4-3)

and for nonbuilding structures located where $S_1 \geq 0.6g$, C_s shall not be taken less than

$$C_s = \frac{0.5 S_1}{\left(\frac{R}{I}\right)} \quad (15.4\text{-}4)$$

Minimum base shear requirements need not apply to the convective (sloshing) component of liquid in tanks.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

S236–07/08
Chapter 35

Proponent: David P. Tyree, P.E., C.B.O., American Forest & Paper Association, representing American Forest & Paper Association

Revise as follows:

CHAPTER 35
REFERENCED STANDARDS

American Forest and Paper Association

ANSI/AF&PA SDPWS-~~05~~ 08 AF&PA Supplement Special Design Provisions for Wind and Seismic

Reason: This is an update to an existing AF&PA/ANSI Standard. The new supplement is scheduled to be approved as an AF&PA standard by June 2008. The supplement will further be approved as an ANSI consensus standard by August 2008. *ANSI / AF&PA SDPWS-2008 - Special Design Provisions for Wind and Seismic standard with Commentary* covers materials, design and construction of wood members, fasteners, and assemblies to resist wind and seismic forces. Engineered design of wood structures to resist wind or seismic forces is either by allowable stress design (ASD); or load and resistance factor design (LRFD). Criteria for proportioning, design, and detailing of engineered wood systems, members, and connections in lateral force resisting systems is provided. Nominal shear capacities of diaphragms and shear walls are provided for reference assemblies.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, ANSI/AF&PA SDPWS, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

S237–07/08
Chapter 35; IRC Chapter 43

Proponent: David P. Tyree, P.E., C.B.O. and Dennis Pitts, American Forest & Paper Association, representing American Forest & Paper Association

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC STRUCTURAL AND THE IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC STRUCTURAL

Revise as follows:

CHAPTER 35
REFERENCED STANDARDS

American Forest and Paper Association

ANSI/AF&PA WFCM- ~~01~~ 08	Wood Frame Construction Manual for One and Two-family Dwellings

PART II – IRC BUILDING/ENERGY

Revise as follows:

CHAPTER 43
REFERENCED STANDARDS

American Forest and Paper Association

WFCM- ~~01~~ 08	Wood Frame Construction Manual for One and Two-family Dwellings

Reason: (IBC)This is an update to an existing AF&PA/ANSI Standard. The new standard is scheduled to be approved as an AF&PA standard by June 2008. The supplement will further be approved as an ANSI consensus standard by August 2008. The *Wood Frame Construction Manual (WFCM) for One- and Two-Family Dwellings, 2008Edition* is an ANSI approved document that provides engineered and prescriptive requirements for wood frame construction based on dead, live, snow, seismic and wind loads derived from the 2006 International Building Code (IBC). The WFCM includes design and construction provisions for connections, wall systems, floor systems, and roof systems. A range of structural elements are covered, including sawn lumber, structural glued laminated timber, wood structural sheathing, I-joists, and trusses. Also included are provisions approved by the 2000 IBC for perforated shearwalls, wall stud system factors, and increased capacities for shearwalls and diaphragms used in high wind applications.

(IRC) This is an update to an existing referenced AF&PA/ANSI standard. The WFCM has been updated to comply with the current version of ASCE 7 (ASCE 7-05). The anticipated schedule for ANSI approval of the new edition is August of 2008. The document will be available prior to the Final Action Hearings in September.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard(s) proposed for inclusion in the code, ANSI/AF&PA WFCM, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

PART I – IBC STRUCTURAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING/ENERGY

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

S238–07/08
Chapter 35

Proponent: Standards writing organizations as listed below.

Revise standards as follows:

AA

The Aluminum Association
1525 Wilson Blvd., Suite 600
Arlington, VA 22209

Standard reference number	Title
ADM~~1~~ 2005	Aluminum Design Manual: Part I-A Specification for Aluminum Structures - Allowable Stress Design; and Part I-B Specification for Aluminum Structures - ~~Building~~ Load and Resistance Factor Design

AAMA

American Architectural Manufacturers Association
1827 Waldon Office Square, Suite 550
Schaumburg, IL 60173

Standard reference number	Title
AAMA/WDMA/CSA 101/I.S.2/A440-08 ~~05~~	North American Fenestration Standard/Specifications for Windows, Doors and ~~Unit~~ Skylights

AISI

American Iron and Steel Institute
1140 Connecticut Avenue, Suite 706
Washington, DC 20036

Standard reference number	Title
~~General 04~~ AISI S200-07	North American Standard for Cold-formed Steel Framing—General Provisions
~~Header—04~~ AISI S212-07	North American Standard for Cold-formed Steel Framing—Header Design
~~Lateral—04~~ AISI S213-07	North American Standard for Cold-formed Steel Framing—Lateral Design
~~NAS—01~~ AISI S100-07	North American Specification for the Design of Cold-formed Steel Structural Members, ~~including 2004 Supplement~~
~~PM—01~~ AISI S230-07	Standard for Cold-formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings~~,~~ ~~including 2004 Supplement~~
~~Truss—04~~ AISI S214-07	North American Standard for Cold-formed Steel Framing—Truss Design
~~WSD—04~~ AISI S211-07	North American Standard for Cold-formed Steel Framing—Wall Stud Design

AITC

American Institute of Timber Construction
7012 S. Revere Parkway, Suite 140
Englewood, CO 80112

Standard reference number	Title
ANSI/AITC A 190.1— 07 ~~02~~	Structural Glued Laminated Timber

ASTM

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

Standard reference number	Title
A 6/A 6M-07 ~~05~~	Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
A 185/A 185M-06E01 ~~05a~~	Specification for Steel Welded Wire Reinforcement, Plain for Concrete
A 240/A 240M-07 ~~05a~~	Standard Specification for Chromium and Chromium-nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
A 307-04E01	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A 416/A 416M— 06 ~~02~~	Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
A 435/A 435M—90(2007~~1~~)	Specification for Straight-beam Ultrasonic Examination of Steel Plates
A 463/A 463M – 05 ~~02a~~	Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot Dip Process
A 480A/A 480M–06b ~~05~~	Specification for General Requirements for Flat-rolled Stainless and Heat-resisting Steel Plate, Sheet and Strip
A 497 A 497M-06e01 ~~05a~~	Specification for Steel Welded Reinforcement Deformed, for Concrete
A 510—06 ~~03~~	Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
A 568/A 568M-06a ~~05a~~	Specification for Steel, Sheet, Carbon, Structural and High-Strength, Low-Allow, Hot-rolled and Cold-rolled, General Requirements for
A 572/A 572M—07 ~~04~~	Specification for High-Strength Low-alloy Columbium-Vanadium Structural Steel
A 653/A 653-07 ~~06~~	Specification for Steel Sheet, Zinc-Coated Galvanized or Zinc-Iron Alloy-Coated Galvannealed by the Hot-Dip Process
A 690/A 690M-07 ~~05~~	Standard Specification for High Strength Low-Alloy Nickel, Copper, Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments
A 722/A 722M-07 ~~05~~	Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete
A 775/A 775M-07 ~~04a~~	Specification for Epoxy-coated Steel Reinforcing Bars
A 792A 792M-06a ~~05~~	Specification for Steel Sheet, 55% Aluminum-zinc Allow-coated by the Hot-dip Process
A 875/A 875M- 06 ~~05~~	Standard Specification for Steel Sheet Zinc-5 percent, Aluminum Allow-Coated by the Hot-dip Process
A 884-A884M-06 ~~04~~	Specification for Epoxy-coated Steel Wire and Welded Wire Fabric ~~for~~ Reinforcement
A 898/A 898M— 07 ~~91 (2001)~~	Specification for Straight Beam Ultrasonic Examination of Rolled Steel Shapes
A 924/A924M—07 ~~04~~	Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process
A 951—06 ~~02~~	Specification for Steel Wire Masonry Joint Reinforcement
A 992/A 992M-06a ~~04a~~	Standard Specification for Structural Shapes
A 996/A 996M-06a ~~05a~~	Specification for Rail-steel and Axle-steel Deformed Bars for Concrete Reinforcement
A 1008/A 1008M-07 ~~05b~~	Specification for Steel, Sheet, Cold-rolled, Carbon, Structural, High-strength Low-allow and High-strength Low-alloy with Improved Formability
B 209— 06 ~~04~~	Specification for Aluminum and Aluminum Alloy Steel and Plate
C 31/31M-06 ~~03a~~	Practice for Making and Curing Concrete Test Specimens in the Field
C 55—06e01 ~~03~~	Specification for Concrete Building Brick
C 61/C 61M—00(2006)	Specification for Gypsum Keene's Cement
C 67-07 ~~05~~	Test Methods of Sampling and Testing Brick and Structural Clay Tile

C 90-06b	Specification for Loadbearing Concrete Masonry Units
C 150-07 ~~05~~	Specification for Portland Cement
C 212—00(2006)	Specification for Structural Clay Facing Tile
C 216-07 ~~05a~~	Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale)
C 270-07 ~~05a~~	Specification for Mortar for Unit Masonry
C 315—02	Specification for Clay Flue Liners ~~ings~~ and Chimney Pots
C 406-06e01 ~~05~~	Specification for Roofing Slate
C 473-06a ~~05~~	Test Methods for Physical Testing of Gypsum Panel Products
C 474—05 ~~02~~	Test Methods for Joint Treatment Materials for Gypsum Board Construction
C 475—05 ~~01~~	Specification for Joint Compound and Joint Tape for Finishing Gypsum ~~Wall~~ Board
C 557—03e01	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing
C 578-07 ~~05a~~	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
C 595-07 ~~05~~	Specification for Blended Hydraulic Cements
C 636/C36M—06 ~~04~~	Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
C 645-07-04~~a~~	Specification for Nonstructural Steel Framing Members
C 836-06 ~~05~~	Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
C 840-07 ~~05~~	Specification for Application and Finishing of Gypsum Board
C 842—05 ~~99~~	Specification for Application of Interior Gypsum Plaster
C 843—99(2006) ~~e01~~	Specification for Application of Gypsum Veneer Plaster
C 847—06 ~~00~~	Specification for Metal Lath
~~C 931/C 931M—04~~	~~Specification for Exterior Gypsum Soffit Board~~
C 932-06 ~~05~~	Specification for Surface-Applied Bonding Compounds Agents for Exterior Plastering
C 955—06 ~~03~~	Standard Specification for Load-bearing Transverse and Axial Steel Studs, Runners Tracks, and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases
C 957- 06 ~~05a~~	Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface
C1032—06 ~~04~~	Specification for Woven Wire Plaster Base
C1063—06 ~~03~~	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Based Plaster
C 1072-06 ~~05b~~	Standard Text Method for Measurement of Masonry Flexural Bond Strength
C 1088—07a ~~02~~	Specification for Thin Veneer Brick Units Made from Clay or Shale
C 1177/C 1177M-06 ~~04e01~~	Specification for Glass Mat Gypsum Substrate for Use as Sheathing
C 1178/C 1178M-06 ~~04e01~~	Specification for Coated ~~Glass~~ Mat Water-Resistant Gypsum Backing Panel
C 1186—07 ~~02~~	Specification for Flat Non Asbestos Fiber Cement Sheets
C 1261-07 ~~05~~	Specification for Firebox Brick for Residential Fireplaces

C 1278/C 1278M-06 ~~03e01~~	Specification for Fiber-Reinforced Gypsum Panels
C 1283—07 ~~03e01~~	Practice for Installing Clay Flue Lining ~~ers~~
C1314—07 ~~03b~~	Test Method for Compressive Strength of Masonry Prisms
C1386— 07 ~~98~~	Specification for Precast Autoclaved Aerated Concrete (~~P~~AAC) Wall Construction Units
C1396/1396M—06a ~~02~~	~~Standard~~ Specification~~s~~ for Gypsum ~~Wall~~ Board
C 1405-07 ~~0a05a~~	Standard Specification for Glazed Brick (Single Fired, Solid Brick Units)
D 225-04 ~~05~~	Specification for Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules
D 226-06 ~~05~~	Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
D 312—00(2006)	Specification for Asphalt Used in Roofing
D 422—63 (2002)e01	Test Method for Particle-size Analysis of Soils
D 450—07 ~~96 (2000)e01~~	Specification for Coal-tar Pitch Used in Roofing, Dampproofing and Waterproofing
D 635—06 ~~03~~	Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
D1143/D1143M—07 ~~(1994) E01~~	Test Method for Piles Under Static Axial Compressive Load
D 1227—95(2007)~~2000~~	Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
D1761—06 ~~88 (2000) e01~~	Test Method for Mechanical Fasteners in Wood
D 2166-06 ~~00e01~~	Test Method for Unconfined Compressive Strength of Cohesive Soil
D 2487—06 ~~00~~	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D 2822—05 ~~91 (97)e01~~	Specification for Asphalt Roof Cement
D 3019—94(2007) ~~e01(Supp)~~	Specification for Lap Cement Used with Asphalt Roll Roofing, Nonfibered, Asbestos Fibered and Nonasbestos Fibered
D3201— 07 ~~94 (2003)~~	Test Method for Hygroscopic Properties of Fire-retardant-treated Wood and Wood-based Products
D 3161—06 ~~03b~~	Test Method for a Wind Resistance of Asphalt Shingles (Fan Induced Method)
D 3462—07 ~~04~~	Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules
D 3468—99(2006)e01	Specification for Liquid-Applied Neoprene and Chlorosulfonated Polyethylene Used in Roofing and Waterproofing
~~D3689—90 (1995)~~	~~Method for Testing Individual Piles Under Static Axial Tensile Load~~
D 3737-07 ~~05~~	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)
D 3747— 79 (2007~~0e01~~)	Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation
D 3957— 06 ~~03~~	Standard Practices for Establishing Stress Grades for Structural Members Used in Log Buildings
D 4022—07 ~~94 (2000)e01~~	Specification for Coal Tar Roof Cement, Asbestos Containing
D 4434—06 ~~04~~	Specification for Poly (Vinyl Chloride) Sheet Roofing
D 4479—07 ~~00~~	Specification for Asphalt Roof Coatings—Asbestos-free
D 4829— 07 ~~03~~	Test Method for Expansion Index of Soils
D 4869—05e01 ~~04~~	Specification for Asphalt-Saturated (Organic Felt) Underlayment Used in Steep Slope Roofing
D 5019—07 ~~96e01~~	Specification for Reinforced Nonvulcanized Polymeric Sheet Used in Roofing Membrane
D 5643—06 ~~94 (2000)e01~~	Specification for Coal Tar Roof Cement, Asbestos-free
D 5665—99a(2006)	Specification for Thermoplastic Fabrics Used in Cold-applied Roofing and Waterproofing

D 6694—07 01	Standard Specification for Liquid-applied Silicone Coating Used in Spray Polyurethane Foam Roofing
D 6757— 07 02	Standard Specification for Inorganic Underlayment for Use with Steep Slope Roofing Products
D 6878—06a 03	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing
D 7158—07 05	Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method
E 518— 03e01	Standard Test Methods for Flexural Bond Strength of Masonry
E 519—07 02	Standard Test Method for Diagonal Tension (Shear) in Masonry Assemblages
E 1996-06 05b	Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Storm Shutters Impacted by Windborne Debris in Hurricanes
G 152— 06 04	Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

AWPA

American Wood Protection Association
P. O. Box 361784
Birmingham, AL 35236-1784

Standard reference number	Title
U1-07 06	USE CATEGORY SYSTEM: User Specification for Treated wood except Section 6 Commodity Specification H

DASMA

Door and Access Systems Manufacturers Association International
1300 Summer Avenue
Cleveland, OH 44115-2851

Standard reference number	Title
108-05 02	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference
115-05 03	Standard Method for Testing Sectional Garage doors and Rolling Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure

DOC

U.S. Department of Commerce
National Institute of Standards and Technology
100 Bureau Drive Stop 3460
Gaithersburg, MD 20899

Standard reference number	Title
PS-1— 07 95	Construction and Industrial Structural Plywood

GA

Gypsum Association
810 First Street, NE #510
Washington, DC 20002-4268

Standard reference number	Title
GA 216—07 04	Application and Finishing of Gypsum Board Panel Products

PTI

Post-Tensioning Institute
8601 N. Black Canyon Hwy., Suite 103
Phoenix, AZ 85021

Standard reference number	Title
PTI—2007 2004	Standard Requirements for Analysis of Shallow Concrete Foundations on Expansive Soils, First Third Edition
PTI— 2007 2004	Standard Requirements for Design of Shallow Post-tensioned Concrete Foundation on Expansive Soils, Second Edition

SPRI

Single Ply Roofing Institute
77 Rumford Avenue, Suite 3-B
Waltham, MA 02453

Standard reference number	Title
ANSI/SPRI/FM4435-ES-1~~03~~	Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

TIA

Telecommunications Industry Association
2500 Wilson Boulevard
Arlington, VA 22201-3834

Standard reference number	Title
TIA/~~EIA~~-222-G-1- 2007 ~~2005~~	Structural Standards for Steel Antenna Towers and Antenna Supporting Structures – Addendum 1

TMS

The Masonry Society
3970 Broadway, Unit 201-D
Boulder, CO 80304-1135

Standard reference number	Title
402— 08 ~~05~~	Building Code Requirements for Masonry Structures
602—08 ~~05~~	Specification for Masonry Structures

TPI

Truss Plate Institute
218 North Lee Street, Suite 312
Arlington, VA 22314

Standard reference number	Title
TPI 1— 2007 ~~2002~~	National Design Standards for Metal Plate Connected Wood Truss Construction

UL

Underwriters Laboratories
333 Pfingsten Road
Northbrook, IL 60062

Standard reference number	Title
~~580—2006 94~~	~~Test for Uplift Resistance of Roof Assemblies—with Revisions through February 1998~~
1258-02	**Fire Test of Roof Deck Construction – with Revisions through January 2007**
2390—2003 ~~04~~	Test Method for ~~Measuring the~~ Wind Resistant ~~Uplift Coefficients for~~ Asphalt Shingles with Sealed Tabs with Revisions through January 2004

WDMA

Window and Door Manufacturers Association
1400 East Touhy Avenue #470
Des Plaines, IL 60018

Standard reference number	Title
AAMA/WDMA/CSA101/I.S.2/A 440—08 ~~05~~	Specifications for Windows, Doors and Unit Skylights

Reason: The *CP 28 Code Development Policy*, Section 4.5* requires the updating of referenced standards to be accomplished administratively, and be processed as a Code Change Proposal. In May 2007, a letter was sent to each developer of standards that are referenced in the International Codes, asking them to provide ICC with a list of their standards in order to update to the current edition. Above is the received list of the referenced standards that are under the maintenance responsibility of the IBC Structural Committee.

***4.5 Updating Standards:** The updating of standards referenced by the Codes shall be accomplished administratively by the appropriate code development committee in accordance with these full procedures except that multiple standards to be updated may be included in a single proposal.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	D