RB101–07/08
R401.3

Proponent: Gary J. Ehrlich, National Association of Home Builders (NAHB)

Revise as follows:

R401.3 Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection so as to not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches (152 mm)within the first 10 feet (3048 mm).

Exception: Where lot lines, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet (3048 mm), ~~the final grade shall slope away from the foundation at a minimum slope of 5 percent and the water shall be directed to~~ drains or swales shall be provided to ensure drainage away from the structure. ~~Swales shall be sloped a minimum of 2 percent when located within 10 feet (3048 mm) of the building foundation.~~ Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the building.

Reason: The requirements for site drainage were amended in the 2003-2004 cycle (S44-03/04 Parts I & II) to provide guidance for zero-lot-line or cluster developments where the standard 6 inch in 10 foot slope is not possible. The proponent was concerned about the potential for water ponding against the foundation wall, and about a lack of guidance in the original exception allowing the 5% slope to be reduced to 2%.

We believe the provision as amended creates issues that the proponent did not intend. It is very difficult to achieve a 5% or greater slope on a lot with less than a 10 feet side yard setback without creating either an erosion issue or a fall hazard. In fact, the 2006 IRC Commentary on Section R401.3 indicates that slopes should be designed with as moderate a grade as possible to prevent slope instability or erosion The 2% swale slope also presents a problem, particularly when combined with the side yard slope. Picture a narrow, deep house on a narrow, deep lot. If one slopes down 5% from the side of the house to the side of the narrow lot, then slopes 2% along the length of the house towards the front or rear of the lot for the swale, it is possible to wind up with a 20% or 30% slope from one corner of the house to the nearest corner of the lot. This is an excessively steep slope which will be prone to erosion and is very difficult to cut and maintain. Something nearly flat will work for the swale as long as the end is open. Thus the builder should not be required to provide both the 5% slope of the final grade plus an additional 2% slope for a swale or drain.

The appropriate slope for the lot is a function of the combined ground frost and moisture conditions, the soil type, the geological conditions, and the local geographic conditions. The 2003 IRC Commentary, through Figure R401.3(3), indicated that a 2% swale slope is only required in areas of intense rainfall along the Gulf Coast and including Florida, Hawaii and Puerto Rico. Across the Central and Northeast US, the Commentary figure indicated only that a 2% or greater slope may be recommended, if annual precipitation in the area is 20" or greater and the frost penetration is 3" or greater. Over most of the Western US, plus portions of Texas, Arkansas, Louisiana, Mississippi, Alabama, Georgia, South Carolina and North Carolina, the Commentary indicates that a minimal slope is acceptable, if it is required at all. Therefore, to subject the entire country to an onerous requirement which is only required along the Gulf Coast and Florida is not justified.

Additionally, the 5% side slope and 2% side slopes create an issue in areas such as the Great Plains where the typical terrain is flat, and grading requirements can force the builder to excavate or truck in a substantial amount of soil in order to create the required slopes. This imposes a cost burden, particularly for developments intended to provide affordable housing.

There is also an issue of property maintenance. Regardless of the slopes provided, many drainage issues stem from actions taken by homeowners after construction. Additions to the home, outbuildings, gardening and landscaping activities can result in depressions or interrupted drainage flows that allow water to pool against walls and cause problems. However, it is not the purpose of the IRC to address homeowner maintenance issues.

This change basically restores the 2003 IRC language, except that the slope requirement for impervious surfaces is retained. The drainage provisions are restored to a level appropriate for a minimum structural code requirement. NAHB asks for your support of this proposal.

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

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

RB102–07/08
R401.3

Proponent: Gary J. Ehrlich, National Association of Home Builders (NAHB)

Revise as follows:

R401.3 Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection so as to not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches (152 mm)within the first 10 feet (3048 mm).

Exception: Where lot lines, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet

(3048 mm), the final grade shall slope away from the foundation at a minimum slope of ~~5~~ 2 percent and the water shall be directed to drains or swales to ensure drainage away from the structure. Swales shall be sloped a minimum of 2 percent when located within 10 feet (3048 mm) of the building foundation. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of ~~2~~ 1 percent away from the building.

Reason: The requirements for site drainage were amended in the 2003-2004 cycle (S44-03/04 Parts I & II) to provide guidance for zero-lot-line or cluster developments where the standard 6 inch in 10 foot slope is not possible. The proponent was concerned about the potential for water ponding against the foundation wall, and about a lack of guidance in the original exception allowing the 5% slope to be reduced to 2%.

We believe the provision as amended creates issues that the proponent did not intend. It is very difficult to achieve a 5% or greater slope on a lot with less than a 10 feet side yard setback without creating either an erosion issue or a fall hazard. In fact, the 2006 IRC Commentary on Section R401.3 indicates that slopes should be designed with as moderate a grade as possible to prevent slope instability or erosion. The 2% swale slope also presents a problem, particularly when combined with the side yard slope. Picture a narrow, deep house on a narrow, deep lot. If one slopes down 5% from the side of the house to the side of the narrow lot, then slopes 2% along the length of the house towards the front or rear of the lot for the swale, it is possible to wind up with a 20% or 30% slope from one corner of the house to the nearest corner of the lot. This is an excessively steep slope which will be prone to erosion and is very difficult to cut and maintain. Something nearly flat will work for the swale as long as the end is open. Thus the builder should not be required to provide both the 5% slope of the final grade plus an additional 2% slope for a swale or drain.

The appropriate slope for the lot is a function of the combined ground frost and moisture conditions, the soil type, the geological conditions, and the local geographic conditions. The 2003 IRC Commentary, through Figure R401.3(3), indicated that a 2% swale slope is only required in areas of intense rainfall along the Gulf Coast and including Florida, Hawaii and Puerto Rico. Across the Central and Northeast US, the Commentary figure indicated only that a 2% or greater slope may be recommended, if annual precipitation in the area is 20" or greater and the frost penetration is 3" or greater. Over most of the Western US, plus portions of Texas, Arkansas, Louisiana, Mississippi, Alabama, Georgia, South Carolina and North Carolina, the Commentary indicates that a 1% slope would be acceptable. Therefore, to subject the entire country to an onerous requirement which is only required along the Gulf Coast and Florida is not justified.

Additionally, the 5% side slope and 2% side slopes create an issue in areas such as the Great Plains where the typical terrain is flat, and grading requirements can force the builder to excavate or truck in a substantial amount of soil in order to create the required slopes. This imposes a cost burden, particularly for developments intended to provide affordable housing.

There is also an issue of property maintenance. Regardless of the slopes provided, many drainage issues stem from actions taken by homeowners after construction. Additions to the home, outbuildings, gardening and landscaping activities can result in depressions or interrupted drainage flows that allow water to pool against walls and cause problems. However, it is not the purpose of the IRC to address homeowner maintenance issues.

This proposal amends the 2006 IRC language to require the alternate slope be 2% instead of 5% and that the swale slope be 1% instead of 2%. The amended values are taken from local code amendments in Sioux Falls, SD and Juneau, AK. This proposal will provide a prescriptive requirement which represents an appropriate minimum criteria to for good basement wall and foundation performance. NAHB asks for your support of this proposal.

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

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

RB103–07/08
R402.2

Proponents: J. Edward Sauter, Concrete Foundations Association of North America; Daniel Falconer, American Concrete Institute; Erin Ashley, National Ready-Mix Concrete Association

Revise as follows:

R402.2 Concrete. Concrete shall have a minimum specified compressive strength of f'_c, as shown in Table R402.2. Concrete subject to moderate or severe weathering as indicated in Table R301.2(1) shall be air entrained as specified in Table R402.2. The maximum weight of fly ash, other pozzolans, silica fume, slag or blended cements that is included in concrete mixtures for garage floor slabs and for exterior porches, carport slabs and steps that will be exposed to deicing chemicals shall not exceed the percentages of the total weight of cementitious materials specified in Section 4.2.3 of ACI 318. Materials used to produce concrete and testing thereof shall comply with the applicable standards listed in Chapter 3 of ACI 318 or ACI 332.

Reason: This code change supports the proper use of ACI's Residential Concrete Code to reference the structures that are within the scope of the IRC. The information found in ACI 332 is identical to or more appropriate than ACI 318 information based on the application to one- and two-family residential structures.

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

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

RB104–07/08
R202

Proponent: Gregory A. Stutz, National Precast Concrete Association

Add new definition as follows:

PRECAST CONCRETE FOUNDATION WALLS. Pre-engineered, precast concrete wall panels that are designed to withstand specified stresses and used to build below grade foundations.

Reason: The purpose of the code change is to clarify the Code regarding the definition of precast concrete foundation walls. The Code has recently approved sections relative to precast concrete foundation wall systems in several sections. Upon review of Chapter 2, no definition of said system exists that identifies the generic category of structural precast concrete panels (above or below grade).

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

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

RB105–07/08
R404.6 (New), R404.6.1 (New), R404.6.2 (New), R404.6.3 (New)

Proponent: Gregory A. Stutz, National Precast Concrete Association

Add new text as follows:

R404.6 Precast concrete foundation walls. Precast concrete foundation walls shall be manufactured and installed in accordance with Section R 404.6.

R404.6.1 Design. The design and manufacture of precast foundation systems shall be in accordance with Section R404.6.2 and ACI 318. The system design shall be sealed by a registered professional engineer. Individual projects built from the system design, drawings, manuals and fabrication procedures shall not be required to bear the seal of the architect or engineer unless otherwise required by state law of the jurisdiction having authority. Fabrication plants shall be inspected annually by an approved third-party inspection agency.

R404.6.2 Minimum design criteria for precast concrete foundation walls

1. Total uniform load applied to the top of foundation walls, 5300 lbs/ft (7886 kg/m)
2. Lateral earth pressure 60 lbs/ft^2/ft of depth (9.42 kPa/mm)
3. Accommodate concentrated loads in excess of the uniform load

R404.6.3 Precast concrete foundation wall design drawings. Precast concrete panel systems used as foundations shall be pre-engineered systems and shall have all applicable design criteria and rated capacities noted on the panel design drawings. The panel design drawings shall be available to the building official. Precast concrete panel design drawings shall include at a minimum, the information specified below:

1. Soil bearing capacity (psf)
2. Footing design and material
3. Maximum allowable total uniform load (lbs/linear foot)
4. Concentrated loads and their points of application

Reason: To clarify the Code regarding the design of precast foundation wall systems.

These changes insure that precast foundation walls are designed to recognized engineering standards, manufactured in a plant under verified quality control, when installed will meet required performance criteria, and is neutral regarding the various design approaches and systems. The section addresses the design requirements for precast concrete foundation systems. The committee made reference to Section 404 which addresses cast-in-place concrete walls and is not appropriate for precast concrete foundation systems. Precast foundations systems are pre-engineered products based on several design approaches including, but are not limited to, stud and cavity, solid wall panel, composite panel and hollow core systems, all of which are not included in Section 404. This submission 404.6 provides minimum performance design criteria that all precast concrete foundation systems shall meet. This allows the IRC to remain non-proprietary in nature by not specifying or excluding any specific system. This section also requires manufacturers to provide key information for building officials.

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

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

RB106–07/08
R402.3

Proponent: Gregory A. Stutz, National Precast Concrete Association

Revise as follows:

R402.3 (Supp) Precast concrete. Precast concrete foundations shall be designed in accordance with Section R404.6 and meet the ~~minimum~~ material requirements of Section R402.3.1 and shall be installed in accordance with the provisions of this code and the manufacturer's installation instructions.

Reason: To clarify the Code regarding the design and installation of precast foundation wall systems.

These proposed changes clarify that precast foundation walls will meet the more rigorous precast material requirements regarding low water cement ratio of section 402.3.1 and similar practices. The changes will assure that precast foundation walls meet the precast design and manufacturing requirements of section 404.6.

Further clarification with this section is necessary to emphasize the material requirements as stated in the first sentence of R402.3.1. The standards mentioned within the same section are requirements for compliance and should not be considered minimums.

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

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

RB107–07/08
R405.1.1 (New)

Proponent: Gregory A. Stutz, National Precast Concrete Association

Add new text as follows:

R405.1.1 Precast concrete foundation. Precast concrete walls that retain earth and enclose habitable or useable space located below-grade that rest on crushed stone footings shall have a perforated drainage pipe installed below the base of the wall on either the interior or exterior side of the wall, at least one foot (305mm) beyond the edge of the wall. If the exterior drainage pipe is used, an approved filter membrane material shall cover the pipe. The drainage system shall discharge into an approved sewer system or to daylight.

Reason: To clarify the Code regarding the drainage of precast foundation wall systems. To specifically address Committee Reasons submitted in response to R155-06/07.

This proposed code change specifically addresses Committee Reasons submitted previously for R155 – 06/07.

In addition, Section R405.1 addresses concrete and masonry foundations and Section R405.2 addresses wood foundations and acknowledges crushed stone or gravel footings. Adding this proposed section provides clarity to the building official when precast foundation wall systems are used. It is important that drainage pipe, tile, etc. be located at least 1 foot beyond the edge of the wall when precast concrete foundation wall systems are used in conjunction with crushed stone footings, which this section clarifies and requires.

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

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

RB108–07/08
R406.4

Proponent: Gregory A. Stutz, National Precast Concrete Association

Revise as follows:

R406.4 (Supp) Precast concrete foundation system dampproofing. Except where required by Section R406.2 to be waterproofed, precast concrete foundation walls enclosing habitable or useble spaces located below grade shall be dampproofed in accordance with Section R406.1.

Exception: Precast concrete foundations that are manufactured in accordance with the durability requirements of Tables 4.2.1 and 4.2.2 of ACI 318.

Reason: To clarify the Code regarding the dammproofing of precast foundation wall systems.

Consensus built research, standards and practices exist through organizations such as American Concrete Institute and the Portaland Cement Association that address durability and permeability attributes of concrete. This information as well as a long history of successful building industry field application warrants clarifying the Code to represent and acknowledge these findings.

There is extensive research into the durability of concrete and the role that porosity and permeability play in durability. The performance advantages of low water/cementitious materials ratios and proper air entrainment are well established in the professional literature, and incorporated into the Code by tables such as ACI 318-05 (Building Code Requirements for Structural Concrete) - Table 4.2.1 (Total Air Content for Frost Resistant Concrete) and Table 4.2.2 (Requirements for Special Exposure Conditions). The specification for precast concrete products in IRC Section R402.3.1 meets the requirements of those tables.

In "Design and Control of Concrete Mixtures", Engineering Bulletin 001 (EB001.14) 14th Edition, Figure 1-19, 1-20, 1-21 and 1-26, the Portland Cement Association makes a clear case for the performance benefits of low water-cement ratios (<0.50) and air entrainment in lowering permeability and increasing durability.

Section R406 currently addresses dampproofing and waterproofing materials applied over all below-grade exterior foundation walls. It should be noted that section R406.4 does not address the benefits of mix design and quality assurance practices experienced through precast concrete processes. Some projects may specify concrete compressive strengths (f'**c**) in the range of 2500 to 4000 psi with corresponding water/cementitious materials ratios (w/cm) of 0.75 to 0.50 respectively. In IRC Section R402.3.1 the minimum required compressive strength of precast concrete is 5000psi, which correlates to a maximum w/cm of 0.40. This low ratio is far superior to conventional mix design criteria and is proven to eliminate the need for topical application of dampproofing materials for below-grade precast foundation wall components.

Bibliography:

ACI, American Concrete Institute, 38800 Country Club Drive, Farmington Hills, MI 48333-9094; Standard Referenced: ACI 318-05 (Building Code Requirements for Structural Concrete); ACI Manual of Concrete Practice 2007 – Part 3; ISSN 0065-7875; Cerl R. Bischof, Editor.

PCA, Portland Cement Association, 5420 Old Orchard Road, Skokie IL 60077, Engineering Bulletin 001 (EB001.14) 14th Edition, Design and Control of Concrete Mixtures, ISBN 0-89312-217-3, Steven H. Kosmatka, Beatrix Kerkhoff, and William C. Panerese; PCA R&D Serial Number SN2561.

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

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

RB109–07/08

R403.1

Proponent: Tim Nogler, Washington State, representing Washington State Building Code Council

Revise as follows:

R403.1 (Supp) General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other approved structural systems which shall be of sufficient design to accommodate all loads ~~according to~~ in accordance with Section R301 and to transmit the resulting loads to the supporting soil within the limitations as determined from the ~~character~~ characteristics of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Foundation walls complying with Section R404 or stem walls complying with Section R403.1.3 shall be permitted to support exterior walls, exterior braced wall lines and exterior braced wall panels provided they are supported by continuous footings.

Reason: The purpose of this proposed code change is to clarify the Code. The added language is intended to make this section more technically sound by recognizing that the IRC permits the support of exterior walls by foundation walls or stem walls provided they are, in turn, supported by continuous footings. The addition of "supporting" is proposed for consistency with R401.2; "characteristics" of the soil is consistent with R401.4.

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

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

RB110–07/08

R403.1

Proponent: J. Edward Sauter, Concrete Foundations Association of North America; Daniel Falconer, American Concrete Institute; Erin Ashley, National Ready-Mix Concrete Association

Revise as follows:

R403.1 (Supp) General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other approved structural systems which shall be of sufficient

design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footings shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332 or other approved structural standards.

Reason: The addition of language to Section R403.1 to reference ACI's Residential Concrete Code provides additional technical details for the design and construction of footing conditions not found in the IRC such as discontinuous footings and wall steps. The reference to ACI 332 in this section is in keeping with the reference made in Section R
404 for foundation walls.

The principal purpose of this code change is to permit the legal reference to footing and foundation constructions that eliminate excessive material and labor is used to create structural components that do not contribute to the stability and performance of residential foundations.

The provisions made to the 2007 version of this concrete code incorporate seismic references unavailable in the 2004 version.

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

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

RB111–07/08

Figure R403.1(1)

Proponent: Daniel Jewitt, Acworth, GA, representing himself

Revise as follows:

Add "T", indicating footing thickness, to these spread footings (remainder of figure unchanged):

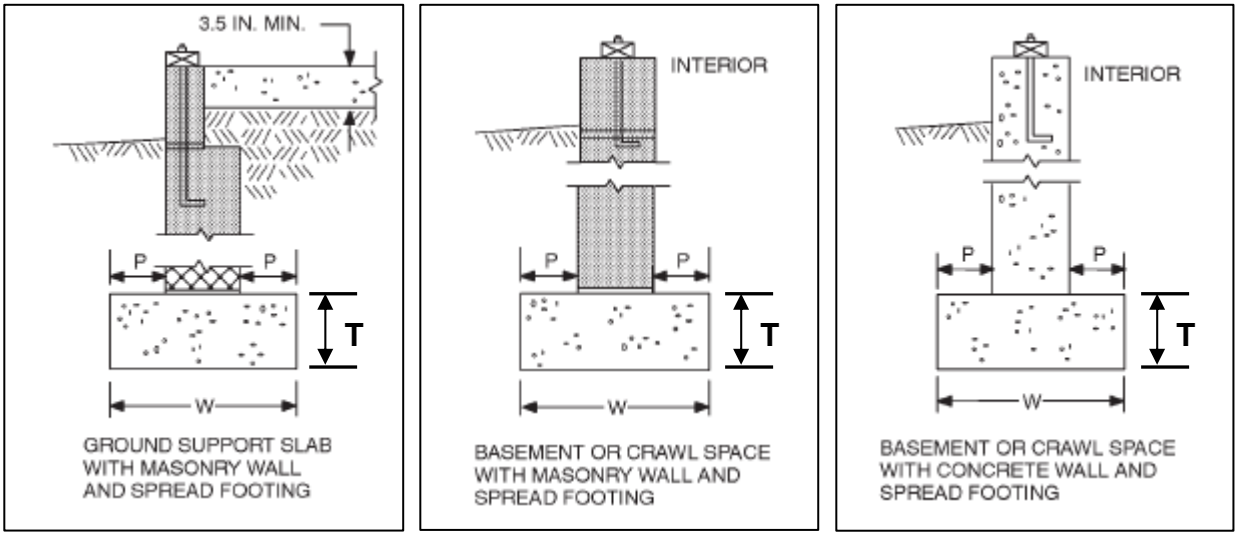


FIGURE R403.1(1)
CONCRETE AND MASONRY FOUNDATION DETAILS

Reason: The addition of the "T" detail to indicate footing thickness in the three footing drawings found in Figure R403.1(1) helps better represent and complement the information in R403.1.1 stating that projections shall not exceed the thickness of footings. This code identifies the relationship of WIDTH, PROJECTIONS, and THICKNESS of the footing and the addition will help illustrate this.

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

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

RB112–07/08
R403.1.3

Proponent: Tim Nogler, Washington State, representing Washington State Building Code Council

Revise as follows:

R403.1.3 Seismic reinforcing in Seismic Design Categories D_0, D_1 and D_2. Concrete footings of buildings located in Seismic Design Categories D_0, D_1 and D_2, ~~as established in Table R301.2(1),~~ shall comply with this section and have minimum reinforcement as specified by Section R403.1.3.1 or R403.1.3.2. Bottom reinforcement shall be located a minimum of 3 inches (76 mm) ~~clear~~ to 4-inches (102 mm) from the bottom of the footing.

~~In Seismic Design Categories D_0, D_1 and D_2~~ Where a construction joint is created between a concrete footing and a concrete stem wall, ~~a~~ minimum vertical reinforcement of one No. 4 bar shall be ~~installed~~ provided at not more than 4 feet (1219 mm) on center. The ~~vertical bar~~ bars shall extend to 3 inches (76 mm) clear of the bottom of the footing, have a standard hook and extend ~~a minimum of 14 inches (357 mm)~~ into the stem wall the lesser of 2 inches (49 mm) clear of the top of the wall and 14 inches (357 mm).

~~In Seismic Design Categories D_0, D_1 and D_2~~ Where a solidly grouted masonry stem wall is supported on a concrete footing ~~and stem wall~~, ~~a~~ minimum vertical reinforcement of one No. 4 bar shall be ~~installed~~ provided at not more than 4 feet on center. The ~~vertical bar~~ bars shall extend to 3 inches (76 mm) clear of the bottom of the footing, ~~and~~ have a standard hook, and extend into the stem wall to 2 inches (49 mm) clear of the top of the wall.

~~In Seismic Design Categories D_0, D_1 and D_2~~ Masonry stem walls without solid grout and vertical reinforcing are not permitted.

Concrete and masonry stem walls shall comply with the requirements of Section R404 for foundation walls.

Exception: In detached one- and two-family dwellings ~~which are~~ of light-framed construction and three stories or less ~~in height~~ above grade, ~~and constructed with stud bearing walls,~~ plain concrete footings ~~without longitudinal reinforcement supporting walls and isolated plain concrete footings~~ supporting walls, columns or pedestals are permitted.

Reason: The purpose of this code change proposal is to clarify the code. The revision to the title of Section R403.1.3 is proposed to enable the deletion of duplicate references to the Seismic Design Categories D_0, D_1 and D_2. The change from a "minimum of 3 inches" to "3 inches to 4 inches" is proposed for consistency with similar language in Section R403.1.3.1. The reference to Table R301.2(1) is deleted because it is superfluous.

The addition of "concrete" and "vertical reinforcement" in the second paragraph of Section R403.1.3 is proposed to clarify the intent of the requirements. The changes at the end of the second and third paragraphs are proposed because a minimum extension of 14 inches may not be possible in a shallow stem wall. The other revisions to the third paragraph are proposed to clarify the intent of the requirements. Note that the current requirements are limited to masonry stem walls supported on concrete footings and stem walls, which excludes a masonry stem wall supported on a concrete footing unless there is an additional stem wall. Note also that masonry walls with solid grout are not permitted according to the fourth paragraph. The addition of the fifth paragraph is proposed to establish technical requirements for the construction of stem walls, which currently do not exist in the IRC.

The revisions to the Exception to Section R403.1.3 are proposed to clarify its intent. The addition of "light-frame construction" is proposed to employ a term currently defined in Section R202.

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

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

RB113–07/08
Table R301.2(1), R403.1.4, R403.1.4.1, Table R403.1.4 (New)

Proponent: Gary J. Ehrlich, National Association of Home Builders (NAHB)

1. Revise as follows:

TABLE R301.2(1) (Supp)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

(No change to table entries)

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

a. (No change)

b. ~~The frost line depth may require deeper footings than indicated in Figure R403.1(1)~~. The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade as determined in accordance with Section R403.1.4.

c. through k. (No change)

R403.1.4 Minimum depth. Exterior footings shall extend to or below the frost line as determined using Table R403.1.4 and either Figure R403.3(2) or Table R403.3(2). ~~All~~ Exterior footings shall be placed at least 12 inches (305 mm) below the undisturbed ground surface. Where applicable, the depth of footings shall also conform to Sections R403.1.4.1 through R403.1.4.2.

R403.1.4.1 Frost protection. ~~Except where otherwise protected from frost,~~ Foundation walls, piers and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. ~~Extended~~ Extending to or below the frost line specified in Table R301.2.(1);
2. Constructing in accordance with Section R403.3;
3. Constructing in accordance with ASCE 32; or
4. ~~Erected~~ Erecting on solid rock.

Exceptions:

1. Protection of freestanding accessory structures with an area of 600 square feet (56 m2) or less, of light-framed construction, with an eave height of 10 feet (3048 mm) or less shall not be required.
2. Protection of freestanding accessory structures with an area of 400 square feet (37m2) or less, of other than light-framed construction, with an eave height of 10 feet (3048 mm) or less shall not be required.
3. Decks not supported by a dwelling need not be provided with footings that extend below the frost line.

Footings shall not bear on frozen soil unless the frozen condition is permanent.

2. Add new table as follows:

TABLE R403.1.4
FROST LINE DEPTH[a]

100-YEAR AIR-FREEZING INDEX [Figure R403.3(2) or Table R403.3(2)]	FROST LINE DEPTH (inches)
≤ 350	12
500	16
1000	24
1500	32
2000	40
2500	45
3000	52
3500	57
4000	62
4250	65

For SI: 1 inch = 25.4 mm

a. These design frost depths are intended to be used for protection of building foundations against frost heave and are not applicable to site or street utilities or other non-building applications.

Reason: National model building codes currently defer the user to local experience or applicable local building codes when using "frost-depth" to protect foundations, unless approved thermal insulation is provided per the frost-protected shallow foundation requirements of the IRC or ASCE 32. The manner of establishing frost depths by this means (local experience) varies somewhat inconsistently with newer frost depth data and hazard predictions. Therefore, this revision addresses this "gap" in current U.S. building code provisions by including newer frost depth risk data, calibrating this data to existing local practice, and correlating recommended frost depths to the 100-year AFI Map. This design guidance is needed for foundations or foundation portions that are intended to extend below a design frost depth as part of an overall frost-protection strategy. It will ensure that equivalent performance is more consistently achieved with all methods of frost-protection addressed in the standard and in practice.

This provision has been successfully balloted as an addition to ASCE 32, the Frost Protected Shallow Foundation standard and will appear in the next edition. By bringing this forward here and now as a prescriptive option, the IRC will align with the FPSF standard. NAHB asks for your support of this proposal.

Bibliography:

HUD, *Development of Frost Depth Maps for the United States*, U.S. Department of Housing and Urban Development, Washington, DC (July 2001).

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

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

RB114–07/08
R403.1.6

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

Revise as follows:

R403.1.6 Foundation anchorage. Sill plates and ~~When braced~~ walls ~~panels are~~ supported directly on continuous foundations~~, the wall wood sill plate or cold-formed steel bottom track~~ shall be anchored to the foundation in accordance with this section.

~~The~~ Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs, and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. ~~In Seismic Design Categories D_0, D_1 and D_2, anchor bolts shall be spaced at 6 feet (1829 mm) on center and located within 12 inches (305 mm) of the ends of each plate section at interior braced wall lines when required by Section R602.10.9 to be supported on a continuous foundation. Bolts shall be at least 1/2 inch (13 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into masonry or concrete.~~ Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. ~~A nut and washer shall be tightened on each bolt of the plate.~~ Sill~~s~~ plates and sole plates shall be protected against decay and termites where required by Sections R319 and R320. Cold-formed steel framing systems shall be fastened to ~~the~~ wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.1.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (13 mm) anchor bolts.
2. Walls 24 inches (610 mm) total length or shorter connecting offset braced wall panels shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels per Figure ~~R602.10.5~~ R602.10.4.3(1) at corners.
3. Walls 12 inches (305 mm) total length or shorter connecting offset braced wall panels shall be permitted to be connected to the foundation without anchor bolts. The wall shall be attached to adjacent braced wall panels per Figure ~~R602.10.5~~ R602.10.4.3(1) at corners.

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This non-technical change applies to anchorage of braced wall panels. These changes will:

- Editorially rearrange sentences to be clearer;
- Delete redundant language;
- Specify that anchor bolts must be installed into grouted cells in CMU foundation walls;
- Specify anchorage of interior braced wall panels;
- And correct a figure reference that was changed during the 06/07 code change cycle.

The ICC Ad Hoc Committee on Wall Bracing reviewed this section and found it possibly confusing and redundant as written. Also, the Committee believes that anchorage of braced wall panels, whether they be interior or exterior, is very important.

- The committee argues that all walls need to be anchored, not just braced wall panels. All anchor bolts along the line of the bottom plate resist the shear from the braced wall panel, not just the bolts directly at the braced wall panel.
- Braced wall panels at building interior are designed to resist shear forces equal to braced wall panels at building exteriors, so equal anchorage must be specified.
- Several sentences are relocated so that sentences that apply to similar subjects are adjacent to each other.
- The sentence on nut and washers was slightly revised to read better.
- The sentence on anchor bolts for interior braced wall lines in Seismic Design Categories D_0, D_1 and D_2 is deleted because the exact same requirement exists in Section R403.1.6.1. Although Section R403.1.6.1 only applies to wood light-frame structures, cold formed steel light-framed structures are required to comply with the AISI COFS/PM prescriptive method in Seismic Design Categories D_0, D_1 and D_2, so there is no reduction in requirements.
- The sentence on interior bearing walls was revised to specify that only sole plates on slabs that are not part of a braced wall panel could be anchored to the slab with “approved fasteners”. That particular wording is maintained because members of the ICC Ad Hoc Wall Bracing committee felt that the current requirement was working well. Interior braced wall anchorage on wood foundation will be covered in a separate code change.

- Reference to Figure R602.10.5 was changed to R602.10.4.3(1) because that figure was renamed during the 06/07 code cycle.
- The specification for installation of anchor bolts was clarified that the bolts must be installed in filled cells of concrete masonry units. The committee has found that anchor bolts installed into brick do not have sufficient load carrying capacity to support shear loads from braced wall panels.

Cost Impact: This code change proposal may increase the cost of construction if anchor bolts are currently being installed in brick foundations or if interior braced wall panels are not currently being positively anchored to slab foundations.

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

RB115–07/08
Table R403.3(1), Figure R403.3(1)

Proponent: Steve Skalko, Portland Cement Association

Revise as follows:

TABLE R403.3(1) (Supp)
MINIMUM FOOTING DEPTH AND INSULATION REQUIREMENTS FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS[a]

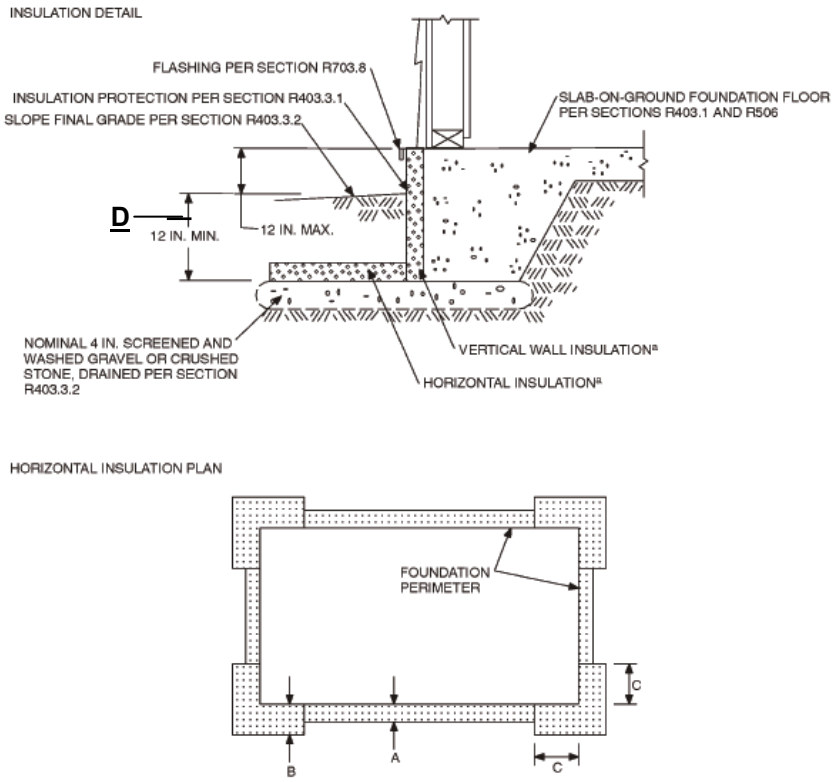
AIR FREEZING INDEX (F-days)	MINIMUM FOOTING DEPTH, D (in.)	VERTICAL INSULATION R-VALUE[c,d]	HORIZONTAL INSULATION R-VALUE[c,e]		HORIZONTAL INSULATION DIMENSIONS PER FIGURE R403.3(1) (inches)		
			Along walls	At corners	A	B	C
(No change)	12	(No change)	(No change)	(No change)	(No change)	(No change)	(No change)
	14						
	16						
	16						
	16						
	16						

For SI: 1 inch = 25.4 mm

a. See Table R403.3 for required dimensions and R-values for vertical and horizontal insulation and minimum footing depth.

(Footnotes not shown remain unchanged)

FIGURE R403.3(1)
INSULATION PLACEMENT FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS



Reason: Section R403.3 of the code contains prescriptive provisions to protect footings from frost heave. Those provisions are just one of the alternatives to meet the minimum footing depth requirements in Section R403.1.4. ASCE 32, *Design and Construction of Frost-Protected Shallow Foundations* is also referenced as another alternative for frost protection of the footings (See R403.1.4.1). As the air freezing index increases however Table 4 in ASCE 32 requires deeper footing depths for heated buildings than those prescribed by the requirements in Section R403.3 and Table R403.3. The provisions in Section R403.3 are based on the same technical data used to develop the requirements in ASCE 32. This change revises Table R403.3 and related Figure R403.3 to be consistent with the minimum footing depths required for heated buildings in ASCE 32 based on the air freezing index.

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

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

RB116–07/08
R404.1, R702.3.4, Chapter 43

Proponent: Steve Skalko, Portland Cement Association

1. Revise as follows:

R404.1 (Supp) Concrete and masonry foundation walls. Concrete foundation walls shall be selected and constructed in accordance with the provisions of Section R404.1.2. ~~and m~~ Masonry foundation walls shall be selected and constructed in accordance with the provisions of Section R404.1.1 ~~or in accordance with ACI 318,ACI 332, NCMATR68–A or ACI530/ASCE 5/TMS 402 or other approved structural standards. When ACI 318, ACI 332 or ACI 530/ASCE 5/TMS 402 or the provisions of Section R404 are used to design concrete or masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.~~

2. Add new text as follows:

R404.1.1 Design of masonry foundation walls. Masonry foundation walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of ACI530/ASCE 5/TMS 402 or NCMA TR68–A . When ACI530/ASCE 5/TMS 402, NCMA TR68–A or the provisions of this section are used to design masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

3. Revise as follows:

R404.1.1.1 Masonry foundation walls. Concrete masonry and clay masonry foundation walls shall be constructed as set forth in Table R404.1.1(1), R404.1.1(2), R404.1.1(3) or R404.1.1(4) and shall also comply with ~~the provisions of Section R404 and~~ the applicable provisions of Sections R606, R607 and R608. In buildings assigned to Seismic Design Category D_0, D_1 or D_2, concrete masonry and clay masonry foundation walls shall also comply with Section R404.1.4.1. Rubble stone masonry foundation walls shall be constructed in accordance with Sections R404.1.8 and R607.2.2. Rubble stone masonry walls shall not be used in buildings assigned to Seismic Design Category D_0, D_1 or D_2.

R404.1.2 Concrete foundation walls. ~~Concrete foundation walls shall be constructed as set forth in Table R404.1.1(5) and shall also comply with the provisions of Section R404 and the applicable provisions of Section R402.2. In Seismic Design Categories D0, D1 and D2, concrete foundation walls shall also comply with Section R404.1.4.~~ Concrete foundation walls that support light-frame walls shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are within the applicability limits of Section R611.2 shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are not within the applicability limits of Section R611.2 shall be designed and constructed in accordance with the provisions of ACI 318, ACI 332 or PCA 100. When ACI 318, ACI 332, PCA 100 or the provisions of this section are used to design concrete foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

4. Delete table without substitution:

~~TABLE 404.1.1(5)~~
~~CONCRETE FOUNDATION WALLS~~

5. Add new text as follows:

R404.1.2.1 Concrete cross-section. Concrete walls constructed in accordance with this code shall comply with the shapes and minimum concrete cross-sectional dimensions required by Table R611.3. Other types of forming systems resulting in concrete walls not in compliance with this section and Table R611.3 shall be designed in accordance with ACI 318.

R404.1.2.2 Reinforcement for foundation walls. Concrete foundation walls shall be laterally supported at the top and bottom. Horizontal reinforcement shall be provided in accordance with Table R404.1.2(1). Vertical reinforcement shall be provided in accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5), R404.1.2(6), R404.1.2(7) or R404.1.2(8). Vertical reinforcement for flat basement walls retaining 4 feet (1219 mm) or more of unbalanced backfill is permitted to be determined in accordance with Table R404.1.2(9). For basement walls supporting above-grade concrete walls, vertical reinforcement shall be the greater of that required by Tables R404.1.2(2) through R404.1.2(8) or by Section R611.6 for the above-grade wall. In buildings assigned to Seismic Design Category D_0, D_1 or D_2, concrete foundation walls shall also comply with Section R404.1.4.2.

R404.1.2.2.1 Concrete foundation stem walls supporting above-grade concrete walls. Foundation stem walls that support above-grade concrete walls shall be designed and constructed in accordance with this section.

1. **Stem walls not laterally supported at top.** Concrete stem walls that are not monolithic with slabs-on-ground or are not otherwise laterally supported by slabs-on-ground shall comply with this section. Where unbalanced backfill retained by the stem wall is less than or equal to 18 inches (457 mm), the stem wall and above-grade wall it supports shall be provided with vertical reinforcement in accordance with Section R611.6 and Table R611.6(1), R611.6(2) or R611.6(3) for above-grade walls. Where unbalanced backfill retained by the stem wall is greater than 18 inches (457 mm), the stem wall and above-grade wall it supports shall be provided with vertical reinforcement in accordance with Section R611.6 and Table R611.6(4).
2. **Stem walls laterally supported at top.** Concrete stem walls that are monolithic with slabs-on-ground or are otherwise laterally supported by slabs-on-ground shall have vertical reinforcement in accordance with Section R611.6 and Table R611.6(1), R611.6(2) or R611.6(3) for above-grade walls. Where the unbalanced backfill retained by the stem wall is greater than 18 inches (457 mm), the connection between the stem wall and the slab-on-ground, and the portion of the slab-on-ground providing lateral support for the wall shall be designed in accordance with PCA 100 or in accordance with accepted engineering practice. Where the unbalanced backfill retained by the stem wall is greater than 18 inches (457 mm), the minimum nominal thickness of the wall shall be 6 inches (152 mm).

R404.1.2.2.2 Concrete foundation stem walls supporting light-frame above-grade walls. Concrete foundation stem walls that support light-frame above-grade walls shall be designed and constructed in accordance with this section.

1. Stem walls not laterally supported at top. Concrete stem walls that are not monolithic with slabs-on-ground or are not otherwise laterally supported by slabs-on-ground and retain 48 inches (1219 mm) or less of unbalanced fill, measured from the top of the wall, shall be constructed in accordance with Section R404.1.2. Foundation stem walls that retain more than 48 inches (1219 mm) of unbalanced fill, measured from the top of the wall, shall be designed in accordance with Section R404.1.3 and R404.5.
2. Stem walls laterally supported at top. Concrete stem walls that are monolithic with slabs-on-ground or are otherwise laterally supported by slabs-on-ground shall be constructed in accordance with Section R404.1.2. Where the unbalanced backfill retained by the stem wall is greater than 48 inches (1219 mm), the connection between the stem wall and the slab-on-ground, and the portion of the slab-on-ground providing lateral support for the wall shall be designed in accordance with PCA 100 or in accordance with accepted engineering practice.

R404.1.2.3 Concrete, materials for concrete, and forms. Materials used in concrete, the concrete itself, and forms shall conform to requirements of this section, or ACI 318.

R404.1.2.3.1 Compressive strength. The minimum specified compressive strength of concrete, f_c', shall comply with Section R402.2 and shall be not less than 2,500 psi (17.2 MPa) at 28 days in buildings assigned to Seismic Design Category A, B or C and 3000 psi (20.5 MPa) in buildings assigned to Seismic Design Category D_0, D_1 or D_2.

R404.1.2.3.2 Concrete mixing and delivery. Mixing and delivery of concrete shall comply with ASTM C 94 or ASTM C 685.

R404.1.2.3.3 Maximum aggregate size. The nominal maximum size of coarse aggregate shall not exceed one-fifth the narrowest distance between sides of forms, or three-fourths the clear spacing between reinforcing bars or between a bar and the side of the form.

Exception: When approved, these limitations shall not apply where removable forms are used and workability and methods of consolidation permit concrete to be placed without honeycombs or voids.

R404.1.2.3.4 Proportioning and slump of concrete. Proportions of materials for concrete shall be established to provide workability and consistency to permit concrete to be worked readily into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding. Slump of concrete placed in removable forms shall not exceed 6 inches (152 mm).

Exception: When approved, the slump is permitted to exceed 6 inches (152 mm) for concrete mixtures that are resistant to segregation, and are in accordance with the form manufacturer's recommendations.

Slump of concrete placed in stay-in-place forms shall exceed 6 inches (152 mm). Slump of concrete shall be determined in accordance with ASTM C 143.

R404.1.2.3.5 Consolidation of concrete. Concrete shall be consolidated by suitable means during placement and shall be worked around embedded items and reinforcement and into corners of forms. Where stay-in-place forms are used, concrete shall be consolidated by internal vibration.

Exception. When approved for concrete to be placed in stay-in-place forms, self-consolidating concrete mixtures with slumps equal to or greater than 8 inches (203 mm) that are specifically designed for placement without internal vibration need not be internally vibrated.

R404.1.2.3.6 Form materials and form ties. Forms shall be made of wood, steel, aluminum, plastic, a composite of cement and foam insulation, a composite of cement and wood chips, or other approved material suitable for supporting and containing concrete. Forms shall provide sufficient strength to contain concrete during the concrete placement operation.

Form ties shall be steel, solid plastic, foam plastic, a composite of cement and wood chips, a composite of cement and foam plastic, or other suitable material capable of resisting the forces created by fluid pressure of fresh concrete.

R404.1.2.3.6.1 Stay-in-place forms. Stay-in-place concrete forms shall comply with this section.

1. **Surface Burning Characteristics.** The flame-spread classification and smoke-developed index of forming material, other than foam plastic, left exposed on the interior shall comply with Section R315. The surface burning characteristics of foam plastic used in insulating concrete forms shall comply with Section R314.3.
2. **Interior covering.** Stay-in-place forms constructed of rigid foam plastic shall be protected on the interior of the building as required by Section R314. Where gypsum board is used to protect the foam plastic, it shall be installed with a mechanical fastening system. Adhesives are permitted to be used in addition to mechanical fasteners.
3. **Exterior wall covering.** Stay-in-place forms constructed of rigid foam plastics shall be protected from sunlight and physical damage by the application of an approved exterior wall covering complying with this code. Exterior surfaces of other stay-in-place forming systems shall be protected in accordance with this code.
4. **Termite hazards.** In areas where hazard of termite damage is very heavy in accordance with Figure R301.2(6), foam plastic insulation shall be permitted below grade on foundation walls in accordance with one of the following conditions:
   - 4.1. Where in addition to the requirements in Section R320.1, an approved method of protecting the foam plastic and structure from subterranean termite damage is provided.
   - 4.2. The structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure preservatively treated wood.
   - 4.3. On the interior side of basement walls.

R404.1.2.3.7 Reinforcement

R404.1.2.3.7.1 Steel reinforcement. Steel reinforcement shall comply with the requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from rail steel shall be Type R. In buildings assigned to Seismic Design Category A, B or C, the minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (280 MPa). In buildings assigned to Seismic Design Category D_0, D_1 or D_2, reinforcing steel shall comply with the requirements of ASTM A 706 for low-alloy steel with a minimum yield strength of 60,000 psi (Grade 60) (420 MPa).

R404.1.2.3.7.2 Location of Reinforcement in Wall The center of vertical reinforcement in basement walls determined from Tables R404.1.2(3) through R404.1.2(7) shall be located at the centerline of the wall. Vertical reinforcement in basement walls determined from Tables R404.1.2(2) or R404.1.2(8) shall be located to provide a maximum cover of 1.25 inches (32 mm) measured from the inside face of the wall. Regardless of the table used to determine vertical wall reinforcement, the center of the steel shall not vary from the specified location by more than the greater of 10% of the wall thickness and 3/8-inch (10 mm). Horizontal and vertical reinforcement shall be located in foundation walls to provide the minimum cover required by Section R404.1.2.3.7.4.

R404.1.2.3.7.3 Wall openings. Vertical wall reinforcement required by Section R404.1.2.2 that is interrupted by wall openings shall have additional vertical reinforcement of the same size placed within 12 inches (305 mm) of each side of the opening.

R404.1.2.3.7.4 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system such that displacement will not occur during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 in. (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1-1/2 in. (38 mm) for No. 5 bars and smaller, and 2 in. (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be 3/4-inch (19 mm). The minus tolerance for cover shall not exceed the smaller of one-third the required cover and 3/8-inch (10 mm).

R404.1.2.3.7.5 Lap splices. Vertical and horizontal wall reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table R611.5.4.(1) and Figure R611.5.4(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (150 mm). See Figure R611.5.4(1).

R404.1.2.3.7.6 Alternate grade of reinforcement and spacing. Where tables in Section R404.1.2 specify vertical wall reinforcement based on minimum bar size and maximum spacing, which are based on Grade 60 (420 MPa) steel reinforcement, different size bars and/or bars made from a different grade of steel are permitted provided an equivalent area of steel per linear foot of wall is provided. Table R404.1.2(9) is permitted to be used to determine the maximum bar spacing for different bar sizes than specified in the tables and/or bars made from a different grade of steel. Bars shall not be spaced less than one-half the wall thickness, or more than 48 inches (1219 mm) on center.

R404.1.2.3.7.7 Standard hooks. Where reinforcement is required by this code to terminate with a standard hook, the hook shall comply with Section R611.4.5 and Figure R611.5.4(3).

R404.1.2.3.7.8 Construction joint reinforcement. Construction joints in foundation walls shall be made and located so as not to impair the strength of the wall. Construction joints in plain concrete walls, including walls required to have not less than No. 4 bars at 48 inches (1219 mm) on center by Sections R404.1.2.2 and R404.1.4.2, shall be located at points of lateral support, and a minimum of one No. 4 bar shall extend across the construction joint at a spacing not to exceed 24 inches (610 mm) on center. Construction joint reinforcement shall have a minimum of 12 inches (305 mm) embedment on both sides of the joint. Construction joints in reinforced concrete walls shall be located in the middle third of the span between lateral supports, or located and constructed as required for joints in plain concrete walls.

> **Exception:** Vertical wall reinforcement required by this code is permitted to be used in lieu of construction joint reinforcement, provided the spacing does not exceed 24 inches (610 mm), or the combination of wall reinforcement and No.4 bars described above does not exceed 24 inches (610 mm).

R404.1.2.3.8 Exterior wall coverings. Requirements for installation of masonry veneer, stucco and other wall coverings on the exterior of concrete walls and other construction details not covered in this section shall comply with the requirements of this code.

R404.1.2.4 Requirements for Seismic Design Category C. Concrete foundation walls supporting above-grade concrete walls in townhouses assigned to Seismic Design Category C shall comply with ACI 318, ACI 332 or PCA 100 (see Section R404.1.2).

6. Revise as follows:

R404.1.4 Seismic Design Category D_0, D_1 or D_2.

R404.1.4.1 Masonry Foundation Walls. In addition to the requirements of Table~~s~~ R404.1.1(1) ~~and R404.1.1(5), plain concrete and~~ plain masonry foundation walls in buildings assigned to Seismic Design Category D_0,D_1 or D_2, as established in Table R301.2(1), shall comply with the following.

1. Wall height shall not exceed 8 feet (2438 mm).
2. Unbalanced backfill height shall not exceed 4 feet (1219 mm).
~~3. Minimum reinforcement for plain concrete foundation walls shall consist of one No. 4 (No. 13) horizontal bar located in the upper 12 inches (305 mm) of the wall.~~
~~4. Minimum thickness for plain concrete foundation walls shall be 7.5 inches (191 mm) except that 6 inches (152 mm) is permitted when the maximum height is 4 feet, 6 inches (1372 mm).~~
~~5.~~ 3. Minimum nominal thickness for plain masonry foundation walls shall be 8 inches (203 mm).
~~6.~~ 4. Masonry stem walls shall have a minimum vertical reinforcement of one No. 3 (No. 10) bar located a maximum of 4 feet (1220 mm) on center in grouted cells. Vertical reinforcement shall be tied to the horizontal reinforcement in the footings.

Foundation walls in buildings assigned to Seismic Design Category D_0, D_1 or D_2, as established in Table R301.2(1), supporting more than 4 feet (1219 mm) of unbalanced backfill or exceeding 8 feet (2438 mm) in height shall be constructed in accordance with Table R404.1.1(2), R404.1.1(3) or R404.1.1(4). ~~for masonry, or Table R404.1.1(5) for concrete. Where Table R404.1.1(5) permits plain concrete walls, not less than No. 4 (No. 13) vertical bars at a spacing not exceeding 48 inches (1219 mm) shall be provided. Insulating concrete form foundation walls shall be reinforced as required in Table R404.4(1), R404.4(2), R404.4(3), R404.4(4) or R404.4(5). Where no vertical reinforcement is required by Table R404.4(2), R404.4(3) or R404.4(4) there shall be a minimum of one No. 4 (No. 13) bar at 48 inches (1220 mm) on center.~~ All ~~concrete and~~ masonry foundation walls shall have two No. 4 (No. 13) horizontal bars located in the upper 12 inches (305 mm) of the wall.

7. Add new text as follows:

R404.1.4.2 Concrete Foundation Walls. In buildings assigned to Seismic Design Category D_0, D_1 or D_2, as established in Table R301.2(1), concrete foundation walls that support light-frame walls shall comply with this section, and concrete foundation walls that support above-grade concrete walls shall comply with ACI 318, ACI 332 or PCA 100 (see Section R404.1.2). In addition to the horizontal reinforcement required by Table R404.1.2(1), plain concrete walls supporting light-frame walls shall comply with the following.

1. Wall height shall not exceed 8 feet (2438 mm).
2. Unbalanced backfill height shall not exceed 4 feet (1219 mm).
3. Minimum thickness for plain concrete foundation walls shall be 7.5 inches (191 mm) except that 6 inches (152 mm) is permitted where the maximum wall height is 4 feet, 6 inches (1372 mm).

Foundation walls less than 7.5 inches (191 mm) in thickness, supporting more than 4 feet (1219 mm) of unbalanced backfill or exceeding 8 feet (2438 mm) in height shall be provided with horizontal reinforcement in accordance with Table R404.1.2(1), and vertical reinforcement in accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5), R404.1.2(6), R404.1.2(7) or R404.1.2(8). Where Tables R404.1.2(2) through R404.1.2(8) permit plain concrete walls, not less than No. 4 (No. 13) vertical bars at a spacing not exceeding 48 inches (1219 mm) shall be provided.

8. Revise as follows:

R404.1.5 Foundation wall thickness based on walls supported. The thickness of masonry or concrete ~~or masonry~~ foundation walls shall not be less than that required by Section R404.1.5.1 or R404.1.5.2, respectively.

R404.1.5.1 Masonry wall thickness. Masonry foundation walls shall not be less than the thickness of the wall supported, except that masonry foundation walls of at least 8-inch (203 mm) nominal thickness shall be permitted under brick veneered frame walls and under 10-inch-wide (254 mm) cavity walls where the total height of the wall supported, including gables, is not more than 20 feet (6096 mm), provided the requirements of Section~~s~~ R404.1.1 ~~and R404.1.2~~ are met.

9. Add new text as follows:

R404.1.5.2 Concrete wall thickness. The thickness of concrete foundations walls shall be equal to or greater than the thickness of the wall in the story above. Concrete foundation walls with corbels, brackets or other projections built into the wall for support of masonry veneer or other purposes are not within the scope of the tables in this section.

Where a concrete foundation wall is reduced in thickness to provide a shelf for the support of masonry veneer, the reduced thickness shall be equal to or greater than the thickness of the wall in the story above. Vertical reinforcement

for the foundation wall shall be based on Table R404.1.2(8) and located in the wall as required by R404.1.2.3.7.2 where that table is used. Vertical reinforcement shall be based on the thickness of the thinner portion of the wall.

Exception: Where the height of the reduced thickness portion measured to the underside of the floor assembly or sill plate above is less than or equal to 24 inches (610 mm) and the reduction in thickness does not exceed 4 inches (102 mm), the vertical reinforcement is permitted to be based on the thicker portion of the wall.

(Renumber subsequent sections)

10. Revise as follows:

R403.1.3.2 (Supp) Slabs-on-ground with turned-down footings. Slabs on ground with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing.

Exception: For slabs-on-ground cast monolithically with the footing, one No. 5 bar or two No. 4 bars shall be permitted to be located in the middle third of the footing depth as an alternative to placement at the footing top and bottom.

Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks each end shall be provided in accordance with Figure R403.1.3.2. Standard hooks shall comply with Section ~~R611.7.1.5~~ R611.4.5.

11. Add new tables as follows: (UNDERLINING OF TABLES OMITTED FOR CLARITY)

TABLE R404.1.2(1)
MINIMUM HORIZONTAL REINFORCEMENT FOR CONCRETE BASEMENT WALLS [a,b]

Maximum Unsupported Height of Basement Wall feet (meters)	Location of Horizontal Reinforcement
≤ 8 (2.4)	One No. 4 bar within 12 inches (305 mm) of the top of the wall story and one No. 4 bar near mid-height of the wall story
> 8 (2.4)	One No. 4 bar within 12 inches (305 mm) of the top of the wall story and one No. 4 bar near third points in the wall story

[a] Horizontal reinforcement requirements are for reinforcing bars with a minimum yield strength of 40,000 psi (280 MPa) and concrete with a minimum concrete compressive strength 2,500 psi (17.2 MPa).
[b] See Section R404.1.2.2 for minimum reinforcement required for foundation walls supporting above-grade concrete walls.

TABLE R404.1.2(2)
MINIMUM VERTICAL REINFORCEMENT FOR
6-INCH (152 mm) NOMINAL FLAT CONCRETE BASEMENT WALLS [b,c,d,e,g,h,i,j]

Max. Unsupported Wall Height (feet)	Maximum Unbalanced Backfill Height[f] (feet)	Minimum Vertical Reinforcement – Bar Size and Spacing – in.		
		Soil classes[a] and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC AND ML 45	SC, ML-CL AND INORGANIC CL 60
8	4	NR	NR	NR
	5	NR	5@39	6@48
	6	5@39	6@48	6@35
	7	6@48	6@34	6@25
	8	6@39	6@25	6@18
9	4	NR	NR	NR
	5	NR	5@37	6@48
	6	5@36	6@44	6@32
	7	6@47	6@30	6@22
	8	6@34	6@22	6@16
	9	6@27	6@17	DR
10	4	NR	NR	NR
	5	NR	5@35	6@48
	6	6@48	6@41	6@30
	7	6@43	6@28	6@20
	8	6@31	6@20	DR
	9	6@24	6@15	DR
	10	6@19	DR	DR

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf/ft = 0.1571 $kN/m^2/m$

[a] Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1

[b] Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi (420 MPa), concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa), and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.

[c] Vertical reinforcement with a yield strength of less than 60,000 psi (420 MPa) and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).

[d] Deflection criterion is *L/240*, where *L* is the height of the basement wall in inches.

[e] Interpolation shall not be permitted.

[f] Where walls will retain 4 feet (1.2 m) or greater of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

[g] NR indicates no vertical wall reinforcement is required, except for 6-inch (152 mm) nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be No. 4@48 inches (1219 mm) on center.

[h] See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.

[i] See Table R611.3 for tolerance from nominal thickness permitted for flat walls.

[j] DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.

TABLE R404.1.2(3)
MINIMUM VERTICAL REINFORCEMENT FOR
8-INCH (203 mm) NOMINAL FLAT CONCRETE BASEMENT WALLS [b,c,d,e,f,h,]

Max. Unsupported Wall Height (feet)	Maximum Unbalanced Backfill Height[g] (feet)	Minimum Vertical Reinforcement – Bar Size and Spacing – in.		
		Soil classes[a] and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC AND ML 45	SC, ML-CL AND INORGANIC CL 60
8	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6@37
	7	NR	6@36	6@35
	8	6@41	6@35	6@26
9	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6@35
	7	NR	6@35	6@32
	8	6@36	6@32	6@23
	9	6@35	6@25	6@18
10	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6@35
	7	NR	6@35	6@29
	8	6@35	6@29	6@21
	9	6@34	6@22	6@16
	10	6@27	6@17	6@13

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf/ft = 0.1571 $kN/m^2/m$

[a] Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1

[b] Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi (420 MPa), concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa), and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.

[c] Vertical reinforcement with a yield strength of less than 60,000 psi (420 MPa) and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).

[d] NR indicates no vertical reinforcement is required.

[e] Deflection criterion is *L/240*, where *L* is the height of the basement wall in inches.

[f] Interpolation shall not be permitted.

[g] Where walls will retain 4 feet (1.2 m) or greater of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

[h] See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.

[i] See Table R611.3 for tolerance from nominal thickness permitted for flat walls.

TABLE R404.1.2(4)
MINIMUM VERTICAL REINFORCEMENT FOR
10-INCH (252 mm) NOMINAL FLAT CONCRETE BASEMENT WALLS [b,c,d,e,f,h,i]

Max. Unsupported Wall Height (feet)	Maximum Unbalanced Backfill Height[g] (feet)	Minimum Vertical Reinforcement – Bar Size and Spacing – in		
		Soil classes[a] and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC AND ML 45	SC, ML-CL AND INORGANIC CL 60
8	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	NR
	8	6@48	6@35	6@28
9	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	6@31
	8	NR	6@31	6@28
	9	6@37	6@28	6@24
10	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	6@28
	8	NR	6@28	6@28
	9	6@33	6@28	6@21
	10	6@28	6@23	6@17

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf/ft = 0.1571 $kN/m^2/m$

[a] Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1

[b] Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi (420 MPa), concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa), and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.

[c] Vertical reinforcement with a yield strength of less than 60,000 psi (420 MPa) and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).

[d] NR indicates no vertical reinforcement is required.

[e] Deflection criterion is *L/240*, where *L* is the height of the basement wall in inches.

[f] Interpolation shall not be permitted.

[g] Where walls will retain 4 feet (1.2 m) or greater of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

[h] See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.

[i] See Table R611.3 for tolerance from nominal thickness permitted for flat walls.

TABLE R404.1.2(5)
MINIMUM VERTICAL WALL REINFORCEMENT FOR
6-INCH (152 mm) WAFFLE-GRID BASEMENT WALLS[b,c,d,e,g,h,i]

Max. Unsupported Wall Height (feet)	Maximum Unbalanced Backfill Height[f] (feet)	Minimum Vertical Reinforcement – Bar Size and Spacing – in.		
		Soil classes[a] and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC AND ML 45	SC, ML-CL AND INORGANIC CL 60
8	4	4@48	4@46	4@39
	5	4@45	5@46	6@47
	6	5@45	6@40	DR
	7	6@44	DR	DR
	8	6@32	DR	DR
9	4	4@48	4@46	4@37
	5	4@42	5@43	6@44
	6	5@41	6@37	DR
	7	6@39	DR	DR
	≥ 8	DR	DR	DR
10	4	4@48	4@46	4@35
	5	4@40	5@40	6@41
	6	5@38	6@34	DR
	7	6@36	DR	DR
	≥ 8	DR	DR	DR

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf/ft = 0.1571 kN/m^2/m

[a] Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1

[b] Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi (420 MPa), concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa), and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.

[c] Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 (420 MPa) and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi (420 MPa) and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).

[d] Deflection criterion is *L/240*, where *L* is the height of the basement wall in inches.

[e] Interpolation shall not be permitted.

[f] Where walls will retain 4 feet (1.2 m) or greater of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

[g] See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.

[h] See Table R611.3 for thicknesses and dimensions of waffle-grid walls.

[i] DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.

TABLE R404.1.2(6)
MINIMUM VERTICAL REINFORCEMENT FOR
8-INCH (203 mm) WAFFLE-GRID BASEMENT WALLS[b,c,d,e,f,h,i,j]

Max. Unsupported Wall Height (feet)	Maximum Unbalanced Backfill Height[g] (feet)	Minimum Vertical Reinforcement – Bar Size and Spacing – in.		
		Soil classes[a] and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC AND ML 45	SC, ML-CL AND INORGANIC CL 60
8	4	NR	NR	NR
	5	NR	5@48	5@46
	6	5@48	5@43	6@45
	7	5@46	6@43	6@31
	8	6@48	6@32	6@23
9	4	NR	NR	NR
	5	NR	5@47	5@46
	6	5@46	5@39	6@41
	7	5@42	6@38	6@28
	8	6@44	6@28	6@20
	9	6@34	6@21	DR
10	4	NR	NR	NR
	5	NR	5@46	5@44
	6	5@46	5@37	6@38
	7	5@38	6@35	6@25
	8	6@39	6@25	DR
	9	6@30	DR	DR
	10	6@24	DR	DR

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf/ft = 0.1571 kN/m^2/m

[a] Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1

[b] Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi (420 MPa), concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa), and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.

[c] Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 (420 MPa) and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi (420 MPa) and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).

[d] NR indicates no vertical reinforcement is required.

[e] Deflection criterion is *L/240*, where *L* is the height of the basement wall in inches.

[f] Interpolation shall not be permitted.

[g] Where walls will retain 4 feet (1.2 m) or greater of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

[h] See Sections R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.

[i] See Table R611.3 for thicknesses and dimensions of waffle-grid walls.

[j] DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.

TABLE R404.1.2(7)
MINIMUM VERTICAL REINFORCEMENT FOR
6-INCH (152 mm) SCREEN-GRID BASEMENT WALLS [b,c,d,e,g,h,i]

Max. Unsupported Wall Height (feet)	Maximum Unbalanced Backfill Height[f] (feet)	Minimum Vertical Reinforcement – Bar Size and Spacing – in.		
		Soil classes[a] and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC AND ML 45	SC, ML-CL AND INORGANIC CL 60
	4	4@48	4@48	4@43
8	5	4@48	5@48	5@37
	6	5@48	6@45	6@32
	7	6@48	DR	DR
	8	6@36	DR	DR
	4	4@48	4@48	4@41
	5	4@48	5@48	6@48
9	6	5@45	6@41	DR
	7	6@43	DR	DR
	≥ 8	DR	DR	DR
	4	4@48	4@48	4@39
	5	4@44	5@44	6@46
10	6	5@42	6@38	DR
	7	6@40	DR	DR
	≥ 8	DR	DR	DR

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf/ft = 0.1571 kN/m^2/m

[a] Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1

[b] Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi (420 MPa), concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa), and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.

[c] Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 (420 MPa) and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi (420 MPa) and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).

[d] Deflection criterion is *L/240*, where *L* is the height of the basement wall in inches.

[e] Interpolation shall not be permitted.

[f] Where walls will retain 4 feet (1.2 m) or greater of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

[g] See Sections R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.

[h] See Table R611.3 for thicknesses and dimensions of screen-grid walls.

[i] DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.

TABLE R404.1.2(8)
MINIMUM VERTICAL REINFORCEMENT
FOR 6-, 8-, 10- AND 12-INCH NOMINAL FLAT BASEMENT WALLS [b,c,d,e,f,h,i,j,k,n]

MAX. WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT[g] (feet)	MINIMUM VERTICAL REINFORCEMENT – BAR SIZE AND SPACING – IN.											
		Soil classes[a] and design lateral soil (psf per foot of depth)											
		GW, GP, SW, SP 30				GM, GC, SM, SM-SC AND ML 45				SC, ML-CL AND INORGANIC CL 60			
		MINIMUM NOMINAL WALL THICKNESS (inches)											
		6	8	10	12	6	8	10	12	6	8	10	12
5	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR[l]	NR	NR	4@35	NR[l]	NR	NR
	6	NR	NR	NR	NR	5@48	NR	NR	NR	5@36	NR	NR	NR
7	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5@47	NR	NR	NR
	6	NR	NR	NR	NR	5@42	NR	NR	NR	6@43	5@48	NR[l]	NR
	7	5@46	NR	NR	NR	6@42	5@46	NR[l]	NR	6@34	6@48	NR	NR
8	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4@38	NR[l]	NR	NR	5@43	NR	NR	NR
	6	4@37	NR[l]	NR	NR	5@37	NR	NR	NR	6@37	5@43	NR[l]	NR
	7	5@40	NR	NR	NR	6@37	5@41	NR[l]	NR	6@34	6@43	NR	NR
	8	6@43	5@47	NR[l]	NR	6@34	6@43	NR	NR	6@27	6@32	6@44	NR
9	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4@35	NR[l]	NR	NR	5@40	NR	NR	NR
	6	4@34	NR[l]	NR	NR	6@48	NR	NR	NR	6@36	5@39	NR[l]	NR
	7	5@36	NR	NR	NR	6@34	5@37	NR	NR	6@33	6@38	5@37	NR[l]
	8	6@38	5@41	NR[l]	NR	6@33	6@38	5@37	NR[l]	6@24	6@29	6@39	4@48[m]
	9	6@34	6@46	NR	NR	6@26	6@30	6@41	NR	6@19	6@23	6@30	6@39
10	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4@33	NR[l]	NR	NR	5@38	NR	NR	NR
	6	5@48	NR[l]	NR	NR	6@45	NR	NR	NR	6@34	5@37	NR	NR
	7	6@47	NR	NR	NR	6@34	6@48	NR	NR	6@30	6@35	6@48	NR[l]
	8	6@34	5@38	NR	NR	6@30	6@34	6@47	NR[l]	6@22	6@26	6@35	6@45[m]
	9	6@34	6@41	4@48	NR[l]	6@23	6@27	6@35	4@48[m]	DR	6@22	6@27	6@34
	10	6@28	6@33	6@45	NR	DR	6@23	6@29	6@38	DR	6@22	6@22	6@28

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf/ft = 0.1571 kN/m^2/m

Notes to Table R404.1.2(8)

[a] Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1

[b] Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi (414 MPa).

[c] Vertical reinforcement with a yield strength of less than 60,000 psi (420 MPa) and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).

[d] NR indicates no vertical wall reinforcement is required, except for 6-inch (152 mm) nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be #4@48 inches (1219 mm) on center.

[e] Allowable deflection criterion is L/240, where L is the unsupported height of the basement wall in inches.

[f] Interpolation shall not be permitted.

[g] Where walls will retain 4 feet (1.2 m) or greater of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

[h] Vertical reinforcement shall be located to provide a cover of 1.25 inches (32 mm) measured from the inside face of the wall. The center of the steel shall not vary from the specified location by more than the greater of 10% of the wall thickness and 3/8-inch (10 mm).

[i] Concrete cover for reinforcement measured from the inside face of the wall shall not be less than ¾-inch (19 mm). Concrete cover for reinforcement measured from the outside face of the wall shall not be less than 1-1/2 inches (38 mm) for No. 5 bars and smaller, and not less than 2 inches (51 mm) for larger bars.

[j] DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.

[k] Concrete shall have a specified compressive strength, f'_c, of not less than 2,500 psi (17.2 MPa) at 28 days, unless a higher strength is required by footnote l or m.

[l] The minimum thickness is permitted to be reduced 2 inches (51 mm), provided the minimum specified compressive strength of concrete, f'_c, is 4,000 psi (27.6 MPa).

[m] A plain concrete wall with a minimum nominal thickness of 12 inches (305 mm) is permitted, provided minimum specified compressive strength of concrete, f'_c, is 3,500 psi (24.1 MPa).

[n] See Table R611.3 for tolerance from nominal thickness permitted for flat walls.

TABLE R404.1.2(9)
MAXIMUM SPACING FOR ALTERNATE BAR SIZE AND/OR ALTERNATE GRADE OF STEEL [a,b,c]

Bar Spacing From Applicable Table in Section R404.1.2.2 – in.	Bar Size From Applicable Table in Section R404.1.2.2															
	#4					#5					#6					
	Alternate Bar Size and/or Alternate Grade of Steel Desired to be Used															
	Grade 60		Grade 40			Grade 60		Grade 40			Grade 60		Grade 40			
	#5	#6	#4	#5	#6	#4	#6	#4	#5	#6	#4	#5	#4	#5	#6	
	Maximum Spacing for Alternate Bar Size and/or Alternate Grade of Steel – in.															
8	12	18	5	8	12	5	11	3	5	8	4	6	2	4	5	
9	14	20	6	9	13	6	13	4	6	9	4	6	3	4	6	
10	16	22	7	10	15	6	14	4	7	9	5	7	3	5	7	
11	17	24	7	11	16	7	16	5	7	10	5	8	3	5	7	
12	19	26	8	12	18	8	17	5	8	11	5	8	4	6	8	
13	20	29	9	13	19	8	18	6	9	12	6	9	4	6	9	
14	22	31	9	14	21	9	20	6	9	13	6	10	4	7	9	
15	23	33	10	16	22	10	21	6	10	14	7	11	5	7	10	
16	25	35	11	17	23	10	23	7	11	15	7	11	5	8	11	
17	26	37	11	18	25	11	24	7	11	16	8	12	5	8	11	
18	28	40	12	19	26	12	26	8	12	17	8	13	5	8	12	
19	29	42	13	20	28	12	27	8	13	18	9	13	6	9	13	
20	31	44	13	21	29	13	28	9	13	19	9	14	6	9	13	
21	33	46	14	22	31	14	30	9	14	20	10	15	6	10	14	
22	34	48	15	23	32	14	31	9	15	21	10	16	7	10	15	
23	36	48	15	24	34	15	33	10	15	22	10	16	7	11	15	
24	37	48	16	25	35	15	34	10	16	23	11	17	7	11	16	
25	39	48	17	26	37	16	35	11	17	24	11	18	8	12	17	
26	40	48	17	27	38	17	37	11	17	25	12	18	8	12	17	
27	42	48	18	28	40	17	38	12	18	26	12	19	8	13	18	
28	43	48	19	29	41	18	40	12	19	26	13	20	8	13	19	
29	45	48	19	30	43	19	41	12	19	27	13	20	9	14	19	
30	47	48	20	31	44	19	43	13	20	28	14	21	9	14	20	
31	48	48	21	32	45	20	44	13	21	29	14	22	9	15	21	
32	48	48	21	33	47	21	45	14	21	30	15	23	10	15	21	
33	48	48	22	34	48	21	47	14	22	31	15	23	10	16	22	
34	48	48	23	35	48	22	48	15	23	32	15	24	10	16	23	
35	48	48	23	36	48	23	48	15	23	33	16	25	11	16	23	
36	48	48	24	37	48	23	48	15	24	34	16	25	11	17	24	
37	48	48	25	38	48	24	48	16	25	35	17	26	11	17	25	
38	48	48	25	39	48	25	48	16	25	36	17	27	12	18	25	
39	48	48	26	40	48	25	48	17	26	37	18	27	12	18	26	
40	48	48	27	41	48	26	48	17	27	38	18	28	12	19	27	
41	48	48	27	42	48	26	48	18	27	39	19	29	12	19	27	
42	48	48	28	43	48	27	48	18	28	40	19	30	13	20	28	
43	48	48	29	44	48	28	48	18	29	41	20	30	13	20	29	
44	48	48	29	45	48	28	48	19	29	42	20	31	13	21	29	
45	48	48	30	47	48	29	48	19	30	43	20	32	14	21	30	
46	48	48	31	48	48	30	48	20	31	44	21	32	14	22	31	
47	48	48	31	48	48	30	48	20	31	44	21	33	14	22	31	
48	48	48	32	48	48	31	48	21	32	45	22	34	15	23	32	

For SI: 1 inch = 25.4 mm

[a] This table is for use with tables in Section R404.1.2 that specify the minimum bar size and maximum spacing of vertical wall reinforcement for foundation walls and above-grade walls. Reinforcement specified in tables in Sections R404.1.2 is based on Grade 60 (420 MPa) steel reinforcement.

[b] Bar spacing shall not exceed 48 inches (1219 m) on center and shall not be less than one-half the nominal wall thickness.

[c] For Grade 50 (350 MPa) steel bars (ASTM A 996, Type R), use spacing for Grade 40 (280 MPa) bars or interpolate between Grade 40 (280 MPa) and Grade 60 (420 MPa).

12. Delete without substitution:

~~**R404.4 Insulating concrete form foundation walls.** Insulating concrete form (ICF) foundation walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of ACI 318. When ACI 318 or the provisions of this section are used to design insulating concrete form foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design unless otherwise required by the state law of the jurisdiction having authority.~~

~~**R404.4.1 Applicability limits.** The provisions of this section shall apply to the construction of insulating concrete form foundation walls for buildings not more than 60 feet (18 288 mm) in plan dimensions, and floors not more than 32 feet (9754 mm) or roofs not more than 40 feet (12 192 mm) in clear span. Buildings shall not exceed two stories in height above grade with each story not more than 10 feet (3048 mm) high. Foundation walls constructed in accordance with the provisions of this section shall be limited to buildings subjected to a maximum ground snow load of 70 psf (3.35 kPa) and located in Seismic Design Category A, B or C. In Seismic Design Categories D0, D1 and D2,~~

foundation walls shall comply with Section R404.1.4. Insulating concrete form foundation walls supporting above-grade concrete walls shall be reinforced as required for the above- grade wall immediately above or the requirements in Tables R404.4(1), R404.4(2), R404.4(3), R404.4(4) or R404.4(5), whichever is greater.

R404.4.2 Flat insulating concrete form wall systems. Flat ICF wall systems shall comply with Figure R611.3, shall have a minimum concrete thickness of 5.5 inches (140 mm), and shall have reinforcement in accordance with Table R404.4(1), R404.4(2) or R404.4(3). Alternatively, for 7.5-inch (191 mm) and 9.5-inch (241 mm) flat ICF wall systems, use of Table R404.1.1(5) shall be permitted, provided the vertical reinforcement is of the grade and located within the wall as required by that table.

R404.4.3 Waffle-grid insulating concrete form wall systems. Waffle-grid wall systems shall have a minimum nominal concrete thickness of 6 inches (152 mm) for the horizontal and vertical concrete members (cores) and shall be reinforced in accordance with Table R404.4(4). The minimum core dimension shall comply with Table R611.2 and Figure R611.4.

R404.4.4 Screen-grid insulating concrete form wall systems. Screen-grid ICF wall systems shall have a minimum nominal concrete thickness of 6 inches (152 mm) for the horizontal and vertical concrete members (cores). The minimum core dimensions shall comply with Table R611.2 and Figure R611.5. Walls shall have reinforcement in accordance with Table R404.4(5).

R404.4.5 Concrete material. Ready-mixed concrete for insulating concrete form walls shall be in accordance with Section R402.2. Maximum slump shall not be greater than 6 inches (152 mm) as determined in accordance with ASTM C 143. Maximum aggregate size shall not be larger than 3/4 inch (19.1 mm).

> **Exception:** Concrete mixes conforming to the ICF manufacturer's recommendations.

R404.4.6 Reinforcing steel.

R404.4.6.1 General. Reinforcing steel shall meet the requirements of ASTMA615,A706 orA996. The minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). Vertical and horizontal wall reinforcements shall be placed no closer to the outside face of the wall than one-half the wall thickness. Steel reinforcement for foundation walls shall have concrete cover in accordance with ACI 318.

> **Exception:** Where insulated concrete forms are used and the form remains in place as cover for the concrete, the minimum concrete cover for the reinforcing steel is permitted to be reduced to 3/4 inch (19.1 mm).

R404.4.6.2 Horizontal reinforcement. When vertical reinforcement is required, ICF foundation walls shall have horizontal reinforcement in accordance with this section. ICF foundation walls up to 8 feet (2438 mm) in height shall have a minimum of one continuous No. 4 horizontal reinforcing bar placed at 48 inches (1219 mm) on center with one bar located within 12 inches (305 mm) of the top of the wall story. ICF Foundation walls greater than 8 feet (2438 mm) in height shall have a minimum of one continuous No. 4 horizontal reinforcing bar placed at 36 inches (914 mm) on center with one bar located within 12 inches (305 mm) of the top of the wall story.

R404.4.6.3 Wall openings. Vertical wall reinforcement required by Section R404.4.2, R404.4.3 or R404.4.4 that is interrupted by wall openings shall have additional vertical reinforcement of the same size placed within 12 inches (305 mm) of each side of the opening.

R404.4.7 Foam plastic insulation. Foam plastic insulation in insulating concrete foam construction shall comply with this section.

R404.4.7.1 Material. Insulating concrete form material shall meet the surface burning characteristics of Section R314.3. A thermal barrier shall be provided on the building interior in accordance with Section R314.4.

R404.4.7.2 Termite hazards. In areas where hazard of termite damage is very heavy in accordance with Figure R301.2(6), foam plastic insulation shall be permitted below grade on foundation walls in accordance with one of the following conditions:

1. When in addition to the requirements in Section R320.1, an approved method of protecting the foam plastic and structure from subterranean termite damage is provided.
2. The structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure preservatively treated wood.
3. On the interior side of basement walls.

~~**R404.4.8 Foundation wall thickness based on walls supported.** The thickness of ICF foundation walls shall not be less than the thickness of the wall supported above.~~

~~**R404.4.9 Height above finished ground.** ICF foundation walls shall extend above the finished ground adjacent to the foundation at all points a minimum of 4 inches (102 mm) where masonry veneer is used and a minimum of 6 inches (152 mm) elsewhere.~~

~~**R404.4.10 Backfill placement.** Backfill shall be placed in accordance with Section R404.1.7.~~

~~**R404.4.11 Drainage and dampproofing/waterproofing.** ICF foundation basements shall be drained and dampproofed/waterproofed in accordance with Sections R405 and R406.~~

~~**TABLE R404.4(1)**~~
~~**5.5-INCH THICK FLAT ICF FOUNDATION WALLSa, b, c, d**~~

~~**TABLE R404.4(2)**~~
~~**7.5-INCH-THICK FLAT ICF FOUNDATION WALLSa, b, c, d, e**~~

~~**TABLE R404.4(3)**~~
~~**9.5-INCH-THICK FLAT ICF FOUNDATION WALLSa, b, c, d, e**~~

~~**TABLE R404.4(4)**~~
~~**WAFFLE GRID ICF FOUNDATION WALLSa, b, c, d, e**~~

~~**TABLE R404.4(5)**~~
~~**SCREEN-GRID ICF FOUNDATION WALLSa, b c, d, e**~~

13. Revise as follows:

R702.3.4 Insulating concrete form walls. Foam plastics for insulating concrete form walls constructed in accordance with Sections ~~R404.4~~ R404.1.2 and R611 on the interior of habitable spaces shall be ~~covered~~ protected in accordance with Section R314.4. Use of adhesives in conjunction with mechanical fasteners is permitted. Adhesives used for interior and exterior finishes shall be compatible with the insulating form materials.

14. Add standards to Chapter 43 as follows:

ASTM

C 94- 04 Specification for Ready-Mixed Concrete
C 685-01 Specification for Concrete Made by Volumetric Batching and Continuous Mixing

PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

100 -07 Prescriptive Design of Exterior Concrete Walls for One And Two Family Dwellings (Pub. No. EB241)

Reason: This proposal will revise the concrete foundation wall provisions based on provisions in *Prescriptive Design of Exterior Concrete Walls for One and Two Family Dwellings* (PCA 100), a consensus standard developed by the Portland Cement Association's National Standards Development Committee (PCA NSDC) in accordance with ANSI-approved procedures. This new standard replaces PCA publication *Prescriptive Method for Insulating Concrete Forms in Residential Construction* which served as the basis for most of the concrete foundation wall provisions in Section R404.

This proposal is coordinated with a companion proposal to revise Section R611 on above-grade concrete walls. Since the application of Section R611 is limited by Section R611.2, it is the explicit intent of this proposal as expressed in Section R404.1.2 that concrete foundation walls supporting light-frame walls be designed and constructed in accordance with the prescriptive provisions of Section R404, where they apply. Provisions for concrete foundation walls supporting above-grade wall of concrete that are within the applicability limits of Section R611.2 are covered in Section R404, where they apply. Where concrete foundation walls support above-grade concrete walls that are not within the applicability limits of Section R611.2, the foundation wall must be designed in accordance with one of the reference standards – ACI 318, ACI 332 or PCA 100 (see Section R404.1.2).

One general theme for this change to Section R404 is to separate the technical provisions for foundation walls constructed of masonry units and concrete so the code user can easily determine the provisions that apply to each type of wall. These changes can be summarized as follows:

Parts 1 through 5 and 11 – This portion of the code change revises the general provisions to Section R404.1 for concrete and masonry foundation walls. The section is further subdivided to create separate and distinct sections for constructing foundation walls of masonry units and concrete. **This proposal does not make any technical changes to the prescriptive provisions for constructing masonry foundations.**

This proposal revises the concrete foundation wall requirements to incorporate prescriptive requirements extracted from the new PCA Standard - PCA 100. This standard is also referenced as another option for alternate design of concrete foundation walls in addition to the provisions of ACI

318 and ACI 332 presently referenced in the code (R404.1.2). PCA 100 has provisions for alternate designs beyond the prescriptive provisions enumerated in this code change.

This part includes changes to integrate the existing provisions for constructing concrete foundation walls using traditional forming methods (existing Section R404.1.2) with existing provisions for using insulating concrete forms (ICFs) (existing Section R404.4). This approach is preferred rather than maintaining those provisions in separate sections. These prescriptive provisions include revised tables for constructing flat, waffle-grid and screen-grid wall systems (R404.1.2.2). As part of these revisions additional provisions are included for constructing concrete foundation walls based on materials used (i.e. concrete, aggregate, steel reinforcement, etc. – See Section R404.1.2.3)). The provisions also incorporate improved technical requirements for constructing concrete stemwall foundations (R404.1.2.2.1 & R404.1.2.2.2) not presently in the code. In addition, new provisions are given for location and cover for the reinforcement, continuity of the reinforcement, lap splices and standard hooks and installation of construction joints (R404.1.2.3.7). Changes to existing tables for vertical reinforcement were necessary because of changes to ACI 318 and ASCE 7 that have occurred since the original tables were developed. In addition, the vertical reinforcement tables presently in the code were based on the use of 40,000 psi yield strength steel whereas, the new tables are based on reinforcement with a yield strength of 60,000 psi. New Table R404.1.2(9) has been included to provide more flexibility in use of different bar sizes and/or grades of steel than specified in the tables.

Parts 6 and 7 – These parts revise the prescriptive provisions for constructing masonry and concrete foundation walls in buildings assigned to Seismic Design Category D_0, D_1 and D_2 in Section R404.1.4 by separating the requirements into two separate subsections. No technical changes were made to the masonry provisions. The technical provisions for the concrete foundation wall requirements are also the same with one minor change. Presently, where a plain concrete foundation wall supports more than 4 feet of unbalanced backfill or exceeds 8 feet in wall height, the wall is required to have two No. 4 bars in the top of the wall. The revisions reduce this to one No. 4 bar in the top of the wall instead of two. However this change also increases the total number of horizontal reinforcement bars that are spaced vertically for the walls by the introduction of new Table R404.1.2(1). It was felt that providing horizontal bars distributed over the full wall height provides better continuity than that provided by the two bars located only in the top of the wall.

Parts 8 and 9 – These parts revise the prescriptive provisions for the thickness of masonry and concrete foundation walls based on the walls supported above by separating the requirements in Section R404.1.5 into two separate subsections. No technical changes were made to the masonry provisions. The prescriptive concrete provisions are revised based on the provisions in Standard PCA 100. They permit a shelf to be built into the top of the concrete foundation wall for the support of masonry veneer; a common construction practice heretofore not addressed by the code.

Part 10 – During the 2006-2007 code cycle provisions were added to the code to require dowel bars for connection between slab-on-ground and the footing where the two are not cast monolithically. This part revises the section reference when a standard hook is required for these dowel bars.

Part 12 – Part 12 deletes the existing prescriptive provisions for constructing concrete foundation walls using stay-in-place insulating concrete forms (ICFs) from Section R404.4 since the requirements with revisions have been incorporated into the new Section R404.1.2 for concrete foundations.

Part 13 – Part 13 revises Section R702.3.4 to reference the correct requirements that have been relocated with this change, and to change "covered" to "protected" since Section R314.4 does not mandate that the foam be covered in all cases.

Part 14 – This part enumerates the changes needed to Chapter 43 to reflect the addition of needed ASTM standards and the new PCA 100 Standard.

Cost Impact: In some cases the cost of concrete construction will decrease and in some cases the cost will increase.

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

RB117–07/08
R404.5

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

Revise as follows:

R404.5 Retaining walls. Retaining walls that are 4 foot (1219 mm) or more in height measured from the bottom of the footing to the top of the wall, or support a surcharge, ~~not laterally supported at the top and that retain in excess of 24 inches (610 mm) of unbalanced fill~~ shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning.

Reason: The introduction of Section R404.5 into the 2006 IRC has created considerable confusion in the field since adopted because IRC Section R105.2 exempts retaining walls less than 4 foot in height, unless supporting a surcharge, from requiring a permit. This limit potentially conflicts with the height trigger in Section R404.5, causing some to question how and when this criterion is to be enforced.

The intention of this change proposal is simply to make the height limit trigger in Section R404.5 consistent with the long-standing permitting requirement in R105.2.

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

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

RB118–07/08
R407.3

Proponent: James D. McCue, representing the Akron Products Company

Revise as follows:

R407.3 Structural requirements. The columns shall be restrained to prevent lateral displacement at the bottom end. Wood columns shall not be less in nominal size than 4 inches by 4 inches (102 mm by 102 mm) ~~and~~. Steel columns shall not be less than 3-inch-diameter (76 mm) ~~standard pipe or approved equivalent~~ Schedule 40 Pipe manufactured in accordance with ASTM A53 Grade B.

Exception: In Seismic Design Categories A, B and C columns no more than 48 inches (1219 mm) in height on a pier or footing are exempt from the bottom end lateral displacement requirement within underfloor areas enclosed by a continuous foundation.

Reason: The proposed modifications are intended as a clarification. The reference to "standard pipe" has been generally interpreted as a generic term, without implication of wall thickness, material grade, or load capacity. The Akron Products Company polled in excess of 150 local inspection departments in 12 states, and without exception, there was no awareness of minimum standards for steel columns. The majority of inspectors were checking for the presence of a 3-inch tube in the designated location, and the remaining admitted to not checking the columns at all. The reference to standard pipe (confirmed by ICC-ES engineering staff) was originally a reference to ASTM A53, Grade B pipe, which has a 3-inch INSIDE DIAMETER, Schedule 40 wall (.211 inches) of Grade B (46 ksi) steel, and an outside diameter of 3.5-inches. The comprehensive misinterpretation of the reference to "standard pipe" has resulted in a primary load bearing component of the home invalidated and is clearly outside the intent of the IRC.

Cost Impact: The code changed proposed is a clarification and will not result in a change in the cost of construction for those currently in compliance.

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

RB119–07/08
R408.1, R408.2

Proponent: Edward L. Keith, APA – The Engineered Wood Association

Revise as follows:

R408.1 Ventilation. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m2) for each 150 square feet (14 m2) of under-floor space area, unless the ground surface is covered by a Class 1 vapor retarder material. When a Class 1 vapor retarder material is used the minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m^2) for each 1,500 square feet (140 m^2) of under-floor space area.. One such ventilating opening shall be within 3 feet (914 mm) of each corner of the building.

R408.2 Openings for under-floor ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m^2) for each 150 square feet (14 m^2) of under-floor area. One ventilation opening shall be within 3 feet (914 mm) of each corner of the building. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1.4 inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grill or grating.
4. Extruded load-bearing brick vents.
5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch (3.2 mm) thick.

Exception: The total area of ventilation openings shall be permitted to be reduced to 1/1,500 of the under-floor area where the ground surface is covered with an approved Class I vapor retarder material and the required openings are placed so as to provide cross ventilation of the space. The installation of operable louvers shall not be prohibited.

Reason: This provision is currently in the IBC. The purpose of this proposal is to give greater latitude to builders when providing for under-floor ventilation by putting a provision back into the code that permits the reduction of ventilation when ground vapor retarders are used.

In the 2003 IRC the builder was given the option to reduce the required area for foundation vents from 1/150 to 1/1500 providing a vapor retarder was applied to the surface of the ground and the vents were placed in such a way as to permit cross-ventilation. For the 2006 IRC this section was rewritten and many of the exceptions in the old section were incorporated within the text of the section. In the 2006 IRC the proposed provision was left out of the new code. As the code is currently written, there are now only two choices for crawl spaces: 1/150 or no vents at all with the use of mechanical ventilation.

We think that the elimination of the 1/1500 provision was either inadvertent or done in error. Section 1203.3.2 of the 2006 IBC still permits the use of a required area of 1/1500 providing the conditions of the proposed change are met. As very similar structures can be built using the conventional construction provisions of the IBC as are covered in the IRC, it is reasonable and rational to assume that the same ventilation requirements would be appropriate for both codes. The use of the 1/1500 provision in the IBC also requires the use of a Class I vapor retarder over the ground surface. Requiring a minimum net free area for foundation ventilation that does not require a vapor retarder over the ground surface seems to be a questionable policy given the potential for moisture related problems that the lack of as vapor retarder encourages. Note that Section 1910 of the IBC even requires a vapor retarder under a concrete slab. Adoption of this proposal will encourage builders to both use ground vapor retarders and eliminate one area of conflict between the two building codes. A Class I vapor retarder is specified, as this classification is required by the 2007 Supplement to the 2006 IRC.

We are proposing the change in two locations, R408.1 and R408.2.

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

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

RB120–07/08
R408.2

Proponent: Tim Nogler, State of Washington, representing Washington State Building Code Council

Revise as follows:

R408.2 Openings for under-floor ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929m2) for each 150 square feet (14m2) of under-floor area. One ventilating opening shall be within 3 feet (914 mm) of each corner of the building. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1/4 inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch(1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grill or grating.
4. Extruded load-bearing brick vents.
5. Hardware cloth of 0.035 inch (0.89 mm)wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch (3.2 mm).

Exception: The total area of ventilation openings is permitted to be reduced to 1/1,500 of the under-floor area where the ground surface is covered with a Class I vapor retarder material and the required openings are placed so as to provide cross ventilation of the space. The installation of operable louvers shall not be prohibited.

Reason: This proposal provides an exception consistent with the IBC 2007 supplement, and previously allowed under the 2003 IRC. The 2003 IRC and the IBC contain an exception that allows 1:1500 venting with a ground cover rated for 0.1 perm or less in a crawl space. This option has been removed from the 2006 IRC. Standing alone the IRC now assumes that no ground cover will be supplied. The 2006 IRC does not take into account that a ground cover will greatly reduce the need for ventilation. The installation of a ground cover is one of the first things that should be done as a crawl space moisture management step. Class I vapor retarder is defined in the IRC 2007 supplement.

The 1:150 ratio has the effect of leaving very little foundation to support the home. Anchor bolts will be hard to layout and may end up so near vents as to be of little value.

The layout requirement of 3 feet from each corner ignores that vents are never put in foundation walls for attached garages that are common to the crawl space of the home. The use of the proposed exception allows a home with an attached garage to meet the code.

In practice, by placing a vent at each corner on all available sides the area of venting will exceed the 1:1500 and get around 1:500 to 1:700. More than adequate ventilation is achieved, using the ground cover exception.

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

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

RB121–07/08
R408.3

Proponent: Chuck Murray, Washington State University Extension Energy Program, representing Northwest Energy Code Group

Revise as follows:

R408.3 (Supp) Unvented crawl space. In jurisdictions that have adopted Appendix F, structures constructed in high potential radon counties are prohibited from using an unvented crawl space and shall comply with section R408.1. For all other structures, ventilation openings in under-floor spaces specified in Sections R408.1 and R408.2 shall not be required where:

1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall; and
2. One of the following is provided for the under-floor space:
   - 2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cfm (0.47 L/s) for each 50 ft^2 (4.7m^2) of crawlspace floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.8;
   - 2.2. Conditioned air supply sized to deliver at a rate equal to 1 cfm (0.47 L/s) for each 50 ft^2 (4.7 m^2) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.8;
   - 2.3. Plenum complying with Section M1601.4, if under-floor space is used as a plenum.

Reason: The proposed code change prohibits the use of closed crawl spaces in jurisdictions that have adopted Appendix F of the IRC. This is simply a cross reference to the existing code requirements in Appendix F. Appendix F section **AF103.4.1** does not allow air pathways between the crawl space and the conditioned space of the home.

Available research notes that homes with closed crawl spaces may result in increased interior radon levels. In a study conduced by Advanced Energy homes in Princeville, Edgecombe County, North Carolina, it was noted that homes with closed crawl space had radon levels in the occupied space that was nearly 4 times the level as homes with ventilated crawl spaces. This occurred in a county that is noted as a low risk radon location by the US Environmental Protection Agency[1]. The findings of this report are noted here:

> *"Table 27 and Figure 60 show the results of the Phase I long term monitoring, which was carried out between July of 2001 and February of 2002. This monitoring indicated higher average concentrations in the conditioned spaces of the houses on closed crawl spaces, with measurements averaging 0.5 pCi/l in the vented crawl spaces and 1.9 pCi/l in the closed crawl spaces. This monitoring also indicated higher average concentrations in the closed crawl spaces versus vented crawl spaces, with measurements averaging 0.8 pCi/l in the vented crawl spaces and 2.9 pCi/l in the closed crawl spaces. The higher radon measurements in both the crawl spaces and the conditioned spaces appeared to be correlated with the closed crawl space foundations."*[2]

[1]EPA Map of Radon Zones
http://www.epa.gov/radon/zonemap.html

[2]Advanced Energy, Field Study Final Report A Field Study Comparison of the Energy and Moisture Performance Characteristics of Ventilated Versus Sealed Crawl Spaces in the South,
June 22, 2005 http://www.advancedenergy.org/buildings/knowledge_library/crawl_spaces/

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

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

RB122–07/08
R202 (New), R319.5 (New), R502.1.8 (New), Chapter 43 (New)

Proponent: Marcelo M. Hirschler, GBH International, representing the American Fire Safety Council

1. Add new text as follows:

SECTION R202
GENERAL DEFINITIONS

PLASTIC LUMBER. A manufactured product composed of more than 50 weight percent resin, and in which the product generally is rectangular in cross-section and typically supplied in sizes that correspond to traditional lumber board and dimensional lumber sizes, may be filled or unfilled, and may be composed of single or commingled resins.

R319.5 Plastic lumber. Plastic lumber used in exterior deck boards shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 6662.

R502.1.8 Exterior plastic lumber deck boards. Plastic lumber used in exterior deck boards shall comply with the provisions of Section R319.5.

2. Add standard to Chapter 43 as follows:

ASTM

D 6662 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards

Reason: Wood plastic composites (covered by R319.4 and R502.1.7) are composites made of wood pulp (or cellulosic materials) and plastic, and so is plastic lumber. Parallel requirements are proposed for plastic lumber as exist for wood plastic composites in the code for use as exterior deck boards. The principal difference between wood plastic composites and plastic lumber is the fraction of plastic material included. ASTM D 7032, Standard Specification for Establishing Performance Ratings For Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails), addresses wood plastic composites, while ASTM D 6662, Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards, addresses plastic lumber (which has at least 50% plastic). Both standards include all needed requirements in terms of fire properties and in terms of physical properties for use as decking materials. In both standards the fire test requirement is that the composite material must meet a flame spread index of 200 when tested in accordance with ASTM E 84, which is the same as wood decking must meet. In fact, ASTM D 6662 has an additional requirement over ASTM D 7032: it states that plastic lumber test specimens must be self-supporting specimens, meaning that they must remain in place during the test. The wording is:" The test specimen shall either be self-supporting by its own structural characteristics or held in place by added supports along the test specimen surface." ASTM D 6662 also has requirements for flexural testing and for checking that the properties are retained after exposure to water and to light (including ultraviolet light).

The definition of plastic lumber has been taken word by word from ASTM D 6662.

Cost Impact: This proposal should not affect the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 6662, 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

RB123–07/08

R502.2.2.1, Table R502.2.2.1

Proponent: Edward L. Keith, APA – The Engineered Wood Association

Revise as follows:

R502.2.2.1 (Supp) Deck ledger connection to band joist. For decks supporting a total design load of 50 psf (40 psf live load plus 10 psf dead load), the connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir or approved decay-resistant species, and a 2-inch (51 mm) nominal lumber or a minimum 1-inch thick engineered wood band joist bearing on a sill plate or wall plate shall be constructed with ½-inch lag screws or bolts with washers in accordance with Table R502.2.2.1. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel.

TABLE R502.2.2.1 (Supp)
FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND A 2-INCH NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST[c,f, g]
(Deck Live Load = 40 psf, Deck Dead Load = 10 psf)
(No change to table)

For SI: 1 inch = 25.4, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kN/m^2.

a. through e. (No change)

f. When solid-sawn pressure-preservative-treated deck ledgers are attached to engineered wood products (structural composite lumber, ~~rimboard or~~ laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.

g. and h. (No change)

Reason: The purpose of this code change is to clarify and correct the language of the code. It will add the minimum thickness requirement for an engineered wood band joist to Section R502.2.2.1. Note that engineered wood band joists are permitted and covered in footnote f of the table referenced in the section.

Engineered wood band joists vary in thickness from 1 to 1-1/4 inches. ICC-ES Acceptance Criteria AC124 specifies the minimum band joist thickness to be 1 inch. Footnote f of Table R502.2.2.1, referenced in the section, requires connection details using engineered wood products to be designed.

This change proposal also adds "wood structural panel" to the list of engineered wood band joist materials. Wood structural panel band joist products are one of the most commonly types used band joist products used in construction today. It is important to note that all engineered wood band joist products are qualified to exactly the same standard regardless of type. This testing includes lag screw capacity *specifically* designed to address ledger attachment, as shown on pages 4 through 7 of the ICC Building Safety Journal, December 2005.

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

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

RB124–07/08
R502.7

Proponent: Dennis Pitts, American Forest and Paper Association

Revise as follows:

R502.7 Lateral restraint at supports. Joists shall be supported laterally at the ends by full-depth solid blocking not less than 2 inches (51 mm) nominal in thickness; or by attachment to a full-depth header, band or rim joist, or to an adjoining stud or shall be otherwise provided with lateral support to prevent rotation.

Exceptions:

1. Trusses, structural composite lumber, structural glued-laminated members and I-joists shall be supported laterally as required by the manufacturer's recommendations.
2. In Seismic Design Categories D0, D1 and D2, lateral restraint shall also be provided at each intermediate support.

R502.7.1 Bridging. Joists exceeding a nominal 2 inches by 12 inches (51 mm by 305 mm) shall be supported laterally by solid blocking, diagonal bridging (wood or metal), or a continuous 1-inch-by-3-inch (25.4 mm by 76 mm) strip nailed across the bottom of joists perpendicular to joists at intervals not exceeding 8 feet (2438 mm).

Exception: Trusses, structural composite lumber, structural glued-laminated members and I-joists shall be supported laterally as required by the manufacturer's recommendations.

Reason: The requirements pertaining to lateral restraint in this section of the IRC are intended to address solid-sawn joists. Engineered wood products such as those specified in the proposed exceptions may require restraint in different ways. The recommendations of the manufacturer will address those situations.

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

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

RB125–07/08
R202

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

Add new definitions as follows:

BUILDING DESIGNER. Owner of the building or the person that contracts with the owner for the design of the framing structural system and/or who is responsible for the preparation of the construction documents. When mandated by the legal requirements, the building designer shall be a registered design professional.

Diagonal bracing. 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. 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. Also known as continuous lateral brace or CLB. 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.

PERMANENT BUILDING STABILITY BRACING. Lateral force resisting system for the building that resists forces from gravity, wind, seismic and/or other loads.

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.

STRUCTURAL ELEMENT. Single structural member (other than a truss) that is specified in the construction documents.

TRUSS DESIGN DRAWING. Written, graphic and pictorial depiction of an individual truss that includes the information required in sections R502.11.2 and R802.10.2

TRUSS DESIGNER. Person responsible for the preparation of the truss design drawings.

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

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.

Reason: To include definitions of key terms used in Sections R502.11 and R802.10 and harmonize with state of the art industry terminology.
The proposed definitions add clarity and understanding to the key terms used in Sections R502.11 and R802.10 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

RB126–07/08
R502.12.1

Proponent: Dominique Janssens, Structural Board Association

Revise as follows:

R502.12.1 Materials. Draftstopping materials shall not be less than ½-inch (12.7 mm) gypsum board, 3/8-inch (9.5 mm) wood structural panels, ~~3/8-inch (9.5 mm) Type 2-M-W particleboard~~ or other approved materials adequately supported. Draftstopping shall be installed parallel to the floor framing members unless otherwise approved by the building official. The integrity of the draftstops shall be maintained.

Reason: This section refers to a type of particleboard that is no longer available. Type 2-M-W was a grade designation for waferboard when it was first introduced in the codes in the seventies, and was added as a special grade of particleboard in the ANSI A208.1 Particleboard standard at that time (1979). The current 1999 version of that standard no longer refers to this grade (2-M-W). Waferboard is a type of wood structural panel currently referenced in two standards such as DOC PS-2, CSA O325 or CSA O437. There is no need to refer to Type 2-M-W particleboard, since the previous part of the clause. i.e. 3/8-inch (9.5 mm) wood structural panels adequately captures all types of wood structural panels including waferboard.

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

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

RB127–07/08
R505, M1308.1, M2101.6, P2603.2, Chapter 43

Proponent: Bonnie Manley, American Iron and Steel Institute

1. Revise as follows:

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18,288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span, and ~~not greater~~ less than ~~two~~ or equal to three stories in height. Cold-formed Steel floor 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 (3.35 kPa).

R505.1.2 In-line framing. When supported by cold-formed steel framed walls in accordance with Section R603, cold-formed steel floor framing shall be constructed with floor joists located ~~directly~~ in-line with load-bearing studs located below the joists in accordance with Figure R505.1.2 and the tolerances specified as follows:

1. ~~with a~~ The maximum tolerance shall be ~~of~~ 3/4 inch (19.1 mm) between the centerline of the horizontal framing member and the centerline of the vertical framing member ~~between the center lines of the joist and the stud~~
2. Where the centerline of the horizontal framing member and bearing stiffener are located to one side of the centerline of the vertical framing member, the maximum tolerance shall be 1/8 inch (3 mm) between the web of the horizontal framing member and the edge of the vertical framing member.

R505.1.3 Floor trusses. ~~The design, quality assurance, installation and testing of~~ Cold-formed steel trusses shall be designed, braced and installed in accordance with the ~~AISI Standard for Cold-formed Steel Framing-Truss Design (COFS/Truss)~~AISI S100, Section D4. Truss members shall not be notched, cut or altered in any manner without an approved design.

R505.2 Structural framing. Load-bearing floor framing members shall comply with Figure R505.2(1) and with the dimensional and minimum thickness requirements specified in Tables R505.2(1) and R505.2(2). Tracks shall comply with Figure R505.2(2) and shall have a minimum flange width of 11/4 inches (32 mm). The maximum inside bend radius for members shall be the greater~~larger~~ of 3/32 inch (2.4 mm) or twice the ~~uncoated~~ base steel thickness. ~~Holes in joist webs shall comply with all of the following conditions:~~

~~1. Holes shall conform to Figure R505.2(3);~~
~~2. Holes shall be permitted only along the centerline of the web of the framing member;~~
~~3. Holes shall have a center-to-center spacing of not less than 24 inches (610 mm);~~
~~4. Holes shall have a web hole width not greater than 0.5 times the member depth, or 21/2 inches (64.5 mm);~~
~~5. Holes shall have a web hole length not exceeding 41/2 inches (114 mm); and~~
~~6. Holes shall have a minimum distance between the edge of the bearing surface and the edge of the web hole of not less than 10 inches (254 mm).~~

~~Framing members with web holes not conforming to the above requirements shall be patched in accordance with Section R505.3.6 or designed in accordance with accepted engineering practices.~~

R505.2.1 Material. Load-bearing cold-formed steel framing members ~~used in steel floor construction~~ shall be cold-formed to shape from structural quality sheet steel complying with the requirements of one of the following:

1. ASTM A 653: Grades 33, ~~37, 40~~ and 50 (Class 1 and 3).
2. ASTM A 792: Grades 33, ~~37, 40~~ and 50A.
3. ~~ASTM A 875: Grades 33, 37, 40 and 50 (Class 1 and 3).~~
4. ASTM A 1003: Structural Grades 33 Type H, ~~37, 40~~ and 50 Type H.

R505.2.2 Identification. Load-bearing cold-formed steel framing members shall have a legible label, stencil, stamp or embossment with the following information as a minimum:

1. Manufacturer's identification.
2. Minimum ~~uncoated~~ base steel thickness in inches (mm).
3. Minimum coating designation.
4. Minimum yield strength, in kips per square inch (ksi) (kPa).

R505.2.3 Corrosion protection. Load-bearing cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.
3. ~~A minimum of GF 60 in accordance with ASTM A 875.~~

R505.2.4 Fastening requirements. Screws for steel-to-steel connections shall be installed with a minimum edge distance and center-to-center spacing of ~~0.5~~ 1/2 inch (12.7 mm), shall be self-drilling tapping, and shall conform to ~~SAE J78~~ASTM C1513. Floor sheathing shall be attached to cold-formed steel joists with minimum No. 8 self-drilling tapping screws that conform to ~~SAE J78~~ASTM C1513. Screws attaching floor-sheathing~~-~~ to~~-~~ cold-formed steel joists shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of 0.375 inch (9.5 mm). Gypsum board ceilings shall be attached to cold-formed steel joists with minimum No. 6 screws conforming to ASTM C 954 or ASTM C1513 with a bugle head style and shall be installed in accordance with Section R702. For all connections, screws shall extend through the steel a minimum of three exposed threads. All ~~self-drilling tapping screws conforming to SAE J78~~fasteners shall have ~~a Type II coating in accordance with ASTM B 633~~rust inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.

Where No. 8 screws are specified in a steel-to-steel connection, the required number of screws in the connection is permitted to be reduced in accordance with the reduction factors in Table R505.2.4 when larger screws are used or when one of the sheets of steel being connected is thicker than 33 mils (0.84 mm). When applying the reduction factor, the resulting number of screws shall be rounded up.

2. Add new text as follows:

R505.2.5 Web holes, web hole reinforcing, and web hole patching. Web holes, web hole reinforcing, and web hole patching shall be in accordance with this section.

R505.2.5.1 Web holes. Web holes in floor joists shall comply with all of the following conditions:

1. Holes shall conform to Figure R505.2.5.1;
2. Holes shall be permitted only along the centerline of the web of the framing member;
3. Holes shall have a center-to-center spacing of not less than 24 inches (610 mm);
4. Holes shall have a web hole width not greater than 0.5 times the member depth, or 21/2 inches (64.5 mm);
5. Holes shall have a web hole length not exceeding 41/2 inches (114 mm); and
6. Holes shall have a minimum distance between the edge of the bearing surface and the edge of the web hole of not less than 10 inches (254 mm).

Framing members with web holes not conforming to the above requirements shall be reinforced in accordance with Section R505.2.5.2, patched in accordance with Section R505.2.5.3, or designed in accordance with accepted engineering practices.

R505.2.5.2 Web hole reinforcing. Web holes in floor joists not conforming to the requirements of Section R505.2.5.1 shall be permitted to be reinforced if the hole is located fully within the center 40 percent of the span and the depth and length of the hole does not exceed 65% of the flat width of the web. The reinforcing shall be a steel plate or C-shape section with a hole that does not exceed the web hole size limitations of Section R505.2.5.1 for the member being reinforced. The steel reinforcing shall be the same thickness as the receiving member and shall extend at least 1 inch (25.4 mm) beyond all edges of the hole. The steel reinforcing shall be fastened to the web of the receiving member with No.8 screws spaced no greater than 1 inch (25.4 mm) center-to-center along the edges of the patch with minimum edge distance of 1/2 inch (12.7 mm).

R505.2.5.3 Hole patching. Web holes in floor joists not conforming to the requirements in Section R505.2.5.1 shall be permitted to be patched in accordance with either of the following methods:

1. Framing members shall be replaced or designed in accordance with accepted engineering practices where web holes exceed the following size limits:
   1.1. The depth of the hole, measured across the web, exceeds 70 percent of the flat width of the web; or
   1.2. The length of the hole measured along the web, exceeds 10 inches (254 mm) or the depth of the web, whichever is greater.
2. Web holes not exceeding the dimensional requirements in Section R505.2.5.3, Item 1, shall be patched with a solid steel plate, stud section, or track section in accordance with Figure R505.2.5.3. The steel patch shall, as a minimum, be of the same thickness as the receiving member and shall extend at least 1 inch (25 mm) beyond all edges of the hole. The steel patch shall be fastened to the web of the receiving member with No.8 screws spaced no greater than 1 inch (25 mm) center-to-center along the edges of the patch with minimum edge distance of 1/2 inch (13 mm).

3. Revise as follows:

R505.3 Floor construction. Cold-formed steel floors shall be constructed in accordance with this section ~~and Figure R505.3~~.

R505.3.1 Floor to foundation or load-bearing wall connections. Cold-formed steel framed floors shall be anchored to foundations, wood sills or load-bearing walls in accordance with Table R505.3.1(1) and Figure R505.3.1(1), R505.3.1(2), R505.3.1(3), R505.3.1(4), R505.3.1(5) or R505.3.1(6). Anchor bolts shall be located not more than 12 inches (305 mm) from corners or the termination of bottom tracks. Continuous cold-formed steel joists supported by interior load-bearing walls shall be constructed in accordance with Figure R505.3.1(7). Lapped cold-formed steel joists shall be constructed in accordance with Figure R505.3.1(8). End floor joists constructed on foundation walls parallel to the joist span shall be doubled unless a C-shaped bearing stiffener, sized in accordance with Section R505.3.4, is installed web-to-web with the floor joist beneath each supported wall stud, as shown in Figure R505.3.1(9). Fastening of cold-formed steel joists to other framing members shall be in accordance with Section R505.2.4 and Table R505.3.1(2).

4. Delete and substitute as follows:

R505.3.2 ~~Allowable joist spans~~Minimum floor joist sizes. ~~The clear span of cold-formed steel floor joists shall not exceed the limits set forth in Tables R505.3.2(1), R505.3.2(2), and R505.3.2(3). Floor joists shall have a minimum bearing length of 1.5 inches (38 mm). When continuous joists are used, the interior bearing supports shall be located within 2 feet (610mm) of mid span of the steel joists, and the individual spans shall not exceed the span in Tables R505.3.2(2) and R505.3.2(3). Bearing stiffeners shall be installed at each bearing location in accordance with Section R505.3.4 and as shown in Figure R505.3.~~ Floor joist size and thickness shall be determined in accordance with the limits set forth in Table R505.3.2(1) for single spans, and Tables R505.3.2(2) and R505.3.2(3) for multiple spans. When continuous joist members are used, the interior bearing supports shall be located within two feet (0.61 m) of mid-span of the cold-formed steel joists, and the individual spans shall not exceed the spans in Table R505.3.2(2) or R505.3.2(3) as applicable. Floor joists shall have a bearing support length of not less than 1.5 inches (38 mm) for exterior wall supports and 3.5 inches (89 mm) for interior wall supports. Tracks shall be a minimum of 33 mils (0.84 mm) thick except when used as part of floor header or trimmer in accordance with Section R505.3.8. Bearing stiffeners shall be installed in accordance with Section R505.3.4

~~Blocking is not required for continuous back-to-back floor joists at bearing supports. Blocking shall be installed between the joists for single continuous floor joists across bearing supports. Blocking shall be spaced at a maximum of 12 feet (3660 mm) on center. Blocking shall consist of C-shape or track section with a minimum thickness of 33 mils (0.84 mm). Blocking shall be fastened to each adjacent joist through a 33-mil (0.84 mm) clip angle, bent web of blocking or flanges of web stiffeners with two No. 8 screws on each side. The minimum depth of the blocking shall be equal to the depth of the joist minus 2 inches (51 mm). The minimum length of the angle shall be equal to the depth of the joist minus 2 inches (51 mm).~~

5. Revise as follows:

R505.3.3 Joist bracing and blocking. Joist bracing and blocking shall be in accordance with this section.

R505.3.3.1 Joist top flange bracing. The top flanges of cold-formed steel joists shall be laterally braced by the application of floor sheathing fastened to the joists in accordance with Section R505.2.4 and Table R505.3.1(2).

R505.3.3.2 Joist bottom flange bracing/blocking. Floor joists with spans that exceed 12 feet (3658 mm) shall have the bottom flanges laterally braced in accordance with one of the following:

1. Gypsum board installed with minimum No. 6 screws in accordance with Section R702.
2. Continuous steel straps~~sping~~ installed in accordance with Figure R505.3.3.2(1). Steel straps shall be spaced at a maximum of 12 feet (3.66 m) on center and shall be at least 1.5 inches (38 mm) in width and 33 mils (0.84 mm) in thickness. Straps shall be fastened to the bottom flange ~~at~~ of each joist with ~~at least~~ one No. 8 screw~~,and shall be~~ fastened to blocking with ~~at least~~ two No. 8 screws, and fastened at each end (of strap) with two No. 8 screws. Blocking in accordance with Figure R505.3.3.2(1) or Figure R505.3.3.2(2)~~or bridging (X-bracing)~~ shall be installed between joists ~~in line with straps~~ at each end of the continuous strapping and at a maximum spacing of 12 feet (3658 mm) measured along the continuous strapping (perpendicular to the joist run). Blocking shall also be located ~~and~~ at the termination of all straps. As an alternative to blocking at the ends, the strap shall be permitted to be anchored to a stable building component with two No. 8 screws.

6. Add new text as follows:

R505.3.3.3 Blocking at interior bearing supports. Blocking is not required for continuous back-to-back floor joists at bearing supports. Blocking shall be installed between every other joist for single continuous floor joists across bearing supports in accordance with Figure R505.3.1(7). Blocking shall consist of C-shape or track section with a minimum thickness of 33 mils (0.84 mm). Blocking shall be fastened to each adjacent joist through a 33-mil (0.84 mm) clip angle, bent web of blocking or flanges of web stiffeners with two No. 8 screws on each side. The minimum depth of the blocking shall be equal to the depth of the joist minus 2 inches (51 mm). The minimum length of the angle shall be equal to the depth of the joist minus 2 inches (51 mm).

R505.3.3.4 Blocking at cantilevers. Blocking shall be installed between every other joist over cantilever bearing supports in accordance with Figures R505.3.1(4), R505.3.1(5) or R505.3.1(6). Blocking shall consist of C-shape or track section with minimum thickness of 33 mils (0.84 mm). Blocking shall be fastened to each adjacent joist through bent web of blocking, 33 mil clip angle or flange of web stiffener with two No.8 screws at each end. The depth of the blocking shall be equal to the depth of the joist. The minimum length of the angle shall be equal to the depth of the joist minus 2 inches (51 mm). Blocking shall be fastened through the floor sheathing and to the support with three No.8 screws (top and bottom).

7. Delete and substitute as follows:

R505.3.4 Bearing stiffeners. ~~Bearing stiffeners shall be installed at all bearing locations for steel floor joists. A bearing stiffener shall be fabricated from a minimum33mil (0.84 mm) C-section or 43 mil (1.09 mm) track section. Each stiffener shall be fastened to the web of the joist with a minimum of four No. 8 screws equally spaced as shown in Figure R505.3.4. Stiffeners shall extend across the full depth of the web and shall be installed on either side of the web.~~ Bearing stiffeners shall be installed at each joist bearing location in accordance with this section, except for joists lapped over an interior support not carrying a load-bearing wall above. Floor joists supporting jamb studs with multiple members shall have two bearing stiffeners in accordance with Figure R505.3.4(1). Bearing stiffeners shall be fabricated from a C-shaped, track or clip angle member in accordance with the one of following:

1. C-shaped Bearing Stiffeners:
   - 1.1. Where the joist is not carrying a load-bearing wall above, the bearing stiffener shall be a minimum 33 mil (0.84 mm) thickness.
   - 1.2. Where the joist is carrying a load-bearing wall above, the bearing stiffener shall be at least the same designation thickness as the wall stud above.
2. Track Bearing Stiffeners:
   - 2.1. Where the joist is not carrying a load-bearing wall above, the bearing stiffener shall be a minimum 43 mil (1.09 mm) thickness.
   - 2.2. Where the joist is carrying a load-bearing wall above, the bearing stiffener shall be at least one designation thickness greater than the wall stud above.
3. Clip Angle Bearing Stiffeners: Where the clip angle bearing stiffener is fastened to both the web of the member it is stiffening and an adjacent rim track using the fastener pattern shown in Figure R505.3.4(2), the bearing stiffener shall be a minimum 2-inch x 2-inch (51 mm x 51 mm) angle sized in accordance with Tables R505.3.4(1),R505.3.4(2),R505.3.4(3), and R505.3.4(4).

The minimum length of a bearing stiffener shall be the depth of member being stiffened minus 3/8 inch (9.5 mm). Each bearing stiffener shall be fastened to the web of the member it is stiffening as shown in Figure R505.3.4(2). Each clip angle bearing stiffener shall also be fastened to the web of the adjacent rim track using the fastener pattern shown in Figure R505.3.4(2). No. 8 screws shall be used for C-shaped and track members of any thickness and for clip angle members with a designation thickness less than or equal to 54. No. 10 screws shall be used for clip angle members with a designation thickness greater than 54.

8. Revise as follows:

R505.3.5Cutting and notching. Flanges and lips of load-bearing cold-formed steel floor framing members shall not be cut or notched.

9. Delete without substitution:

~~**R505.3.6 Hole patching.** Web holes not conforming to the requirements in Section R505.2 shall be designed in accordance with one of the following:~~

1. ~~Framing members shall be replaced or designed in accordance with accepted engineering practices when web holes exceed the following size limits:~~
   ~~1.1. The depth of the hole, measured across the web, exceeds 70 percent of the flat width of the web; or~~
   ~~1.2. The length of the hole measured along the web, exceeds 10 inches (254 mm) or the depth of the web, whichever is greater.~~
2. ~~Web holes not exceeding the dimensional requirements in Section R505.3.6, Item 1, shall be patched with a solid steel plate, stud section, or track section in accordance with Figure R505.3.6. The steel patch shall, as a minimum, be of the same thickness as the receiving member and shall extend at least 1 inch (25 mm) beyond all edges of the hole. The steel patch shall be fastened to the web of the receiving member with No.8 screws spaced no greater than 1 inch (25 mm) center-to-center along the edges of the patch with minimum edge distance of ~~1/2~~ inch (13 mm).~~

10. Delete, substitute and renumber as follows:

R505.3.6~~7~~ Floor cantilevers. ~~Floor cantilevers shall not exceed 24 inches (610 mm) as illustrated in Figure R505.3. The cantilever back-span shall extend a minimum of 6 feet (1830 mm) within the building, and shall be fastened to a bearing condition in accordance with Section R505.3.1. Floor cantilevers shall be permitted only on the second floor of a two-story building or the first floor of a one-story building. Floor framing that is cantilevered and supports the cantilevered floor only shall consist of single joist members in accordance with Section R505.3.2. Floor framing that is cantilevered and supports the cantilevered floor and the roof framing load above shall consist of double joist members of the same size and material thickness as that for single joist members in accordance with Section R505.3.2, and shall be fastened web-to-web with minimum No. 8 screws at 24 inches (610 mm) maximum on-center spacing top and bottom. Built-up floor framing consisting of a C-section inside a track section, fastened at the top and bottom flanges by minimum No. 8 screws at 24 inches (610 mm) maximum on center spacing, is permitted in lieu of the web-to-web double joist method.~~ Floor cantilevers for the top floor of a two or three story building or the first floor of a one-story building shall not exceed 24 inches (610 mm). Cantilevers, not exceeding 24 inches (610 mm) and supporting two stories and roof (i.e., first floor of a two-story building), shall also be permitted provided that all cantilevered joists are doubled (nested or back-to-back). The doubled cantilevered joists shall extend a minimum of 6 feet (1.83 m) toward the inside and shall be fastened with a minimum of two No.8 screws spaced at 24 inches (610 mm) on center through the webs (for back-to-back) or flanges (for nested joists).

11. Revise as follows:

R505.3.7~~8~~ Splicing. Joists and other structural members shall not be spliced. Splicing of tracks shall conform with Figure R505.3.7~~8~~.

R505.3.8~~9~~ Framing of floor openings. Openings in floors ~~framing~~ shall be framed with header and trimmer joists. Header joist spans shall not exceed 6 feet (1830 mm) or 8 feet (2438 mm) in length in accordance with Figures R505.3.8(1) or R505.3.8(2), respectively. Header and trimmer joists shall be fabricated from joist and track members~~sections~~, ~~which shall be of~~ having a minimum size and thickness ~~as~~ at least equivalent to the adjacent floor joists and shall be installed in accordance with Figures ~~R505.3~~R505.3.8(1), R505.3.8(2), R505.3.8(3), and R505.3.8(4). Each header joist shall be connected to trimmer joists with ~~a minimum of~~ four 2-inch-by-2-inch (51mm by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The clip angles shall have a ~~steel~~ thickness not less than that of the floor joist. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous).

TABLE R505.2(2)
MINIMUM THICKNESS OF COLD-FORMED STEEL MEMBERS

DESIGNATION THICKNESS (mils)	MINIMUM BASE STEEL ~~UNCOATED~~ THICKNESS (inches)	~~REFERENCE GAGE NUMBER~~
33	0.0329~~3~~	~~20~~
43	0.0428~~3~~	~~18~~
54	0.0538~~4~~	~~16~~
68	0.0677~~8~~	~~14~~
97	0.0966	

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm.

12. Delete existing table and substitute as follows:

TABLE R505.3.1(1)
FLOOR TO FOUNDATION OR BEARING WALL CONNECTION REQUIREMENTS [a,b]

FRAMING CONDITION	BASIC WIND SPEED (mph) AND EXPOSURE	
	85 MPH EXPOSURE C OR LESS THAN 110MPH EXPOSURE A/B	LESS THAN 110 MPH EXPOSURE C
Floor joist to wall track of exterior wall per Figure R505.3.1(1)	2-No.8 screws	3-No.8 screws
Rim track or end joist to load-bearing wall top track per Figure R505.3.1(1)	1-No.8 screw at 24" o.c.	1-No.8 screw at 24" o.c.
Rim track or end joist to wood sill per Figure R505.3.1(2)	Steel plate spaced at 4' o.c. with 4-No.8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2' o.c. with 4-No.8 screws and 4-10d or 6-8d common nails
Rim track or end joist to foundation per Figure R505.3.1(3)	1/2" minimum diameter anchor bolt and clip angle spaced at 6' o.c. with 8-No.8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 4' o.c. with 8-No.8 screws
Cantilevered joist to foundation per Figure R505.3.1(4)	1/2" minimum diameter anchor bolt and clip angle spaced at 6' o.c. with 8-No.8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 4' o.c. with 8-No.8 screws
Cantilevered joist to wood sill per Figure R505.3.1(5)	Steel plate spaced at 4' o.c. with 4-No.8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2' o.c. with 4-No.8 screws and 4-10d or 6-8d common nails
Cantilevered joist to exterior load-bearing wall track per Figure R505.3.1(6)	2-No.8 screws	3-No.8 screws

For SI: 1 inch = 25.4 mm, 1 pounds per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm

[a] Anchor bolts are to be located not more than 12 inches (305 mm) from corners or the termination of bottom tracks (e.g. at door openings or corners). Bolts extend a minimum of 15 inches into masonry or 7 inches into concrete. Anchor bolts connecting cold-formed steel framing to the foundation structure are to be installed so that the distance from the center of the bolt hole to the edge of the connected member is not less than one and one-half bolt diameters.

[b] All screw sizes shown are minimum.

13. Revise as follows:

TABLE R505.3.2(1)
ALLOWABLE SPANS FOR COLD-FORMED STEEL JOISTS—SINGLE SPANS[a, b, c, d] 33 ksi STEEL

(No change to table contents)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
a. Deflection criteria: *L*/480 for live loads, *L*/240 for total loads.
b. Floor dead load = 10 psf.
c. Table provides the maximum clear span in feet and inches.
d. Bearing stiffeners are to be installed at all support points and concentrated loads.

TABLE R505.3.2(2)
ALLOWABLE SPANS FOR COLD-FORMED STEEL JOISTS—MULTIPLE SPANS[a, b, c, d, e, f] 33 ksi STEEL

(No change to table contents)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
a. Deflection criteria: *L*/480 for live loads, *L*/240 for total loads.
b. Floor dead load = 10 psf.
c. Table provides the maximum clear span in feet and inches to either side of the interior support.

d. Interior bearing supports for multiple span joists consist of structural (bearing) walls or beams.
e. Bearing stiffeners are to be installed at all support points and concentrated loads.
f. Interior supports shall be located within two feet (0.61 m) of mid span provided that each of the resulting spans does not exceed the appropriate maximum span shown in the table above.

TABLE R505.3.2(3)
ALLOWABLE SPANS FOR COLD-FORMED STEEL JOISTS—MULTIPLE SPANS [a, b, c, d, e, f] 50 ksi STEEL

(No change to table contents)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
a. Deflection criteria: *L*/480 for live loads, *L*/240 for total loads.
b. Floor dead load = 10 psf.
c. Table provides the maximum clear span in feet and inches to either side of the interior support.
d. Interior bearing supports for multiple span joists consist of structural (bearing) walls or beams.
e. Bearing stiffeners are to be installed at all support points and concentrated loads.
f. Interior supports shall be located within two feet (0.61 m) of mid span provided that each of the resulting spans does not exceed the appropriate maximum span shown in the table above.

14. Add new table as follows:

TABLE R505.3.4(1)
CLIP ANGLE BEARING STIFFENERS
20 psf Equivalent Snow Load

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH x 2-INCH (50.8 MM x 50.8 MM) CLIP ANGLE											
	TOP FLOOR				BOTTOM FLOOR IN 2 STORY MIDDLE FLOOR IN 3 STORY				BOTTOM FLOOR IN 3 STORY			
	JOIST SPACING (inches)				JOIST SPACING (inches)				JOIST SPACING (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	43	43	43	43	43	54	68	68	68	97	97	-
800S162-43	43	43	43	43	54	54	68	68	97	97	97	97
800S162-54	43	43	43	43	43	54	68	68	68	97	97	-
800S162-68	43	43	43	43	43	43	54	68	54	97	97	-
800S162-97	43	43	43	43	43	43	43	43	43	43	54	97
1000S162-43	43	43	43	43	54	68	97	97	97	-	-	-
1000S162-54	43	43	43	43	54	68	68	97	97	97	-	-
1000S162-68	43	43	43	43	54	68	97	97	97	-	-	-
1000S162-97	43	43	43	43	43	43	43	54	43	68	97	-
1200S162-43	43	54	54	54	97	97	97	97	-	-	-	-
1200S162-54	54	54	54	54	97	97	97	97	-	-	-	-
1200S162-68	43	43	54	54	68	97	97	97	-	-	-	-
1200S162-97	43	43	43	43	43	54	68	97	97	-	-	-

For SI: 1 in = 25.4 mm.

TABLE R505.3.4(2)
CLIP ANGLE BEARING STIFFENERS
30 psf Equivalent Snow Load

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH x 2-INCH (50.8 MM x 50.8 MM) CLIP ANGLE											
	TOP FLOOR				BOTTOM FLOOR IN 2 STORY MIDDLE FLOOR IN 3 STORY				BOTTOM FLOOR IN 3 STORY			
	JOIST SPACING (inches)				JOIST SPACING (inches)				JOIST SPACING (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	43	43	43	43	54	68	68	97	97	97	97	-
800S162-43	43	43	43	54	68	68	68	97	97	97	97	-
800S162-54	43	43	43	43	54	68	68	97	97	97	-	-
800S162-68	43	43	43	43	43	54	68	97	68	97	97	-
800S162-97	43	43	43	43	43	43	43	43	43	43	68	97
1000S162-43	54	54	54	54	68	97	97	97	97	-	-	-
1000S162-54	54	54	54	54	68	97	97	97	97	-	-	-
1000S162-68	43	43	54	68	68	97	97	-	97	-	-	-
1000S162-97	43	43	43	43	43	43	54	68	54	97	-	-
1200S162-43	54	68	68	68	97	97	97	-	-	-	-	-
1200S162-54	68	68	68	68	97	97	-	-	-	-	-	-
1200S162-68	68	68	68	68	97	97	97	-	-	-	-	-
1200S162-97	43	43	43	43	54	68	97	-	97	-	-	-

For SI: 1 in = 25.4 mm.

TABLE R505.3.4(3)
CLIP ANGLE BEARING STIFFENERS
50 psf Equivalent Snow Load

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH x 2-INCH (50.8 MM x 50.8 MM) CLIP ANGLE											
	TOP FLOOR				BOTTOM FLOOR IN 2 STORY MIDDLE FLOOR IN 3 STORY				BOTTOM FLOOR IN 3 STORY			
	JOIST SPACING (inches)				JOIST SPACING (inches)				JOIST SPACING (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	54	54	54	54	68	97	97	97	97	-	-	-
800S162-43	68	68	68	68	97	97	97	97	-	-	-	-
800S162-54	54	68	68	68	97	97	97	97	-	-	-	-
800S162-68	43	43	54	54	68	97	97	97	97	-	-	-
800S162-97	43	43	43	43	43	43	43	54	54	68	97	-
1000S162-43	97	68	68	68	97	97	97	97	-	-	-	-
1000S162-54	97	97	68	68	97	97	97	-	-	-	-	-
1000S162-68	68	97	97	97	97	-	-	-	-	-	-	-
1000S162-97	43	43	43	43	54	68	97	97	-	-	-	-
1200S162-43	97	97	97	97	-	-	-	-	-	-	-	-
1200S162-54	-	97	97	97	-	-	-	-	-	-	-	-
1200S162-68	97	97	97	97	-	-	-	-	-	-	-	-
1200S162-97	54	68	68	97	97	-	-	-	-	-	-	-

For SI: 1 in = 25.4 mm.

TABLE R505.3.4(4)
CLIP ANGLE BEARING STIFFENERS 70 psf Equivalent Snow Load

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH x 2-INCH (50.8 MM x 50.8 MM) CLIP ANGLE											
	TOP FLOOR				BOTTOM FLOOR IN 2 STORY MIDDLE FLOOR IN 3 STORY				BOTTOM FLOOR IN 3 STORY			
	JOIST SPACING (inches)				JOIST SPACING (inches)				JOIST SPACING (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	68	68	68	68	97	97	97	97	-	-	-	-
800S162-43	97	97	97	97	97	97	97	-	-	-	-	-
800S162-54	97	97	97	97	97	-	-	-	-	-	-	-
800S162-68	68	68	68	97	97	97	97	-	-	-	-	-
800S162-97	43	43	43	43	43	54	68	97	97	97	-	-
1000S162-43	97	97	97	97	-	-	-	-	-	-	-	-
1000S162-54	-	97	97	97	-	-	-	-	-	-	-	-
1000S162-68	97	97	-	-	-	-	-	-	-	-	-	-
1000S162-97	68	68	68	68	97	97	-	-	-	-	-	-
1200S162-43	97	97	97	97	-	-	-	-	-	-	-	-
1200S162-54	-	-	-	-	-	-	-	-	-	-	-	-
1200S162-68	-	-	-	-	-	-	-	-	-	-	-	-
1200S162-97	97	97	97	-	-	-	-	-	-	-	-	-

For SI: 1 in = 25.4 mm.

15. Add new figure as follows:

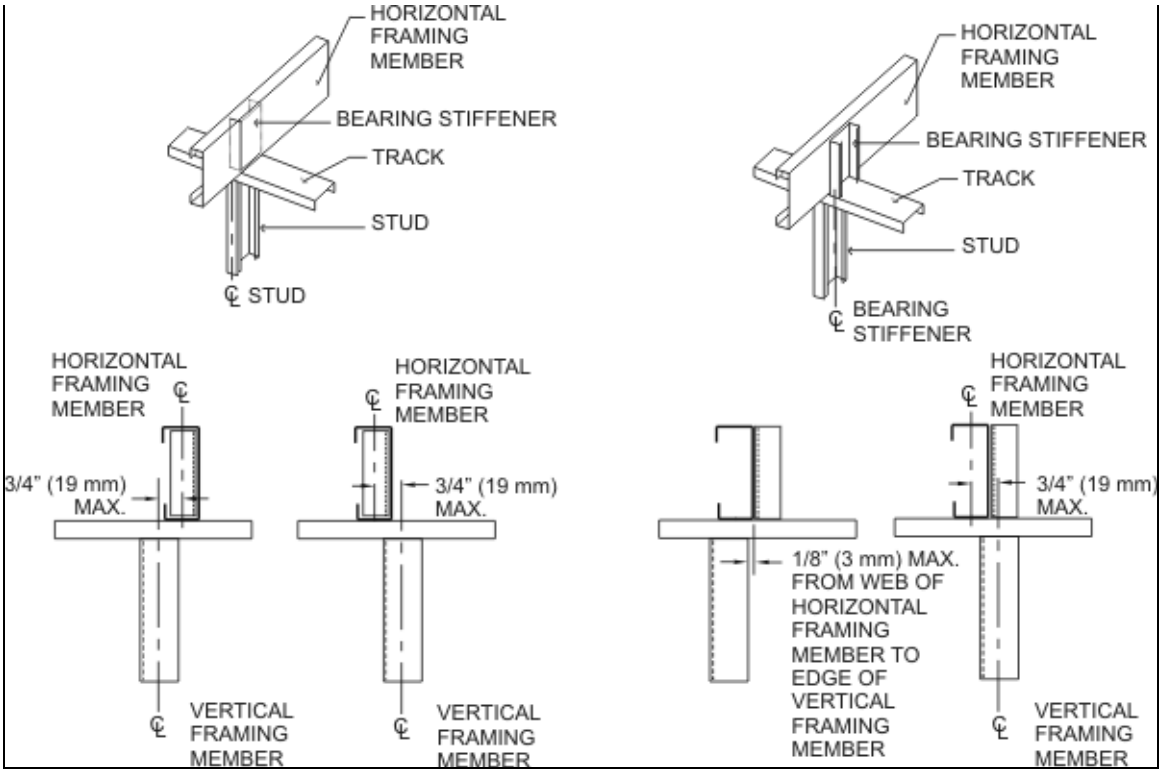


FIGURE R505.1.2
IN-LINE FRAMING

16. Revise as follows:

FIGURE R505.2(1)
C-SHAPED SECTION

(No change to figure)

FIGURE R505.2.5.1~~2(3)~~
FLOOR JOIST WEB HOLES

17. Add new figure as follows:

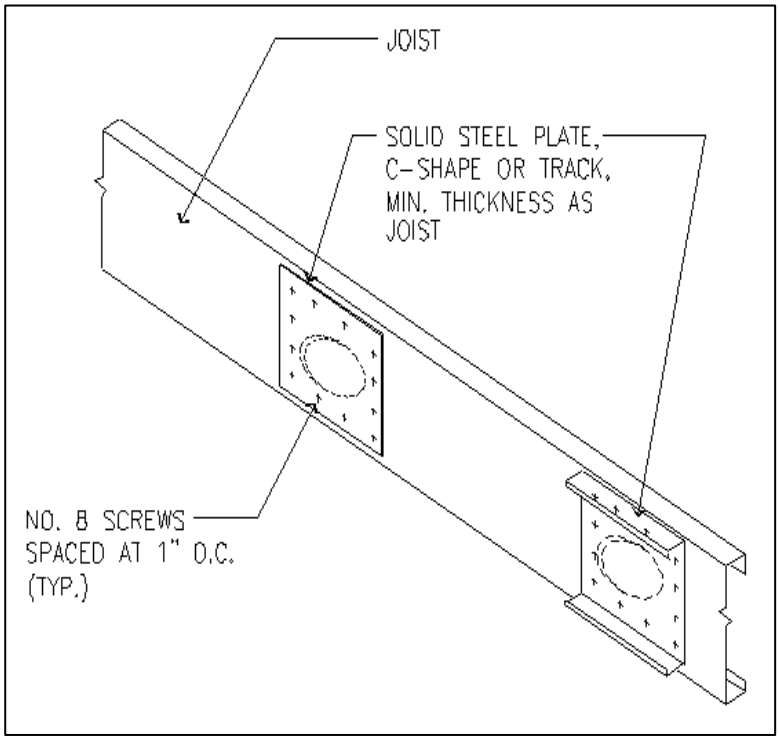


FIGURE R505.2.5.3
WEB HOLE PATCH

18. Delete without substitution:

~~**FIGURE R505.3**~~
~~**STEEL FLOOR CONSTRUCTION**~~

19. Delete existing Figure R505.3.1(1) through (8) and substitute as follows:

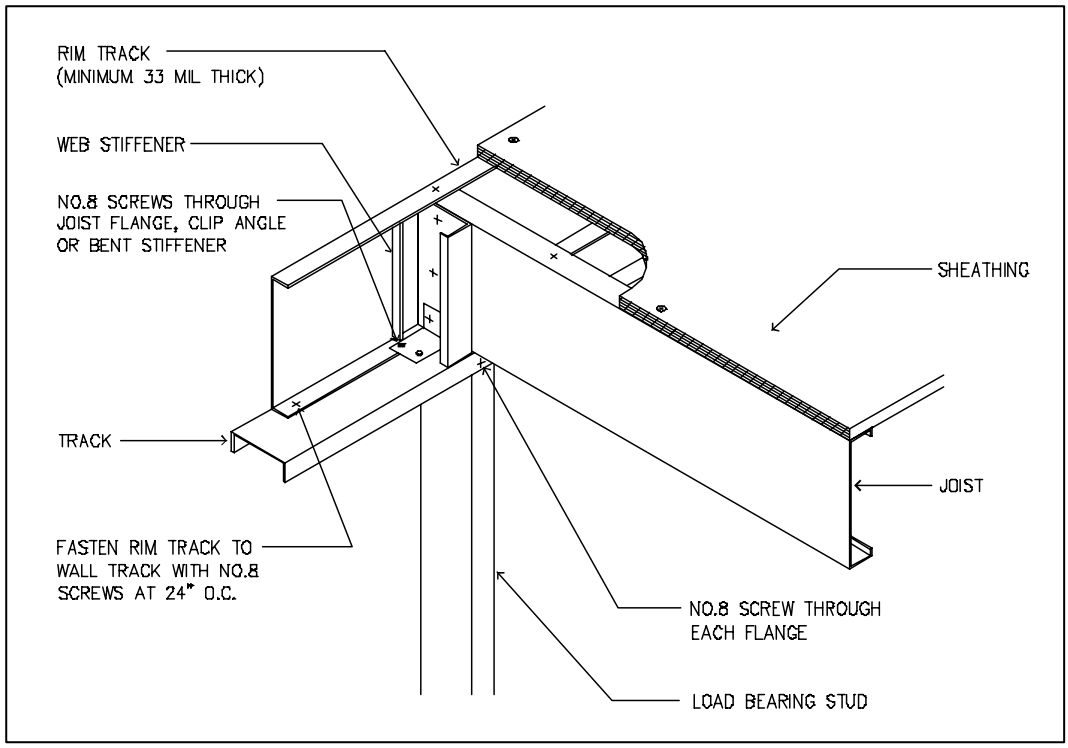


FIGURE R505.3.1(1)
FLOOR TO EXTERIOR LOAD-BEARING WALL STUD CONNECTION

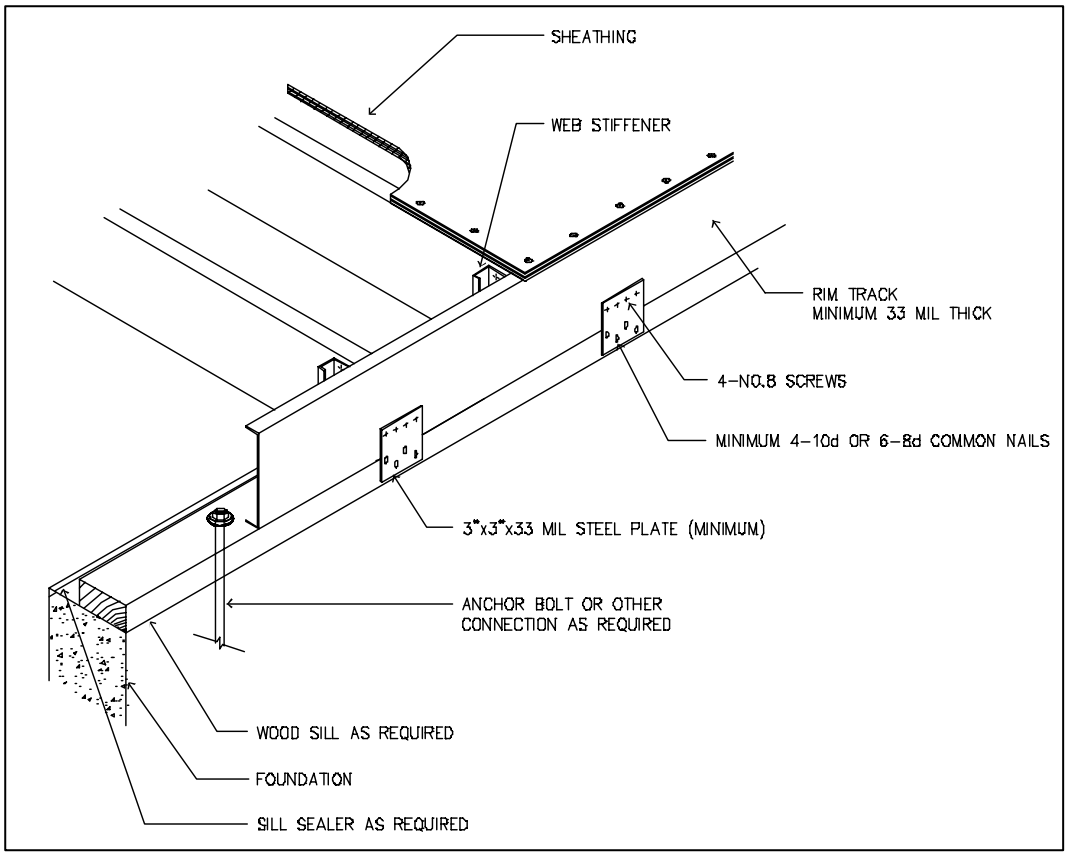


FIGURE R505.3.1(2)
FLOOR TO WOOD SILL CONNECTION

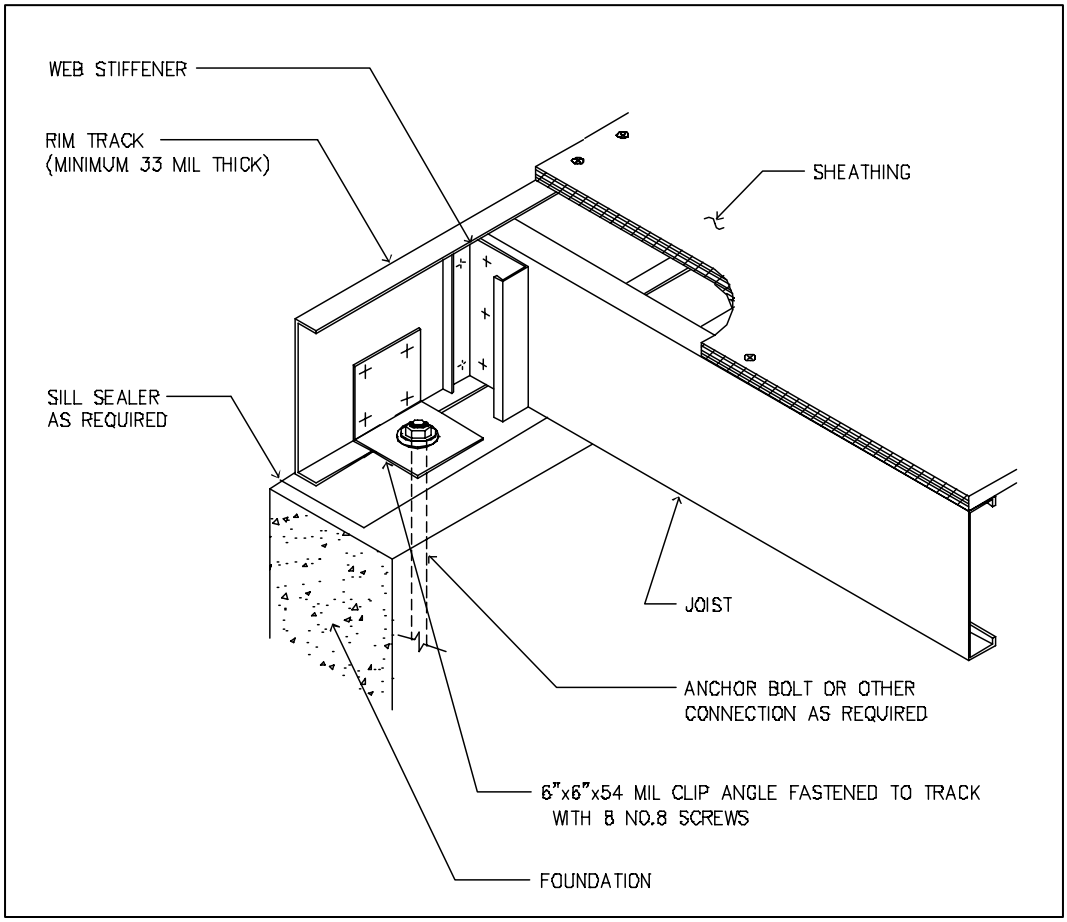


FIGURE R505.3.1(3)
FLOOR TO FOUNDATION CONNECTION

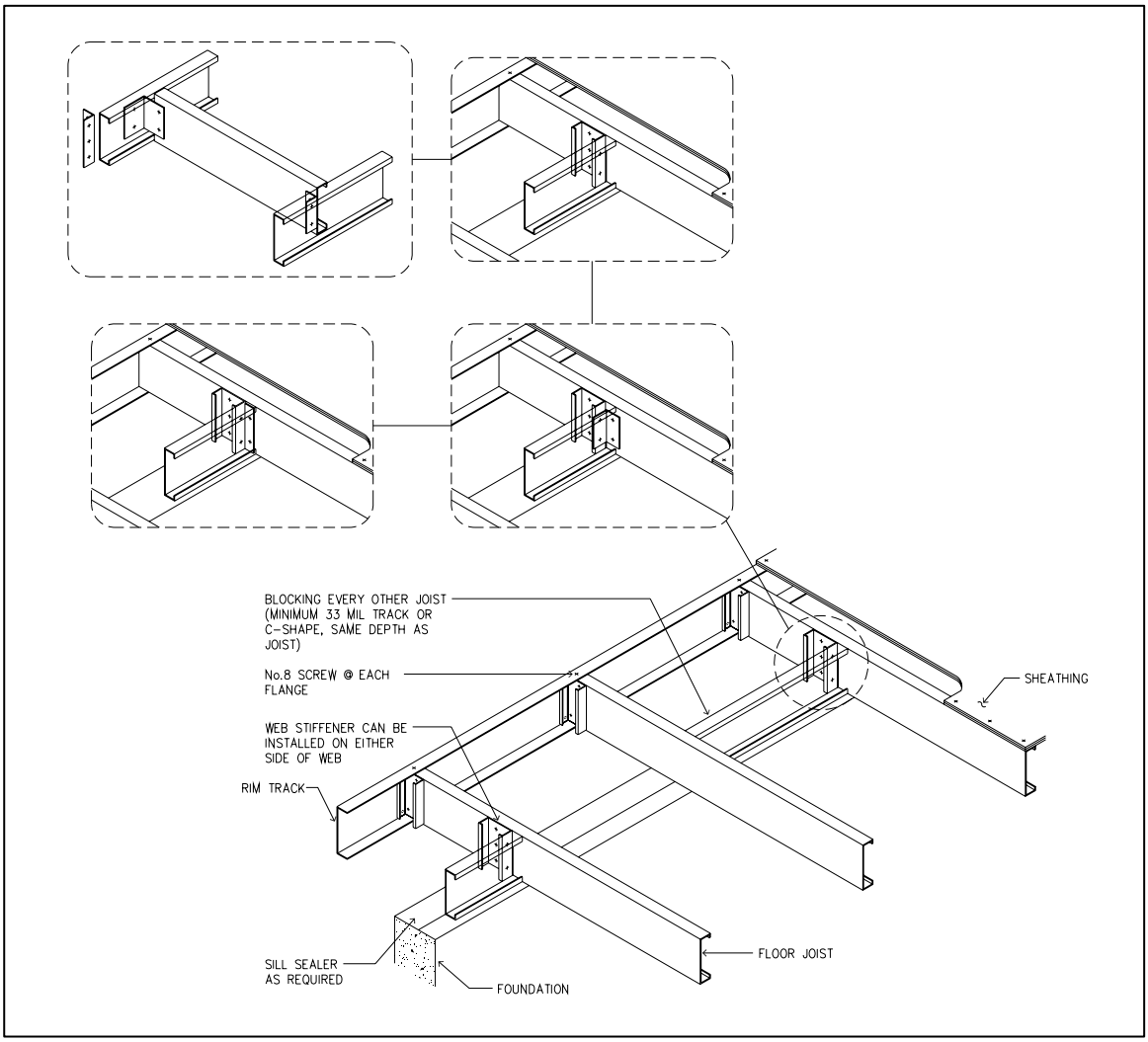


FIGURE R505.3.1(4)
CANTILEVERED FLOOR TO FOUNDATION CONNECTION

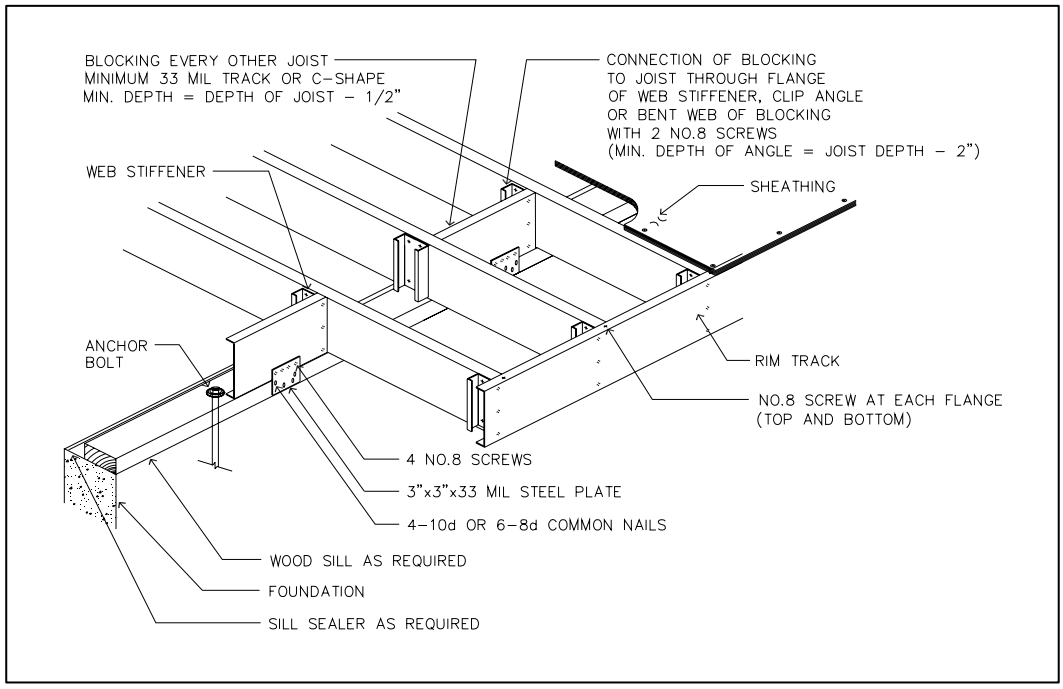


FIGURE R505.3.1(5)
CANTILEVERED FLOOR TO WOOD SILL CONNECTION

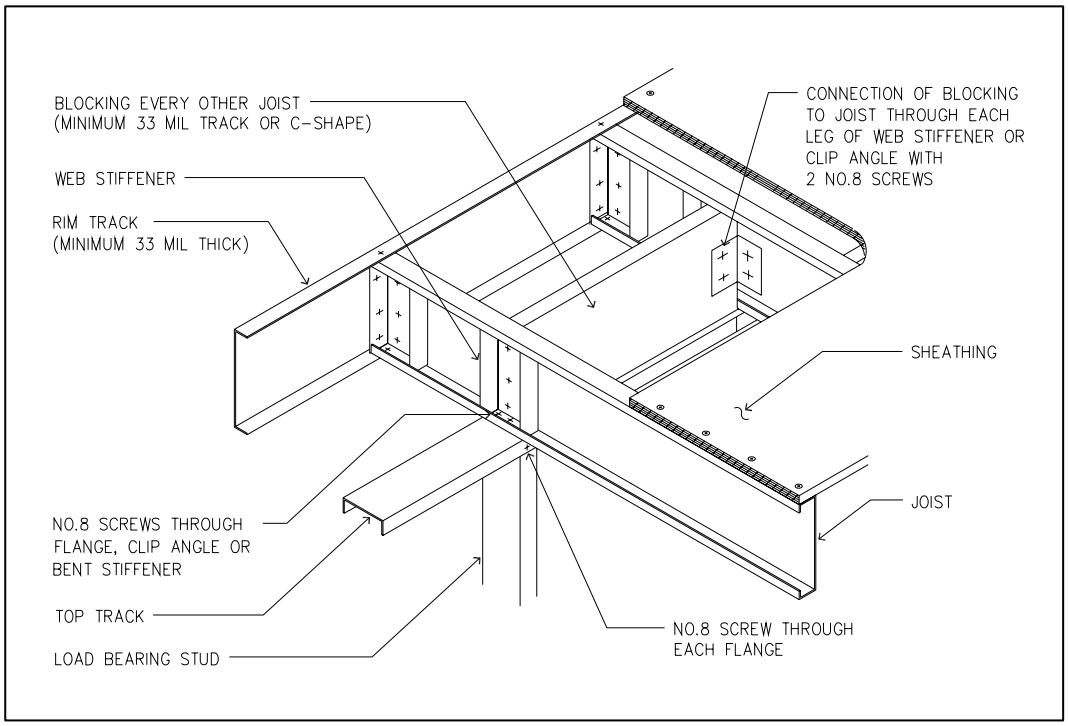


FIGURE R505.3.1(6)
CANTILEVERED FLOOR TO EXTERIOR LOAD-BEARING WALL CONNECTION

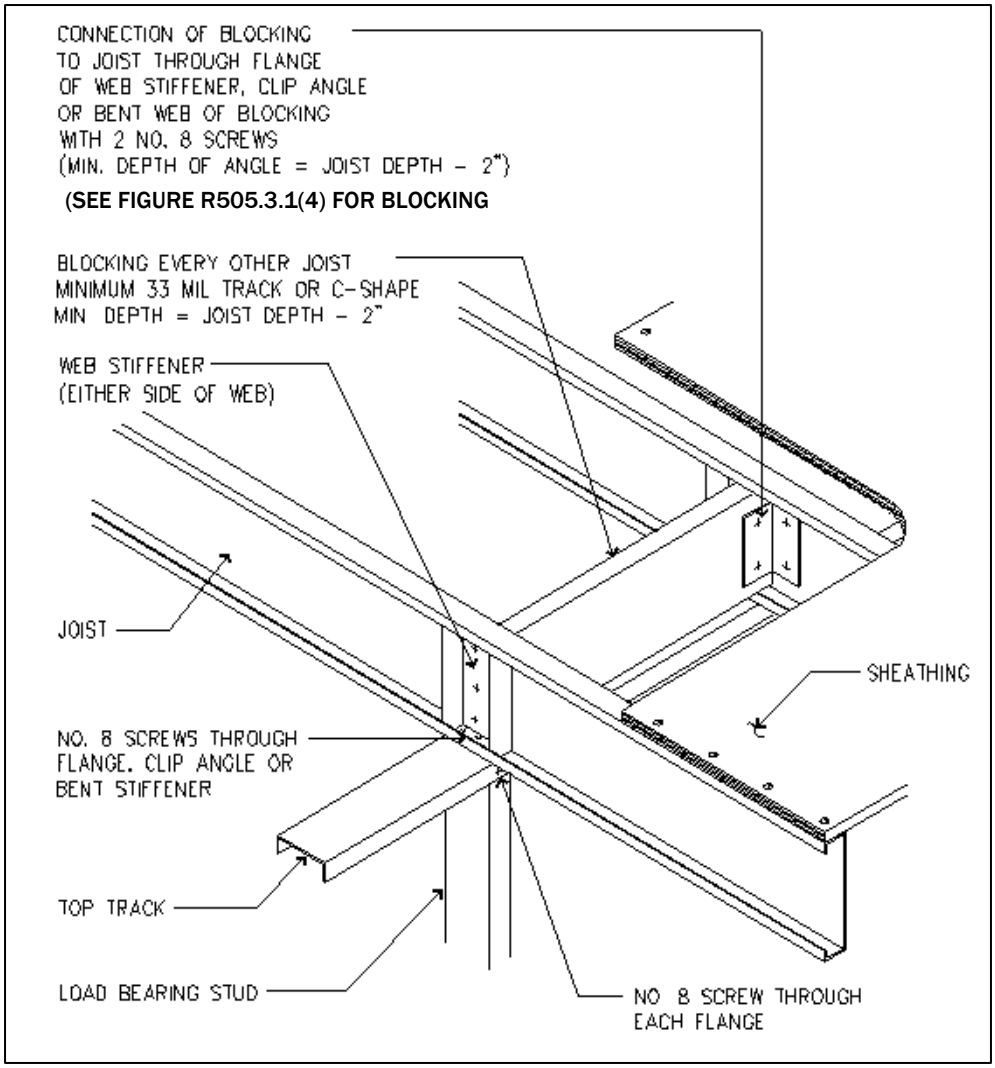


FIGURE R505.3.1(7)
CONTINUOUS SPAN JOIST SUPPORTED ON INTERIOR LOAD-BEARING WALL

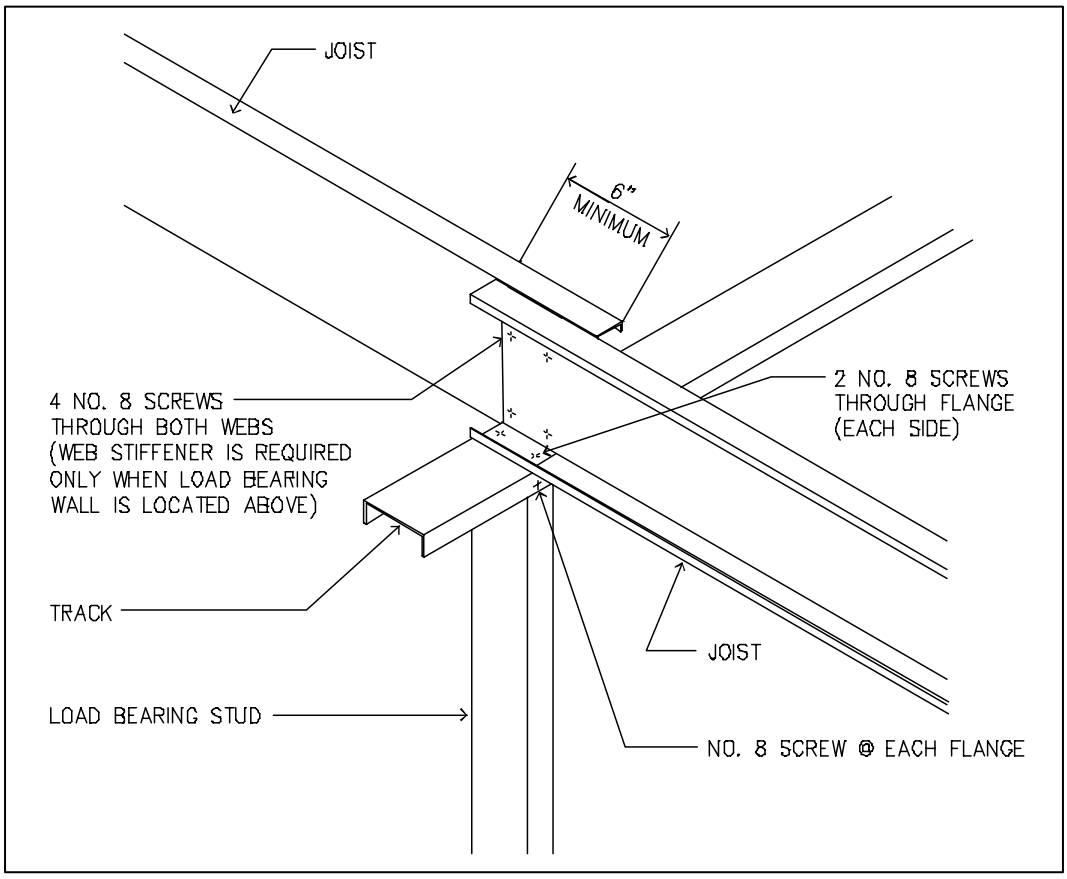


FIGURE R505.3.1(8)
LAPPED JOISTS SUPPORTED ON INTERIOR LOAD-BEARING WALL

20. Add new figures as follows:

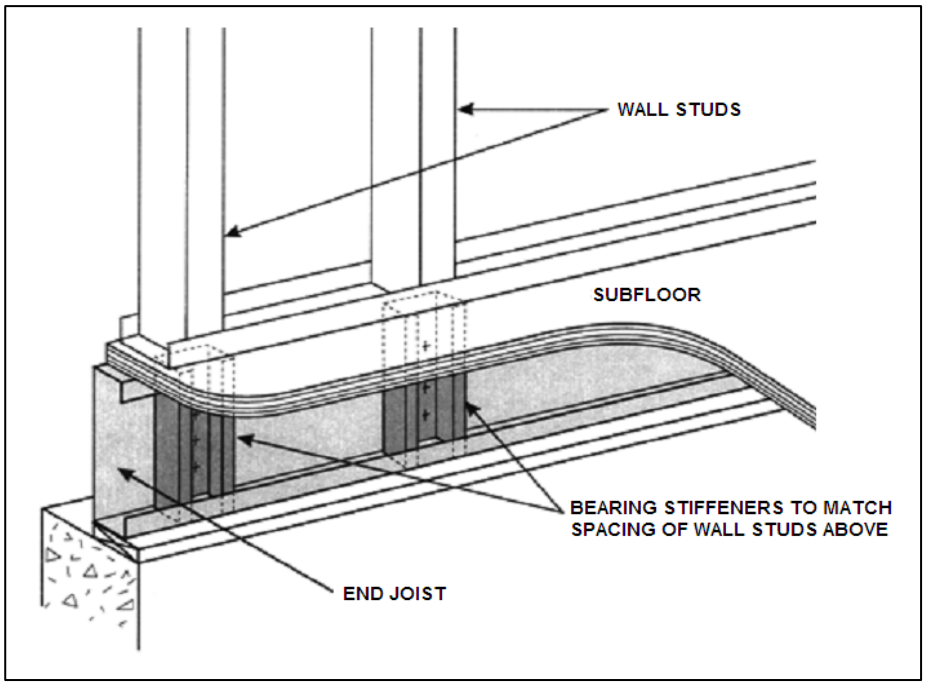


FIGURE R505.3.1(9)
BEARING STIFFENERS FOR END JOISTS

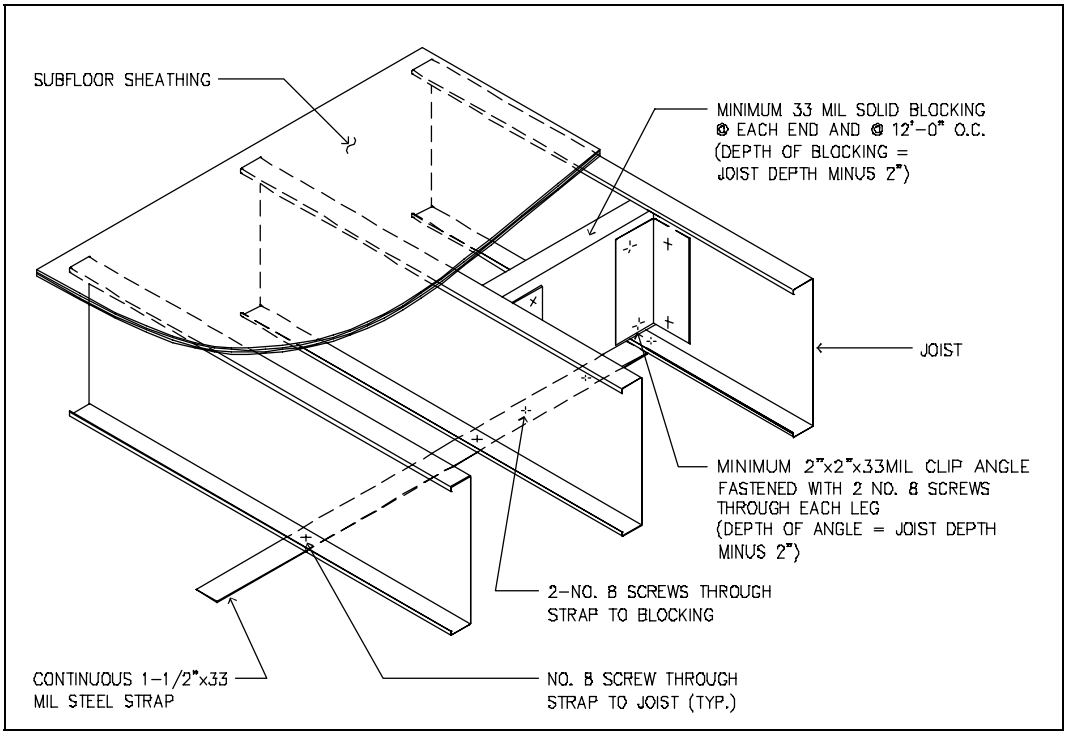


FIGURE R505.3.3.2(1)
JOIST BLOCKING (SOLID)

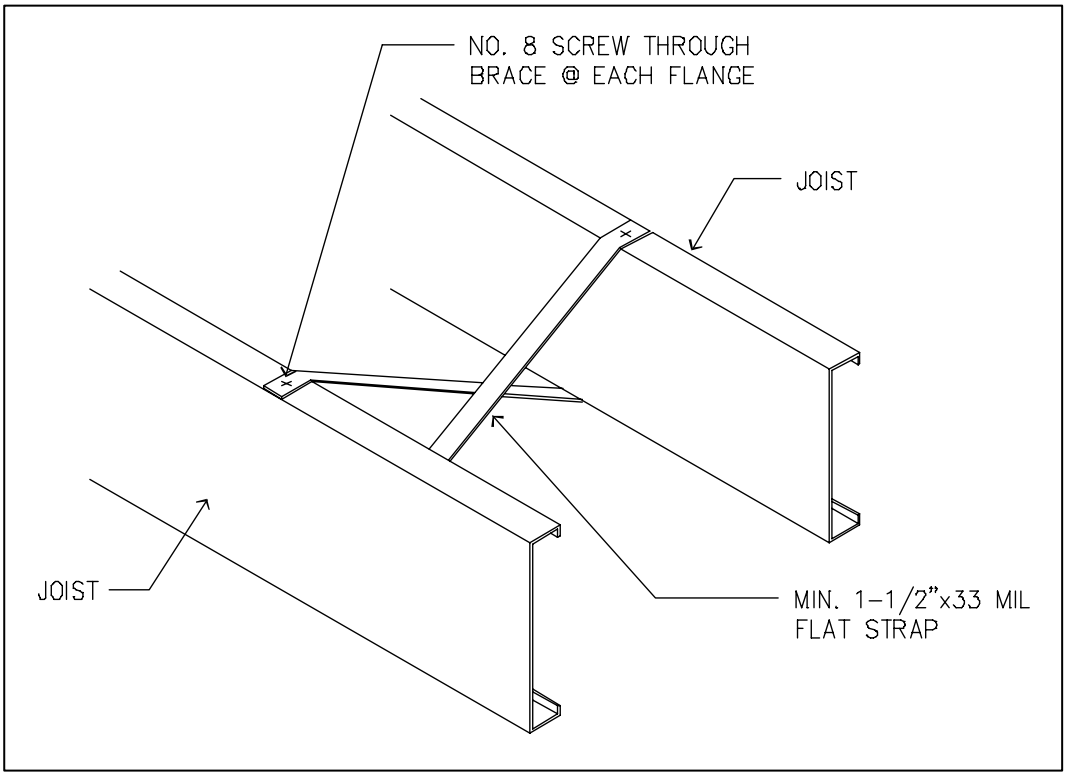


FIGURE R505.3.3.2(2)
JOIST BLOCKING (STRAP)

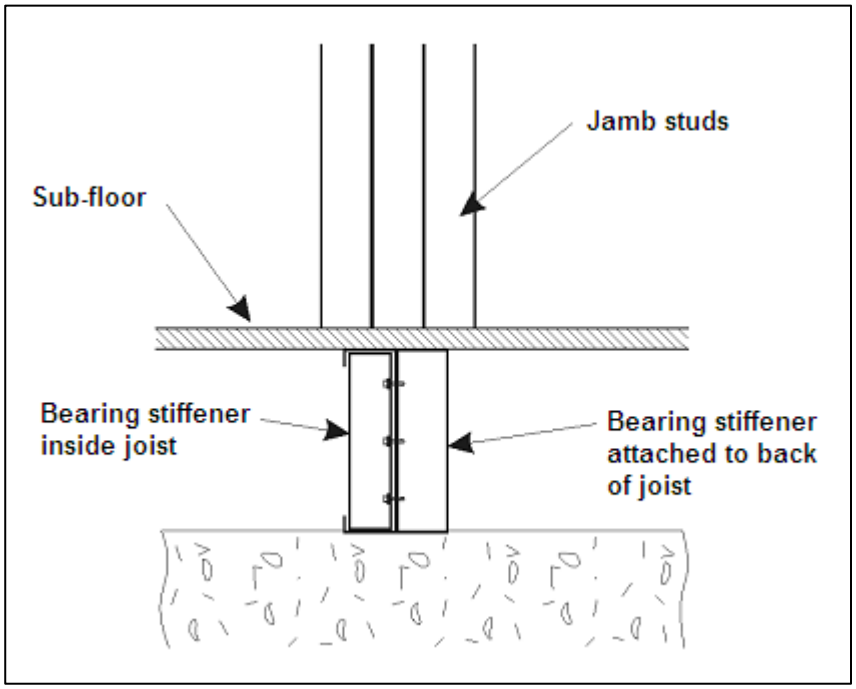


FIGURE R505.3.4(1)
BEARING STIFFENERS UNDER JAMB STUDS

21. Delete existing Figure R505.3.4(2) and replace as follows:

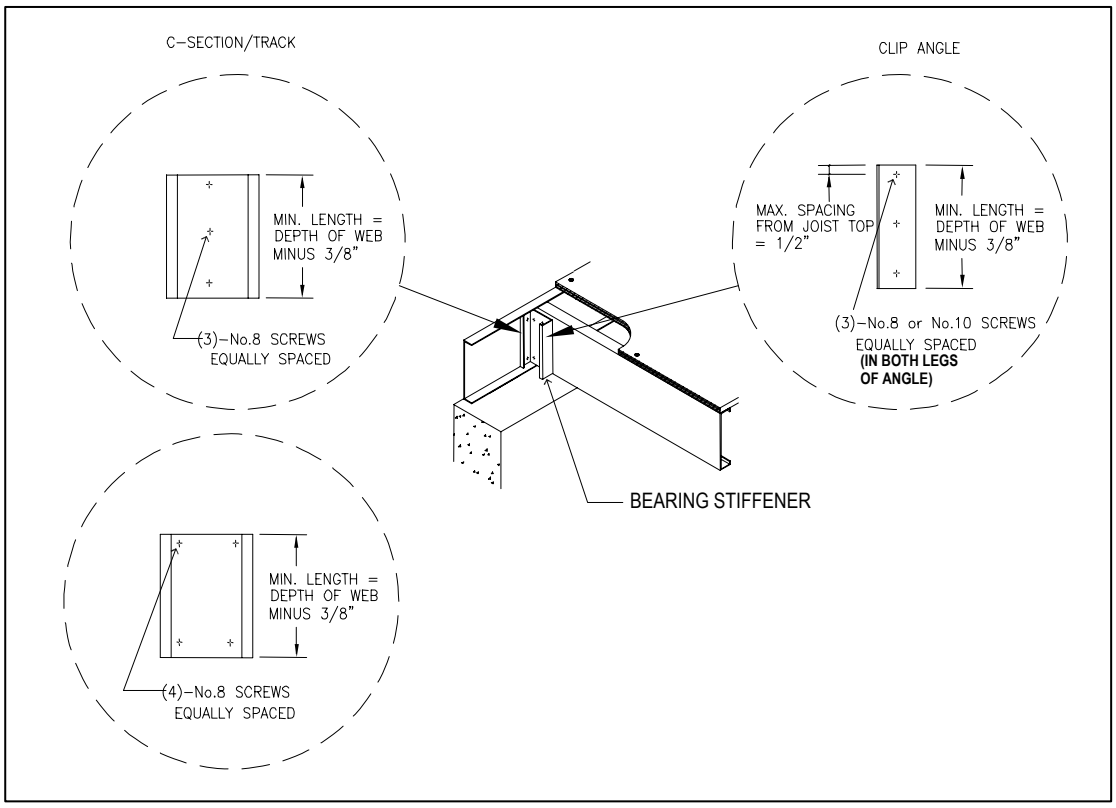


FIGURE R505.3.4(2)
BEARING STIFFENER

22. Delete without substitution:

~~**FIGURE R505.3.6**~~
~~**HOLE PATCH**~~

23. Delete existing Figure R505.3.8, renumber and replace as follows:

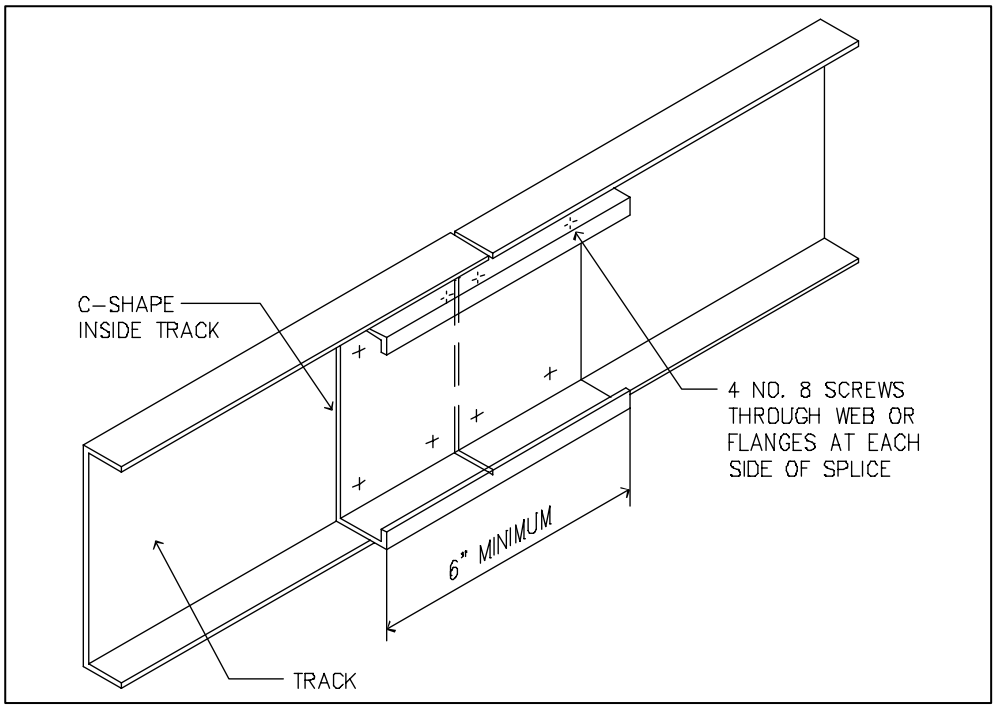


FIGURE R505.3.7~~8~~
TRACK SPLICE

24 Add new figures as follows:

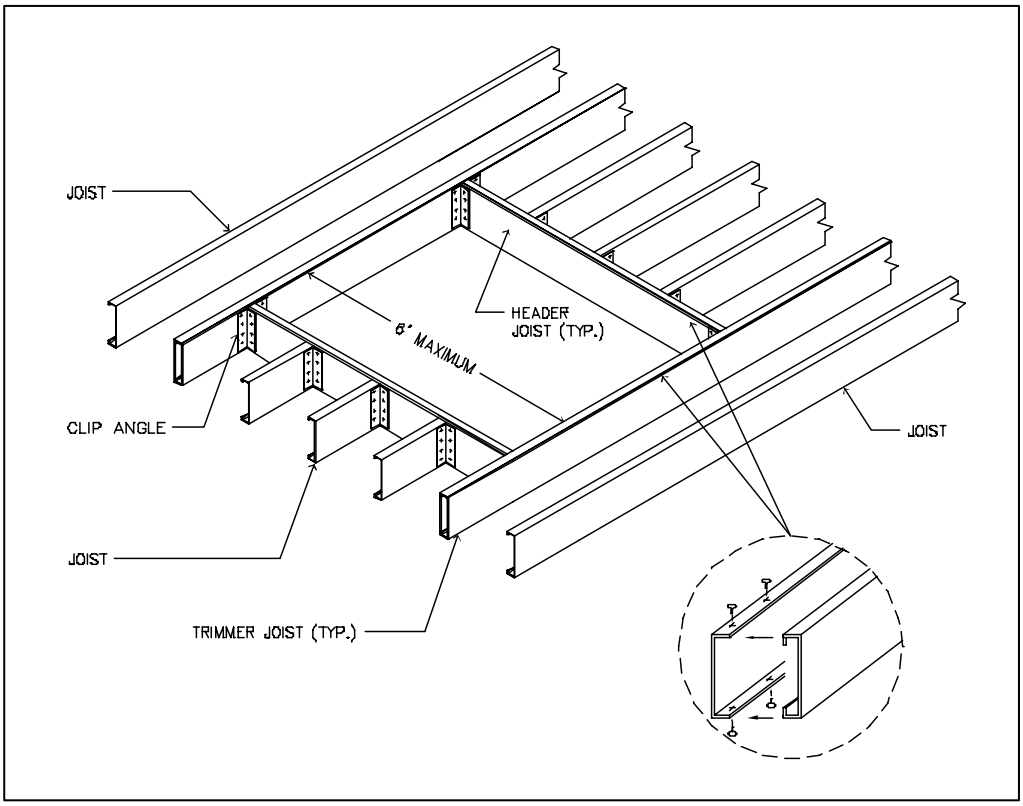


FIGURE R505.3.8(1)
COLD-FORMED STEEL FLOOR CONSTRUCTION: 6-FOOT FLOOR OPENING

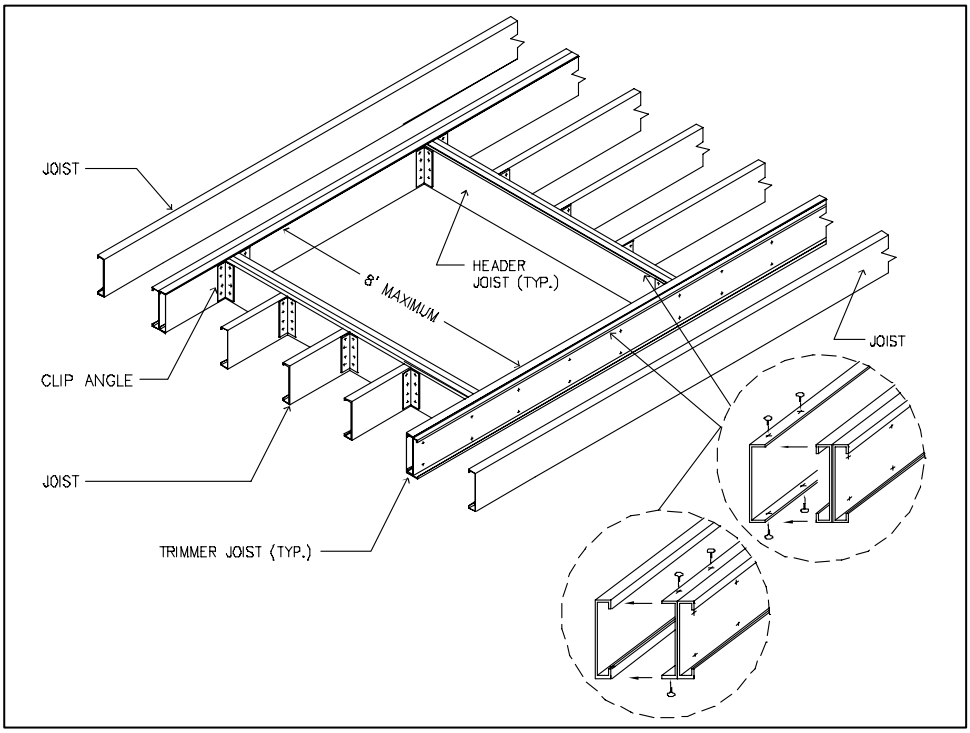


FIGURE R505.3.8(2)
COLD-FORMED STEEL FLOOR CONSTRUCTION; 8-FOOT FLOOR OPENING

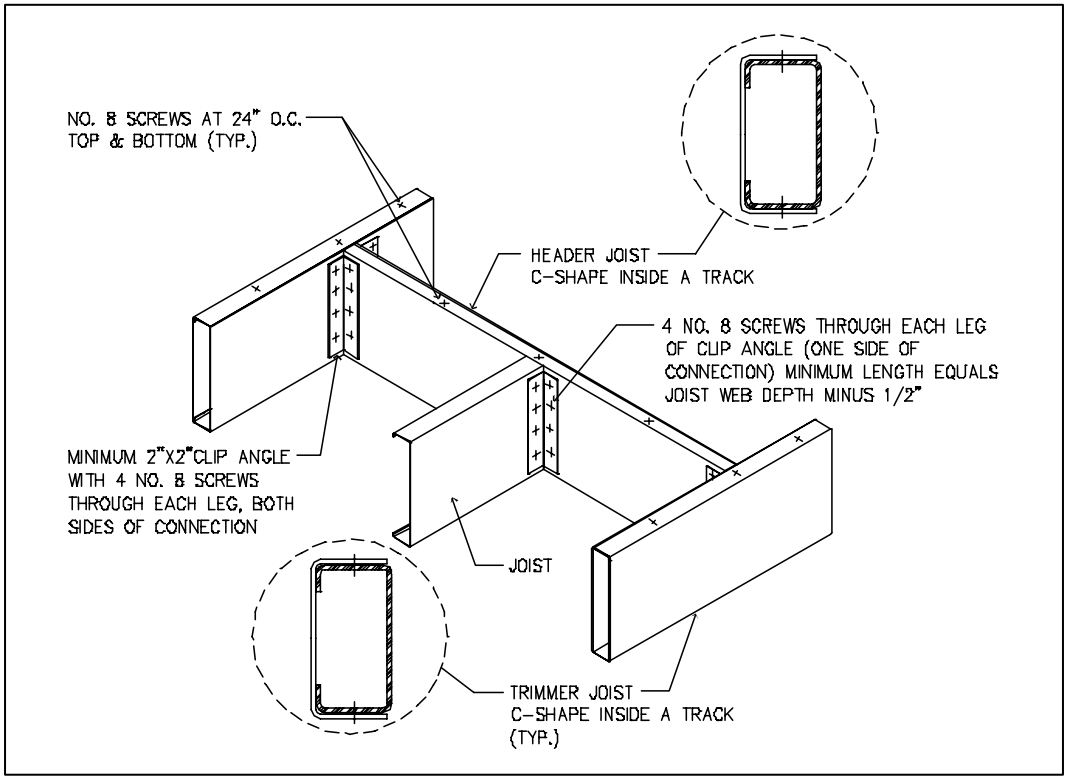


FIGURE R505.3.8(3)
COLD-FORMED STEEL FLOOR CONSTRUCTION: FLOOR HEADER TO TRIMMER CONNECTION
6 FOOT OPENINGS

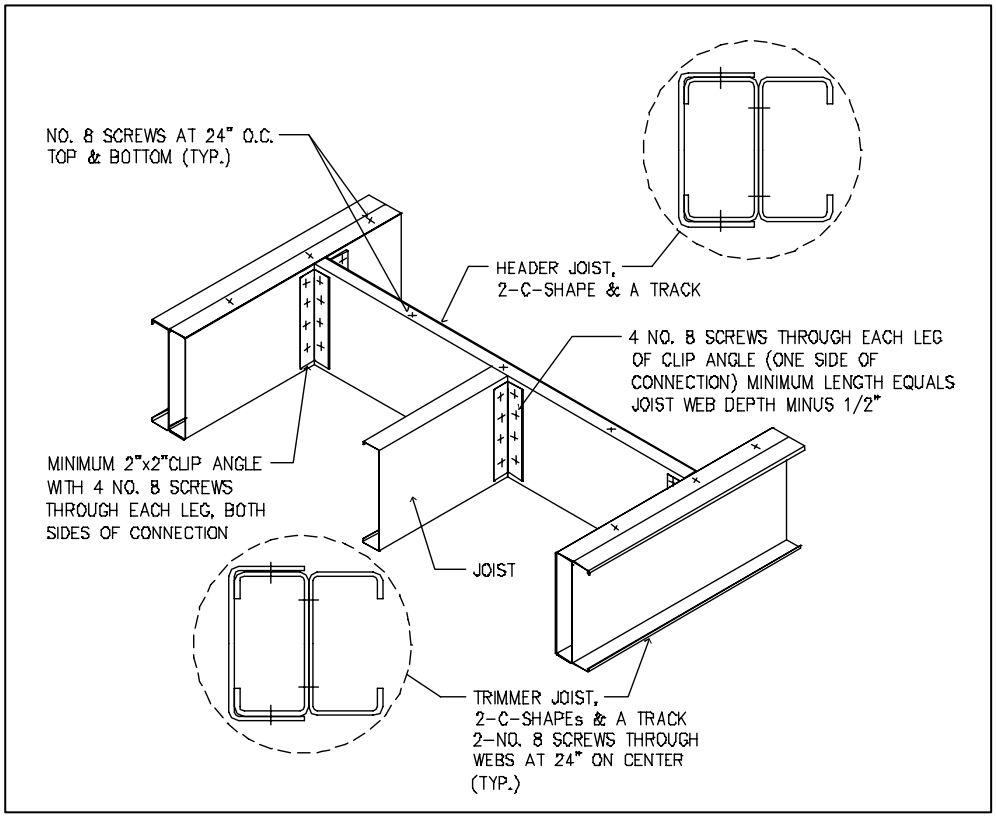


FIGURE R505.3.8(4)
COLD-FORMED STEEL FLOOR CONSTRUCION: FLOOR HEADER TO TRIMMER CONNECTION – 8-FOOT OPENING

25. Revise as follows:

M1308.1 (Supp) Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load bearing members of cold-formed steel light frame construction~~, steel-framed, load-bearing members~~ shall be permitted only in accordance with Sections ~~R505.2~~ R505.2.5, ~~R603.2~~ R603.2.5 and ~~R804.2~~ R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.5, cutting and notching of flanges and lips of load-bearing members of cold-formed~~,~~ steel light frame construction~~-framed, load-bearing members~~ shall not be permitted. Structural insulated panels shall be drilled and notched or altered in accordance with the provisions of Section R614.

M2101.6 (Supp) Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load bearing members of cold-formed steel light frame construction~~, steel-framed, load-bearing members~~ shall be permitted only in accordance with Sections ~~R505.2~~ R505.2.5, ~~R603.2~~ R603.2.5 and ~~R804.2~~ R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.5, cutting and notching of flanges and lips of load-bearing members of cold-formed~~,~~ steel light frame construction~~-framed, load-bearing members~~ shall not be permitted. Structural insulated panels shall be drilled and notched or altered in accordance with the provisions of Section R614.

P2603.2 (Supp) Drilling and notching. Wood-framed structural members shall not be drilled, notched or altered in any manner except as provided in Sections R502.8, R602.5, R602.6, R802.7 and R802.7.1. Holes in load bearing members of cold-formed steel light-framed~~ load-bearing members~~ construction shall be permitted only in accordance with Sections ~~R505.2~~ R505.2.5, ~~R603.2~~ R603.2.5 and ~~R804.2~~ R804.2.5. In accordance with the provisions in Sections R505.3.5, R603.3.4 and R804.3.5, cutting and notching of flanges and lips of load bearing members of cold-formed~~,~~ steel light frame construction ~~framed, load-bearing members~~ shall not be permitted. Structural insulated panels shall be drilled and notched or altered in accordance with the provisions of Section R614

26. Add standards to Chapter 43 as follows:

AISI

S100-07 North American Specification for the Design of Cold-Formed Steel Structural Members

ASTM

C 1513-04 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections

Reason: This code change updates the prescriptive requirements of IRC Section R505 to reflect the 2007 edition of AISI S230, *Standard for Cold-Formed Steel Framing -- Prescriptive Method for One- and Two-Family Dwellings*. The following changes have been made:

Items 1 through 24

Section R505.1.1: The 2007 edition of AISI S230 (*Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings*) increases the allowable number of stories from two to three stories. This modification is intended to coordinate with the new scope of AISI S230-07.

Section R505.1.2: The 2007 edition of AISI S230 references the 2007 edition of AISI S200 (*North American Standard for Cold-Formed Steel Framing—General Provisions*) which has revised the in-line framing tolerance to account for the special case of the bearing stiffener located on the back-side of the joist. This was based on research at the University of Waterloo (Reference: Fox, S.R. (2003), "The Strength of Stiffened CFS Floor Joist Assemblies with Offset Loading," American Iron and Steel Institute, Washington, D.C.)

Section R505.1.3: In 2007, the scope of AISI S100, *North American Specification for the Design of Cold-Formed Steel Structural Members*, Section D4 on Wall Studs and Wall Stud Assemblies was broadened to cover Cold-Formed Steel Light-Frame Construction. This was done in order to properly recognize the growing use of cold-formed steel framing in a broader range of residential and light commercial framing applications and to provide the appropriate charging language for the various ANSI approved standards that have been developed by the AISI Committee on Framing Standards. This proposal corrects the charging language and changes the reference from the too specific AISI Truss document (2004) to the more general, and correct, AISI S100, Section D4, which picks up the reference to the whole library of AISI cold-formed steel light frame construction.

Section R505.2: Table R505.2(2) has been corrected to reflect industry standardized thicknesses for structural members. Additionally, a line has been added for 97 mils, since it is used extensively throughout the IRC. The column on Reference Gage Number has been deleted, since gage is no longer used by industry in referencing structural members. Finally, the topic of holes has been relocated to a new Section R505.2.5 on web holes, web hole reinforcement, and web hole patching. Accordingly, the associated Figure R505.2(3) has been renumbered to Figure R505.2.5.1, with no other changes to the figure.

Section R505.2.1: This section has been modified to coordinate with the 2007 edition of AISI S230, which now recognizes ASTM A 1003 as the primary standard for cold-formed steel light frame construction (via a reference to AISI S200). References to the ASTM A 1003 grades have been corrected to specify Structural Type H. Further, references to Grades 37 and 40 have been deleted, since these grades are not used in the IRC. The references to ASTM A 653 and ASTM A792 have been retained, since AISI S230 still considers them deemed-to-comply with ASTM A 1003. However, reference to ASTM A875 has been deleted, since it is no longer used in the construction marketplace.

Section R505.2.2: This section has been modified to reflect the change in terminology in Table R505.2(2) from "uncoated steel thickness" to "base steel thickness."

Section R505.2.3: This section has been modified to coordinate with the 2007 edition of AISI S230, which now recognizes ASTM A1003 as the primary standard for cold-formed steel light frame construction (via a reference to AISI S200). The reference to ASTM A875 has been deleted, since it is no longer used in the construction marketplace.

Section R505.2.4: This section has been modified to coordinate with the 2007 edition of AISI S230, which now recognizes ASTM C 1513 (via a reference to AISI S200) in lieu of SAE J78. ASTM C1513 is the more appropriate consensus standard, which continues to charge SAE J78. The reference to ASTM B 633 has been deleted in favor of the substituted language from AISI S230.

Section R505.2.5.1: Section R505.2.5.1 has been created using existing IRC Section 505.2 with minor modifications in order to improve the clarity and usability of the code by locating all requirements concerning web holes and web hole adjustments in one central location. In addition, Figure R505.2(3) has been renumbered as Figure R505.2.5.1, with no other changes to the figure, as part of the coordination effort.

Section R505.2.5.2: New to the 2007 edition of AISI S230, this language permits the reinforcing of web holes, thus allowing the utility to remain, as long as the finished web hole meets the requirements of this subsection and that of Section R505.2.5.1. The provisions are based on engineering judgment and have been confirmed by preliminary testing.

Section R505.2.5.3: This language has been relocated from Section R505.3.6 in order to improve the clarity and usability of the code. Modifications have been made to the charging language to reflect the fact that the user now has the choice to reinforce non-conforming holes, patch non-conforming holes, or design non-conforming holes with accepted engineering practice per Section R505.2.5.1. Additionally, Figure R505.2.5.3 has been added as an update to the old Figure R505.3.6, in order to coordinate with AISI S230-07.

Section R505.3: The associated figure has been deleted since it is outdated.

Section R505.3.1, Table R505.3.1(1) and Figures R505.3.1(1) through R505.3.1(9): This section, table and its associated figures have been updated to coordinate with AISI S230-07. The figures include new notes and some new graphics to illustrate the intent of the text portion of the steel provisions. Much of the new graphics are related to the location and/or fastening requirements for the installation of blocking and bearing stiffeners. In some cases the figures illustrate more than one installation option, thus making the provisions more flexible.

Section R505.3.2: The charging language for this section has been updated to coordinate with AISI S230-07. Table notes have been added to reflect guidance given in AISI S230-07. Finally, the discussion on blocking has been updated and relocated to Section R505.3.3.

Section R505.3.3: The charging language for this section has been updated to coordinate with AISI S230-07, D5 on joist bracing and blocking. This change improves the clarity of the section by dividing it into four distinct sections on joist top flange bracing, foist bottom flange bracing/blocking, blocking at interior bearing supports and blocking at cantilevers.

Section R505.3.4, Tables R505.3.4(a)-(d), and Figure R505.3.4: This section has been updated to coordinate with AISI S230-07. The 2007 edition offers more options with respect to bearing stiffeners and this section has been expanded accordingly. Four tables were added detailing the design of clip angle bearing stiffeners in order to permit more options for the builder in the field. Additionally, Figures R505.3.4(1) and R505.3.4(2) were added to reflect these new options.

Section R505.3.6(old): This section has been relocated to a new Section R505.2.5 on web holes, web hole reinforcement, and web hole patching. Figure R505.3.6 is outdated and has been substituted with a new Figure R505.2.5.3, which coordinates with AISI S230-07.

Section R505.3.7(old): This section has been modified to coordinate with AISI S230-07, which reflects the increase in story height from two to three stories.

Figure R505.3.8(old): This figure has been updated to coordinate with AISI S230-07.

Section R505.3.9(old): This section has been updated to coordinate with AISI S230-07, which now has established provisions for openings up to 6ft wide and up to 8ft wide.

Item 25
Sections M1308.1, M2101.6 and P2603.2: This code change proposal is a result of the code changes updating the prescriptive requirements of IRC Sections R505, R603 and R804 to reflect the requirements of the 2007 edition of AISI S230, *Standard for Cold-Formed Steel Framing -- Prescriptive Method for One- and Two-Family Dwelling.* In particular, the section numbers have been updated. Additionally, the charging language has been modified editorially to be consistent with the language used in IRC Sections R505, R603 and R804.

Within IRC Sections R505.2.5, R603.2.5 and R804.2.5, revisions now permit the reinforcing of holes when they fall within specified tolerances – a provision which was not allowed in the IRC before. This allows for greater options for contractors and builders.

Item 26
Chapter 43: The modifications to add reference standards in Chapter 43 are coordinated with changes made to Section R505.

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 S100-07 and ASTM C 1513-04 , 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

RB128–07/08
R505.2.2 (New)

Proponent: Bill Towson, Arch Wood Protection

Add new text as follows:

R505.2.2 Protection of wood and wood based products from termites. In areas subject to damage from termites as indicated by Table R301.2(1), protection of wood and wood based products from termites and decay when used in combination with cold formed steel materials in wall and floor assemblies shall be provided when required in accordance with Sections R319 and R320.

(Renumber subsequent section)

Reason: A new section is required to reiterate the requirements for the protection of wood and wood based products when they are used in combination with cold formed steel framing. When cold formed steel framing is used in combination with wood and wood based products for wall and floor assemblies, any wood and wood based products must be protected from termites and decay when required in accordance with Sections R319 and R320.

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

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

RB129–07/08
R505.2.4, R603.2.4, R804.2.4, Chapter 43 (New)

Proponent: Andrew Liechti, Hilti, Inc.

1. Revise as follows:

R505.2.4 Fastening Requirements. Screws for steel-to steel connections shall be installed with a minimum edge distance and center-to-center spacing of ½ inch (12.7 mm), shall be self-drilling tapping and shall conform to ~~SAE J 78~~ ASTM C 1513. Floor sheathing shall be attached to steel studs with minimum No. 8 self-drilling tapping screws that conform to ~~SAE J 78~~ ASTM C 1513. Screws for attaching floor-sheathing-to-steel joists shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of 0.375 inch (9.5 mm). Gypsum board ceilings shall be attached to steel joists with a minimum No. 6 screws conforming to ASTM C 954 and shall be installed in accordance with Section R702. For all connections, screws shall extend through the steel a minimum of three exposed threads. All self-drilling tapping screws conforming to ~~SAE J 78~~ ASTM C 1513 shall have a ~~type II coating in accordance with ASTM B 633~~ coating conforming to ASTM F 1941.

R603.2.4 Fastening Requirements. Screws for steel-to steel connections shall be installed with a minimum edge distance and center-to-center spacing of ½ inch (12.7 mm), shall be self-drilling tapping and shall conform to ~~SAE J 78~~ ASTM C 1513. Structural sheathing shall be attached to steel studs with minimum No. 8 self-drilling tapping screws that conform to ~~SAE J 78~~ ASTM C 1513. Screws for attaching structural sheathing to steel wall framing shall have a

minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of 3/8 inch (9.5 mm). Gypsum board shall be attached to steel wall framing with a minimum No. 6 screws conforming to ASTM C 954 and shall be installed in accordance with Section R702. For all connections, screws shall extend through the steel a minimum of three exposed threads. All self-drilling tapping screws conforming to ~~SAE J 78~~ ASTM C 1513 shall have a ~~type II coating in accordance with ASTM B 633~~ coating conforming to ASTM F 1941.

R804.2.4 Fastening Requirements. Screws for steel-to steel connections shall be installed with a minimum edge distance and center-to-center spacing of ½ inch (13 mm), shall be self-drilling tapping and shall conform to ~~SAE J 78~~ ASTM C 1513. Structural sheathing shall be attached to steel studs with minimum No. 8 self-drilling tapping screws that conform to ~~SAE J 78~~ ASTM C 1513. Screws for attaching structural sheathing to steel roof framing shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of 3/8 inch (10 mm). Gypsum board ceilings shall be attached to steel joists with a minimum No. 6 screws conforming to ASTM C 954 and shall be installed in accordance with Section R805. For all connections, screws shall extend through the steel a minimum of three exposed threads. All self-drilling tapping screws conforming to ~~SAE J 78~~ ASTM C 1513 shall have a ~~minimum type II coating in accordance with ASTM B 633~~ coating conforming to ASTM F 1941.

2. Add standards to Chapter 43 as follows:

ASTM

C 1513-04 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
F 1941-00 (Reapproved 2006) Standard Specification for electrodeposited Coatings on Threaded Fasteners (unified Inch Screw Threads (UN/UNR))

Reason: To update the code to current date specifications. ASTM C 1513 should replace SAE J78 and ASTM F 1941 should replace ASTM B 633. ASTM C 1513 is referenced by ASTM C 954, which is referenced in both the 2006 IRC and IBC. ASTM F 1941 is referenced by ASTM C1513.

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, ASTM C 1513-04 and ASTM F 1941-00, 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

RB130–07/08
R506.2.3

Proponent: Stephen V. Skalko, PE, Portland Cement Association

Revise as follows:

R506.2.3 Vapor retarder. A 6 mil (0.006 inch; 152 µm) polyethylene or approved vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the concrete floor slab and the base course or the prepared subgrade where no base course exists.

Exception: The vapor retarder may be omitted:

1. From detached garages, utility buildings and other unheated accessory structures.
2. From driveways, walks, patios and other flatwork not likely to be enclosed and heated at a later date.
3. Where approved by the building official, based on local site conditions.

Reason: The most recent editions of the BOCA National Building Code, Standard Building Code, the CABO One and Two Family Dwelling Code required and the present International Building Code requires vapor retarders under attached garage floor slabs-on-ground. One of the primary reasons is that these attached garages have a high probability of being enclosed at a later date and converted to additional living space like a bedroom or den. These living spaces are typically conditioned which increases the temperature difference between the interior space and the ground below the floor slab which can contribute to moisture migration upward into the living space through the slab. Unfortunately a code change in the 2002 cycle (RB102-02) deleted the word detached associated with garages in Exception No. 1 to R506.3.2 of the IRC based on reasoning that stated *"Attached garages are no more likely to be heated than detached garages".* There was no technical study or data referenced in the supporting statement to validate this line of reasoning. In addition, it does not appear that much thought was given to conditions where the garage may be located in a basement space beneath the dwelling where the likelihood of moisture collecting in the enclosed garage space is more prevalent whether the space is conditioned or not.

Installing a vapor retarder under a garage floor slab to minimize moisture transmission into the enclosed space after it has been converted to living space or under a basement garage floor after the floor slab is poured can be very costly. These costs are very likely to be more than the initial cost to place a.vapor retarder under the slab prior to placement of the concrete. To rectify this dilemma and make the IRC consistent with the requirements for vapor retarders under slabs-on-ground in Section 1910 of the IBC, this proposal returns the language in Exception No. 1 to Section 506.3.2 back to the original language in the 2000 edition of the IRC.

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

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

RB131–07/08

R602.3, Table R603.3(3), R602.10.2, Table R602.3(1)

Proponent: Edward L. Keith, APA – The Engineered Wood Association

1. 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 Table 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. Wall sheathing shall be capable of resisting wind pressures listed in Table R301.2(2). Maximum wind speeds permitted for exterior walls covered with wood structural panel sheathing are listed in Table R602.3(3).

2. Delete and substitute as follows:

~~**TABLE R602.3(3) (Supp)**~~
~~**WOOD STRUCTURAL PANEL WALL SHEATHING**~~

~~Panel Span Rating~~	~~Panel Nominal Thickness (inch)~~	~~Maximum Stud Spacing (inches)~~	
		~~Siding nailed to:[a]~~	
		~~Stud~~	~~Sheathing~~
~~16/0, 20/0, or wall – 16 o.c.~~	~~3/8~~	~~16~~	~~16[b]~~
~~24/0, 24/16, 32/16 or wall – 24 o.c.~~	~~3/8, 7/10, 15/32, 1/2~~	~~24~~	~~24[c]~~

~~For SI: 1 inch = 25.4 mm.~~
~~a. Blocking of horizontal joints shall not be required.~~
~~b. Plywood sheathing 3/8 inch thick or less shall be applied with long dimension across studs.~~
~~c. Three-ply plywood panels shall be applied with long dimension across studs.~~

TABLE R602.3(3)
MAXIMUM WIND SPEED (mph – 3 SECOND GUST) PERMITTED FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES[1,2,3]

Minimum Nail		Minimum Wood Structural Panel Span Rating	Minimum Nominal Panel Thickness (inches)	Maximum Wall Stud Spacing (inches)	Panel Nail Spacing		Maximum Wind Speed (mph)		
							Wind Exposure Category		
Size	Penetration (inches)				Edges (inches o.c.)	Field (inches o.c.)	B	C	D
6d Common (0.113" x 2.0")	1.5	24/0	3/8	16	6	12	110	90	85
8d Common (0.131" x 2.5")	1.75	24/16	7/16	16	6	12	130	110	105
				24	6	12	110	90	85

1. Panel strength axis parallel or perpendicular to supports. Three-ply plywood sheathing with studs spaced more than 16 inches on center shall be applied with panel strength axis perpendicular to supports.
2. Table is based on wind pressures acting toward and away from building surfaces per R301.2. Lateral bracing requirements shall be in accordance with R602.10.

3. Wood Structural Panels with span ratings of Wall-16 or Wall-24 shall be permitted as an alternate to panels with a 24/0 span rating. Plywood Siding rated 16 oc or 24 oc shall be permitted as an alternate to panels with a 24/16 span rating. Wall-16 and Plywood Siding 16 oc shall be used with studs spaced a maximum of 16 inches on center.

3. Revise as follows:

R602.10.2 (Supp) Braced wall panel construction methods. The construction of braced wall panels shall be in accordance with one of the following methods:

1. Nominal 1-inch-by-4-inch (19.1 mm by 88.9 mm) continuous diagonal braces let in to the top and bottom plates and the intervening studs or approved metal strap devices installed in accordance with the manufacturer's specifications. The let-in bracing shall be placed at an angle not more than 60 degrees (1.06 rad) or less than 45 degrees (0.79 rad) from the horizontal.
2. Wood boards of 5/8-inch (15.9 mm) net minimum thickness applied diagonally on studs spaced a maximum of 24 inches (610 mm). Diagonal boards shall be attached to studs in accordance with Table R602.3(1).
3. Wood structural panel sheathing with a thickness not less than 3/8 inch (9.5 mm) for 16-inch (406 mm) or 24-inch (610 mm) stud spacing. Wood Structural panels shall be installed in accordance with Table R602.3~~(3)~~(1) ~~and Table R602.3(1)~~ for wind speeds less than 85 mph. For winds in excess of 85 mph, wood structural panels shall be installed in accordance with Table R602.3(3).
4. One-half-inch (12.7 mm) or 25/32-inch (19.8 mm) thick structural fiberboard sheathing applied vertically or horizontally on studs spaced a maximum of 16 inches (406 mm) on center. Structural fiberboard sheathing shall be installed in accordance with Table R602.3(1).
5. Gypsum board with minimum ½-inch (12.7 mm) thickness placed on studs spaced a maximum of 24 inches (610 mm) on center and fastened at panel edges including top and bottom plates at 7 inches (178 mm) on center with the size nails specified in Table R602.3(1) for sheathing and Table R702.3.5 for interior gypsum board.
6. Particleboard wall sheathing panels installed in accordance with Table R602.3(4) and Table R602.3(1).
7. Portland cement plaster on studs spaced a maximum of 16 inches (406 mm) on center and installed in accordance with Section R703.6.
8. Hardboard panel siding when installed in accordance with Table R703.4.

Exception: Alternate braced wall panels constructed in accordance with Sections R602.10.3.2.1 or R602.10.3.2.2 shall be permitted to replace any braced wall panel in any of the above methods of braced wall panels.

TABLE R602.3(1) (Supp)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER[b, c,e]	SPACING OF FASTENERS	
		Edges (Inches)	[i]Intermediate supports[c,e] (inches)
Wood structural panels, subfloor, roof and wall sheathing to framing, and particleboard wall sheathing to framing			
3/8" – 1/2"	6d common (2" x 0.131" nail (subfloor, wall) [j] 8d common (2 1/2" x 0.131") nail (roof)[f]	6	12[g]

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1ksi = 6.895 MPa.

a. through i. (No change)

j. For regions having basic wind speed of 85 mph or greater, the nail size and attachment schedule of Table R602.3(3) shall be used for attaching wood structural panel wall sheathing.

(Portions of table and footnotes not shown remain unchanged)

Reason: The code change updates the existing wood structural panel wall sheathing table to include requirements for winds regions having a basic wind speed of 85 mph or greater.

The proposed table is an abbreviated version of a similar table that was adopted into the IBC last cycle and is available in the IBC 2007 Supplement in Section 2304.6.1.

The current Table R602.2(3) in the IRC that gives recommended minimum panel thicknesses for wall panel sheathing. To be more precise, it is OK most of the time but in higher wind regions (still within the range of the IRC) the panel thicknesses and orientations recommended in the table and footnotes may not provide the minimum protection to the home and inhabitants that is currently required in Section R301.2.

Recent analysis conducted by the APA staff indicates that in the extreme wind regions covered by the IRC (less than 110 mph) and with more severe exposures (C and D) the minimum thicknesses recommendations given in Table R603.2(3) – Wood Structural Panel Wall Sheathing – are insufficient in thickness and attachment. The proposed table provides the requirements to ensure that this important part of the structural system is correct. The analysis considered panel bending, stiffness, nail withdrawal and nail head pull through as well as the wind pressure requirements of Section R301.2.

Note that the impact to most will be minimal because the most commonly used wood structural panel sheathing thickness in the US is 7/16". As can be seen in the proposed table this sheathing thickness is satisfactory for winds up to 110 mph in all but Exposure D conditions. Most builders will only see the requirement for 8d nails as a change, and this is already the nail required for roof sheathing applications.

The change also proposes a corresponding editorial changes to references in R602.10.3 and adds a footnote to the appropriate cell in the fastening table, Table R602.3(1) – continued, that directs the user to the new table for panel thickness, fastener selection and spacing in winds regions having a basic wind speed of 85 mph or greater.

Cost Impact: The code change proposal will increase the cost of construction in high wind areas. No additional sheathing will be required but in areas of high wind sheathing up to 7/16" may be required as well as 8d nails. Please note that 7/16" sheathing is the most popular thickness of wall sheathing used in the US and in many areas the shift to 8d nails is all that will be seen as a change in practice. As such, the impact on cost will be minimal in most areas.

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

RB132–07/08
Table R602.3(1)

Proponent: Gary J. Ehrlich, PE, National Association of Home Builders

Revise table as follows:

TABLE R602.3(1) (Supp)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER[b, c,e]	SPACING OF FASTENERS	
		Edges (Inches)[i]	Intermediate supports[c,e] (inches)
Rafter or roof truss to plate, toe nail	~~2~~ 3-16d box nails (3½"x0.135") or 3-10d common nails (3"x0.148")	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss[j]	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1ksi = 6.895 MPa.

a. through i. (No change)

j. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe-nails on one side of the rafter and toe-nails from the ceiling joist to top plate in accordance with this schedule. The toe-nail on the opposite side of the rafter shall not be required.

(Portions of table and footnotes not shown remain unchanged)

Reason: This proposal increases the number of toe-nails for a standard rafter or truss connection to three nails and requires one nail be placed on the opposite side of the framing member. This "slant nail" configuration increases the withdrawal capacity of the connection over and above what would be gained from simply adding the third nail. This connection has been tested in the laboratory by Forest Products Laboratory and in existing houses in South Carolina by Clemson University and found to have an average ultimate capacity of 668 pounds.

A footnote is added to clarify that when a rafter is attached to a parallel ceiling joist the third toe-nail on the opposite side is not required. The assembly would then be attached with 2-16d or 2-10d toe-nails from the rafter to the top plate and 3-8d toe-nails from the ceiling joist to the top plate, for a total of five toe-nails. This combined connection provides a higher capacity than the individual rafter connection taken in isolation, but is not normally accounted for in a purely engineered approach.

This increase in the fastening requirements is offered as an alternative to more comprehensive proposals that will subject average houses in areas of low wind hazards to requirements for hurricane clips and strap ties. It preserves the ability to use conventional connections in those areas of the country where they have performed well and does not subject single-story houses and houses in built-up, well-shielded areas to provisions based on overly conservative engineering requirements that do not reflect near-ground reductions in wind loads. NAHB asks for your support of this proposal.

Cost Impact: This code change will minimally increase the cost of construction.

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

RB133–07/08
Table R602.3(1)

Proponent: Michael Gardner, Gypsum Association

Revise table as follows:

TABLE R602.3(1) (Supp)
FASTNER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER[b, c,e]	SPACING OF FASTENERS	
		Edges (Inches)[i]	Intermediate supports[c,e] (inches)
Wood structural panels, subfloor, roof and wall sheathing to framing, and particleboard wall sheathing to framing			
Other wall sheathing[h]			
1/2" gypsum sheathing[d]	1½" galvanized roofing nail; staple galvanized, 1 ½" long; 1 ¼" screws, Type W or S	~~4~~ 8	8
5/8" gypsum sheathing[d]	1 3/4" galvanized roofing nail; staple galvanized, 1 5/8" long; 1 5/8" screws, Type W or S	~~4~~ 8	8

(Portions of table and footnotes not shown remain unchanged)

Reason: Code should reflect the attachment requirements in GA-253 and ASTM C1280. Both documents permit panels not being used in shear or similar structural installation to be fastened using 8 inch on center spacing for edge fasteners.

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

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

RB134–07/08
Table R602.3(1), Table R702.3.5

Proponent: Edward L. Keith, PE, APA – The Engineered Wood Association

Revise table as follows:

TABLE R602.3(1) (Supp)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER[b, c, e]	SPACING[c] OF FASTENERS	
		Edges (inches)[i]	Intermediate Support[c,e] (inches)
Other Wall Sheathing[h]			
½" gypsum sheathing[d]	1 1/2" galvanized roofing nail; staple galvanized 1 1/2" long; 1 1/4 screws, Type W or S	4[j]	8[j]
5/8" gypsum sheathing[d]	1 3/4" galvanized roofing nail; staple galvanized 1 5/8" long; 1 5/8" screws, Type W or S	4[j]	8[j]

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1ksi = 6.895 MPa.

a. through i. (No change)

j. When gypsum wall sheathing is used as bracing, fasteners shall be installed at 7" along all panel edges and at 7" over intermediate supports as specified in Section R602.10.2, item 5.

(Portions of table and footnotes not shown remain unchanged)

TABLE R702.3.5
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD

THICKNESS OF GYPSUM BOARD (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBER (inches o.c.)	MAXIMUM SPACING OF FASTENERS (INCHES)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING
				Nails[a,f]	Screws[b,g]	

For SI: 1 inch = 25.4 mm.

a. through e. (No change)

f. When gypsum wall board is used as bracing, nails shall be installed at 7" along all panel edges and at 7" over intermediate supports as specified in Section R602.10.2, item 5.

g. When gypsum wall board is used as bracing, screws shall not be permitted for fastening.

(Portions of table and footnotes not shown remain unchanged)

Reason: The purpose of this proposal is to clarify the code. It adds no new requirements. It adds clarification to areas of potential conflict with respect to proper attachment of gypsum wall board products when used as wall bracing.

1. Section R602.10.2, item 5, (2007 Supplement) identifies gypsum sheathing as a candidate for wall bracing providing it uses fasteners in accordance with Table R602.3(1) and attached with a nailing pattern of 7" on panel edges and 7" over intermediate framing. Table R602.3(1), entitled Fastener Schedule for *Structural* Members (emphasis ours), does have fastener recommendations for gypsum sheathing but it also has a recommended nail spacing that is different from the bracing nail spacing. This could cause a potential conflict because one of the true structural applications for gypsum sheathing is when it is used as bracing. This proposal adds a footnote to the fastener spacing columns that clarifies that when used for bracing the 7" and 7" nail spacing is appropriate. This nail spacing has been verified as the relevant nail spacing for gypsum sheathing when used as bracing by the Gypsum Association.

2. Section R602.10.2, item 5, (2007 Supplement) identifies gypsum board as a potential candidate for wall bracing providing it uses fasteners in accordance with Table R702.3.5 and attached with a nailing pattern of 7" on panel edges and 7" over intermediate framing. Table R702.3.5, entitled

Minimum Thickness and Application of Gypsum Board, does have fastener recommendations for gypsum sheathing but it also has recommended nail spacing. In addition, it permits the use of screws for attachment of gypsum board. . This could cause a potential conflict with the recommendations in Section R602.10.2, Item 5. This proposal adds a footnote to the fastener spacing column for nails that clarifies that when used for bracing the 7" and 7" nail spacing is appropriate. A companion footnote is placed in the "SCREWS" column. This footnote states that screws shall not be used to attach gypsum board when it is being used as wall bracing. This nail spacing has been verified as the relevant nail spacing for gypsum sheathing when used as bracing by the Gypsum Association.

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

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

RB135–07/08

Table R602.3(1), Table R802.5.1(9)

Proponent: Dennis Pitts, American Forest & Paper Association

Revise tables as follows:

TABLE R602.3(1) (Supp)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER[b, c,e]	SPACING OF FASTENERS	
		Edges (Inches)[i]	Intermediate supports[c,e] (inches)
~~Ceiling joist, laps over partitions, face nail~~	~~3 – 10d~~	----	
~~Ceiling joists to parallel rafters, face nail~~	~~3 – 10d~~	----	

(Portions of table and footnotes not shown remain unchanged)

Table R802.5.1(9)
RAFTER/CEILING JOIST HEEL JOINT CONNECTIONS [a, b, c, d, e, f, g, h]

RAFTER SLOPE	RAFTER SPACING (inches)	GROUND SNOW LOAD (psf)											
		30 psf [g]				50 psf			70 psf				
		Roof span (feet)											
		12	20	28	36	12	20	28	36	12	20	28	36
		Required number of 16 d common nails [a, b] per heel joint splices [c, d, e, f]											

a. through f. (No change)
g. Applies to roof live load of 20 psf or less.
(Reletter subsequent footnote)

(Portions of table and footnotes not shown remain unchanged)

Reason: RB168-03/04, which was approved as modified, made substantial changes to the wording of R802.3.1 in an attempt to make the subjects of rafter-to-joist connections, rafter ties, and collar ties clearer. One of the requirements of that change was that rafter/ceiling joist heel connections and connections of ceiling joists where they lap over partitions should be in accordance with Table R802.5.1.9. In doing so, reference to the generic fastener table, Table R602.3(1), was deleted. However, even though the reference to Table R602.3(1) was deleted and new connection requirements were added to Table R802.5.1.9, the connection requirements in Table R602.3(1) were inadvertently left in the table. Their presence there causes confusion over the proper fastener schedule. This proposal corrects that problem.

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

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

RB136–07/08
Table R602.3(1)

Proponent: Daniel Jewitt, Acworth, GA, representing himself

Revise table as follows:

(All additions/deletions are indicated by strike-thru and underline. The remainder of the changes are for reorganization.)

TABLE R602.3(1) (Supp)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a,b,c]	SPACING OF FASTENERS
ROOF		
Blocking between joists or rafters to top plate, toe nail	3-8d (2 ½" x 0.113")	--
Ceiling joists to plate, toe nail	3-8d (2 ½" x 0.113")	--
Ceiling joist, laps over partitions, face nail	3-10d (3" x 0.128")	--
Ceiling joist to parallel rafters, face nail	3-10d (3" x 0.128")	--
Collar tie to rafter, face nail, or 1-1/4" x 20 gage ridge strap	3-10d (3" x 0.128")	--
Rafter to plate, toe nail	2-16d (3 ½ "x 0.135")	--
Roof rafters to ridge, valley or hip rafters: toe nail face nail	 4-16d (3 ½" x 0.135") 3-16d (3 ½" x 0.135")	 -- --
~~Rafter ties to rafters, face nail~~	~~3-8d (21/2" x 0.113")~~	~~—~~
WALL		
Built-up corner studs	10-d (3" x 0.128")	24" o.c.
Built-up header, two pieces with 1/2" spacer	16d (3 ½" x 0.135")	16" o.c along each edge
Continued header, two pieces	16d (3 ½" x 0.135")	16" o.c along each edge
Continuous header to stud, toe nail	4-8d (2 ½" x 0.113")	--
Double studs, face nail	10d (3" x 0.128")	24" o.c.
Double top plates, face nail	10d (3" x 0.128")	24" o.c
Double top plates, minimum 48-inch offset of end joints, face nail in lapped area	8-16d (3 ½" x 0.135")	--
Sole plate to joist or blocking, face nail	16d (3 ½" x 0.135")	16" o.c.
Sole plate to joist or blocking at braced wall panels	3-16d (3 ½" x 0.135")	16" o.c.
Stud to sole plate, toe nail	3-8d (2 ½" x 0.113") or 2-16d (3 ½" x 0.135")	--
Top or sole plate to stud, end nail	2-16d (3 ½" x 0.135")	--
Top plates, laps at corners and intersections, face nail	2-10d (3" x 0.128")	--
1" brace to each stud and plate, face nail	2-8d (2 ½" x 0.113") 2 staples 1-3/4"	-- --
1" x 6" sheathing to each bearing, face nail	2-8d (2 ½" x 0.113") 2 staples 1-3/4"	-- --
1" x 8" sheathing to each bearing, face nail	2-8d (2 ½" x 0.113") 3 staples 1-3/4"	-- --
Wider than 1" x 8" sheathing to each bearing, face nail	3-8d (2 ½" x 0.113") 4 staples 1-3/4"	-- --
FLOOR		
Built-up girders and beams, 2-inch lumber layers	10-d (3" x 0.128"	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.
Joist to sill or girder, toe nail	3-8d (2 ½" x 0.113")	--
1" x 6" subfloor or less to each joist, face nail	2-8d (2 ½" x 0.113") 2 staples 1-3/4"	—
2" subfloor to joist or girder, blind and face nail	2-16d (2 ½" x 0.135")	--
Rim joist to top plate, toe nail (Roof applications also)	8d (2 ½" x 0.113")	6" o.c.
2" planks (Plank & Beam – Floor & Roof)	2-16d (2 ½ "x 0.135")	At each bearing

(Portions of table and footnotes not shown remain unchanged)

Reason: This table has been reformatted to allow ease of use. The items have been organized in the appropriate categories of "Roof", "Wall", and "Floor" which should make using the table less of a treasure hunt. The present condition of the table is not orderly and tends to contribute to confusion or difficulty of use.

Also, the item **"Rafter ties to rafters face nail"** has been removed to conform to the change to R802.3.1 in the 2006 edition which now requires rafter ties to be nailed in accordance to Table R802.5.1(9).

No other change requiring "technical information or substantiation" has been made.

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

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

RB137–07/08
Table R602.3(2)

Proponent: Edward L. Keith, PE, APA – The Engineered Wood Association

Revise as follows:

TABLE R602.3(2)
ALTERNATE ATTACHMENTS

NOMINAL MATERIAL THICKNESS (inches)	DESCRIPTION[a,b] OF FASTENER AND LENGTH (inches)	SPACING[c] OF FASTENERS	
		Edges (inches)	Body of panel[d]
Floor underlayment: plywood-hardboard-particleboard[f]			
Plywood			
11/32, 3/8, 15/32, and ½ ~~and 19/32~~	1 ¼ ring or screw shank nail-minimum 12 ½ ga. (0.099") shank diameter	6	8[e]
19/32, 5/8, 23/32 and 3/4	1 1/2 ring or screw shank nail-minimum 12 ½ ga. (0.099") shank diameter	6	8
	Staple 16 ga. 1 1/2	6	8

(Portions of table and footnotes not shown remain unchanged)

Reason: The revision corrects a small error within the code.

1. The proposed change removes the 19/32" thickness from the thinner grouping of panel thicknesses in the code that permit the use of 1-1/4" nails and places it in the thicker grouping of panel thicknesses that require a 1-1/2" long nail to secure them.

2. Throughout the code the 19/32" thickness is grouped with the 5/8" thicknesses because of their close proximity in thicknesses. In fact, given the applicable thickness tolerances for both thicknesses the 19/32" panel to its maximum positive thickness tolerance can actually be thicker than a 5/8" thickness manufactured to its maximum permissible negative tolerance. They are essentially recognized as performing the same in most sections of the building code except this one. If a 1-1/2" long nail is required to hold down a 5/8" panel than the same length is required to hold down a 19/32". This change will also make the IRC consistent with Industry's very long-standing underlayment installation recommendations.

Cost Impact: The code change proposal could very slightly increase the cost of construction. This increase would be based on the difference in price between a 1-1/4" 12.5 gage nail and a 1-1/2" 12.5 gage nail used for installation of underlayment only.

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

RB138–07/08
Table R602.3(5)

Proponent: Ken Nejbauer, Snohomish County, WA, representing himself

Revise table footnote as follows:

TABLE R602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS

(No change to table contents)

For SI: 1 inch = 25.4 mm.

a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted in Section R301.3 or where justified by an engineered analysis.

b. Shall not be used in exterior walls.

Reason: Add Section R301.3 to the sentence in footnote "a". This section allows the stud height to be increased to 12 feet by increasing the length of bracing in Table R602.10.1(1) by a factor of 1.2. This information should be added to Table R602.3(5) as it will help designers and code officials interpret the code.

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

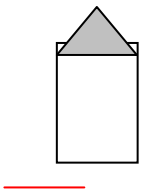
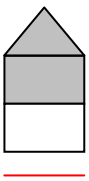
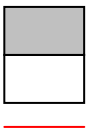
Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

RB139–07/08
Table R602.3(5)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing Virginia Building and Code Officials Association (VBCOA)

Revise table as follows:

TABLE R602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS[a]

	BEARING WALLS					NONBEARING WALLS	
STUD SIZE (inches)	Laterally unsupported stud height [a] (feet)	Maximum spacing when supporting roof and ceiling assemblies or a loft assembly [c], only (inches)	Maximum spacing when supporting one floor, roof and ceiling assemblies or a loft assembly [c], (inches)	Maximum spacing when supporting two floors, roof and ceiling assemblies or a loft assembly [c], (inches)	Maximum spacing when supporting one floor only (inches)	Laterally unsupported stud height [a] (feet)	Maximum spacing (inches)
							
2× 3[b]	—	—	—	—	—	10	16
2 × 4	10	24	16	—	24	14	24
3 × 4	10	24	24	16	24	14	24
2 × 5	10	24	24	—	24	16	24
2 × 6	10	24	24	16	24	20	24

For SI: 1 inch = 25.4 mm.

a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted where justified by analysis.
b. Shall not be used in exterior walls.

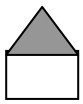
c. LOFT. A finished or unfinished area, not considered a story, with an occupiable space complying with all of the following requirements:

a. The occupiable floor area is at least 70 sqft, measured between areas that are at least 5 feet tall,
b. The occupiable area has headroom of at least 7' clearance for at least 50% of the occupiable floor area,
c. The occupiable floor area does not exceed 70% of the total width of the structure,
d. The occupiable area is designed to carry a minimum of 30 psf live load,
e. The space has no exterior walls, and is enclosed by the knee walls (if applicable) on the sides, and the roof assembly (above) and the floor-ceiling assembly (below).

A loft assembly shall include loads from the roof rafters and ceiling joist assemblies or trusses extended to the perimeter of the structure.

Reason: This change is intended to clarify the intention Table R603(5).

I have tried teaching this chapter of the IRC and have not been able to answer questions regarding the intentions or limitations of this table. Accepted construction practice says that there is not a problem, but the table is too exclusive to be practical. This change it intended to provide prescriptive clarification of the Stud Table.



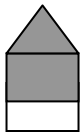
Column3: "**Maximum spacing when supporting roof and ceiling assemblies or a loft assembly only"**

In general the Stud Table R602.3(5) is tacit about how it handles attics, walk-up attics, room trusses, or the infamous attic-finished-off-to-create-another-floor situation, sometimes called a "half story" or "finished attics" (an oxy-moron) or even "residential mezzanines". The Table offers more questions than answers:

1. Should it be assumed that the Stud Table has taken into account attics, or "finished attics"?
2. Should it be assumed that the Stud Table has taken into account truss roof systems?

Solution:

1. "Roof and ceiling *assemblies*" and "loft *assembly*" provide a more inclusive language as to what the stud table is intended to carry. It would include truss roof systems that are otherwise not clearly allowed.
2. By introducing the new term "loft assembly" into the category heading and defining "loft" in the footnote, we can solve several situations simultaneously. A "loft assembly" along with the footnote definition of "loft" describes the habitable (or potentially habitable) space above the top floor ceiling – without all of the implications of creating another story. It has the physical properties and design load allowances of "habitable" space, but makes the issue of being finished off now or in the future a moot point.
3. Regardless if the studs are supporting a "roof and ceiling assembly" or a "loft assembly" the typical 2x4 studs at 16" o.c. would agree with common accepted practice.
4. The little icon of the one story house is added to help describe the situation.



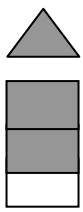
Column 4: "**Maximum spacing when supporting one floor, roof and ceiling assemblies or a loft assembly"**

Under the current IRC, if the two-story house has a "finished attic" it should be treated as a three-story house. That puts the homeowner in a precarious position when he wants to finish off the attic of his two-story house. The plan reviewer would have to treat the finished space as another floor, and the Stud Table would require the homeowner to replace all of the 2x4 first floor studs with 2x6 studs (i.e. going from Column 4 in the Table (supporting one floor plus roof/ceiling) to Column 5 (supporting two floors plus roof/ceiling in the table)).

Similarly, if the two-story house has a roof system constructed with "room trusses" (see attached picture), the truss system then would have to be considered another floor or story with the same issues.

Solution:

1. "Roof and ceiling assemblies" and "loft assembly" provide a more inclusive language of what the stud table was intended to carry. It would include truss roof systems that are otherwise not clearly allowed.
2. Again, by introducing the new term "loft assembly" into the category heading and defining "loft" in the footnote, we can solve several situations simultaneously. By the footnote definition, "loft" would not be considered another story, and therefore would not put extra design requirements on the structure. The first floor studs supporting the second floor and a "loft assembly" could be the typical 2x4 studs at 16" o.c., and would agree with common accepted practice; there is empirical precedence from thousands of homes with two floors, "roof and ceiling assemblies" or "loft assemblies" that prove that these structures do not fail.



Column 5: **"Maximum spacing when supporting two floors, roof and ceiling assemblies or a loft assembly".**

We also have hundreds of houses with a walkout basement, two stories and "finished attic". This creates several other issues: If the basement is a "story above grade", the house is really have a four-story structure. The Table R602.3(5) does not prescribe stud sizes and spacing for four story houses. It is outside the IRC code, and has to be engineered per the IBC.

Solution:

Again the new term "loft" is beneficial. If implemented:

1. The basement would not have to be a story below grade, and hence facilitate walk-out basements easier, AND
2. Table R602.3(5), Column 4 would prescribe 2x4 studs @ 16" o.c. for the first floor walls, consistent with the way contractors are building today, AND
3. Table R602.3(5), Column 5 would prescribe 2x6 studs @16" o.c. for the basement floor walls, consistent with the way contractors are building today.

IMPORTANT NOTE1:

We have run the calculations for wall studs carrying one floor, one exterior wall, and a two-point bearing room truss, and found that 2x4 studs @16" o.c. works for spans up to 32 feet with conventional shingles.

Because the calculations show the 32 feet width (with 5 foot knee walls each side) is about the limit for the studs of a two-story house with trusses, we have the limit of "70% of the total width of the structure" requirement. (i.e. the occupiable space utilizes about 22/32 or 70% of the total width of the structure.).

~~Wall studs supporting one floor, one exterior wall, and a two-point bearing room truss with longer spans should go the Table column for studs supporting two floors and a loft and use 2x6 @16" o.c..~~

IMPORTANT NOTE 2:

If the proposed definition of "loft" is accepted by separate submittal, footnote c is not required, and footnote c can be renumbered.

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

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

RB140–07/08

R602.8

Proponent: Marcelo M. Hirschler, GBH International, representing the American Fire Safety Council

Revise as follows:

R602.8 (Supp) Fireblocking required. Fireblocking shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top story and the roof space. Fireblocking shall be provided in wood-frame construction in the following locations.

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs; as follows:
   1.1. Vertically at the ceiling and floor levels.
   1.2. Horizontally at intervals not exceeding 10 feet(3048 mm).
2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R311.2.2.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an approved material to resist the free passage of flame and products of combustion. ~~The material filling this annular space shall not be required to meet the ASTM E 136 requirements.~~
   4.1. <u>The fireblocking material filling this annular space shall be an approved penetration firestop system installed as tested in accordance with ASTM E 814 or UL 1479, with a minimum positive pressure differential of 0.01 inch of water (3 Pa).</u>
   4.2. <u>If the floor or ceiling assembly penetrated has a required fire-resistance rating, the fireblocking material shall have an F rating of not less than the required fire-resistance rating of the floor or ceiling assembly penetrated.</u>
   4.3. <u>If the floor or ceiling assembly penetrated does not have a required fire-resistance rating, the fireblocking material shall exhibit no flame penetration during the test for a period of 30 minutes.</u>
5. For the fireblocking of chimneys and fireplaces, see SectionR1003.19.
6. Fireblocking of cornices of a two-family dwelling is required at the line of dwelling unit separation.

Reason: This proposal is attempting to create some way to address a section that is unclear at present. Item 4 of R602.8 was introduced in the 2006 code cycle. Unfortunately, the way it was put in makes it unclear as to what the requirements are for that fireblocking material. Section R602.8.1 describes the appropriate fireblocking materials for items 1, 2, 3, and 6. Section R1003.19 describes the requirements for item 5 (fireblocking of chimneys and fireplaces).

The concept used for this proposal was that the fireblocking material need not be a noncombustible material (i.e. it need not be a material meeting ASTM E 136 requirements) but should be a material that actually resists the passage of flame and smoke. It must be noted that this section is dealing with wood wall framing and therefore it would be overkill to require noncombustible materials (note that the IBC requires noncombustible fireblocking materials in section 705.7, which deals with fire walls, but not in other sections). On the other hand, the IRC code already believes that it should not be acceptable for a floor or ceiling penetration around vents, pipes, ducts, cables and wires to be simply one of the materials listed in R602.8.1. It is not clear that all of the materials contained in R602.8.1 are necessarily ideally suitable "to resist the free passage of flame and products of combustion". Therefore, it is important that the material used for the "fireblocking" be at least as good in resisting the free passage of flame and products of combustion as the floor or ceiling it penetrates.

In the case of assemblies that are not required to be fire-resistance rated, it is suitable to require that the fireblocking material resist flame penetration for a minimum period of 30 minutes. Unfortunately the present code language is unclear and positive action of some kind is required.

The test method recommended, ASTM E 814 or UL 1479, is already contained in the IRC, in section R317.3.1.2. Thus, the standard is not being provided. The title of the standards is: ASTM E 814 "Standard Test Method for Fire Tests of Through-Penetration Firestops" and UL 1479, "Standard Fire Tests of Through-Penetration Firestops".

Some relevant code sections of the IBC and IRC 2007 supplements are being shown, for clarification.

IRC R602 – WOOD WALL FRAMING

R602.8.1 Fireblocking materials. *Except as provided in Section R602.8, Item 4, fireblocking shall consist of the following materials:*

1. *2-inch (51 mm) nominal lumber.*
2. *Two thicknesses of 1-inch (25.4 mm) nominal lumber with broken lap joints.*
3. *One thickness of 23/32-inch (18.3 mm) wood structural panels with joints backed by 23/32-inch (18.3 mm) wood structural panels.*
4. *One thickness of 3/4-inch (19.1 mm) particleboard with joints backed by 3/4-inch (19.1 mm) particleboard.*
5. *1/2-inch (12.7 mm) gypsum board.*
6. *1/4-inch (6.4 mm) cement-based millboard.*
7. *Batts or blankets of mineral wool or glass fiber or other approved materials installed in such a manner as to be securely retained in place.*

R602.8.1.1 Batts or blankets of mineral or glass fiber. *Batts or blankets of mineral or glass fiber or other approved nonrigid materials shall be permitted for compliance with the 10-foot (3048 mm) horizontal fireblocking in walls constructed using parallel rows of studs or staggered studs.*

R602.8.1.2 Unfaced fiberglass. *Unfaced fiberglass batt insulation used as fireblocking shall fill the entire cross section of the wall cavity to a minimum height of 16 inches (406 mm) measured vertically. When piping, conduit or similar obstructions are encountered, the insulation shall be packed tightly around the obstruction.*

R602.8.1.3 Loose-fill insulation material. *Loose-fill insulation material shall not be used as a fireblock unless specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gases.*

R602.8.1.4 Fireblocking integrity. *The integrity of all fireblocks shall be maintained.*

R1003.19 Chimney fireblocking. *All spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with noncombustible material securely fastened in place. The fireblocking of spaces between chimneys and wood joists, beams or headers shall be self-supporting or be placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney.*

IBC definition: FIREBLOCKING. *Building materials installed to resist the free passage of flame to other areas of the building through concealed spaces.*

IRC definition: FIREBLOCKING. *Building materials or materials labeled for use as fireblocking, installed to resist the free passage of flame to other areas of the building through concealed spaces.*

IBC

705.7 Combustible framing in fire walls. *Adjacent combustible members entering into a concrete or masonry firewall from opposite sides shall not have less than a 4-inch (102 mm) distance between embedded ends. Where combustible members frame into hollow walls or walls of hollow units, hollow spaces shall be solidly filled for the full thickness of the wall and for a distance not less than 4 inches (102 mm) above, below and between the structural members, with noncombustible materials approved for fireblocking.*

IBC – 712 Penetrations

712.4.2 Nonfire-resistance-rated assemblies. *Penetrations of nonfire-resistance rated floor or floor/ceiling assemblies or the ceiling membrane of a nonfire-resistance rated roof/ceiling assembly shall meet the requirements of Section 707 or shall comply with Section 712.4.2.1 or 712.4.2.2.*

712.4.2.1 Noncombustible penetrating items. *Noncombustible penetrating items that connect not more than three stories are permitted, provided that the annular space is filled with an approved noncombustible material to resist the free passage of flame and the products of combustion.*

712.4.2.2 Penetrating items. *Penetrating items that connect not more than two stories are permitted, provided that the annular space is filled with an approved material to resist the free passage of flame and the products of combustion*

IBC -717 CONCEALED SPACES

717.1 General. *Fireblocking and draftstopping shall be installed in combustible concealed locations in accordance with this section. Fireblocking shall comply with Section 717.2. Draftstopping in floor/ceiling spaces and attic spaces shall comply with Sections 717.3 and 717.4, respectively. The permitted use of combustible materials in concealed spaces of buildings of Type I or II construction shall be limited to the applications indicated in Section 717.5.*

717.2 Fireblocking. *In combustible construction, fireblocking shall be installed to cut off concealed draft openings (both vertical and horizontal) and shall form an effective barrier between floors, between a top story and a roof or attic space. Fireblocking shall be installed in the locations specified in Sections 717.2.2 through 717.2.7.*

717.2.1 Fireblocking materials. *Fireblocking shall consist of the following materials:*

1. *Two-inch (51 mm) nominal lumber.*
2. *Two thicknesses of 1-inch (25 mm) nominal lumber with broken lap joints.*
3. *One thickness of 0.719-inch (18.3 mm) wood structural panels with joints backed by 0.719-inch (18.3 mm) wood structural panels.*
4. *One thickness of 0.75-inch (19.1 mm) particleboard with joints backed by 0.75-inch (19 mm) particleboard.*
5. *One half-inch (12.7 mm) Gypsum board.*
6. *One fourth-inch (6.4 mm) Cement-based millboard.*
7. *Batts or blankets of mineral wool, mineral fiber or other approved materials installed in such a manner as to be securely retained in place.*

717.2.1.1 Batts or blankets of mineral wool or mineral fiber. *Batts or blankets of mineral wool or mineral fiber or other approved nonrigid materials shall be permitted for compliance with the 10-foot (3048 mm) horizontal fireblocking in walls constructed using parallel rows of studs or staggered studs.*

717.2.1.2 Unfaced fiberglass. *Unfaced fiberglass batt insulation used as fireblocking shall fill the entire cross section of the wall cavity to a minimum height of 16 inches (406 mm) measured vertically. When piping, conduit or similar obstructions are encountered, the insulation shall be packed tightly around the obstruction.*

717.2.1.3 Loose-fill insulation material. *Loose-fill insulation material, insulating foam sealants and caulk materials shall not be used as a fireblock unless specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gases.*

717.2.1.4 Fireblocking integrity. *The integrity of fireblocks shall be maintained.*

717.2.1.5 Double stud walls. *Batts or blankets of mineral or glass fiber or other approved nonrigid materials shall be allowed as fireblocking in walls constructed using parallel rows of studs or staggered studs.*

717.2.2 Concealed wall spaces. *Fireblocking shall be provided in concealed spaces of stud walls and partitions, including furred spaces, and parallel rows of studs or staggered studs, as follows:*

1. *Vertically at the ceiling and floor levels.*
2. *Horizontally at intervals not exceeding 10 feet (3048 mm).*

717.2.3 Connections between horizontal and vertical spaces. *Fireblocking shall be provided at interconnections between concealed vertical stud wall or partition spaces and concealed horizontal spaces created by an assembly of floor joists or trusses, and between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings, cove ceilings and similar locations.*

717.2.4 Stairways. *Fireblocking shall be provided in concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall also comply with Section 1009.5.3.*

717.2.5 Ceiling and floor openings. *Where annular space protection is provided in accordance with Exception 6 of Section 707.2, Exception 1 of Section 712.4.1.2, or Section 712.4.2, fireblocking shall be installed at openings around vents, pipes, ducts, chimneys and fireplaces at ceiling and floor levels, with an approved material to resist the free passage of flame and the products of combustion. Factory-built chimneys and fireplaces shall be fireblocked in accordance with UL 103 and UL 127.*

717.2.6 Architectural trim. *Fireblocking shall be installed within concealed spaces of exterior wall finish and other exterior architectural elements where permitted to be of combustible construction as specified in Section 1406 or where erected with combustible frames, at maximum intervals of 20 feet (6096 mm), so that there will be no open space exceeding 100 square feet (9.3 m3). Where wood furring strips are used, they shall be of approved wood of natural decay resistance or preservative-treated wood. If noncontinuous, such elements shall have closed ends, with at least 4 inches (102 mm) of separation between sections.*

Exceptions:

1. *Fireblocking of cornices is not required in single-family dwellings. Fireblocking of cornices of a two-family dwelling is required only at the line of dwelling unit separation.*
2. *Fireblocking shall not be required where installed on noncombustible framing and the face of the exterior wall finish exposed to the concealed space is covered by one of the following materials:*
   - *2.1. Aluminum having a minimum thickness of 0.019 inch (0.5 mm).*
   - *2.2. Corrosion-resistant steel having a base metal thickness not less than 0.016 inch (0.4 mm) at any point.*
   - *2.3. Other approved noncombustible materials.*

717.2.7 Concealed sleeper spaces. *Where wood sleepers are used for laying wood flooring on masonry or concrete fire-resistance-rated floors, the space between the floor slab and the underside of the wood flooring shall be filled with an approved material to resist the free passage of flame and products of combustion or fireblocked in such a manner that there will be no open spaces under the flooring that will exceed 100 square feet (9.3 m2) in area and such space shall be filled solidly under permanent partitions so that there is no communication under the flooring between adjoining rooms.*

Exceptions:

1. *Fireblocking is not required for slab-on-grade floors in gymnasiums.*
2. *Fireblocking is required only at the juncture of each alternate lane and at the ends of each lane in a bowling facility.*

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

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

RB141–07/08
R602.8, M1501.2 (New)

Proponent: Julius Ballanco, PE, JB Engineering and Code Consulting, representing In-O-Vate Technologies

1. Revise as follows:

R602.8 (Supp) Fireblocking required. Fireblocking shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top story and the roof space. Fireblocking shall be provided in wood-frame construction in the following locations.

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs; as follows:
   1.1. Vertically at the ceiling and floor levels.
   1.2. Horizontally at intervals not exceeding 10 feet(3048 mm).
2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R311.2.2.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an approved material to resist the free passage of flame and products of combustion. The material filling this annular space shall not be required to meet the ASTM E 136 requirements.
5. For the fireblocking of chimneys and fireplaces, see SectionR1003.19.
6. Fireblocking of cornices of a two-family dwelling is required at the line of dwelling unit separation.
7. At openings around dryer exhaust duct at the dryer location in accordance with Section M1501.2.

2. Add new text as follows:

M1501.2 Dryer exhaust duct penetrations. Where a clothes dryer exhaust duct is located within a framed wall, the penetration of the wall membrane at the location of the dryer shall have the annular space sealed with noncombustible material, approved fire caulking, or a noncombustible dryer exhaust duct wall receptacle. Clothes dryer exhaust duct penetrations of fire-resistance-rated wall or floor assemblies shall comply with Section R317.3.

Reason: I submitted a similar change last cycle, however, there was confusion as to what penetration needed to be protected as specified. I have clarified the code text to emphasis that the penetration is located at the dryer, or typically behind the dryer. This is where the higher incident of fire occurs.

The difference between a dyer exhaust duct penetration and other penetration is that it is in close proximity to a fuel fired appliance or electric heating appliance. Dryers are more prone to fire than other appliances. To protect the structure, it is important to have a higher level of protection.

A similar change was adopted in the International Mechanical Code. This change will result in consistency between the two codes.

The CPSC identified 15,600 fires associated with dryers in a single year. Studies have shown that metal ducts protect the structure from the spread of fire. Additionally, noncombustible material or fire caulk around the annular space prevents the fire from spreading into the wall or ceiling cavity. The same can be accomplished with manufactured noncombustible receptacles. The noncombustible receptacles also allow for the proper storage and recoil of the transition flexible duct to a metal duct.

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

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

RB142–07/08
R602.10, R602.10.1, R602.10.1.3.1, R602.10.4, Table R602.10.1.4.1, R602.10.4.7, R602.10.5.1, R602.10.6, R602.10.6.1, R602.10.8.1

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

Revise as follows:

R602.10 (Supp) Wall bracing. ~~All exterior walls~~ Buildings shall be braced in accordance with this section. ~~In addition, interior braced wall lines shall be provided in accordance with Section R602.10.1.~~ Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1 ~~accepted engineering practice~~.

Exception: Detached one-and two-family dwellings located in Seismic Design Category C are exempt from the seismic bracing requirements of this section. Wind speed provisions for bracing shall be applicable to detached one- and two-family dwellings.

R602.10.1 (Supp) Braced wall lines. Braced wall lines~~, both interior and exterior,~~ shall be provided in accordance with this section ~~with braced wall panels in the percentage and location specified in this section~~.

Braced wall panels shall be in accordance with one of the bracing methods specified in Section R602.10.2, the alternate braced wall method of Section R602.10.3.2, or the continuous structural panel sheathing method of Section R602.10.4. Bracing method shall be permitted to vary as follows:

1. Variation in bracing method from story to story is permitted.
2. Variation in bracing method from braced wall line to braced wall line within a story is permitted, except that continuous structural panel sheathing shall conform to the additional requirements of Section R602.10.4.
3. In Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C, variation in bracing method within a braced wall line is permitted. The required sheathing percentage for the braced wall line with mixed sheathing types shall have the higher bracing percentage, in accordance with Table R602.10.1(1), of all types of bracing used. Wall lines using continuous wood structural panel sheathing shall conform to the additional requirements of Section R602.10.4.

R602.10.1.3.1 (Supp) Braced wall panel location in Seismic Design Categories D_0, D_1 and D_2. ~~Exterior b~~ Braced wall lines at exterior walls shall have a braced wall panel located at each end of the braced wall line.

Exception: For braced wall panel construction Method 3 of Section R602.10.2, the braced wall panel shall be permitted to begin no more than 8 feet (2438 mm) from each end of the braced wall line provided one of the following is satisfied in accordance with Figure R602.10.1.3.1:

1. A minimum 24-inch-wide (610 mm) panel is applied to each side of the building corner and the two 24-inch-wide (610 mm) panels at the corner shall be attached to framing in accordance with Figure R602.10.4.3(1), or
2. The end of each braced wall panel closest to the corner shall have a tie-down device fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below. The tie-down device shall be capable of providing an uplift allowable design value of at least 1,800 pounds (8 kN). The tie-down device shall be installed in accordance with the manufacturer's recommendations.

R602.10.4 (Supp) Continuously-sheathed braced wall line using Method 3 (wood structural panel). Continuously sheathed braced wall lines using wood structural panels shall comply with this section. Different bracing methods shall not be permitted within a continuously sheathed braced wall line. Other bracing methods prescribed by this code shall be permitted on other braced wall lines ~~on the same story level or on different story levels of the building.~~

Exception: ~~All exterior b~~ Braced wall lines at exterior walls shall be continuously sheathed where required by Section R602.10.4.7.

TABLE R602.10.1.4.1 (Supp)
ADJUSTMENTS OF BRACING PERCENTAGE FOR BRACED WALL LINES GREATER THAN 25 FEET [a,b]

BRACED WALL LINE SPACING (feet)	MULTIPLY BRACING PERCENTAGE IN TABLE R602.10.1(1) BY:
25	1.0
30	1.2
35	1.4

For SI: 1 foot = 304.8 mm

Notes:

a. Linear interpolation is permissible.

b. ~~For an interior braced wall, the adjustment for the larger spacing between braced wall lines shall be used.~~ When a braced wall line has a parallel braced wall line on both sides, the larger adjustment factor shall be used.

R602.10.4.7 (Supp) Continuously-sheathed braced wall lines. Where a continuously-sheathed braced wall line is used in Seismic Design Categories D_0, D_1, and D_2 or regions where the basic wind speed exceeds 100 miles per hour, all other ~~exterior~~ braced wall lines at exterior walls in the same story shall be continuously sheathed.

R602.10.5.1 (Supp) ~~Interior b~~ Connections at braced wall lines at interior walls ~~panel connections~~ for Seismic Design Categories D_0, D_1 and D_2. ~~Interior b~~ Braced wall lines at interior walls shall be fastened to floor and roof framing in accordance with Table R602.3(1), to required foundations in accordance with Section R602.11.1, and in accordance with the following requirements:

1. Floor joists parallel to the top plate shall be toe-nailed to the top plate with at least 8d nails spaced a maximum of 6 inches (150 mm) on center.
2. Top plate laps shall be face-nailed with at least eight 16d nails on each side of the splice.

R602.10.6 (Supp) ~~Interior b~~ Braced wall support. ~~In Seismic Design Categories A through D_1, interior b~~ Braced wall support shall be provided as follows: ~~lines shall be supported as provided in Section R502.4.~~

1. In Seismic Design Categories A through D_1, ~~interior~~ braced wall lines at interior walls shall be supported as provided in Section R502.4.
2. Cantilevered floor joist, supporting braced wall lines, shall comply with Section R502.3.3. Solid blocking shall be provided at the nearest bearing wall location. In Seismic Design Categories A, B, and C, where the cantilever is not more than 24 inches (607 mm), a full height rim joist instead of solid blocking shall be provided.
3. Elevated post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice.

R602.10.6.1 (Supp) ~~Interior b~~ Braced wall support for Seismic Design Category D_2. In one-story buildings located in Seismic Design Category D_2, ~~interior~~ braced wall lines shall be supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm). In two story buildings located in Seismic Design Category D_2, all ~~interior~~ braced wall ~~panels~~ lines at interior walls shall be supported on continuous foundations.

Exception: Two-story buildings shall be permitted to have ~~interior~~ braced wall lines supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm) provided that:

1. The height of cripple walls does not exceed 4 feet (1219 mm).
2. First-floor braced wall panels are supported on doubled floor joists, continuous blocking or floor beams.
3. The distance between bracing lines does not exceed twice the building width measured parallel to the braced wall line.

R602.10.8.1 (Supp) Cripple wall bracing in Seismic Design Categories D_0, D_1 and D_2. In addition to the requirements of Section R602.10.8, where ~~interior~~ braced wall lines at interior walls occur without a continuous foundation below, the length of parallel exterior cripple wall bracing shall be one and one-half times the length required by Table R602.10.1(1). Where cripple walls braced using Method 3 of Section R602.10.2 cannot provide this additional length, the capacity of the sheathing shall be increased by reducing the spacing of fasteners along the perimeter of each piece of sheathing to 4 inches (102 mm) on center.

In Seismic Design Category D_2, cripple walls shall be braced in accordance with Table R602.10.1(1).

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a non-technical formatting change to provide:

- Clarity by eliminating the terms “interior braced wall line” and “exterior braced wall line”

This change was initiated because the term “interior braced wall line” implied to some folks that the braced wall line had to be *inside* the structure, and that is not the case. An interior braced wall line might begin on the *outside* of the structure and extend/continue *inside* the building.

The braced wall line is not considered differently due to location as far as the structural requirements are concerned. This code change is intended to eliminate the confusion and say that all braced wall lines are essentially equal and should be treated as such regardless where they are located on the building.

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

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

RB143–07/08
R602.10

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

1. Revise as follows:

R602.10.1 (Supp) Braced wall lines. Braced wall lines, both interior and exterior, shall be provided in accordance with this section. ~~with braced wall panels in the percentage and location specified in this section.~~

R602.10.1.1 (Supp) Braced wall panels. Braced wall panels shall be constructed in accordance with ~~one of the bracing methods~~ the intermittent bracing methods specified in Section R602.10.2 ~~the alternate braced wall method of Section R602.10.3.2~~, or the continuous structural panel sheathing method ~~of~~ specified in Section R602.10.4. Mixing of ~~B~~bracing method shall be permitted ~~to vary~~ as follows:

1. ~~Variation in~~ Mixing bracing methods from story to story is permitted.
2. ~~Variation in~~ Mixing bracing methods from braced wall line to braced wall line within a story is permitted, except that continuous structural panel sheathing shall conform to the additional requirements of Section R602.10.4.
3. Mixing bracing methods within a braced wall line is only permitted ~~I~~in Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C, ~~variation in bracing method within a braced wall line is permitted.~~ The required sheathing percentage for the braced wall line with mixed sheathing types shall have the higher bracing percentage, in accordance with Table R602.10.1.2(1), of all types of bracing used. ~~Wall lines using continuous wood structural panel sheathing shall conform to the additional requirements of Section R602.10.4.~~

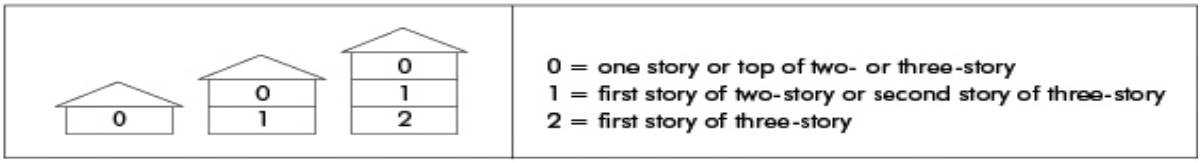
R602.10.1.2~~1~~ Percentage of bracing. The percentage of bracing along each braced wall line shall be in accordance with Table R602.10.1.2(1) and shall be the greater of that required by the Seismic Design Category or the design wind speed. Adjustments to the percent of braced wall specified in Table R602.10.1.2(1) shall be as specified in Table R602.10.1.2(2)

TABLE R602.10.1.2(1)[a,b,c] (Supp)
WALL BRACING SEISMIC DESIGN CATEGORY (SDC) OR WIND SPEED STORIES ABOVE BRACED WALL LINE[d] METHOD OF BRACING PERMITTED PER TABLE R602.10.2 PERCENTAGE OF FULL-HEIGHT BRACING PER WALL LINE MAXIMUM SPACING BETWEEN BRACED WALL LINES (FT)

SEISMIC DESIGN CATEGORY (SDC) OR WIND SPEED	STORIES ABOVE BRACED WALL LINE[d]	METHOD OF BRACING PERMITTED PER TABLE R602.10.2	PERCENTAGE OF FULL-HEIGHT BRACING PER WALL LINE		MAXIMUM SPACING BETWEEN BRACED WALL LINES (FT)
			For Method WSP Bracing	For other methods permitted[e]	
SDC A and B (S_s 0.35g and S_{ds} 0.33g), and . <= 100 mph	0	Methods ~~1-8~~ LIB, DWB, WSP, SFB, GB, PBS, PCP, HPS	16%	16%	35 (See Section R602.10.1.4 for exceptions)
	1	Methods ~~1-8~~ LIB, DWB, WSP, SFB, GB, PBS, PCP, HPS	16%	25%	
	2	Methods ~~2-8~~ DWB, WSP, SFB, GB, PBS, PCP, HPS	25%	35%	
SDC C (S_s 0.6g and S_{ds} 0.53g), and . <= 110 mph	0	Methods LIB, DWB, WSP, SFB, GB, PBS, PCP, HPS~~1-8~~	16%	25%	
	1	Methods DWB, WSP, SFB, GB, PBS, PCP, HPS~~2-8~~	30%	45%	
	2	Methods DWB, WSP, SFB, GB, PBS, PCP, HPS~~2-8~~	45%	60%	
SDC D_0 & D_1 (S_s 1.25g and S_{ds} 0.83g), and . <= 110 mph	0	Methods DWB, WSP, SFB, GB, PBS, PCP, HPS~~2-8~~	20%	30%	25 (See Section R602.10.1.4.1 for exceptions)
	1	Methods DWB, WSP, SFB, GB, PBS, PCP, HPS~~2-8~~	45%	60%	
	2	Methods DWB, WSP, SFB, GB, PBS, PCP, HPS~~2-8~~	60%	85%	
SDC D_2, and . <= 110 mph	0	Methods DWB, WSP, SFB, GB, PBS, PCP, HPS~~2-8~~	25%	40%	
	1	Methods DWB, WSP, SFB, GB, PBS, PCP, HPS~~2-8~~	55%	75%	
	Cripple wall	Method ~~3~~WSP	75%	Not Permitted	

a. Wall bracing percentages are based on a soil site class "D." Interpolation of bracing percentage between the S_{ds} values associated with the Seismic Design Categories shall be permitted when a site-specific S_{ds} value is determined in accordance with Section 1613.5 of the *International Building Code*.
b. Foundation cripple wall panels shall be braced in accordance with Section R602.10.8.

c. Methods of bracing shall be as described in Section R602.10.2. ~~The alternate braced wall panels described in Section R602.10.3.2 shall also be permitted~~.
d. Stories above braced wall line. 0 = one story or top of two or three story. 1 = first story of two story or second story of three story. 2 = first story of three story.



e. Method ~~1~~ LIB ~~bracing~~ is exempt from the percentage bracing requirement.

TABLE R602.10.1.2(2) (Supp)
ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED WALL BRACING [a]

ADJUSTMENT BASED ON:			MULTIPLY PERCENTAGE OF BRACING PER WALL LINE BY:	APPLIES TO:
Story height[b] (Section 301.3)		≤10 ft	1.0	All bracing methods - R602.10.2
		>10 ≤ 12 ft	1.2	
Braced wall line spacing in SDC A-C[b,d]		≤35 ft	1.0	
		> 35 ≤ 50 ft	1.43	
Wall dead load[e]		> 8 ≤ 15	1.0	
		<8 psf	0.85	
Roof/ceiling dead load for wall supporting [b,c]:	roof only or roof plus one story	<15 psf	1.0	
	roof only	> 15 psf ≤ 25 psf	1.1	
	roof plus one story	> 15 psf ≤ 25 psf	1.2	
Walls with stone or masonry veneer in SDC C-D_2		See Section R703.7, Exception 1-4		
Cripple walls		See Section R602.10.8		

a. The total percentage of bracing required for a given wall line is the product of all applicable adjustment factors.
b. Linear interpolation shall be permitted.
c. Bracing required for a site's wind speed shall not be adjusted for dead load.
d. Braced wall line spacing in excess of 35-ft shall be in accordance with R602.10.1.5.
e. The adjusted percentage of bracing shall not be less than that required for the site's wind speed.

R602.10.1.~~2~~3 (Supp) Angled corners. At corners, braced wall lines shall be permitted to angle out of plane up to 45 degrees with a maximum diagonal length of 8 feet (2438 mm). When determining the percentage of bracing, the length of each braced wall line shall be determined as shown in Figure R602.10.1.3. The placement of bracing for the braced wall lines shall begin at the point where the braced wall line, which contains the angled wall adjoins the adjacent braced wall line (Point A as shown in Figure R602.10.1.3). Where an angled corner is constructed at an angle equal to 45 degrees and the diagonal length is no more than 8 feet (2438 mm) in length, the angled wall may be considered as part of either of the adjoining braced wall lines, but not both. Where the diagonal length is greater than 8 feet (2438 mm), it shall be considered its own braced wall line and be braced in accordance with Section R602.10.1 and methods in Section R602.10.2.

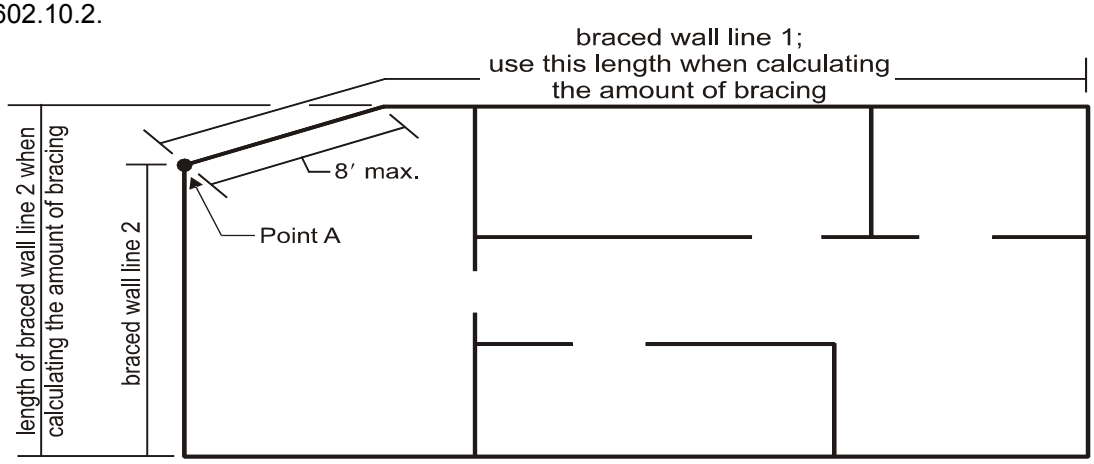


FIGURE R602.10.1.~~3~~2 (Supp)
ANGLED CORNERS

R602.10.1.~~43~~ (Supp) Braced wall panel location. Braced wall panels shall be located in accordance with Table R602.10.1.2(1) and Figure R602.10.1.~~43~~(1). Braced wall panels shall be located at least every 25 feet on center and shall begin no more than 12.5 feet (3810 mm) from each end of a braced wall line in accordance with Figure R602.10.1.~~43~~(2). Braced wall panels may be offset out-of-plane up to 4 feet (1219 mm) provided that the total out-to-out offset in any-braced wall line is not more than 8 feet (2438 mm) in accordance with Figure R602.10.1.3(3).

R602.10.1.~~43~~.1 (Supp) Braced wall panel location in Seismic Design Categories D_0, D_1 and D_2. Exterior braced wall lines shall have a braced wall panel located at each end of the braced wall line.

Exception: For braced wall panel construction Method WSP~~3~~ of Section R602.10.2, the braced wall panel shall be permitted to begin no more than 8 feet (2438 mm) from each end of the braced wall line provided one of the following is satisfied in accordance with Figure R602.10.1.~~43~~.1:

1. A minimum 24-inch-wide (610 mm) panel is applied to each side of the building corner and the two 24-inch-wide (610 mm) panels at the corner shall be attached to framing in accordance with Figure R602.10.4.3(1), or
2. The end of each braced wall panel closest to the corner shall have a tie-down device fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below. The tie-down device shall be capable of providing an uplift allowable design value of at least 1,800 pounds (8 kN). The tie-down device shall be installed in accordance with the manufacturer's recommendations.

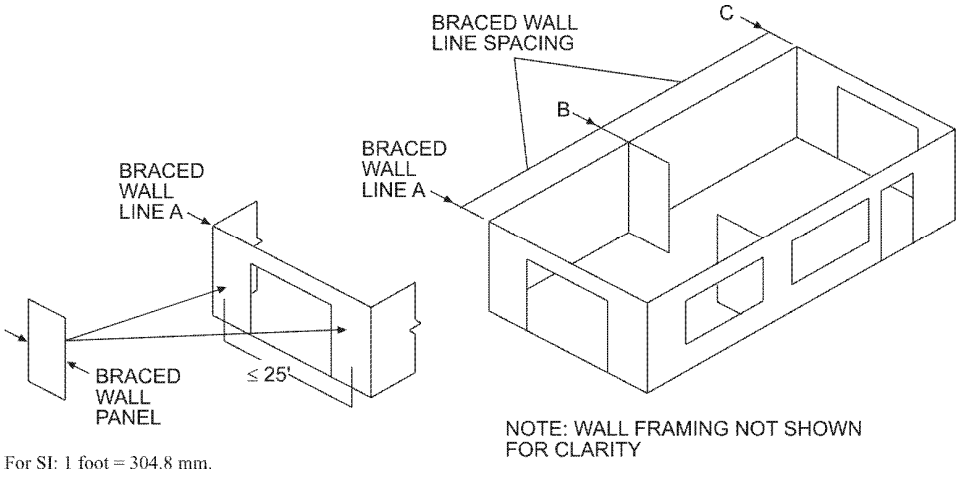


FIGURE R602.10.1.~~3~~4(1) (Supp)
BRACED WALL PANELS AND BRACED WALL LINES

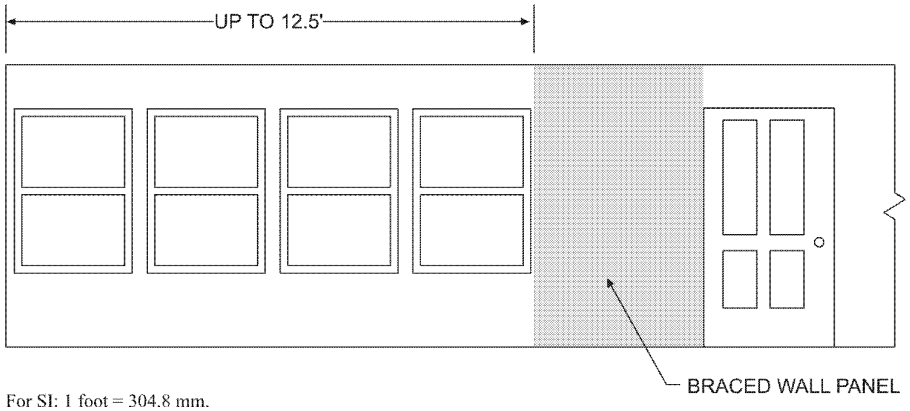


FIGURE R602.10.1.~~3~~4(2) (Supp)
PERMITTED BRACED WALL PANEL DISTANCES FROM ENDS OF A BRACED WALL LINE (SDC A, B and C)

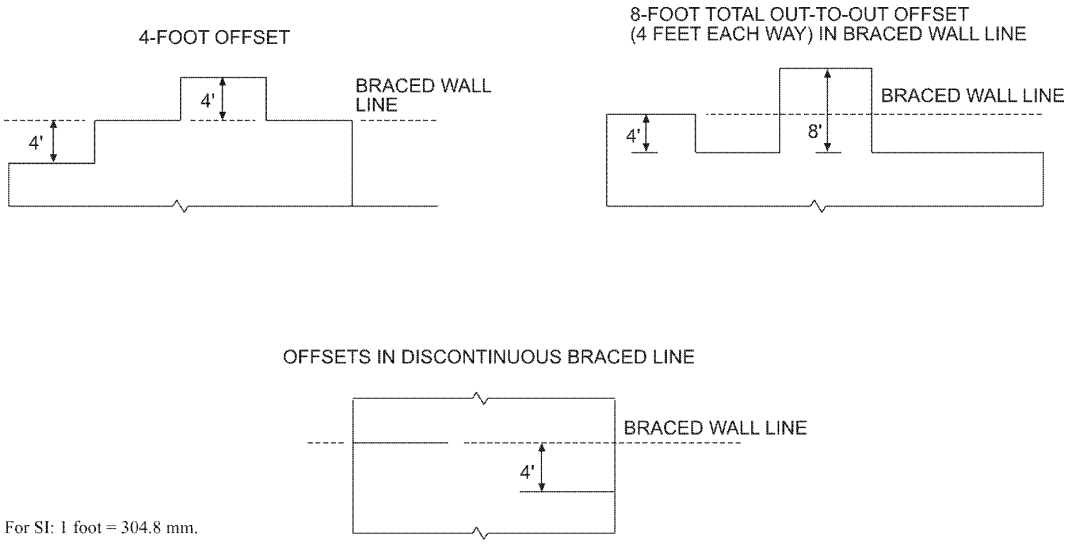


FIGURE R602.10.1.~~43~~(3) (Supp)
OFFSETS PERMITTED FOR BRACED WALL LINES

2. Delete and substitute as follows:

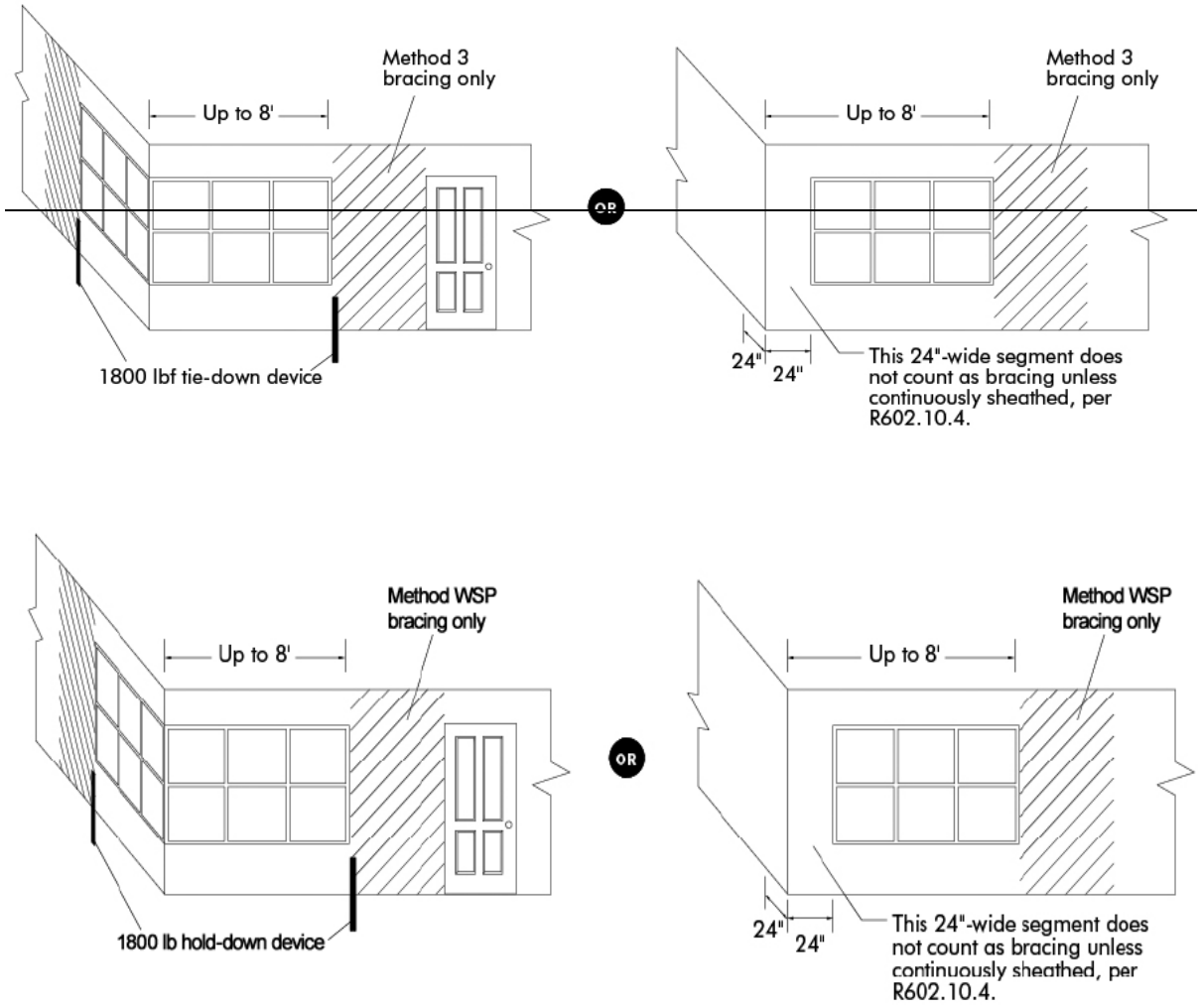


FIGURE R602.10.1.~~34~~.1 (Supp)
BRACED WALL PANELS AT BRACED WALL-LINE ENDS IN SEISMIC DESIGN CATEGORIES D_0, D_1 AND D_2

3. Revise as follows:

R602.10.1.54 (Supp) Braced wall line spacing. Spacing of braced wall lines shall not exceed 35 feet (10 668 mm) on center in both the longitudinal and transverse direction in each story.

Exception: Spacing of braced wall lines not exceeding 50 feet (15 240 mm) shall be permitted where:

1. The wall bracing provided equals or exceeds the percentage of bracing required by Table R602.10.1.2(1) multiplied by a factor equal to the braced wall line spacing divided by 35 feet (10 668 mm), and
2. The length-to-width ratio for the floor/roof diaphragm as measured between braced wall lines does not exceed 3:1.

R602.10.1.54.1 (Supp) Braced wall line spacing for Seismic Design Categories D_0, D_1 and D_2. Spacing between braced wall lines in each story shall not exceed 25 feet (7620 mm) on center in both the longitudinal and transverse directions.

Exception: In one-and two-story buildings, spacing between two adjacent braced wall lines shall not exceed 35 feet (10 668 mm) on center in order to accommodate one single room not exceeding 900 square feet (84 m^2) in each dwelling unit. Spacing between all other braced wall lines shall not exceed 25 feet (7 620 mm). A spacing of 35 feet (10 668 mm) or less shall be permitted between braced wall lines where the length of wall bracing required by Table R602.10.1.2(1) is multiplied by the appropriate adjustment factor from Table R602.10.1.54.1, the length-to-width ratio for the floor/roof diaphragm does not exceed 3:1, and the top plate lap splice face nailing shall be twelve 16d nails on each side of the splice.

TABLE R602.10.1.54.1 (Supp)
ADJUSTMENTS OF BRACING PERCENTAGE FOR BRACED WALL LINES GREATER THAN 25 FEET [a,b]

BRACED WALL LINE SPACING (feet)	MULTIPLY BRACING PERCENTAGE IN TABLE R602.10.1(1) BY:
25	1.0
30	1.2
35	1.4

For SI: 1 foot = 304.8 mm
Notes:
a. Linear interpolation is permissible.
b. For an interior braced wall, the adjustment for the larger spacing between braced wall lines shall be used.

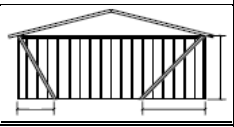
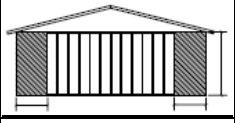
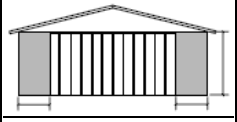
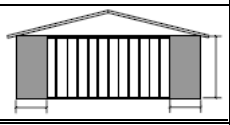
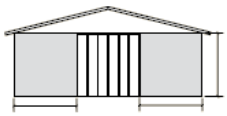
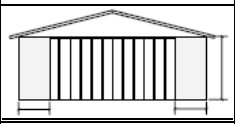
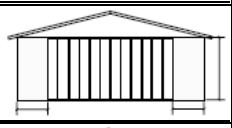
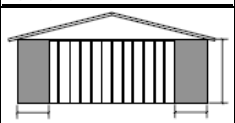
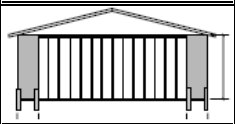
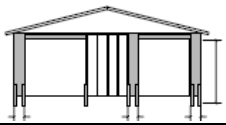
R602.10.2 (Supp) Intermittent braced wall panel construction methods.The construction of intermittent braced wall panels shall be in accordance with one of the ~~following~~ methods listed in Table R602.10.2.~~:~~

~~1. Nominal 1 inch by 4 inch (19.1 mm by 88.9 mm) continuous diagonal braces let in to the top and bottom plates and the intervening studs or approved metal strap devices installed in accordance with the manufacturer's specifications. The let-in bracing shall be placed at an angle not more than 60 degrees (1.06 rad) or less than 45 degrees (0.79 rad) from the horizontal.~~
~~2. Wood boards of 5/8-inch (15.9 mm) net minimum thickness applied diagonally on studs spaced a maximum of 24 inches (610 mm). Diagonal boards shall be attached to studs in accordance with Table R602.3(1).~~
~~3. Wood structural panel sheathing with a thickness not less than 3/8 inch (9.5 mm) for 16 inch (406 mm) or 24 inch (610 mm) stud spacing. Wood Structural panels shall be installed in accordance with Table R602.3(3) and Table R602.3(1).~~
~~4. One half inch (12.7 mm) or 25/32 inch (19.8 mm) thick structural fiberboard sheathing applied vertically or horizontally on studs spaced a maximum of 16 inches (406 mm) on center. Structural fiberboard sheathing shall be installed in accordance with Table R602.3(1).~~
~~5. Gypsum board with minimum ½ inch (12.7 mm) thickness placed on studs spaced a maximum of 24 inches (610 mm) on center and fastened at panel edges including top and bottom plates at 7 inches (178 mm) on center with the size nails specified in Table R602.3(1) for sheathing and Table R702.3.5 for interior gypsum board.~~
~~6. Particleboard wall sheathing panels installed in accordance with Table R602.3(4) and Table R602.3(1).~~
~~7. Portland cement plaster on studs spaced a maximum of 16 inches (406 mm) on center and installed in accordance with Section R703.6.~~
~~8. Hardboard panel siding when installed in accordance with Table R703.4.~~

~~**Exception:** Alternate braced wall panels constructed in accordance with Sections R602.10.3.2.1 or R602.10.3.2.2 shall be permitted to replace any braced wall panel in any of the above methods of braced wall panels.~~

4. Add new table as follows:

TABLE R602.10.2
INTERMITTENT BRACING METHODS

METHOD	MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA
LIB	Let-in-bracing	1x4 wood or approved metal straps at 45° to 60° angles		wood: 2-8d nails per stud metal: per manufacturer
DWB	Diagonal wood boards at 24" spacing	$^5/_8$"		2-8d (2½" x 0.113") nails or 2 staples, 1¾" per stud
WSP	Wood structural panel	$^3/_8$"		6d common (2"x0.113") nails at 6" spacing (panel edges) and at 12" spacing (intermediate supports) or 16 ga. x 1-$^3/_4$ staples: at 3" spacing (panel edges) and 6" spacing (intermediate supports)
SFB	Structural fiberboard sheathing	$^1/_2$" or $^{25}/_{32}$" for 16" stud spacing only		1½" galvanized roofing nails or 8d common (2½"x0.131) nails at 3" spacing (panel edges) at 6" spacing (intermediate supports)
GB	Gypsum board	$^1/_2$"		Nails at 7" spacing at panel edges including top and bottom plates; for exterior sheathing nail size, see Table R602.3(1); for interior gypsum board nail size, see Table R702.3.5
PBS	Particleboard sheathing	$^3/_8$" or $^1/_2$" for 16" stud spacing only		1½" galvanized roofing nails or 8d common (2½"x0.131) nails at 3" spacing (panel edges) at 6" spacing (intermediate supports)
PCP	Portland cement plaster	See Section R703.6		$1^1/_2$", 11 gage, $^7/_{16}$" head nails at 16" spacing or $^7/_{16}$", 16 gage staples at 6" spacing
HPS	Hardboard panel siding	$^7/_{16}$"		0.092" dia., 0.225" head nails with length to accommodate 1½" penetration into studs at 4" spacing (panel edges), at 8" spacing (intermediate supports)
ABW	Alternate braced wall	See Section R602.10.3.2		See Section R602.10.3.2
PFH	Intermittent portal frame	See Section R602.10.3.3		See Section R602.10.3.3

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

5. Revise as follows:

R602.10.2.1 (Supp) Intermittent ~~B~~braced wall panel interior finish material. Intermittent ~~B~~braced wall panels shall have gypsum wall board installed on the side of the wall opposite the bracing material. Gypsum wall board shall be not less than ½ inch (12.7 mm) in thickness and be fastened in accordance with Table R702.3.5 for interior gypsum wall board.

Exceptions:

1. Wall panels that are braced in accordance with Methods 5GB, ABW and PFH.
2. ~~Wall panels that are braced in accordance with Section R602.10.3.2 .~~2. When an approved interior finish material with an in-plane shear resistance equivalent to gypsum board is installed.
3. For Methods ~~2~~DWB, ~~3~~WSP, ~~4~~SFB, ~~6~~PBS, ~~7~~PCP, and ~~8~~HPS, gypsum wall board is permitted to be omitted provided the percentage of bracing in Table R602.10.1.2(1) is multiplied by a factor of 1.5.

R602.10.3 (Supp) Minimum length of braced panels. For Methods ~~2~~DWB, ~~3~~WSP, ~~4~~SFB, ~~6~~PBS, ~~7~~PCP and ~~8~~HPS~~above~~, each braced wall panel shall be at least 48 inches (1219 mm) in length, covering a minimum of three stud spaces where studs are spaced 16 inches (406 mm) on center and covering a minimum of two stud spaces where studs are spaced 24 inches (610 mm) on center. For Method ~~5~~GB ~~above~~, each braced wall panel and shall be at least 96 inches (2438 mm) in length where applied to one face of a braced wall panel and at least 48 inches (1219 mm) where applied to both faces. For Methods ~~2~~DWB, ~~3~~WSP, ~~4~~SFB, ~~6~~PBS, ~~7~~PCP and ~~8~~HPS, for purposes of computing the percentage of panel bracing required in Table R602.10.1.2(1), the effective length of the braced wall panel shall be equal to the actual length of the panel. When Method ~~5~~GB panels are applied to only one face of a braced wall panel, bracing percentages required in Table R602.10.1.2(1) for Method ~~5~~ GB shall be doubled.

Exceptions:

1. Lengths of braced wall panels for continuous wood structural panel sheathing shall be in accordance with Section R602.10.4.
2. Lengths of ~~alternate braced wall~~ Method ABW panels shall be in accordance with Section R602.10.3.2.~~1or Section R602.10.3.2.2~~.
3. Length of Method PFH shall be in accordance with Section R602.10.3.3.
~~3~~ 4. For Methods ~~2~~DWB, ~~3~~WSP, ~~4~~SFB, ~~6~~PBS, ~~7~~PCP and ~~8~~HPS in Seismic Design Categories A, B, and Panels between 36 inches and 48 inches in length shall be permitted to count towards the required percentage of bracing in Table R602.10.1.2(1), and the effective contribution shall comply with Table R602.10.3.

TABLE R602.10.3 (Supp)
EFFECTIVE LENGTHS FOR BRACE WALL PANELS LESS THAN 48 INCHES IN ACTUAL LENGTH (BRACE METHODS ~~2~~DWB, ~~3~~WSP, ~~4~~SFB, ~~6~~PBS, ~~7~~PCP, AND ~~8~~HPS[a]

	Effective Length of Braced Wall Panel (inches)		
Actual Length of Braced Wall Panel (inches)	8-foot Wall Height	9-foot Wall Height	10-foot Wall Height
48	48	48	48
42	36	36	N/A
36	27	N/A	N/A

For SI: 1 inch = 25.4mm
Interpolation shall be permitted.

R602.10.3.1 (Supp) Adjustment of length of braced panels. When story height (H), measured in ft, exceeds 10 feet (3048 mm), in accordance with Section R301.3, the minimum length of braced wall panels specified in Section R602.10.3 shall be increased by a factor H/10. See Table R602.10.3.1. Interpolation is permitted.

TABLE R602.10.3.1 (Supp)
MINIMUM LENGTH REQUIREMENTS FOR BRACED WALL PANELS

SEISMIC DESIGN CATEGORY AND WIND SPEED	BRACING METHOD	HEIGHT OF BRACED WALL PANEL				
		8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
SDC A, B, C, D_o, D_1 and D_2 Wind speed < 110 mph	~~2~~LIB, ~~3~~WSP, ~~4~~SFB, ~~6~~PBS, ~~7~~PCP, ~~8~~HPS and Method ~~5~~GB when double sided	4'-0"	4'-0"	4'-0"	4'-5"	4'-10"
	Method ~~5~~GB, single sided	8'-0"	8'-0"	8'-0"	8'-10"	9'-8"

For SI: I inch = 25.4mm, 1 foot = 305 mm

6. Delete without substitution:

~~**R602.10.3.2 (Supp) Alternative bracing panels**. As an alternate to the bracing methods in Section R602.10.2, wall bracing panels in accordance with Sections R602.10.3.2.1 and R602.10.3.2.2 shall be permitted.~~

7. Revise as follows:

R602.10.3.2~~.1~~ Method ABW: Alternate braced wall panels. ~~Alternate~~Method ABW braced wall panels constructed in accordance with one of the following provisions shall be permitted to replace each 4 feet (1219 mm) of braced wall panel as required by Section R602.10.3. The maximum height and minimum length and tie-down force of each panel shall be in accordance with Table R602.10.3.2.1:

1. In one-story buildings, each panel shall be sheathed on one face with 3/8-inch-minimum-thickness (9.5 mm) wood structural panel sheathing nailed with 8d common or galvanized box nails spaced in accordance with Table R602.3(1) and blocked at all wood structural panel sheathing edges. Two anchor bolts installed in accordance with Figure R403.1(1) shall be provided in each panel. Anchor bolts shall be placed 6 to 12 inches from each end of the plate. Each panel end stud shall have a tie-down device fastened to the foundation, capable of providing an uplift capacity in accordance with Table R602.10.3.2.1. The tie-down device shall be installed in accordance with the manufacturer's recommendations. The panels shall be supported directly on a foundation or on floor framing supported directly on a foundation, which is continuous across the entire length of the braced wall line. This foundation shall be reinforced with not less than one No. 4 bar top and bottom. When the continuous foundation is required to have a depth greater than 12 inches (305 mm), a minimum 12-inch-by-12-inch (305 mm by 305 mm) continuous footing or turned down slab edge is permitted at door openings in the braced wall line. This continuous footing or turned down slab edge shall be reinforced with not less than one No.4 bar top and bottom. This reinforcement shall be lapped 15 inches (381 mm) with the reinforcement required in the continuous foundation located directly under the braced wall line.
2. In the first story of two-story buildings, each braced wall panel shall be in accordance with Item 1 above, except that the wood structural panel sheathing edge nailing spacing shall not exceed four inches on center.

TABLE R602.10.3.2~~.1~~
MINIMUM LENGTH REQUIREMENTS AND TIE-DOWN FORCES
FOR ~~ALTERNATE~~ METHOD ABW BRACED WALL PANELS

SEISMIC DESIGN CATEGORY AND WIND SPEED		HEIGHT OF BRACED WALL PANEL				
		8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
SDC A, B and C Wind speed < 110 mph	Minimum Sheathed Length	2'-4"	2'-8"	2'-10"	3'-2"	3'-6"
	R602.10.3.2.1, Item 1 Tie-down Force (lbs)	1800	1800	1800	2000	2200
	R602.10.3.2.1, Item 2 Tie-down Force (lbs)	3000	3000	3000	3300	3600
SDC D_o, D_1 and D_2 Wind speed < 110 mph	Minimum Sheathed Length	2'-8"	2'-8"	2'-10"	NP[a]	NP[a]
	R602.10.3.2.1, Item 1 Tie-down Force (lbs)	1800	1800	1800	NP[a]	NP[a]
	R602.10.3.2.1, Item 2 Tie-down Force (lbs)	3000	3000	3000	NP[a]	NP[a]

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound = 4.44822 N
a. NP = Not Permitted. Maximum height of 10 feet (3,048 mm).

R602.10.3.3~~2.2~~ (Supp) Method PFH: Portal frame with hold-downs ~~Alternate bracing wall panel adjacent to a door or window opening~~. ~~Alternate~~Method PFH braced wall panels constructed in accordance with one of the following provisions are also permitted to replace each 4 feet (1219 mm) of braced wall panel as required by Section R602.10.3 for use adjacent to a window or door opening with a full-length header:

1. In one-story buildings, each panel shall have a length of not less than 16 inches (406 mm) and a height of not more than 10 feet (3048 mm). Each panel shall be sheathed on one face with a single layer of 3/8-inch-minimum-thickness (9.5 mm) wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with Figure R602.10.3.3~~2.2~~. The wood structural panel sheathing shall extend up over the solid sawn or glued-laminated header and shall be nailed in accordance with Figure R602.10.3.~~3~~2.2. A built-up header consisting of at least two 2 X 12s and fastened in accordance with Table R602.3(1) shall be permitted to be used. A spacer, if used, shall be placed on the side of the built-up beam opposite the wood structural panel sheathing. The header shall extend between the inside faces of the first full-length outer studs of each panel. The clear span of the header between the inner studs of each panel shall be not less than 6 feet (1829 mm) and not more than 18 feet (5486 mm) in length. A strap with an uplift capacity of not less than 1000 pounds (4448 N) shall fasten the header to the side of the inner studs opposite the sheathing. One anchor bolt not less than 5/8-inch-diameter (16 mm) and installed in accordance with Section R403.1.6 shall be provided in the center of each sill plate. The studs at each end of the panel shall have a tie-down device fastened to the foundation with an uplift capacity of not less than 4,200 pounds (18 683 N). The tie-down devices shall be an embedded-strap type, installed in accordance with the manufacturer's recommendations.

   Where a panel is located on one side of the opening, the header shall extend between the inside face of the first full-length stud of the panel and the bearing studs at the other end of the opening. A strap with an uplift

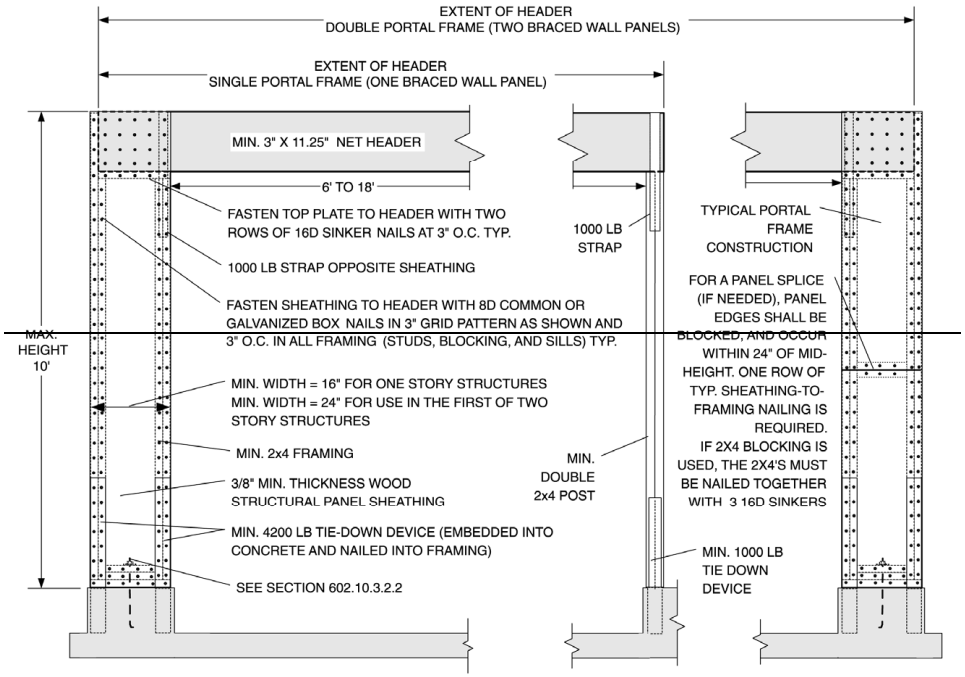
capacity of not less than 1,000 pounds (4448 N) shall fasten the header to the bearing studs. The bearing studs shall also have a tie-down device fastened to the foundation with an uplift capacity of not less than 1,000 pounds (4448 N).

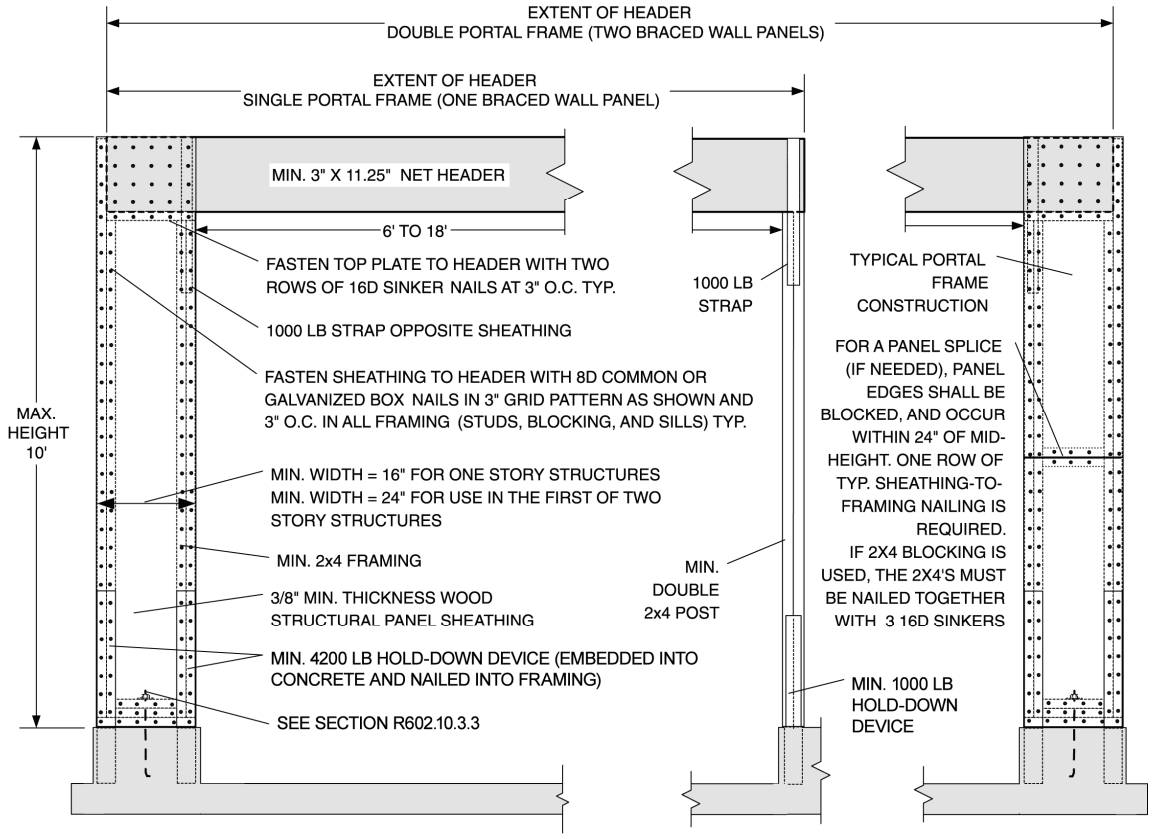
The panels shall be supported directly on a foundation, which is continuous across the entire length of the braced wall line. The foundation shall be reinforced with not less than one No. 4 bar top and bottom.

Where the continuous foundation is required to have a depth greater than 12 inches (305 mm), a minimum 12-inch-by-12-inch (305 mm by 305 mm) continuous footing or turned down slab edge is permitted at door openings in the braced wall line. This continuous footing or turned down slab edge shall be reinforced with not less than one No. 4 bar top and bottom. This reinforcement shall be lapped not less than 15 inches (381 mm) with the reinforcement required in the continuous foundation located directly under the braced wall line.

2. In the first story of two-story buildings, each wall panel shall be braced in accordance with item 1 above, except that each panel shall have a length of not less than 24 inches (610 mm).

8. Delete and substitute as follows:





For SI: 1 inch = 25.4 mm, 1 foot = 305 mm

FIGURE R602.10.3.3~~2.2~~ (Supp)
~~ALTERNATE BRACED WALL PANEL ADJACENT TO A DOOR OR WINDOW OPENING~~
METHOD PFH: PORTAL FRAME WITH HOLD-DOWNS

9. Revise as follows:

R602.10.4 (Supp) Continuously-sheathed braced wall line using Method ~~3~~WSP (wood structural panel). Continuously sheathed braced wall lines using wood structural panels shall comply with this section. Different bracing methods shall not be permitted within a continuously sheathed braced wall line. Other bracing methods prescribed by this code shall be permitted on other braced wall lines on the same story level or on different story levels of the building.

Exception: All exterior braced wall lines shall be continuously sheathed where required by Section R602.10.4.7.

R602.10.4.4 (Supp) Braced wall percentage. In addition to bracing percentage adjustments specified elsewhere in this code, the braced wall percentages for Method ~~3~~ WSP from Table 602.10.1.2(1) shall be permitted to be multiplied by a factor in accordance with Table R602.10.4.4.

TABLE R602.10.4.4 (Supp)
ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED BRACING PER WALL LINE –CONTINUOUSLY SHEATHED

ADJUSTMENT BASED ON MAXIMUM WALL CLEAR OPENING HEIGHT:		MULTIPLY PERCENTAGE OF BRACING PER WALL LINE BY:
Continuous wood structural panel sheathing when maximum opening height in wall line does not exceed [a] (Section 301.2.2.2.1)	85% of wall height	0.9
	67% of wall height	0.8

a. Percentage of bracing for continuous wood structural panel sheathing shall be based on Method ~~3~~ WSP requirements.

R602.10.7 (Supp) Panel joints. All vertical joints of panel sheathing shall occur over, and be fastened to common studs. Horizontal joints in braced wall panels shall occur over, and be fastened to common blocking of a minimum 1-1/2 inch (38 mm) thickness.

Exceptions:

1. Blocking at horizontal joints shall not be required in wall segments that are not counted as braced wall panels.
2. Where the bracing percentage provided is at least twice the minimum percentage required by Table R602.10.1.2(1) blocking at horizontal joints shall not be required in braced wall panels constructed using Methods ~~3, 4, 5, 6, or 8~~WSP, SFB, GB, PBS or PCP.

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a non-technical formatting change to provide:

- Further differentiation between intermittent panel methods and the continuous sheathing method,
- To remove method numbers and replace them in a tabular format with distinct names, abbreviations and descriptions.

Members of the ICC Ad-Hoc Committee on Wall Bracing have reported that there is significant confusion among builders and designers regarding identification and options of bracing methods. To address the confusion, we have categorized the methods into two distinct classifications: "intermittent" and "continuous" methods. To help understand "intermittent methods", we have:

- Put the original 8 methods listed in the 2006 IRC, into tabular format with new abbreviations, description and connection criteria,
- Added the two "alternate" methods into new table as actual methods, the *Alternate Brace Wall Panels,* now referred to as Method ABW, and the *Alternate Bracing Wall Panel Adjacent to a Door or Opening* method, now referred to Method, PFH

Another area of confusion has been the bracing methods being identified as numbers. Most users of the IRC cannot easily identify Method 3 with wood structural panels. However, it is easier to identify WSP with wood structural panels. It is also easier to retire and/or add new methods without having to alter a numbering scheme.

The new tabular format is intended to make it easier for everyone to understand the options available.

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

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

RB144–07/08
R602.10

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

1. Revise as follows:

R602.10.1 (Supp) Braced wall lines. Braced wall lines, both interior and exterior, shall be provided with braced wall panels in the percentage and location specified in this section.

Braced wall panels shall be in accordance with one of the bracing methods specified in Sections R602.10.2, the alternate braced wall method of Section R602.10.3.2, or the continuous ~~structural panel~~ sheathing methods ~~of~~ specified in Section R602.10.4.1. Bracing method shall be permitted to vary as follows:

1. Variation in bracing methods from story to story is permitted.
2. Variation in bracing methods from braced wall line to braced wall line within a story is permitted, except that continuous ~~structural panel~~ sheathing methods shall conform to the additional requirements of Section R602.10.4.
3. In Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C, variation in bracing method within a braced wall line is permitted. The required sheathing percentage for the braced wall line with mixed sheathing types shall have the higher bracing percentage, in accordance with Table R602.10.1(1), of all types of bracing used. Wall lines using continuous ~~wood structural panel~~ sheathing methods shall conform to the additional requirements of Section R602.10.4.

R602.10.1.1 (Supp) Percentage of bracing. The percentage of bracing along each braced wall line shall be in accordance with Table R602.10.1(1) and shall be the greater of that required by the Seismic Design Category or the design wind speed. Adjustments to the percent of braced wall specified in Table R602.10.1(1) shall be as specified in Table R602.10.1(2).