

INTERNATIONAL RESIDENTIAL BUILDING/ENERGY CODE

RB2-06/07

R101.2

Proposed Change as Submitted:

Proponent: William W. Stewart, FAIA, Chesterfield, Missouri, representing himself

Revise as follows:

R101.2 Scope. The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above-grade plane in height with a separate means of egress and their accessory structures.

Reason: Inserted text makes the IRC consistent with the IBC. As written the IRC words could be construed to mean that a basement that is totally below grade is a story as far as the limitations of the IRC are concerned, thus making the IRC inapplicable for a three story residence that has a basement.

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

Committee Action:

Disapproved

Committee Reason: There are significant differences between the definition of grade and grade plane. The additional language associated with the definition of grade plane was the reason the change was disapproved. The committee felt that in this case the IRC should remain a stand alone code and not have the definition match what appeared in the IBC.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William W. Stewart, FAIA, representing himself, requests Approval as Submitted.

Commenter's Reason: This change makes the scope of the IRC the same as the scope of the IBC, thus coordinating the two codes. On some sloped sites there might be a building that is three stories "above grade" but not three stories "above grade plane". The committee agrees with me on this point. The reason the committee turned this change down was they think the IRC is a stand alone code. I respectfully submit that they are wrong. While the IRC might be a complete code in its own right we have no stand alone codes. We have a group of coordinated codes with coordinated scopes, coordinated definitions and coordinated requirements. There is no justification in creating a situation where a user is kicked out of one code and is not able to get into another code or a situation where both codes claim to be the appropriate one.

Final Action: AS AM AMPC ____ D

RB3-06/07

R101.3

Proposed Change as Submitted:

Proponent: Rebecca Baker, Jefferson County, CO, Chair, ICC Ad Hoc Committee on the Administrative Provisions in the I-Codes (AHC-Admin)

Revise as follows:

R101.3 Purpose Intent. The purpose of this code is to provide establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

Reason: Consistency and coordination among the I-Codes is one of the cornerstones of the ICC Code Development Process. This holds true for not only the technical code provisions but also for the administrative code provisions as contained in Chapter 1 of all the I-Codes.

In response to concerns raised by the ICC membership since publication of the first editions of the I-Codes, the ICC Board established the Ad Hoc Committee on the Administrative Provisions in the I-Codes (AHC-Admin) to review Chapter 1 administrative provisions in each code in the International Codes family and improve the correlation among the I-Codes through the code development process. In order to ensure that this correlation process will continue in an orderly fashion, it is also anticipated that future code development and maintenance of the administrative provisions of the I-Codes family will be overseen by a single, multi-discipline code development committee.

The AHC-Admin is submitting a series of code change proposals designed to provide consistent and correlated administrative provisions among the I-Codes using existing I-Code texts, as noted. The intent of this correlation effort is not to have absolutely identical text in each of the I-Codes but, rather, text that has the same intent in accomplishing the administrative tasks among the I-Codes. While some proposed text may be "new" because it was judged by the AHC to be necessary to this particular code, it is not new to the I-Code family, since it already exists in one or more of the International Codes. Unless otherwise noted, there are no technical changes being proposed to these sections. A comparative matrix of current I-Codes Chapter 1 text may be found on the ICC website at www.iccsafe.org/cs/cc/admin/index.html.

This proposal focuses on the intent of the IRC and intends to provide correlation between the IRC and Section 101.3 of the *International Building Code* and *International Fire Code*. The added text will make the intent of the code clear--that it is to set forth regulations that establish the minimum acceptable level to provide protection for fire fighters and emergency responders in building emergencies and well as to safeguard public health, safety and welfare. Renaming the section and changing "provide" to "establish", while editorial, will also correlate with the section in the *International Building Code* and *International Fire Code*.

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

Committee Action:

Disapproved

Committee Reason: The committee voiced concern over changing the title of this section from purpose to intent. The language as proposed would seem to regulate the interior contents of the structure in addition to the structure itself. After some discussion the current language in the IRC was preferred.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Sean DeCrane, Cleveland Fire Fighters Association, IAFF Local #93, requests Approval as Submitted.

Commenter's Reason: Not only will the proposed language ensure the continuity of the Residential Building Code to the International Building and International Fire Codes, it will also establish the basis for the consideration of the protection of fire fighters and emergency responders in the design and construction of the residential building. More fire fighters are killed each year in residential buildings than any other type of construction. It is time the Residential Code recognize the consideration of fire fighter safety in this type of construction.

Public Comment 2:

Rick Thornberry, PE, The Code Consortium, Inc., representing Cellulose Insulation Manufacturers Association (CIMA), requests Approval as Submitted.

Commenter's Reason: The Cellulose Insulation Manufacturers Association (CIMA) has submitted this Public Comment to encourage the ICC voting membership to overturn the Committee's recommendation for disapproval in order to approve this code change proposal as submitted. This code change proposal is basically editorial and correlative with the purpose/intent statement of Section 101.3 of the *International Building Code* (IBC). Approving this code change proposal will make these two sections virtually identical and incorporate the concept of providing safety to fire fighters and emergency responders during emergency operations.

Certainly there are basic fire safety provisions that are included in the *International Residential Code* (IRC) that not only provide for safety to life and property from fire but also provide safety to fire fighters and emergency responders. Why not recognize this and make the codes consistent regarding their administrative provisions for the purpose/intent of the code? Most of the fires this country experiences occur in one and two family dwellings which are regulated by the IRC. Since they put the most demand upon local fire departments and the responding fire fighters and other emergency responders, it makes sense that the code should recognize these emergency personnel in the intent/purpose statement of the code. Therefore, we urge the ICC voting membership to approve this code change proposal as submitted.

Final Action: AS AM AMPC_____ D

RB7-06/07 R102.8 (New)

Proposed Change as Submitted:

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

Add new text as follows:

R102.8 Structures in Wildland-Urban Interface Areas. Where an area has been designated by the local jurisdiction as a Wildland-Urban Interface area, the requirements of the *International Wildland-Urban Interface Code* shall apply.

Reason: The *International Wildland-Urban Interface Code* is not actually referenced in the IRC but it should be because buildings in areas designated for such use need to comply with the IWUIC.

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

Committee Action:

Disapproved

Committee Reason: This new language concerning the *International Wildland-Urban Interface Code* should be covered initially under the scoping provisions of this code before this new section is added.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, GBH International, representing American Fire Safety Council, requests Approval as Modified by this public comment.

Replace proposal as follows:

R101.2 Scope. The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above-grade in height with a separate means of egress and their accessory structures. The provisions of the *International Residential Code for One- and Two-family Dwellings* shall be permitted to be supplemented by the provisions of the *International Wildland-Urban Interface Code* for the construction, alteration, movement, repair, maintenance and use of one- and two-family dwellings and townhouses not more than three stories above-grade in height with a separate means of egress, and their accessory structures, in areas where the following applies: (1) the applicable governmental jurisdiction has designated the area as a wildland-urban interface area and (2) the *International Wildland-Urban Interface Code* has been adopted by reference by the applicable governmental jurisdiction in accordance with the jurisdiction's laws.

Commenter's Reason: The *International Wildland-Urban Interface Code* is not actually referenced in the IRC but it should be because buildings in areas designated for such use need to have the opportunity to comply with the IWUIC if the authority having jurisdiction adopts the code. The committee looking at the proposal explained that the added reference would be more appropriate in the scope section. Comments by committee members also made two added key points: (a) it is essential to be very specific in terms of what the IWUIC code should actually address in those areas where it is being applied and (b) it is essential that the local jurisdiction should have adopted the IWUIC before it is required to be used. The comment makes the appropriate changes.

Final Action: AS AM AMPC ____ D

RB11-06/07 R105.2

Proposed Change as Submitted:

Proponent: Rick Davidson, City of Hopkins, Minnesota

Revise as follows:

R105.2 Work exempt from permit. Permits shall not be required for the following. Exemption from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

Building:

1. One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 120 square feet (11.15 m²).
2. Fences not over 6 feet (1829 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks without roof structures that (a) are not more than 30 inches above grade at any point, (b) are not structurally attached to a dwelling, and (c) do not serve the exit door required by Section R311.4.

Electrical:

Repairs and maintenance: A permit shall not be required for minor repair work, including the replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles.

Gas:

1. Portable heating, cooking or clothes drying appliances.
2. Replacement of any minor part that does not alter approval of equipment or make such equipment unsafe.
3. Portable-fuel-cell appliances that are not connected to a fixed piping system and are not interconnected to a power grid.

Mechanical:

1. Portable heating appliances.
2. Portable ventilation appliances.
3. Portable cooling units.
4. Steam, hot or chilled water piping within any heating or cooling equipment regulated by this code.
5. Replacement of any minor part that does not alter approval of equipment or make such equipment unsafe.
6. Portable evaporative coolers.
7. Self-contained refrigeration systems containing 10 pounds (4.54 kg) or less of refrigerant or that are actuated by motors of 1 horsepower (746 W) or less.
8. Portable-fuel-cell appliances that are not connected to a fixed piping system and are not interconnected to a power grid.

The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a permit shall be obtained and inspection made as provided in this code.

The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

Reason: The purpose of this code change is to delete permit requirements for open decks that are built close to the ground and pose little danger. There is little in the IRC to regulate them. These structures are exempt from frost footing requirements by R403.1.4.1. They don't need guards. They don't require stairs. They don't serve the main exit door. The cost for permits and plan reviews to the homeowner is an unnecessary expense. The building department's resources can be better used on projects that have more of an impact on safety. As with the other structures that are exempted from permits, there is still an obligation by the owner to follow any codes that might be applicable including any local zoning ordinances. But just like the tool shed or retaining wall, they wouldn't need to obtain a permit.

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

Committee Action:

Disapproved

Committee Reason: The proposed language would allow decks to be built without a permit with no inspection, permits or requirements to meet the structural provisions of the IRC.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Rick Davidson, City of Maple Grove, Minnesota, requests Approval as Submitted.

Commenter's Reason: The proposed amendment will exclude decks from permits only when no part of the deck floor is more than 30 inches above grade, the deck has no roof, the deck is not structurally attached to the dwelling, and the deck does not serve the main exit door. The committee argued that low decks should be regulated because they could be considered a gathering area and pose a hazard from collapse and that the proposal would exempt decks from meeting the structural requirements. The proposal did not exempt decks from meeting structural requirements. It only exempts decks that meet specific criteria from permits and inspections. R105.2 states that exemption from permitting does not allow construction that is not in conformance with the code. So the owner still has an obligation to follow any applicable code requirements, just as they do for other exempt construction. And while there is some minor risk of injury from collapse, one must remember that these decks must be less than 30 inches above grade at all points. The risk of injury is minimal. It is also important to keep in mind that a large majority of deck collapses are a result of a failure of the connection of the deck to the structure. This exception would not apply to decks connected to a dwelling, only free standing decks. The IRC exempts some swimming pools from permits even though they still pose a hazard from drowning and exempts playground equipment and children's playhouses when they could pose a significant hazard to children.

Public Comment 2:

Gilbert Gonzales, Murray City Corporation, representing Utah Chapter ICC, requests Approval as Modified by this public comment.

Modify proposal as follows:

R105.2 Work exempt from permit. Permits shall not be required for the following. Exemption from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

Building:

1. One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 120 square feet (11.15 m²).
2. Fences not over 6 feet (1829 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks 120 square feet (11.15 m²) or less, without roof structures ~~that~~ which (a) are not more than 30 inches above grade at any point, (b) are not structurally attached to a dwelling, and (c) do not serve the exit door required by Section R311.4.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: It appears the committee disapproved the code change based on no inspections or requirements to meet the structural provisions of the IRC.

Section 105.2 states “**Exemption from permit requirements of this code shall not be deemed to grant authorization for any work to be done in a manner in violation of the provisions of this code or any other laws or ordinances of the jurisdictions.**

Although no permit would be required it would still need to meet the requirements of the IRC, similarly to allowing a 120 sq.ft accessory structure to be built without the benefit of a permit.

Final Action: AS AM AMPC____ D

RB25-06/07

R202

Proposed Change as Submitted:

Proponent: Rick Davidson, City of Hopkins, Minnesota

Revise definition as follows:

ATTIC. ~~The~~ A non-habitable unfinished space between the ceiling joists of the top story and the roof rafters.

Reason: The current text references space between “ceiling joists” (not floor joists) and “roof rafters” which seems to imply an unfinished non-habitable space. But the IRC Committee disapproved a code change in Cincinnati (RB232-04/05) that would have allowed alternative stair designs to an attic with the statement that the change would have allowed noncompliant stairs to a *habitable* attic. The term “habitable attic” is an oxymoron. The space would then be considered a story and traditional stairs would be required. Typical attics would not be considered a story. Because of confusion that may be caused as a result of statements attributed to the committee, it is necessary to clarify that this space is non-habitable.

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

Committee Action: **Disapproved**

Committee Reason: This proposed language does not clarify or improve the current code text.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, Minnesota, requests Approval as Submitted.

Commenter’s Reason: While it may seem obvious that an attic is intended to be **non-habitable** space because it is defined as unfinished space between ceiling joists and roof rafters and habitable space would require floor (not ceiling) joists, the Committee denied a code change in the last cycle citing the term “habitable attic” (Report of the Public Hearings 04/05 for RB232). Assuming attics could be habitable space adds significant confusion to the code because the IRC is limited to three story buildings and if an attic is considered habitable it constitutes a story. If the attic was considered habitable, it would require compliance with egress requirements including a code compliant stairs, smoke alarm requirements, and perhaps a host of other issues. The IRC Committee disapproved this proposal on a close 6-5 vote with the chair breaking the tie. Some committee members expressed concern about adding this term without knowing to what extent the space may be finished. Again, the term “attic” is already defined as being space that is unfinished. The concern is unnecessary.

Final Action: AS AM AMPC____ D

RB31-06/07

R202

Proposed Change as Submitted:

Proponent: Roy Scott, New York State Department of State (NYSDOS)

Add new definition as follows:

**SECTION 202
DEFINITIONS**

STAIRWAY. One or more flights of stairs, either interior or exterior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another within or attached to a building, porch or deck.

STAIR. A change in elevation, consisting of one or more risers.

Reason: While there are a lot of very detailed requirements for stairways in the residential code, there is no definition to tell what a stair or stairway is.

Many code officials attempt to regulate stairways that have nothing to do with achieving safe egress from a dwelling, such as from a patio, into a swimming pool or some other landscaping feature. It is understood that stairways both within a building and those that provide access to grade from a dwelling need to be regulated. Stretching the code to apply to features that aren't related to safe ingress and egress to and from a dwelling is overly restrictive. The applicability of the code must be consistent with the scoping in R101.2; dwelling and accessory structures. Accessory structures are also buildings by definition. In order to assure that stairways that are not necessary for use in gaining access to or egress from a building are not inadvertently regulated, this definition must be included.

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

Committee Action:

Disapproved

Committee Reason: While Stairway is a term that should be defined in the IRC the definition should match the one that is currently listed in the IBC. This would avoid any conflicts between the two codes and provide needed consistency.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Pate, City and County of Broomfield, Colorado Building Department, representing Colorado Chapter ICC, requests Approval as Modified by this public comment.

Modify proposal as follows:

STAIRWAY. One or more flights of stairs, either interior or exterior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another ~~within or attached to a building, porch or deck.~~

STAIR. A change in elevation, consisting of one or more risers.

Commenter's Reason: The committee supported the intent of this code change in order to get a definition of stair and stairway into this Code. The reason for disapproval was because the proposed definition did not match the one in the IBC. This modification is consistent with the IBC and will therefore solve that problem.

Final Action: AS AM AMPC_____ D

**RB33-06/07, Part II
R301.1.1, Chapter 33; IBC 2301.2, Chapter 35**

Proposed Change as Submitted:

PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED HERE FOR INFORMATIONAL PURPOSES ONLY.

Proponent: Rob Pickett, Rob Pickett & Associates, LLC, representing ICC IS-LOG Standards Committee

PART I – IRC

1. Revise as follows:

301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards the design shall comply with the *International Building Code*.

1. American Forest & Paper Association (AF&PA), Wood Frame Construction Manual (WFCM).
2. American Iron and Steel Institute (AISI), Standard for Cold-Formed Steel Framing – Prescriptive Method for One- and Two-family Dwellings (COFS-PM).
3. ICC-400.

2. Add standard to Chapter 43 as follows:

International Code Council (ICC)

ICC-400 IS-LOG Standard for the Design and Construction of Log Structures

PART II – IBC

1. Revise as follows:

2301.2 General design requirements. The design of structural elements or systems, constructed partially or wholly of wood or wood-based products, shall be in accordance with one of the following methods:

1. Allowable stress design in accordance with Sections 2304, 2305 and 2306.
2. Load and resistance factor design in accordance with Sections 2304, 2305 and 2307.
3. Conventional light-frame construction in accordance with Sections 2304 and 2308.

Exception: Buildings designed in accordance with the provisions of the AF&PA WFCM shall be deemed to meet the requirements of the provisions of Section 2308.

4. The design and construction of log structures shall be in accordance with the provisions of the ICC-400.

2. Add standard to Chapter 35 as follows:

International Code Council (ICC)

ICC-400 IS-LOG Standard for the Design and Construction of Log Structures

Reason: Currently the IBC and IRC do not provide any guidelines or list a standard for the construction of log structures. The ICC-400 IS-LOG Standard for the Design and Construction of Log Structures represents those industry standards and guidelines.

Cost Impact: The cost of construction will be that incurred to build properly with quality products, connectors and methods as compared to the utilization of any material with no proper methodology used in the structures development.

Analysis: The proposed standard has not been reviewed for compliance with Section 3.6 of the ICC Code Development process. Staff will review it and post the results at the ICC website prior to the code change hearings.

Note: The following analysis was not in the Code Change Proposal book but was published in the “Errata to the 2006/2007 Proposed Changes to the International Codes and Analysis of Proposed Reference Standards” provided at the code development hearings:

Analysis: ICC-400 was not complete at the time the monograph was printed. It has since been completed and was provided to the committee prior to the hearings.

PART I — IRC

Committee Action:

Approved as Submitted

Committee Reason: This new standard, ICC-400 Standard for the Design and Construction of Log Structures, gives the code official an important tool for inspection and understanding log construction.

Assembly Action:

None

PART II – IBC STRUCTURAL

Committee Action:

Disapproved

Committee Reason: The committee’s disapproval is based on the status of the proposed referenced standard. If the standard is completed the proponent is encouraged to submit a public comment on this proposal. The standard was developed under the ANSI process and is desperately needed.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rob Pickett, Chair/Robert Savignau, Vice Chair, ICC IS-LOG Standards Committee request Approval as Submitted for Part II.

Commenter's Reason: At the time of the Public Hearings in Orlando, Florida the IBC Structural committee and the IRC B/E committee was furnished with draft copies of the completed log standard. The document had not been approved by ANSI for publication that time but the language was complete. Since that time the document has been submitted to ANSI and has received approval for publication as an American National Standard. The ICC Standard for Design and Construction of Log Structures is now published and available for purchase. We urge the membership to follow the actions of the IRC B/E committee and support the reference of this important tool in the IBC.

Final Action: AS AM AMPC____ D

RB34-06/07

R202 (New), R301.1.1, R301.2.1.1, R301.2.2.2.1, R301.2.2.4.1, R301.2.3, R301.3, M1308.1, M2101.6, P2603.2, R614 (New), Chapter 43

Proposed Change as Submitted:

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

1. Add new definitions as follows:

SECTION R202 DEFINITIONS

CORE. The light-weight middle section of the sandwich structural insulated panel composed of molded expanded polystyrene (EPS) insulation, which provides the link between the two facing shells.

FACING. The structural wood panel facers that form the two outmost rigid layers of the structural insulated panel.

PANEL THICKNESS. Thickness of core plus two layers structural wood panel facers.

SPLINE. A long, flat, pliable strip of wood structural panel cut from the same material used for the panel facers, used to connect two structural insulated panels. The strip (spline) fits into a groove cut into the longitudinal edges of the two structural insulated panels to be joined. Splines are used in pairs, one behind each facing of the structural insulated panels being spliced as per Figure R614.8.

STRUCTURAL INSULATED PANEL (SIP). A structural sandwich panel which consists of a light weight core securely laminated between two thin, rigid facings.

2. Revise as follows:

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards the design shall comply with the *International Building Code*.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual (WFCM)*.
2. American Iron and Steel Institute (AISI) *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings (COFS/PM) with Supplement to Standard for Cold-Formed Steel Framing-Prescriptive Method for One- and Two-Family Dwellings*.
3. Structural Insulated Panel Association (SIPA), Prescriptive Method for Structural Insulated Panel Wall Construction. (PM/SIP)

R301.2.1.1 Design criteria. Construction in regions where the basic wind speeds from Figure R301.2(4) equal or exceed 100 miles per hour (45 m/s) in hurricane-prone regions, or 110 miles per hour (49m/s) elsewhere, shall be designed in accordance with one of the following:

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM); or
2. *Southern Building Code Congress International Standard for Hurricane Resistant Residential Construction* (SSTD 10); or
3. *Minimum Design Loads for Buildings and Other Structures* (ASCE-7); or
4. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings (COFS/PM) with Supplement to Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings*.
5. Concrete construction shall be designed in accordance with the provisions of this code.
6. Structural insulated panels shall be designed in accordance with the provisions of this code.

R301.2.2.2.1 Weights of materials. Average dead loads shall not exceed 15 pounds per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal projection) or 10 pounds per square foot (480 Pa) for floor assemblies, except as further limited by Section R301.2.2. Dead loads for walls above grade shall not exceed:

1. Fifteen pounds per square foot (720 Pa) for exterior light-frame wood walls.
2. Fourteen pounds per square foot (670 Pa) for exterior light-frame cold-formed steel walls.
3. Ten pounds per square foot (480 Pa) for interior light-frame wood walls.
4. Five pounds per square foot (240 Pa) for interior light-frame cold-formed steel walls.
5. Eighty pounds per square foot (3830 Pa) for 8-inch-thick (203 mm) masonry walls.
4. Eighty-five pounds per square foot (4070 Pa) for 6-inch-thick (152 mm) concrete walls.
7. Ten psf (0.48 kN/m²) for structural insulated panel walls.

Exceptions:

1. Roof and ceiling dead loads not exceeding 25 pounds per square foot (1190 Pa) shall be permitted provided the wall bracing amounts in Chapter 6 are increased in accordance with Table R301.2.2.2.1.
2. Light-frame walls with stone or masonry veneer shall be permitted in accordance with the provisions of Sections R702.1 and R703.
3. Fireplaces and chimneys shall be permitted in accordance with Chapter 10.

R301.2.2.4.1 Height limitations. Wood framed buildings shall be limited to three stories above grade or the limits given in Table R602.10.1. Cold-formed steel framed buildings shall be limited to two stories above grade in accordance with COFS/PM. Mezzanines as defined in Section 202 shall not be considered as stories. Structural insulated panel buildings shall be limited to two stories above grade.

R301.2.3 Snow loads. Wood framed construction, cold-formed steel framed construction and masonry and concrete construction, and structural insulated panel construction in regions with ground snow loads 70 pounds per square foot (3.35 kPa) or less, shall be in accordance with Chapters 5, 6 and 8. Buildings in regions with ground snow loads greater than 70 pounds per square foot (3.35 kPa) shall be designed in accordance with accepted engineering practice.

R301.3 Story height. Buildings constructed in accordance with these provisions shall be limited to story heights of not more than the following:

1. For wood wall framing, the laterally unsupported bearing wall stud height permitted by Table R602.3(5) plus a height of floor framing not to exceed 16 inches.

Exception: For wood framed wall buildings with bracing in accordance with Table R602.10.1, the wall stud clear height used to determine the maximum permitted story height may be increased to 12 feet without requiring an engineered design for the building wind and seismic force resisting systems provided that the length of bracing required by Table R602.10.1 is increased by multiplying by a factor of 1.20. Wall studs are still subject to the requirements of this section.

2. For steel wall framing, a stud height of 10 feet, plus a height of floor framing not to exceed 16 inches.
3. For masonry walls, a maximum bearing wall clear height of 12 feet plus a height of floor framing not to exceed 16 inches.

Exception: An additional 8 feet is permitted for gable end walls.

4. For insulating concrete form walls, the maximum bearing wall height per story as permitted by Section 611 tables plus a height of floor framing not to exceed 16 inches.
5. For structural insulated panel walls, the maximum bearing wall height per story as permitted by Section 614 tables plus a height of floor framing not to exceed 10 feet.

Individual walls or walls studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided story heights are not exceeded. An engineered design shall be provided for the wall or wall framing members when they exceed the limits of Chapter 6. Where the story height limits are exceeded, an engineered design shall be provided in accordance with the *International Building Code* for the overall wind and seismic force resisting systems.

M1308.1 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 cold-formed, steel-framed, load-bearing members shall be permitted only in accordance with Sections R505.2, R603.2 and R804.2. 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 cold-formed, steel-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 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.6, R602.6, R602.6.1 and R802.6. Holes in cold-formed, steel-framed, load-bearing members shall be permitted only in accordance with Sections R506.2, R603.2 and R804.2. 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 cold-formed, steel-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 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 cold-formed steel-framed load-bearing members shall be permitted only in accordance with Sections R505.2, R603.2 and R804.2. In accordance with the provisions of Sections R603.3.4 and R804.3.5 cutting and notching of flanges and lips of cold-formed steel-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.

3. Add new text as follows:

SECTION R614 **STRUCTURAL INSULATED PANEL WALL CONSTRUCTION**

R614.1 General. Structural Insulated Panel walls shall be designed in accordance with the provisions of this section. When the provisions of this section are used to design structural insulated panel 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.

R614.2 Applicability Limits. The provisions of this section shall control the construction of exterior structural Insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist or truss span, not greater than 40 feet (10 973 mm) in width parallel to the joist span or truss, and not greater than two stories in height with each story not greater than 10 feet (3048 mm) high. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 130 miles per hour Exposure A, B or C and a maximum ground snow load of 70 pounds per foot (3.35 kN/m²), and Seismic Zones A, B, and C.

R614.3 Materials. Structural insulated panels (SIPs) shall comply with the following criteria:

R614.3.1 Core. The core material of SIPs shall be composed of molded expanded polystyrene (EPS) meeting the requirements of ASTM C 578, type I, with minimum density of 0.90 lb/cu ft or an approved alternate. Flame-spread rating of SIP cores shall be less than 75 and the smoke-development rating shall be less than 450, tested in accordance with ASTM E 84. The minimum thickness of the core for SIP walls shall be 3.5 inches (89 mm). SIP core insulation shall bear a label with the manufacturer identification, product standard and type, flame-spread/smoke-developed and name of quality assurance agency.

R614.3.2 Facing. Facing materials for structural insulated panels shall be wood structural panels conforming to DOC PS 1 or DOC PS 2, each having a minimum nominal thickness of 7/16 inches (11 mm). Facing shall be identified by a grade mark or certificate of inspection issued by an approved agency. The facing materials shall meet the minimum qualification test values specified in R301.1.1.

R614.3.3 Adhesive. Adhesives used to structurally laminate the EPS insulation core material to the structural wood facers shall be Type II, Class 2 conforming to ASTM D2559 specifically intended for use as an adhesive intended for use in the lamination of structural insulated panels. Each container of adhesive shall bear a label with the adhesive manufacturer name, adhesive name and type and the name of the quality assurance agency.

R614.3.4 Lumber. The minimum lumber framing materials used for SIPs prescribed in this document is NLGA graded No. 2 Spruce-pine-fir (SPF). Other wood species/grades that meet or exceed the mechanical properties and specific gravity of No. 2 SPF shall be permitted for substitution.

R614.3.5 SIP Screws. Screws used for the erection of SIPs as specified in Section R614.5 shall be provided by the SIPs manufacturer and shall be sized to fully penetrate the main member – the wood member to which the assembly is being attached.

R614.4 SIP Wall Panels. SIPs for wall systems shall comply with Figure R614.4 and shall have minimum panel thickness as per Tables R614.5(1) and R614.5(2) for above-grade walls. All SIPs shall be identified by grade mark or certificate of inspection issued by an approved agency.

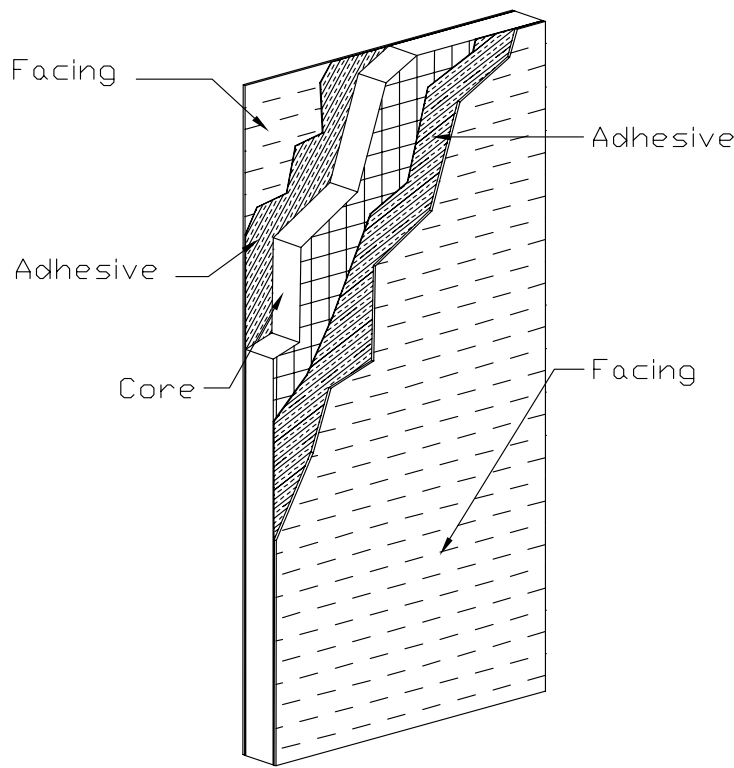


FIGURE R614.4
SIPS WALL PANEL

R614.4.1 Labeling. All panels shall be identified by grade mark or certificate of inspection issued by an approved agency. Each structural insulated panel shall bear a stamp or label with the following minimum information.

- Manufacturer Name/Logo
- Identification of the assembly
- Quality assurance agency

R614.5 Wall Construction. Exterior walls of structural insulated panel construction shall be designed and constructed in accordance with the provisions of this section and Tables R614.5(1) and R614.5(2) and Figures R614.5(1) and R614.5(2). Structural insulated panel walls shall be fastened through both facing surfaces to other wood building components in accordance with Tables R602.3(1) through R602.3(4).

Framing shall be attached in accordance to Section R602.3(1) unless otherwise provided for in Section R614.

**TABLE R614.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING
SIP OR LIGHT-FRAME ROOF ONLY**

Wind Speed (3-sec. gust)		Snow Load (psf)	Building Width (ft)														
			24			28			32			36			40		
			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)		
Exp. A/B	Exp. C	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	
85		20	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		30	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		50	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		70	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
100	85	20	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		30	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		50	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		70	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
110	100	20	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		30	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		50	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		70	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
120	110	20	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		30	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		50	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		70	4	4	4	4	4	4	4	4	4	4	4	4	6	4	4
130	120	20	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		30	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		50	4	4	4	4	4	4	4	4	6	4	4	6	4	4	6
		70	4	4	4	4	4	4	6	4	4	6	4	6	N/A	4	6
	130	20	4	4	6	4	4	N/A	4	4	N/A	4	4	N/A	4	6	N/A
		30	4	4	N/A	4	4	N/A	4	4	N/A	4	6	N/A	4	6	N/A
		50	4	6	N/A	4	6	N/A	4	N/A	N/A	6	N/A	N/A	6	N/A	N/A
		70	4	N/A	N/A	6	N/A	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

Deflection criteria: L/240.

Roof load: 7 psf.

Ceiling load: 5 psf.

Wind loads based on Table R301.2(2).

N/A indicates not applicable.

TABLE R614.5(2)
MINIMUM THICKNESS FOR SIP WALLS SUPPORTING
SIP OR LIGHT-FRAME ONE STORY AND ROOF

Wind Speed (3-sec. gust)	Snow Load (psf)	Building Width (ft)																
		24			28			32			36			40				
		Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)				
Exp. A/B	Exp. C	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10		
85	20																	
	30																	
	50																	
	70												6	6	6	6	6	
100	85	20																
		30																
		50																
		70										6	6	6	6	6	N/A	N/A
110	100	20															6	
		30												6	4	6	6	
		50										6	4	6	6	6	N/A	N/A
		70							6	6	6	N/A	6	N/A	N/A	N/A	N/A	N/A
120	110	20															6	
		30													6	6	N/A	N/A
		50			6	4	4	6	4	6	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A
		70			6	4	6	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
130	120	20			6	4	4	6	4	6	N/A	4	6	N/A	6	N/A	N/A	
		30			6	4	4	N/A	4	6	N/A	6	N/A	N/A	6	N/A	N/A	
		50		6	N/A	4	6	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		70		6	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	130	20	6	N/A	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		30	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

Deflection criteria: L/240.

Roof load: 7 psf.

Ceiling load: 5 psf.

Second floor live load: 30 psf.

Second floor dead load: 10 psf.

Second floor dead load from walls: 10 psf.

Wind loads based on Table R301.2(2).

N/A indicates not applicable.

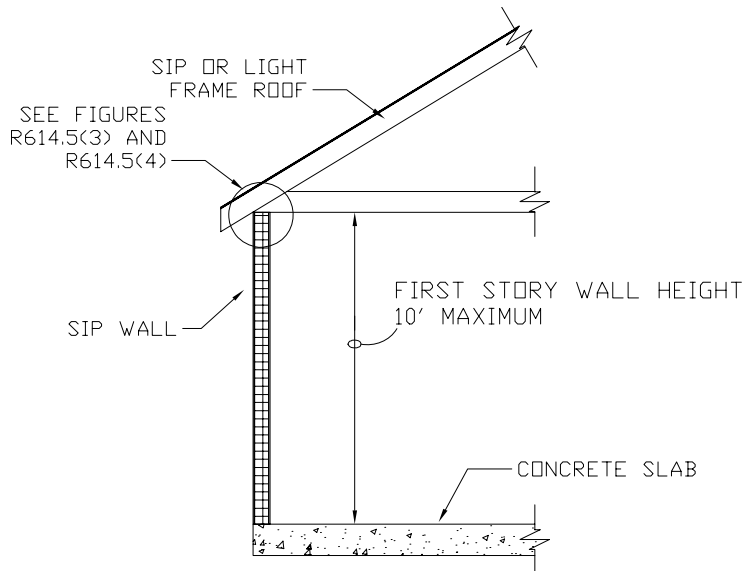


FIGURE R614.5(1)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS

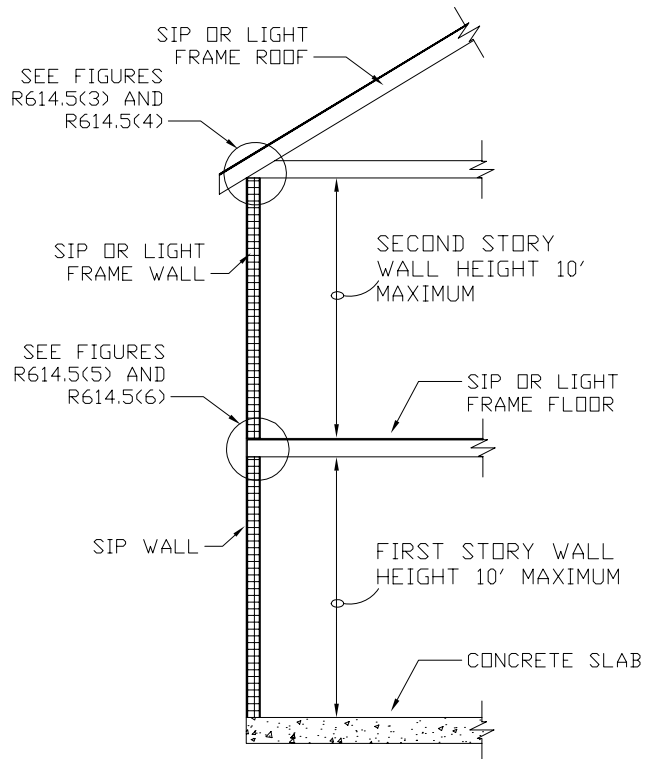


FIGURE R614.5(2)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS

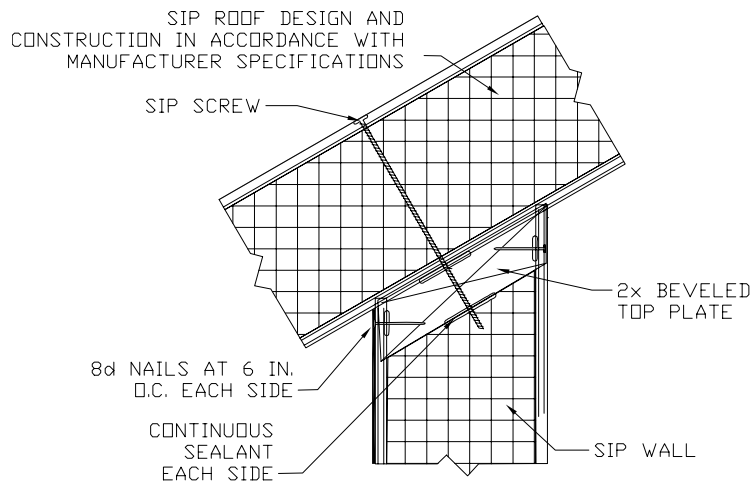


FIGURE R614.5(3)
SIP WALL TO ROOF BEVELED TOP PLATE CONNECTION

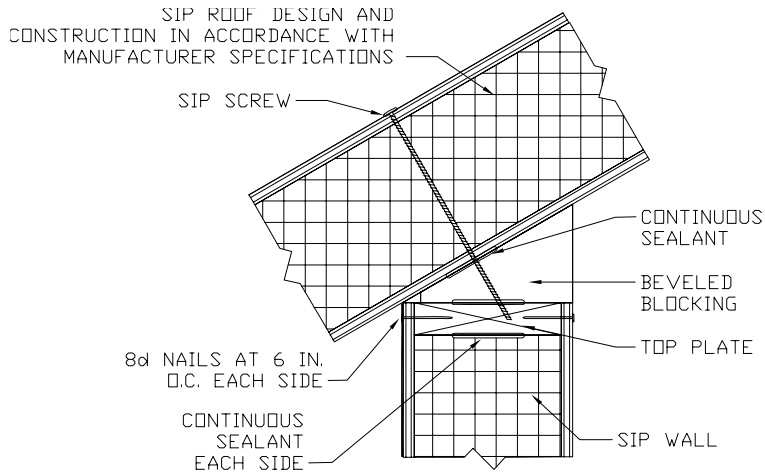


FIGURE R614.5(4)
SIP WALL TO ROOF BEVELED BLOCKING CONNECTION

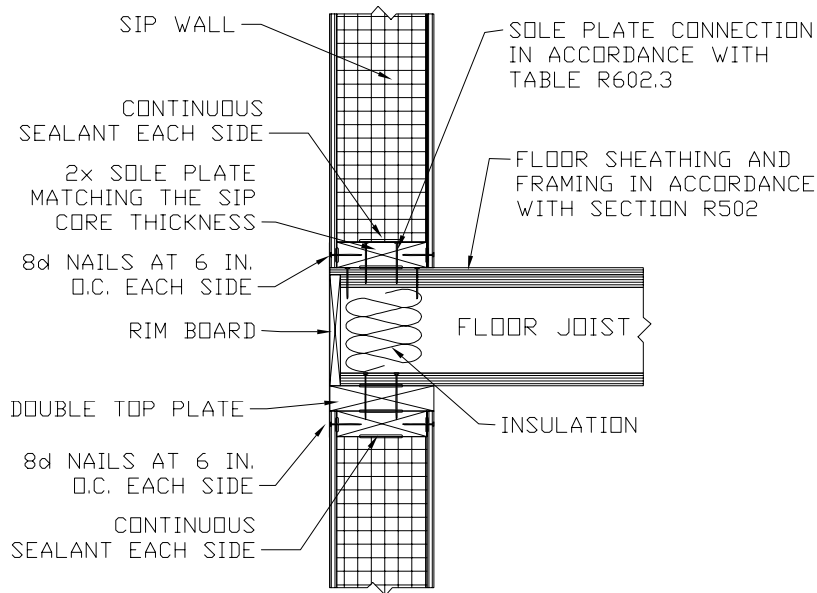


FIGURE R614.5(5)
SIP WALL TO WALL PLATFORM FRAME CONNECTION

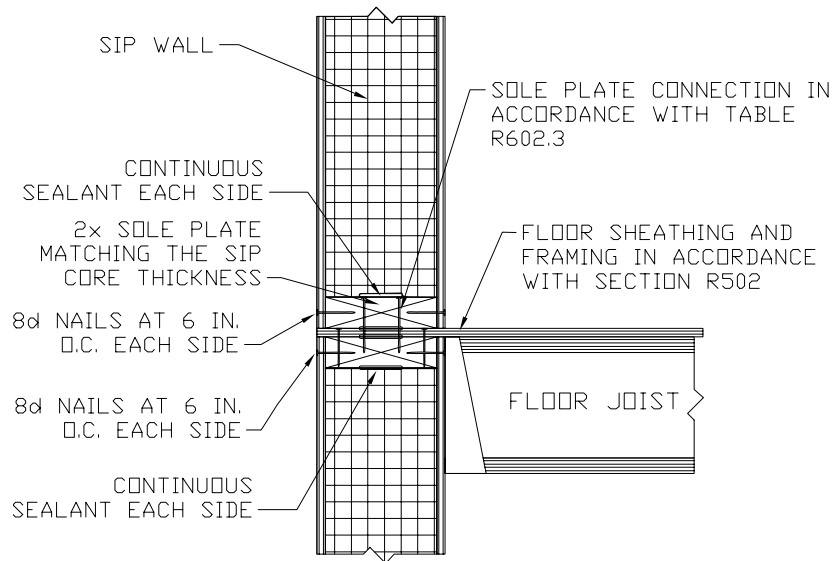
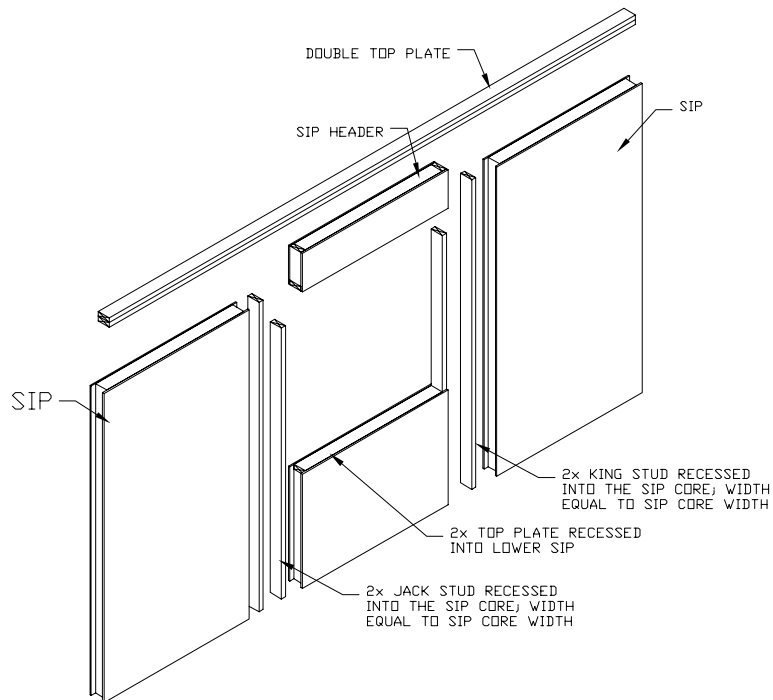


FIGURE R614.5(6)
SIP WALL TO WALL BALLOON FRAME CONNECTION

R614.5.1 Top plate. Structural insulated panel walls shall be capped with a double top plate installed to provide overlapping at corner, intersections and splines in accordance with Figure R614.5.1. End joints in top plates shall be offset at least 24 inches (610 mm). Plates shall be a nominal 2 inches in depth (51 mm) and have a width equal to the width of the structural insulated panel core.



Notes:

Top plates shall be continuous over header.

SIP facing surfaces shall be nailed to framing and cripples with 8d common galvanized box nails spaced 3 inches on center, staggering alternate nails 1/2 inch.

Galvanized nails shall be hot-dipped or tumbled. Framing shall be attached in accordance to R602.3(1) unless otherwise provide for in Section R614.

FIGURE R614.5.1
SIP WALL FRAMING CONFIGURATION

R614.5.2 Bottom (sole) plate. Structural insulated panel walls shall have full bearing on sole plate having a width equal to the nominal width of the foam core. When structural insulated wall panels are supported directly on continuous foundations, the wall wood sill plate shall be anchored to the foundation in accordance with Section R403.1.

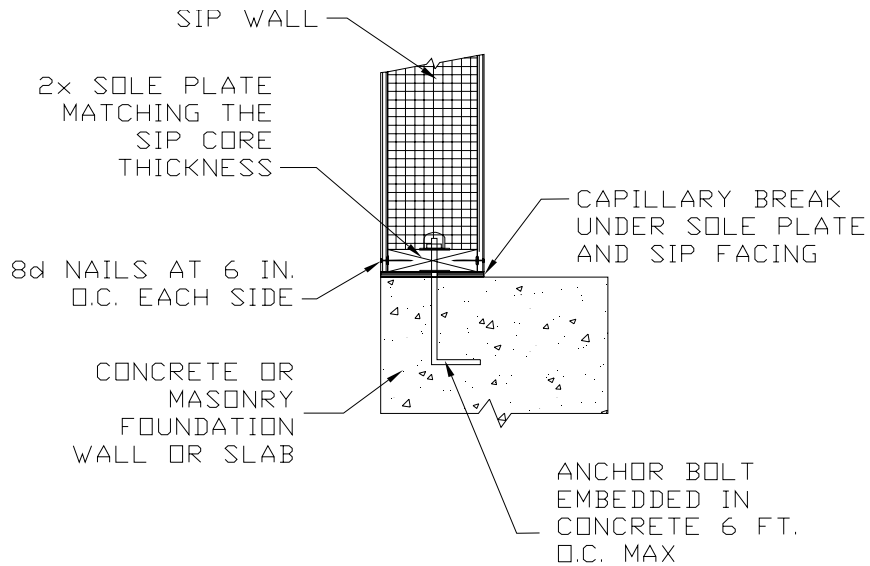


FIGURE R614.5.2
SIP WALL TO CONCRETE SLAB OR FOUNDATION WALL ATTACHMENT

R614.5.3 Wall bracing. Structural insulated panel walls shall be braced in accordance with Section R602.10. SIP walls shall be considered continuous wood structural panel sheathing for purposes of computing percent bracing required. SIP walls shall meet the requirements of R602.10.5 except that SIPs corners shall be fabricated as shown in Figure R614.9.

R6.14.6 Interior load-bearing walls. Interior load-bearing walls shall be constructed as specified for exterior walls.

R614.7 Drilling and Notching-SIPs. The maximum vertical chase penetration in SIPs shall have a maximum side dimension of 2-inches (50.8 mm) centered in the panel core. Vertical chases shall have a minimum spacing of 24-inches (610 mm) on center. Maximum of 2 horizontal chases shall be permitted in each wall panel-one at 14-inches (360 mm) from the bottom of the panel and one at mid height of wall panel. The maximum allowable penetration size in a wall panel shall be circular or rectangular with maximum dimension of 12-inches (300 mm). Over-cutting of holes in facing panels shall not be permitted.

R614.8 Splicing. Structural insulated panels shall be spliced in accordance with Figure R614.8 or by other approved method.

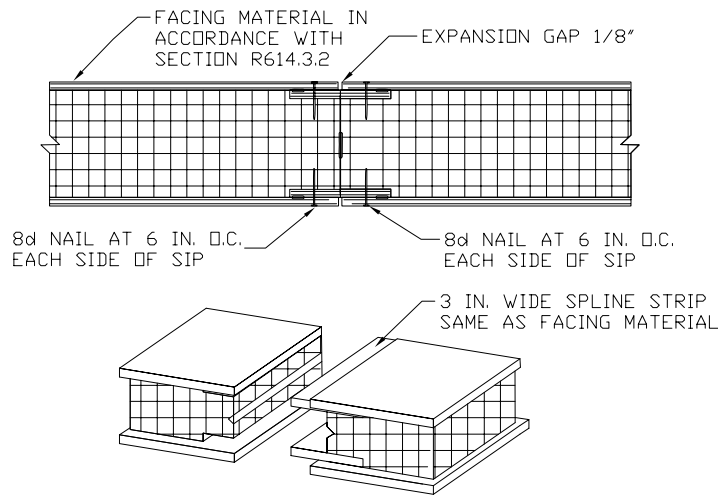


FIGURE R614.8
TYPICAL SIP SPLICING DETAILS

R614.9 Corner framing. Corner framing of structural insulated panel walls shall be constructed in accordance with Figure R614.9.

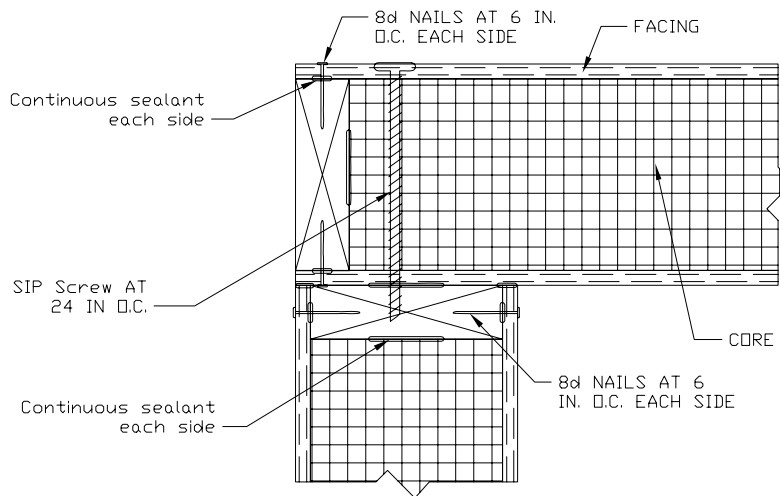


FIGURE R614.9
SIP CORNER FRAMING DETAIL

R614.10 Headers. Structural insulated panel headers shall be designed and constructed according to Table R614.10 and Figure R614.5.1(1). SIPs headers shall be continuous sections without splines. Headers longer than 4 ft should be constructed according to Section 602.7.

**TABLE R614.10
MAXIMUM SPANS FOR SIP HEADERS**

Load Condition	Snow Load (psf)	Building Width (ft)				
		24	28	32	36	40
Supporting Roof Only	20	4	4	4	4	2
	30	4	4	4	2	2
	50	2	2	2	2	2
	70	2	2	2	N/A	N/A
Supporting Roof and One-Story	20	2	2	N/A	N/A	N/A
	30	2	2	N/A	N/A	N/A
	50	2	N/A	N/A	N/A	N/A
	70	N/A	N/A	N/A	N/A	N/A

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

Deflection criteria: L/360.

Roof load: 7 psf.

Ceiling load: 5 psf.

Second floor live load: 30 psf.

Second floor dead load: 10 psf.

Second floor dead load from walls: 10 psf.

N/A indicates not applicable.

R614.10.1 Wood structural panel box headers. Wood structural panel box headers shall be allowed where structural insulated panel headers are not applicable. Wood structural panel box headers shall be constructed in accordance with Figure R602.7.2 and Table R602.7.2.

4. Add standard to Chapter 43 as follows:

ASTM

ASTM D 2559-04 Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (West Use) Exposure Conditions

Reason: Add a proven construction methodology to the IRC.

In 2003 the Structural Insulated Panel Association (SIPA) made a proposal to the U. S. Department of Housing and Urban Development (HUD), through their Partnership for Advancing Technology in Housing (PATH), to develop a prescriptive method for the residential design using structural insulated panels (SIPs). HUD approved the proposal and subsequently signed a contract with the National Association of Home Builders – Research Center (NAHB-RC) to manage the project. The NAHB-RC has worked in conjunction with Building Works, Incorporated, to develop this method.

APA – The Engineered Wood Association worked with SIPA and the wood structural panel industry in the development of minimum design properties for the wood structural panel skins. Minimums were also established for adhesives and foam density. Using these industry developed minimum properties for panels, adhesives and foam density, APA ran a series of tests on SIPs manufactured to reflect these minimums. Tests included axial, shear and transverse loads, all conducted in accordance with recognized test methods. From the results of these tests, capacities were developed and used for the attached proposal.

Using the prescriptive information provided in this proposal, a building designer should be able to draw up a set of residential house plans within the bounds set by the IRC. The code change proposal was modeled after the light gage steel section recently added to the IRC. After acceptance by the code the SIPs will be required to carry a third-party trademark stamp like all other code recognized construction materials.

The proposal contains generic tables, bracing information, moisture proofing information and construction details similar to those found in the wood, light gage steel, and concrete sections.

Acceptance of this proposal would go a long way toward mainstreaming a building method with many years of outstanding performance that is extremely efficient in conserving both our building materials and energy resources.

A list of benefits that can be attributed to the use of SIP panel construction are as follows:

- Thermal Efficiency - The R-value of a SIP varies depending on the thickness and type of foam core used. According to a study by Oak Ridge National Laboratory, the "whole-wall" R-value of a wall with a 3-1/2" EPS core is 14 compared to 9.8 for a 2"x 4" wood framed wall insulated with R-11 fiberglass insulation. When the performance of the whole wall system is considered, SIPs perform better than traditional systems because they are manufactured in a controlled environment characterized by uniform fabrication of components without gaps or air pockets. They are also designed for efficient field installation that reduces air infiltration, and there are few thermal breaks or penetrations in the panels that are typical of wood frame construction.
- Cost - Building with SIPs generally costs about the same as building with wood frame construction, when the labor savings resulting from shorter construction time and less job-site waste are factored in. Cutting and fabricating are typically done in a SIP manufacturing plant. That reduces site labor and time building materials are exposed to the weather on the job site. Other savings are realized because less expensive heating and cooling systems are required with SIP construction.
- Strength and Fire Resistance - SIPs structural characteristics are similar to a steel I-beam. The skins act like the flanges of an I-beam, and the rigid core provides the web of the I-beam configuration. This composite assembly yields stiffness, strength, and predictable performance.

- Environmentally Friendly Material - SIPs homes can save 50% or more on energy costs when compared to conventional stick frame construction. That means less fossil fuel consumption and less greenhouse gas emissions. SIP technology provides higher whole-wall R-value, tightens the building envelope, and reduces air infiltration. That allows a downsized the heating and cooling equipment. SIP construction produces less job-site waste, which results in green building benefits, better utilization of material resources, and more environmentally friendly building practices.

Proposal also adds a new standard ASTM D 2559-04 to Chapter 43 as it is referenced in proposal.

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

Analysis: Results of the review of the proposed standard(s) will be posted on the ICC website by August 20, 2006.

Note: The following analysis was not in the Code Change Proposal book but was published in the "Errata to the 2006/2007 Proposed Changes to the International Codes and Analysis of Proposed Reference Standards" provided at the code development hearings:

Analysis: Review of proposed new standard indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria.

Committee Action:

Disapproved

Committee Reason: There is no consensus standard that addresses structural insulated panel systems. Section R104.11 speaks to alternate materials and already allows the use of these materials. The language as proposed could offer one producer a proprietary advantage with this product and create an unlevel playing field in regard to SIPS products. Labeling is an issue. Who is the approved agency and what is the process they use? The need for a consensus standard is paramount.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Edward L. Keith, APA – The Engineered Wood Association, requests Approval as Modified by this public comment.

Modify proposal as follows:

SECTION R202 DEFINITIONS

CORE. The light-weight middle section of the sandwich structural insulated panel composed of ~~molded expanded polystyrene (EPS) foam~~ foam plastic insulation, which provides the link between the two facing shells.

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards the design shall comply with the *International Building Code*.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual (WFCM)*.
2. American Iron and Steel Institute (AISI) *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings (COFS/PM) with Supplement to Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings*.
3. ~~Structural Insulated Panel Association (SIPA), Prescriptive Method for Structural Insulated Panel Wall Construction. (PM/SIP).~~

R614.3 Materials. Structural insulated panels (SIPs) shall comply with the following criteria:

R614.3.1 Core. The core material of SIPs shall be composed of ~~molded expanded polystyrene (EPS) foam plastic insulation~~ meeting the requirements of ASTM C 578, ~~type I, and shall have a~~ with minimum density of 0.90 lb/cu ft or an approved alternate. ~~Flame spread rating of SIP cores shall be less than 75 and the smoke development rating shall be less than 450, tested in accordance with ASTM E 84. The minimum thickness of the core for SIP walls shall be 3.5 inches (89 mm). All cores shall meet the requirements of Section R314. SIP core insulation shall bear a label with the manufacturer identification, product standard and type, flame-spread/smoke-developed and name of quality assurance agency.~~

R614.3.2 Facing. Facing materials for structural insulated panels shall be wood structural panels conforming to DOC PS 1 or DOC PS 2, each having a minimum nominal thickness of 7/16 inches (11 mm). Facing shall be identified by a grade mark or certificate of inspection issued by an approved agency. The facing materials shall meet the minimum qualification test values specified in ~~R304.1.4 Table R614.3.2.~~

**TABLE R614.3.2
MINIMUM PROPERTIES FOR ORIENTED STRAND BOARD FACING MATERIAL USED IN SIP WALLS**

Thickness (in.)	Product	Flatwise Stiffness ^a (lbf-in ² /ft)		Flatwise Strength ^b (lbf-in/ft)		Tension ^b (lbf/ft)		Density ^{a,c} (pcf)
		Along	Across	Along	Across	Along	Across	
7/16	Sheathing	54,700	27,100	950	870	6,800	6,500	35

For SI: 1 lbf-in²/ft = 9.415 x 10⁻⁶ kiloNewton meter²/meter, 1 lbf-in/ft = 3.707 x 10⁻⁴ kiloNewton meter/meter, 1 lbf/ft = 0.0146 Newton/millimeter, 1 pcf = 16.018 kilogram/meter³.

a. Mean test value shall be in accordance with Section 7.6 of DOC PS2.

b. Characteristic test value (5th percent with 75% confidence).

c. Density shall be based on oven-dry weight and oven-dry volume.

R614.3.3 Adhesive. Adhesives used to structurally laminate the EPS foam plastic insulation core material to the structural wood facers shall be Type II, Class 2 conforming conform to ASTM D2559 or approved alternate specifically intended for use as an adhesive intended for use in the lamination of structural insulated panels. Each container of adhesive shall bear a label with the adhesive manufacturer name, adhesive name and type and the name of the quality assurance agency.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: In response to the encouragement of the IRC Building and Energy Code Committee at the mid-year meeting in Atlanta, the joint proponents of the original proposal (APA – The Engineered Wood Association, the Structural Insulated Panel Association, HUD, NAHB Research Center) have worked with the opponents (Dow Chemical, Polyiso Insulation Manufacturers Association (PIMA), Extruded Polystyrene Foam Association (XPSA)) to resolve the perceived issues of exclusivity in the original language, however unintended. As the prescriptive tables contained in the original proposals are based on physical testing, that fraction of the industry representing the excluded foam products has also agreed to have their products tested as were those used for the development of the original proposal. Given the properties of these foam products there is every expectation of satisfactory results for this series of tests. The results of which will be available by and reported on at the Final Action Hearing.

In addition, this inclusive industry group determined that the best way to handle the issue of the non-consensus referenced standard would be to delete it completely and to place into the proposed code change the only piece of necessary information not already included.

The changes proposed to resolve the exclusivity and consensus issues are explained individually below.

1. In the definition of "Core" the term "molded expanded polystyrene (EPS) insulation" was changed to the more inclusive term, "foam plastic insulation."
2. In Section R301.1.1 "Alternate provisions," the reference to the SIP/HUD document was deleted. As mentioned above, the referenced standard was not a consensus-based document, as required by the procedures and policies of the ICC. By design, the original proposal was meant to stand alone, making reference to the standard unnecessary with one exception. This exception was the table on minimum mechanical and physical properties used to "define" the oriented strand board used for the SIP facings. This table was added to the proposed code change and is placed in Section R614.3.2 where the original reference to the deleted standard was located. This reference standard will be reintroduced into the code process when it is eligible, via the ANSI process, for inclusion within the body of the code.
3. The language in Section R614.3.1 was modified to eliminate the exclusionary language. The deleted references to flame spread and smoke development are already in the IRC, in Section R314, and were eliminated from Section R614.3.1 to prevent unnecessary duplication of provisions within the body of the code.
4. Section R614.3.3 was modified to be more general when referencing core materials and requirements for adhesives.

Please note that the changes proposed in this Public Comment completely resolve the issues voiced by the Committee, as well as by those testifying in opposition. There is almost universal agreement in favor of this type of construction to be referenced in the IRC for a host of reasons, including preservation of natural resources and reducing energy costs. This need was voiced by a number of the Committee members and we were urged to work with other industry interests to correct the deficiencies and bring this proposed change back to the membership via Public Comment. We urge the membership to do the right thing and overturn the Committee's recommendation for denial. Approval will bring recognition to this important type of construction

Public Comment 2:

Lorraine Ross, Intech Consulting, Inc., representing API – Alliance for the Polyurethane Industry, requests Approval as Modified by this public comment.

Modify proposal as follows:

**SECTION R202
DEFINITIONS**

CORE. The light-weight middle section of the sandwich structural insulated panel composed of ~~molded expanded polystyrene (EPS) foam plastic~~ insulation, which provides the link between the two facing shells.

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards the design shall comply with the *International Building Code*.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual (WFCM)*.

2. American Iron and Steel Institute (AISI) *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings* (COFS/PM) with *Supplement to Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings*.
3. Structural Insulated Panel Association (SIPA), *Prescriptive Method for Structural Insulated Panel Wall Construction*. (PM/SIP).

R614.3 Materials. Structural insulated panels (SIPs) shall comply with the following criteria:

R614.3.1 Core. The core material of SIPs shall be composed of ~~molded expanded polystyrene (EPS)~~ foam plastic insulation meeting one of the following requirements:

1. ASTM C578 and a minimum density of 0.90 lb/cu. ft., or
2. Polyurethane meeting the physical properties shown in Table R614.3.1, or
3. An approved alternate. ~~the requirements of ASTM C 578, type I, with minimum density of 0.90 lb/cu ft or an approved alternate.~~

~~Flame spread rating of SIP cores shall be less than 75 and the smoke development rating shall be less than 450, tested in accordance with ASTM E 84. The minimum thickness of the core for SIP walls shall be 3.5 inches (89 mm).~~

All cores shall meet the requirements of Section R314. SIP core insulation shall bear a label with the manufacturer identification, product standard and type, flame-spread/smoke-developed and name of quality assurance agency.

**TABLE R614.3.1
MINIMUM PROPERTIES FOR POLYURETHANE INSULATION USED AS SIPS CORE**

<u>PHYSICAL PROPERTY</u>	<u>ASTM TEST</u>	<u>POLYURETHANE</u>
<u>Density (lb/ft³)</u>	<u>D 1622</u>	<u>2.0</u>
<u>Compressive resistance at yield or 10% deformation, whichever occurs first, psi</u>	<u>D 1621</u>	<u>16 (perpendicular to rise)</u>
<u>Thermal resistance of 1.00 inch thickness (R-value) at 75°F mean temperature</u>	<u>C 518</u>	<u>6.0</u>
<u>Flexural strength, min, psi</u>	<u>C 203</u>	<u>36</u>
<u>Water vapor permeance of 1.00-in. thickness, max, perm</u>	<u>E 96</u>	<u>2.3</u>
<u>Water absorption by total immersion, max, volume %</u>	<u>C 272</u>	<u>1.6</u>
<u>Dimensional stability (change in dimensions), max %</u>	<u>D 2126</u>	<u>2</u>

R614.3.2 Facing. Facing materials for structural insulated panels shall be wood structural panels conforming to DOC PS 1 or DOC PS 2, each having a minimum nominal thickness of 7/16 inches (11 mm). Facing shall be identified by a grade mark or certificate of inspection issued by an approved agency. The facing materials shall meet the minimum qualification test values specified in ~~R301.1.4~~ Table R614.3.2.

**TABLE R614.3.2
MINIMUM PROPERTIES FOR ORIENTED STRAND BOARD FACING MATERIAL USED IN SIP WALLS**

<u>Thickness (in.)</u>	<u>Product</u>	<u>Flatwise Stiffness^a (lbf-in²/ft)</u>		<u>Flatwise Strength^b (lbf-in/ft)</u>		<u>Tension^b (lbf/ft)</u>		<u>Density^{ad} (pcf)</u>
		<u>Along</u>	<u>Across</u>	<u>Along</u>	<u>Across</u>	<u>Along</u>	<u>Across</u>	
7/16	Sheathing ^e	54,700	27,100	950	870	6,800	6,500	35

For SI: 1 lbf-in²/ft = 9.415 x 10⁻⁶ kiloNewton meter²/meter, 1 lbf-in/ft = 3.707 x 10⁻⁴ kiloNewton meter/meter, 1 lbf/ft = 0.0146 Newton/millimeter, 1 pcf = 16.018 kilogram/meter³.

- a. Mean test value shall be in accordance with Section 7.6 of DOC PS2.
- b. Characteristic test value (5th percent with 75% confidence) shall be in accordance with Section 7.6 of DOC PS2.
- c. Density shall be based on oven-dry weight and oven-dry volume.

R614.3.3 Adhesive. Adhesives used to structurally laminate the EPS foam plastic insulation core material to the structural wood facers shall be ~~Type II, Class 2 conforming conform~~ conform to ASTM D2559 or approved alternate specifically intended for use as an adhesive ~~intended for use~~ in the lamination of structural insulated panels. Each container of adhesive shall bear a label with the adhesive manufacturer name, adhesive name and type and the name of the quality assurance agency.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: With the kind cooperation of the original proponents of RB 34 (APA - The Engineered Wood Association and SIPA -Structural Insulated Panel Association), the Alliance for the Polyurethanes Industry (API) is submitting this Public Comment on behalf of the Extruded Polystyrene Association (XPSA) and the Polyiso Insulation Manufacturers Association (PIMA). This Public Comment adds extruded polystyrene and polyurethane as core insulation for SIPS to the original RB 34 that exclusively listed expanded polystyrene. As noted in the Report of Hearings, the IRC Committee urged all stakeholders to work together to bring this proposal back once all applicable insulation types were addressed. In addition to agreeing on suitable code language, appropriate technical data is under development to support the addition of these two foam insulation types. SIPS containing extruded polystyrene and polyurethane are currently slated for testing at the APA laboratories using the same testing protocol as was used for the development of the original proposal that listed only expanded polystyrene. Note that the extruded polystyrene products are included in C578 and minimum physical properties for polyurethane are representative of that used in the test panels and are listed in new Table 614.3.2. These values were derived from those physical properties of expanded polystyrene products that had previously performed successfully in SIPS panels. Therefore, similar acceptable results are expected for the SIPS with extruded polystyrene and polyurethane cores. Results from the new round of testing will be available and reported at the ICC Final Action Hearing in Rochester, NY in May 2007.

The remainder of this Public Comment is from the APA Public Comment on RB 34 and is re-printed here with their permission. The re-print is an indication of the extruded polystyrene and polyurethane industries agreement with APA and SIPA on their recommendation for the best way forward on this proposal.

The changes proposed to resolve the exclusivity and consensus issues are explained individually below.

1. In the definition of "Core", the term "molded expanded polystyrene (EPS) insulation" was changed to the more inclusive term "foam plastic insulation".
2. In Section R301.1.1 Alternate provisions, the reference to the SIP/HUD document was deleted. As mentioned above, the referenced standard was not a consensus-based document as required by the procedures and policies of the ICC. By design, the original proposal was meant to stand alone making reference to the standard unnecessary with one exception. This exception was the table on minimum mechanical and physical properties used to "define" the oriented strand board used for the SIP facings. This table was added to the proposed code change and is placed in Section R614.3.2 where the original reference to the deleted standard was located. This reference standard will be reintroduced into the code process when it is eligible via the ANSI process for inclusion within the body of the code.
3. The language in Section R614.3.1 was modified to eliminate the exclusionary language. The deleted references to flame spread and smoke development are already in the IRC in Section R314 and were eliminated from Section R614.3.1 to prevent unnecessary duplication of provisions within the body of the code.
4. Section R614.3.3 was modified to be more generic when referencing core materials and requirement for adhesives.

Please note that the changes proposed in this Public Comment completely resolve all of the issues voiced by the Committee as well as by those testifying in opposition. There is almost universal agreement for the need of this type of construction to be referenced in the IRC for a host of reasons including preservation of natural resources, and reducing energy costs. This need was voiced by a number of the Committee members and we were urged to work with the other industry interests to correct the deficiencies and bring this back to the membership via Public Comment. We urge the membership to do the right thing and overturn the Committee's recommendation for denial. Approval will get this important type of construction recognized a year and a half earlier than if we are required to bring it back next cycle.

Final Action: AS AM AMPC____ D

RB36-06/07

R301.2.1, Table R301.2(4) (New)

Proposed Change as Submitted:

Proponent: Joseph R. Hetzel, P.E., Door and Access Systems Manufacturers Association

1. Revise as follows:

R301.2.1 Wind limitations. Buildings and portions thereof shall be limited by wind speed, as defined in Table R301.2(1) and construction methods in accordance with this code. Basic wind speeds shall be determined from Figure R301.2(4). Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where loads for wall coverings, curtain walls, roof coverings, exterior windows, skylights, ~~garage doors~~ and exterior doors are not otherwise specified, the loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, ~~garage doors~~ and exterior doors. Where loads for garage doors are not otherwise specified, the loads listed in Table R301.2(4) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for garage doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.6.

2. Add new table as follows:

TABLE R301.2(4)
GARAGE DOOR LOADS FOR A BUILDING
WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B

ROOF ANGLE > 10 DEGREES EFFECTIVE AREA:		BASIC WIND SPEED (MPH – 3 SECOND GUST)													
Width (ft)	Height (ft)	90		100		110		120		130		140		150	
<u>9</u>	<u>7</u>	<u>12.8</u>	<u>-14.5</u>	<u>15.8</u>	<u>-17.9</u>	<u>19.1</u>	<u>-21.6</u>	<u>22.8</u>	<u>-25.8</u>	<u>26.7</u>	<u>-30.2</u>	<u>31.0</u>	<u>-35.1</u>	<u>35.6</u>	<u>-40.2</u>
<u>16</u>	<u>7</u>	<u>12.3</u>	<u>-13.7</u>	<u>15.2</u>	<u>-16.9</u>	<u>18.3</u>	<u>-20.4</u>	<u>21.8</u>	<u>-24.3</u>	<u>25.6</u>	<u>-28.5</u>	<u>29.7</u>	<u>-33.1</u>	<u>34.1</u>	<u>-38.0</u>

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 sq m, 1 mile per hour = 1.609 km/h

1. For effective areas or wind speeds between those given above the load may be interpolated, otherwise use the load associated with the lower effective area.
2. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).
3. Plus and minus signs signify pressures acting toward and away from the building surfaces.
4. Negative pressures assume door has 2 feet of width in building's end zone.

Reason: Clarification is needed for the code user regarding provisions governing wind effects on garage doors, particularly wind loads. The use of Table 301.2 (2) is difficult to apply to garage doors. Common garage door sizes are other than those shown in the table. Common garage door proximity to building corners results in doors being installed within multiple building wind zones. Consequently, garage door wind load determinations using that table are not adequate. Therefore, DASMA proposes that the IRC include a chart to provide a simplified means of such determinations. The table, formatted for consistency with other similar tables currently in the IRC, takes into consideration the following:

1. Common sizes. The 9x7 and 16x7 sizes are most commonly associated with residential applications.
2. Multiple zones. A note below the charts indicates "negative pressures assume door has 2 feet of width in building's end zone." DASMA research has shown that this end zone condition covers the vast majority of applications.
3. Roof angle. Residential applications are closely associated with roof angles greater than 10 degrees.

The proposed table is currently incorporated into the 2004 Florida Building Code.

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

Committee Action:

Disapproved

Committee Reason: The proposed table for garage door loading is limited in the size of garage doors that may be used and it would not allow some doors that are common and in use today. The tabular reference to wind loads of 100 and 110 seems to be overly restrictive. It would appear to be more of a regional issue rather than something that should be imposed on the entire country.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Joseph R. Hetzel, PE, Thomas Associates, Inc., representing Door & Access Systems Manufacturers Association, requests Approval as Modified by this public comment.

Modify proposal as follows:

TABLE R301.2(4)
GARAGE DOOR LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT
OF 30 FEET LOCATED IN EXPOSURE B

Basic Wind Speed (mph - 3 second gust)

		90	100	110	120	130
Roof Angle > 10 degrees						
Effective Area:						
Width (ft)	Height (ft)					
9	7	12.8 -14.5	15.8 -17.9	19.1 -21.6	22.8 -25.8	26.7 -30.2
16	7	12.3 -13.7	15.2 -16.9	18.3 -20.4	21.8 -24.3	25.6 -28.5
18	8	12.0 -13.4	14.9 -16.5	18.0 -20.0	21.4 -23.8	25.1 -28.0

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 sq m, 1 mile per hour = 1.609 km/h

1. For effective areas or wind speeds between those given above the load may be interpolated, otherwise for larger sizes use the load associated with the ~~lower~~ 18x8 effective area.
2. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2 (3)
3. Plus and minus signs signify pressures acting toward and away from the building surfaces.
4. Negative pressures assume door has 2 feet of width in building's end zone.

(Portions of proposal and table not shown remain unchanged)

Commenter's Reason: Changes shown in the Table address concerns raised by Committee members and testers at the Fall 2006 hearings. Garage door size alternatives have been expanded to include 18x8 doors, which are becoming increasingly common in addition to the 16x7 and 9x7 sizes included. Clarification regarding loads for sizes larger than 18x8 has been included in the notation accompanying the table.

Otherwise, Committee reasoning for disapproval of the code change proposal was not germane to the IBC itself. The supportive reasoning accompanying RB36-06/07 began with the following two points: "Clarification is needed for the code user regarding provisions governing wind effects on garage doors, particularly wind loads. The use of Table 301.2(2) is difficult to apply to garage doors." Regarding the comments that the Table is "overly restrictive" and that garage door loads "appear to be more of a regional issue", loads that can be applied to garage doors are already in existence in the code, in the aforementioned Table 301.2(2).

RB37-06/07

R301.2.1.1

Proposed Change as Submitted:

Proponent: Bob Boyer, Building Officials Association of Florida Development Committee, representing the Building Officials Association of Florida

Revise as follows:

R301.2.1.1 Design criteria. ~~Construction~~ In regions where the basic wind speeds from Figure R301.2(4) equal or exceed 100 miles per hour (45 m/s) in hurricane-prone regions, or 110 miles per hour (49m/s) elsewhere, the structural design of buildings shall be designed in accordance with one of the following:

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM); or
2. *Southern Building Code Congress International Standard for Hurricane Resistant Residential Construction* (SSTD 10); or
3. *Minimum Design Loads for Buildings and Other Structures* (ASCE-7); or
4. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings (COFS/PM) with Supplement to Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings*.
5. Concrete construction shall be designed in accordance with the provisions of this code.

Reason: The intent of this proposal is to clarify the code. Some code readers assume that if the building in question is constructed in an area with design wind speeds equal to or greater than those given in R301.2.1.1, no portion of the building is required to comply with the IRC. The wording being proposed will make clear that only the structural portions of the building fall outside the requirements contained in the code.

Cost Impact: The code change proposal will not increase the cost of construction. This change merely clarifies the applicable design standards for high wind areas.

Committee Action:

Disapproved

Committee Reason: This issue appears to be more of a local or regional concern and should not be brought into the code text and forced on all code users throughout the country. The proposed language stipulates the "structural design of buildings". There may be other provisions of these documents beyond structural design that we also want to pick up.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary Ehrlich, PE, National Association of Home Builders, requests Approval as Modified by this public comment.

Modify proposal as follows:

R301.2.1.1 Design criteria. In regions where the basic wind speeds from Figure R301.2(4) equal or exceed 100 miles per hour (45 m/s) in hurricane-prone regions, or 110 miles per hour (49m/s) elsewhere, the structural design of buildings elements and building components required to resist wind loads shall be designed in accordance with one of the following:

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM); or
2. *Southern Building Code Congress International Standard for Hurricane Resistant Residential Construction* (SSTD 10); or
3. *Minimum Design Loads for Buildings and Other Structures* (ASCE-7); or
4. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings (COFS/PM) with Supplement to Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings*.
5. Concrete construction shall be designed in accordance with the provisions of this code.

Commenter's Reason: The IRC-B/E committee denied this proposal in part due to concerns that it did not cover all items requiring design for wind loads. This modification expands the description to cover all the items listed in R301.2.1 above. This is consistent with the proponent's intent to clarify that the electrical, mechanical and plumbing systems and other remaining structural or non-structural components of the building not subject to wind loading are still covered by the IRC.

Public Comment 2:

Dennis Pitts, American Forest & Paper Association, requests Approval as Modified by this public comment.

Modify proposal as follows:

R301.2.1.1 Design criteria. In regions where the basic wind speeds from Figure R301.2(4) equal or exceed 100 miles per hour (45 m/s) in hurricane-prone regions, or 110 miles per hour (49m/s) elsewhere, the ~~structural~~ design of buildings shall be in accordance with one of the following ~~methods~~. The elements of design not addressed by those documents in Items 1 through 4 shall be in accordance with this code.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM); or
2. *Southern Building Code Congress International Standard for Hurricane Resistant Residential Construction* (SSTD 10); or
3. *Minimum Design Loads for Buildings and Other Structures* (ASCE-7); or
4. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings (COFS/PM) with Supplement to Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings.*
5. Concrete construction shall be designed in accordance with the provisions of this code.

Commenter's Reason: One of the reasons given for disapproval of RB37-06/07 was that it was perceived as being a response by BOAF to a regional problem. However, AF&PA submitted RB36-06/07 (which was withdrawn in favor of RB37) because we occasionally are asked to what extent the IRC applies when our Wood Frame Construction Manual is used. We felt that language addressing the question was needed to tie up a minor loose end in the code.

A second reason given for disapproval was that a part of RB37's proposed revision to the existing wording – "the structural design of buildings shall be designed in accordance with one of the following" -- overlooked provisions in the referenced documents that might go beyond structural matters. The new text being proposed in this Public Comment attempts to generalize the content of the documents.

Final Action: AS AM AMPC _____ D

RB39-06/07

R202, R301.2.1, Figures R301.1.4 (1-3) (New), Table R301.2(4) (New)

Proposed Change as Submitted:

Proponent: Scott Beard, City of Tacoma, Washington, representing Structural Engineers Association of Washington

1. Add new definition as follows:

SECTION R202 DEFINITIONS

TOPOGRAPHIC FEATURE. A land surface feature characterized by having lower elevation land on at least one side, such as a hill, ridge, or escarpment.

2. Revise as follows:

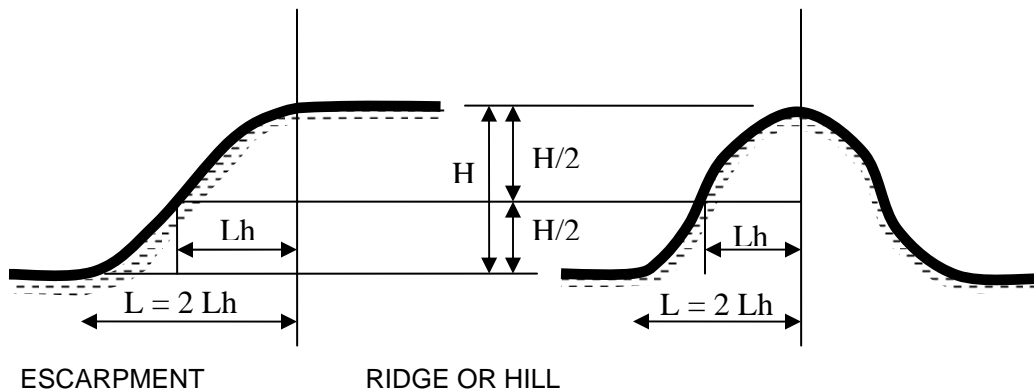
R301.2.1 Wind limitations. Buildings and portions thereof shall be limited by wind speed, as defined in Table R301.2(1) and construction methods in accordance with this code. Basic wind speeds shall be determined from Figure R301.2(4). Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where loads for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors are not otherwise specified, the loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.6.

Buildings sited on the top half of an isolated topographic feature, meeting the following conditions shall be designed for an increased wind basic wind speed as determined by Table R301.2(4):

1. The topographic feature is 60 feet or higher if located in Exposure B or 30 feet or higher if located in Exposures C or D;
2. The average slope of the top half of the topographic feature exceeds 10 percent; and
3. The topographic feature is unobstructed up-wind by other such topographic features for a distance from the high point of 100 times the height of the hill or 2 miles, whichever is less.
4. The topographic feature protrudes above the height of upwind topographic features within a 2-mile radius in any quadrant by a factor of 2 or more.

In the case of the high side of an escarpment, the increased basic wind speed shall extend horizontally downwind from the edge of the escarpment 1.5 times the horizontal length of the upwind slope (1.5L), or 6 times the height of the escarpment (6H), whichever is greater.

3. Add new figures as follows:



Note: $H/2$ determines the measurement point for L_h . L is twice L_h .

FIGURE R301.1.4(1)
TOPOGRAPHIC FEATURES FOR WIND SPEED UP EFFECT

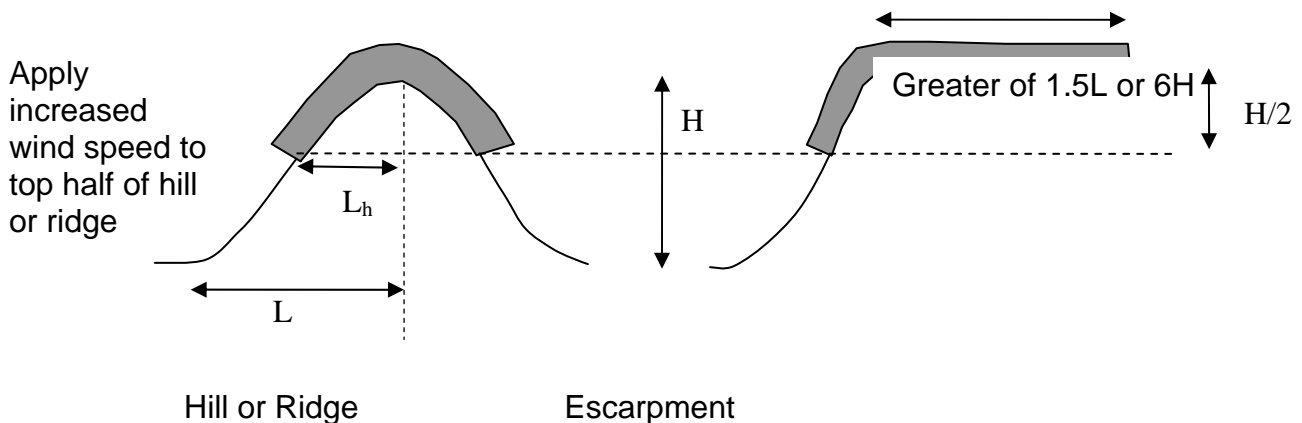


FIGURE R301.1.4(2)
ILLUSTRATION OF WHERE ON A TOPOGRAPHIC FEATURE, WIND SPEED INCREASE IS APPLIED

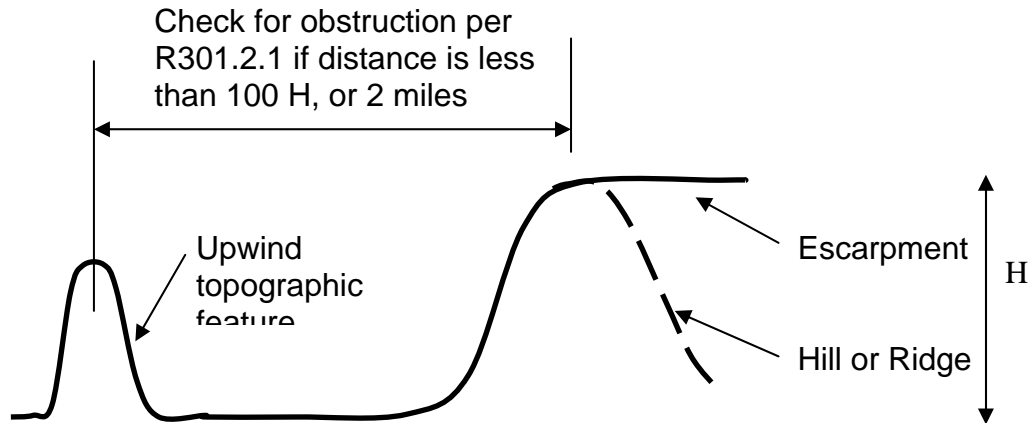


FIGURE R301.1.4(3)
ILLUSTRATION OF UPWIND OBSTRUCTION

4. Add new table as follows:

TABLE R301.2(4)
BASIC WIND SPEED MODIFICATION FOR TOPOGRAPHIC WIND SPEED UP EFFECT

BASIC WIND SPEED FROM FIGURE R301.2(4)	AVERAGE SLOPE OF THE TOP HALF OF THE TOPOGRAPHIC FEATURE						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25 or greater
	Required basic wind speed, modified for topographic wind speed up to:						
<u>85</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>110</u>	<u>110</u>	<u>110</u>	<u>120</u>
<u>90</u>	<u>100</u>	<u>100</u>	<u>110</u>	<u>110</u>	<u>120</u>	<u>120</u>	<u>120</u>
<u>100</u>	<u>110</u>	<u>120</u>	<u>120</u>	<u>130</u>	<u>130</u>	<u>130</u>	<u>140</u>
<u>110</u>	<u>120</u>	<u>130</u>	<u>130</u>	<u>140</u>	<u>140</u>	<u>150</u>	<u>150</u>
<u>120</u>	<u>140</u>	<u>140</u>	<u>150</u>	<u>150</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>
<u>130</u>	<u>150</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>

Reason: This proposal does two related things. First, it provides a method to be able to safely use the two alternatives to prescriptive, the Wood Framed Construction Manual and SSTD-10, on hills and other topographic features. It also provides a method to determine if wind speed increases due to topographic effects are great enough that they go past the simple low-wind detailing of the prescriptive provisions, so that to ensure the integrity of the house during a full design wind the Wood Framed Construction Manual or SSTD-10 should be used, which do have the proper detailing for higher winds.

The wind speed up effect is simplified from previous proposals. The main difference is that on closer examination, worst case hills and ridges are so steep and pointy topped that they are essentially un-buildable. Any house at that such a location would for steepness reasons be engineered, and thus have the correct ASCE-7 wind corrections.

This not only simplifies the table, but since escarpments have a lesser speed up effect, the impact is less. The values are rounded down (per k2 effect), so that no interpolation is required. In addition, the designer no longer has to distinguish between hills, ridges, and escarpments. They only need to recognize that they are on a steep "generic" topographic feature.

Let's be clear here. We are after the "bad boys" of hills. Remember that when the table gives an average slope of 10%, that hills are typically rounded at the top, so the steepest section would be 20%. There is no mistaking these hills. They are not small gentle rises. These are the ones that you want traction devises for your car during the winter.

A pair of pictures will illustrate what we are trying to take account of with this provision:



Note: this is what a 15% average slope hill looks like. Prescriptive would be ok in most of the country (where base wind speed is 90 mph or less).



This is what a 27% average slope hill looks like. The vegetation is on a shear cliff. This hill would require use of WFCM or SSTD 10 for a prescriptive design.

Clearly, we get speed-up effects on hills like these. If you are still unsure, go to Radio Shack, get a pair of cheap anemometers, and take a friend over to a steep hill next big windstorm, and see the effect for yourself.

Not all jurisdictions have hills like these. They are common in the western part of the country. Wherever you live, if you have a hill like this, you need to account for the wind speed-up.

Some have argued that it should be left to the local jurisdiction to map these hills. This would just put an unfair burden on small jurisdictions. They often do not have a structural engineer on staff, and without some warning in the Code, may not even be aware that they have a problem that needs to be dealt with. Why send them out to get an expensive wind study, when the problem has already been defined and solved. All we need to do is to adopt it.

Two more quick items:

The triggers for topographic wind speed up vary between ASCE-7, and the IBC. There are multiple routes through the code that would result in different triggers. What we have done is to envelope the triggers that are least likely to require topo speedup. This is justified by the size and nature of residential construction. Applying pure ASCE-7 not only requires advanced study, but also will typically produce higher pressure. Despite that, anyone wishing to apply ASCE-7, instead of these provisions, is welcome to.

Don't let the large appearing wind speeds fool you. This is a consequence of how the new code measures wind. The lateral pressures from a worst-case escarpment are almost identical to the lateral pressures in the legacy BOCA and UBC codes. (In other words, BOCA and UBC got it right, if you design for "one size fits all" worst-case wind, you end up with the traditional lateral values.)

The reason we have the new wind code is that we have discovered that uplift and cladding pressures are really higher than in the older codes. Once we get past 100 mph, (or 110 mph), the current prescriptive code does not have the cladding and uplift detailing that is necessary. We are observing patterns of damage in large windstorms, (less than full design wind), that match the steep hill locations. In these locations, we need to be using one of the alternate prescriptive codes that do address this detailing. (Wood Framed Construction Manual, or SSTD-10.)

This is one of the few times that "doing it right" doesn't have to cost more. The Wood Framed Construction Manual is so efficient in its use of bracing that higher winds are not a penalty. It isn't really a case of adding more, it's a case of having the builders follow the correct details for their wind area.

Take for example a one story 35'x35' house in 90 mph exp B, with topographic wind speed-up that brings it up to 120 mph. (Worst case speedup.)

Current IRC Prescriptive	Wood Framed Construction Manual
48' of braced wall panel	16' of braced wall panel
12 pcs of OSB @ \$13.80 = \$166	4 pcs of OSB @ \$13.80 = \$55
	6 STHD14 foundation straps
	6 pcs @ \$12.50 = \$75
	4 extra 2x4 studs
	4 @ \$1.80 = \$7
	more nails per panel, but less total
\$166	\$137

In addition, this proposal would allow use of the Wood Framed Construction Manual on lesser topographic features, where the cost savings would be greater.

The Wood Framed Construction Manual is also more flexible in its layout rules. We estimate that in our jurisdiction, over 90% of the custom engineered houses could have been done by the WFCM, if allowed in topographic speed up areas. This would result in a savings to the construction industry in engineering fees alone of nearly \$200,000 per year from the City of Tacoma jurisdiction alone.

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

Committee Action:

Disapproved

Committee Reason: The committee preferred the language in RB43-06/07.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Scott Beard, City of Tacoma, Washington, representing Structural Engineers Association of Washington, requests Approval as Modified by this public comment.

Replace proposal with the following:

SECTION R202 DEFINITIONS

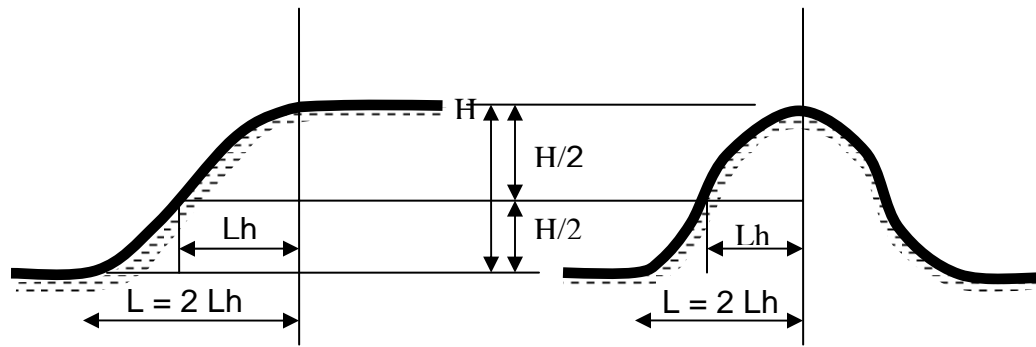
Topographic feature. A land surface feature characterized by having lower elevation land on at least one side, such as a hill, ridge, or escarpment.

R301.2.1.5 Topographic wind effects. In areas designated in Table R301.2(1) as having local historical data documenting structural damage to buildings due to wind speed-up at isolated topographic features, topographic wind effects shall be considered in the design of the building in accordance with section R301.2.1.5, or in accordance with the provisions of ASCE 7.

Buildings sited on the top half of an isolated topographic feature, meeting the following conditions shall be designed for an increased wind basic wind speed as determined by Table R301.2(4):

1. The topographic feature is 60 feet or higher if located in Exposure B or 30 feet or higher if located in Exposures C or D;
2. The average slope of the top half of the topographic feature exceeds 10 percent; and
3. The topographic feature is unobstructed up-wind by other such topographic features for a distance from the high point of 100 times the height of the hill or 2 miles, whichever is less.
4. The topographic feature protrudes above the height of upwind topographic features within a 2-mile radius in any quadrant by a factor of 2 or more measured from its high point.

In the case of the high side of an escarpment, the increased basic wind speed shall extend horizontally downwind from the edge of the escarpment 1.5 times the horizontal length of the upwind slope (1.5L), or 6 times the height of the escarpment (6H), whichever is greater.

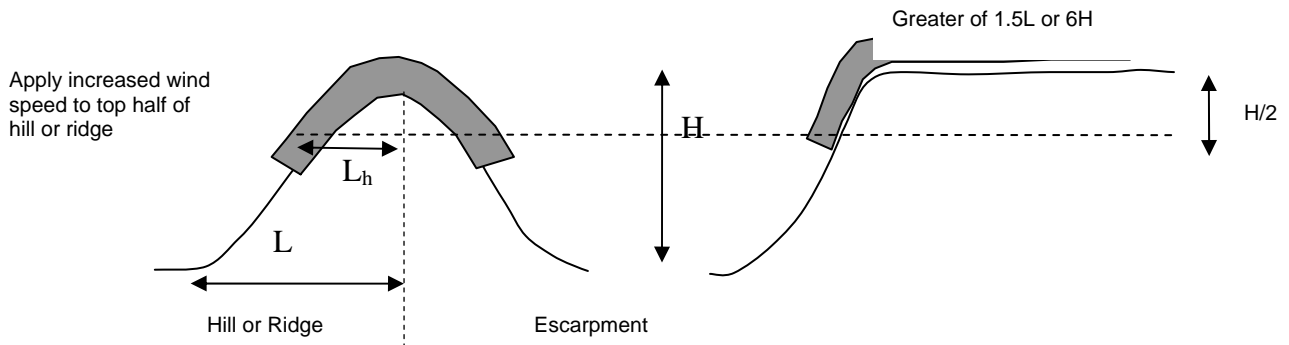


ESCARPMENT

RIDGE OR HIL

Note: $H/2$ determines the measurement point for L_h . L is twice L_h .

FIGURE R301.1.4(1)
TOPOGRAPHIC FEATURES FOR WIND SPEED UP EFFECT



FIGURE

R301.1.4(2)

Illustration of where on a topographic feature, wind speed increase is applied

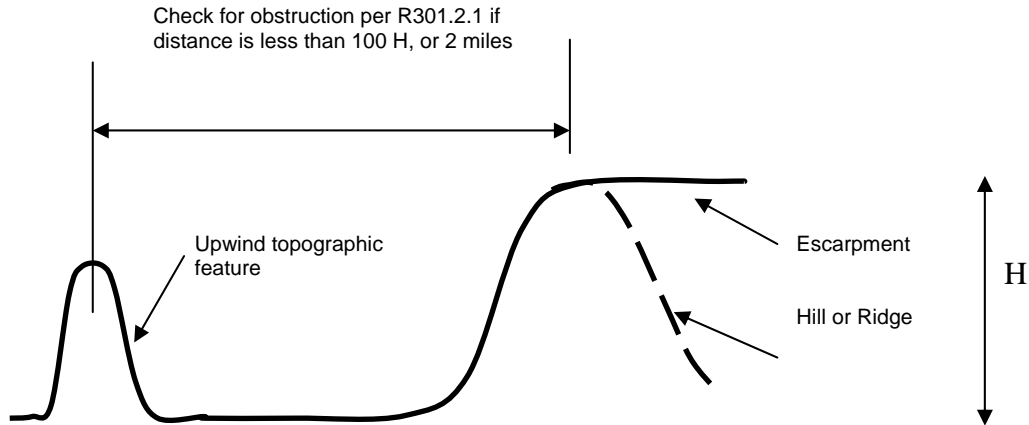


FIGURE R301.1.4(3)

Illustration of upwind obstruction

TABLE R301.2(4)
BASIC WIND SPEED MODIFICATION FOR TOPOGRAPHIC WIND SPEED UP EFFECT

BASIC WIND SPEED FROM FIGURE R301.2(4)	AVERAGE SLOPE OF THE TOP HALF OF THE TOPOGRAPHIC FEATURE						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25 or greater
	Required basic wind speed, modified for topographic wind speed up to:						
85	100	100	100	110	110	110	120
90	100	100	110	110	120	120	120
100	110	120	120	130	130	130	140
110	120	130	130	140	140	150	150
120	140	140	150	150	n/a	n/a	n/a
130	150	n/a	n/a	n/a	n/a	n/a	n/a

Commenter's Reason: This is the merged RB39 and RB43 that the National Association of Home Builders and the Structural Engineers Association of Washington jointly tried to enter as a floor amendment at the Orlando Code Hearing. It unfortunately was ruled too big a modification to be done as merely a floor amendment.

RB 43 (now copied into this proposal) provides the trigger for whether topographic wind needs to be considered. There is no sense having anyone spend time addressing it in jurisdictions where these types of features do not exist.

RB 38 provides a much simplified way to address the topographic wind effects. The bare version of RB 43, in cases where topographic effects apply, would require engineering design. Under the simplified method, most can still be done prescriptively. Where design is required, the simplified method is MUCH less work.

In more detail:

1. Without the Simplified Method, topographic effect using ASCE 7 would always require engineering design.
2. You don't want so subject ANYONE to the ASCE 7 topographic provisions, not even engineers. It is far more complex than warranted, and would unnecessarily increase building costs
3. Virtually all of the houses that would require engineering design per ASCE 7, can be done prescriptively when the Simplified Method is used.
4. The Simplified Method is truly that. A designer does not need to figure out if something is a hill, ridge, or escarpment, only that there is a raised area. The design does not require math – it is a simple look-up table. The table has been rounded to standard wind values, so that interpolation is not necessary.
5. The Simplified Method will typically produce more favorable values than an ASCE 7 design. It's like an 'expert system'. All of the best wind design engineering tricks have been incorporated into it.
6. The Simplified Method will create a single topographic wind speed for an entire development. ASCE 7's topographic method actually creates a different wind pressure for each individual house. (This is fine for commercial, but a pain in the rear for house design.)
7. Much easier for Jurisdictions to check. If a question were raised, a Jurisdiction wouldn't have to hire an engineer to do a wind study. It is that simple to use.

Final Action: AS AM AMPC___ D

RB42-06/07

R401.2.1.4

Proposed Change as Submitted:

Proponent: Ed Sutton, National Association of Home Builders (NAHB)

Revise as follows:

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. The exposure category shall be representative of the anticipated conditions during the life of the structure. For a site where multiple detached one- and two-family dwellings, townhouses or other structures are planned, it shall be based upon the conditions that will exist at the time when all adjacent structures have been constructed. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
2. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
3. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat open country, grasslands and shorelines in hurricane prone regions.
4. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water (excluding shorelines in hurricane prone regions) for a distance of at least 1 mile (1.61 km). Shorelines in Exposure D include inland waterways, the Great Lakes and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1,500 feet (457 m) or 10 times the height of the building or structure, whichever is greater.

Reason: This change is intended to clarify that the exposure category of homes constructed on a large residential development site should be based upon the exposure condition that will exist for the vast majority of the structure's life, not the temporary condition(s) that may exist during build-out of the development. Residential construction frequently involves the construction of multiple detached homes and/or townhouses on a large residential development site. Such sites are often cleared creating a temporary situation where Exposure Category C exists until a significant number of the homes are constructed.

This is no different than a large industrial site upon which multiple buildings and structures are being constructed. The exposure category of individual buildings on such sites should be based on the exposure conditions that will exist when the construction on the site has been completed, not on the construction sequence of the buildings on the site.

ASCE 7-05 defines Exposure Category B as "Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger." The Commentary to ASCE 7 indicates that in a recent study, the majority of buildings are in Exposure Category B – as many as 60 to 80 percent. Even a higher percentage is likely for residential construction as jurisdictions push for higher density development and homes are constructed on smaller lots to reduce the impact of rapidly escalating land costs.

Yet, a few jurisdictions have been requiring homes to be designed and constructed to meet the higher Exposure Category C simply because they are among the first to be constructed on a site that has been cleared for construction or where Exposure Category C existed prior to starting the development. It is believed that this is not the intent of ASCE 7.

Exposure Category B will clearly exist for homes in most residential developments upon build-out of the site. Exposure Category C is intended for a building constructed on a site with open terrain and where this exposure would be anticipated to exist for a significant portion of the building's life.

Building to the higher wind loads for Exposure Category C adds significant unjustified construction costs to a home when done solely for transient conditions such as this. In a time when many are looking to conserve our natural resources, it is a waste of building materials and the home buyer's money. Further, there is adequate margin of safety in the design of a home to prevent a structural failure even if the 50-year design wind event should occur during the short time that a transient condition of Exposure Category C existed. It is not until you get to an event with a much longer and infrequent return period that the structural capacity of the building could be exceeded.

This change adds a needed clarification to the IRC, and NAHB asks your support.

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

Committee Action:

Disapproved

Committee Reason: This code change proposal is too subjective. There is no way a code official could foresee what the anticipated conditions may be over the life of the structure. Instead of saying, "over the life of the structure" a prescriptive number would be better here.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Ehrlich, PE, National Association of Home Buildings (NAHB), requests Approval as Modified by this public comment.

Modify proposal as follows:

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arises from natural topography and vegetation as well as from constructed features. ~~The exposure category shall be representative of the anticipated conditions during the life of the structure.~~ For a site where multiple detached one- and two-family dwellings, townhouses or other structures are planned, ~~it shall be based upon the conditions that will exist at the time when all adjacent structures have been constructed~~ to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
2. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
3. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat open country, grasslands, and shorelines in hurricane prone regions.
4. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water (excluding shorelines in hurricane prone regions) for a distance of at least 1 mile (1.61 km). Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington, and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1,500 feet (457 m) or 10 times the height of the building or structure, whichever is greater.

Commenter's Reason: Based on the actions of the IRC-B/E committee, this proposal has been revised to address the issues raised. A clarification has been added that the exposure category is to be determined for each individual structure on the site in question. A one-year time limit from the start of construction of adjacent structures is added.

These additions clarify that the concern is for the exposure category of an individual detached home or townhouse on a large residential development site, encompassing hundreds of dwellings, where a temporary Exposure Category C exists until a significant number of the homes are constructed. With these additions, it is now clear that a house on the fringes of the development that meets an Exposure Category C will still be properly classified. The specification of a subdivision, community, or other approved developed area makes it clear that a small community outside a major town, where other adjacent developments are not expected to occur for a longer period, will also still be properly classified as a higher Exposure Category if justified.

It is hoped that these changes will clarify our intent to insure that the 60 to 80 percent of residential construction completed in Exposure Category B will be properly classified for the condition that exists for each dwelling upon final build-out of the site. Exposure Category C is intended for a building constructed on a site with open terrain where this exposure would be anticipated to exist for a significant portion of the building's life, not just a short period during construction. This change insures that all structures within an individual community or development are constructed to the same requirements unless an individual structure on the fringes of the site requires the higher Exposure Category.

This change adds a needed clarification to the IRC, and NAHB asks your support in approving this proposal as modified and reversing the committee's action.

Final Action: AS AM AMPC____ D

RB44-06/07

R301.2.2

Proposed Change as Submitted:

Proponent: Jay H. Crandell, ARES Consulting

Revise as follows:

R301.2.2 Seismic provisions. The seismic provisions of this code shall apply to buildings constructed in Seismic Design Categories C, D₀, D₁ and D₂, as determined in accordance with this section. ~~Buildings in Seismic Design Category E shall be designed in accordance with the *International Building Code*, except when the seismic design category is reclassified to a lower seismic design category in accordance with Section R301.2.2.1.~~

Deleted text moved to new Section R301.2.4 for SDC E.

Exception: Detached one- and two-family dwellings located in Seismic Design Category C are exempt from the seismic requirements of this code. ~~The weight and irregularity limitations of Section R301.2.2.2 shall apply to buildings in all seismic design categories regulated by the seismic provisions of this code. Buildings in Seismic Design Category C shall be constructed in accordance with the additional requirements of Section R301.2.2.3. Buildings in Seismic Design Categories D₀, D₁ and D₂ shall be constructed in accordance with the additional requirements of Section R301.2.2.4.~~

Deleted text is unnecessary with reorganization that follows.

R301.2.2.1 Determination of seismic design category. Buildings shall be assigned a seismic design category in accordance with Figure 301.2(2).

R301.2.2.1.1 Alternate determination of seismic design category. The Seismic Design Categories and corresponding Short Period Design Spectral Response Accelerations, SDS shown in Figure R301.2(2) are based on soil Site Class D, as defined in Section 1615.1.1 of the *International Building Code*. If soil conditions are other than Site Class D, the Short Period Design Spectral Response Acceleration, SDS, for a site can be determined according to Section 1615.1 of the *International Building Code*. The value of SDS determined according to Section 1615.1 of the *International Building Code* is permitted to be used to set the seismic design category according to Table R301.2.2.1.1, and to interpolate between values in Tables R602.10.1, R603.7, and other seismic design requirements of this code.

**TABLE R301.2.2.1.1
SEISMIC DESIGN CATEGORY DETERMINATION**

(No change to table contents)

R301.2.2.1.2 Alternative determination of Seismic Design Category E. Buildings located in Seismic Design Category E in accordance with Figure R301.2(2) are permitted to be reclassified as being in Seismic Design Category D₂ provided one of the following is done:

1. A more detailed evaluation of the seismic design category is made in accordance with the provisions and maps of the *International Building Code*. Buildings located in Seismic Design Category E per Table R301.2.2.1.1, but located in Seismic Design Category D per the *International Building Code*, may be designed using the Seismic Design Category D₂ requirements of this code.
2. Buildings located in Seismic Design Category E that conform to the following additional restrictions are permitted to be constructed in accordance with the provisions for Seismic Design Category D₂ of this code:
 - 2.1. All exterior shear wall lines or braced wall panels are in one plane vertically from the foundation to the uppermost story.
 - 2.2. Floors shall not cantilever past the exterior walls.
 - 2.3. The building is within all of the requirements of Section R301.2.2.2.2 for being considered as regular.

R301.2.2.2 Seismic limitations. The following limitations apply to buildings in all Seismic Design Categories regulated by the seismic provisions of this code.

R301.2.2.2.1 R301.2.2.2 Weights of materials. Average dead loads shall not exceed 15 pounds per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal projection) or 10 pounds per square foot (480 Pa) for floor assemblies, except as further limited by Section R301.2.2. Dead loads for walls above grade shall not exceed:

1. Fifteen pounds per square foot (720 Pa) for exterior light-frame wood walls.
2. Fourteen pounds per square foot (670 Pa) for exterior light-frame cold-formed steel walls.
3. Ten pounds per square foot (480 Pa) for interior light-frame wood walls.
4. Five pounds per square foot (240 Pa) for interior light-frame cold-formed steel walls.
5. Eighty pounds per square foot (3830 Pa) for 8-inch-thick (203 mm) masonry walls.
6. Eighty-five pounds per square foot (4070 Pa) for 6-inch-thick (152 mm) concrete walls.

Exceptions:

1. Roof and ceiling dead loads not exceeding 25 pounds per square foot (1190 Pa) shall be permitted provided the wall bracing amounts in Chapter 6 are increased in accordance with Table R301.2.2.2.1.
2. Light-frame walls with stone or masonry veneer shall be permitted in accordance with the provisions of Sections R702.1 and R703.
3. Fireplaces and chimneys shall be permitted in accordance with Chapter 10.

**TABLE R301.2.2.2.1
WALL BRACING ADJUSTMENT FACTORS BY ROOF COVERING DEAD LOAD^a**

WALL SUPPORTING	ROOF/CEILING DEAD LOAD	
	15 psf or less	25 psf
Roof only	1.0	1.2
Roof plus one story or two stories	1.0	1.1

For SI: 1 pound per square foot = 0.049 kPa.

a. Linear interpolation shall be permitted.

R301.2.2.3.1 R301.2.2.2.2 Stone and masonry veneer. Stone and masonry veneer shall comply with the requirements of Sections R702.1 and R703.

R301.2.2.3.2 R301.2.2.2.3 Masonry construction. Masonry construction shall comply with the requirements of Section R606.11.2.

R301.2.2.3.3 R301.2.2.2.4 Concrete construction. Concrete construction shall comply with the requirements of Section R611 or R612.

R301.2.2.4 R301.2.2.3 Seismic Design Categories D₀, D₁ and D₂. Structures assigned to Seismic Design Categories D₀, D₁ and D₂ shall conform to the requirements for Seismic Design Category C and the additional requirements of this section.

R301.2.2.4.1 R301.2.2.3.1 Height limitations. Wood framed buildings shall be limited to three stories above grade or the limits given in Table R602.10.1. Cold-formed steel framed buildings shall be limited to two stories above grade in accordance with COFS/PM. Mezzanines as defined in Section 202 shall not be considered as stories.

R301.2.2.2.2 R301.2.2.3.2 Irregular buildings. Prescriptive construction as regulated by this code shall not be used for irregular structures located in Seismic Design Categories C, D₀, D₁ and D₂. Irregular portions of structures shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. When the forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, design of the remainder of the building shall be permitted using the provisions of this code. A building or portion of a building shall be considered to be irregular when one or more of the following conditions occur:

1. When exterior shear wall lines or braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required.

Exception: For wood light-frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of the wood floor joists are permitted to support braced wall panels that are out of plane with braced wall panels below provided that:

1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
 2. The ratio of the back span to the cantilever is at least 2 to 1.
 3. Floor joists at ends of braced wall panels are doubled.
 4. For wood-frame construction, a continuous rim joist is connected to ends of all cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 1 1/2 inches (38 mm) wide fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and
 5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.
2. When a section of floor or roof is not laterally supported by shear walls or braced wall lines on all edges.

Exception: Portions of floors that do not support shear walls or braced wall panels above, or roofs, shall be permitted to extend no more than 6 feet (1829 mm) beyond a shear wall or braced wall line.

3. When the end of a braced wall panel occurs over an opening in the wall below and ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the opening. This provision is applicable to shear walls and braced wall panels offset in plane and to braced wall panels offset out of plane as permitted by the exception to Item 1 above.

Exception: For wood light-frame wall construction, one end of a braced wall panel shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) wide in the wall below provided that the opening includes a header in accordance with the following:

1. The building width, loading condition and framing member species limitations of Table R502.5(1) shall apply and
 2. Not less than one 2x12 or two 2x10 for an opening not more than 4 feet (1219 mm) wide or
 3. Not less than two 2x12 or three 2x10 for an opening not more than 6 feet (1829 mm) wide or
 4. Not less than three 2x12 or four 2x10 for an opening not more than 8 feet (2438 mm) wide and
 5. The entire length of the braced wall panel does not occur over an opening in the wall below.
4. When an opening in a floor or roof exceeds the lesser of 12 feet (3657 mm) or 50 percent of the least floor or roof dimension.
 5. When portions of a floor level are vertically offset.

Exceptions:

1. Framing supported directly by continuous foundations at the perimeter of the building.
 2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.
6. When shear walls and braced wall lines do not occur in two perpendicular directions.
 7. When stories above-grade partially or completely braced by wood wall framing in accordance with Section R602 or steel wall framing in accordance with Section R603 include masonry or concrete construction.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code. When this irregularity applies, the entire story shall be designed in accordance with accepted engineering practice.

R301.2.2.4.2 R301.2.2.3.3 Stone and masonry veneer. Stone and masonry veneer shall comply with the requirements of Sections R702.1 and R703.

~~R301.2.2.4.3~~ R301.2.2.3.4 Masonry construction. Masonry construction in Seismic Design Categories D₀ and D₁ shall comply with the requirements of Section R606.11.3. Masonry construction in Seismic Design Category D₂ shall comply with the requirements of Section R606.11.4.

~~R301.2.2.4.4~~ R301.2.2.3.5 Concrete construction. Buildings with above-grade concrete walls shall be in accordance with Section R611, R612, or designed in accordance with accepted engineering practice.

~~R301.2.2.4.5~~ R301.2.2.3.6 Cold-formed steel framing in Seismic Design Categories D₀, D₁ and D₂. In Seismic Design Categories D₀, D₁ and D₂ in addition to the requirements of this code, cold-formed steel framing shall comply with the requirements of COFS/PM.

R301.2.2.3.7 Masonry chimneys. Masonry chimneys shall be reinforced and anchored to the building in accordance with Sections 1003.3 and 1003.4.

R301.2.2.3.8 Anchorage of water heaters. Water heaters shall be anchored against movement and overturning in accordance with Section M1307.2.

R301.2.2.4 Seismic Design Category E. Buildings in Seismic Design Category E shall be designed in accordance with the *International Building Code*, except when the seismic design category is reclassified to a lower seismic design category in accordance with Section R301.2.2.1.

Reason: This proposal revises material for a current provision of the Code. This proposed revision of Section R301.2.2 seismic provisions is primarily a modest editorial revision and re-organization of the section. The intent is to improve clarity of seismic provisions and when they do or do not apply. Current exemptions for all buildings in SDC A/B and single family detached homes in SDC C are unchanged. References to seismic requirements (vulnerability concerns) existing in other parts of the code are added to ensure awareness and compliance (e.g., masonry chimney and water heater anchorage requirements in SDC D).

There also are some technical improvements in this proposal. For example, the irregularity limits are moved under the heading of Seismic Design Category D requirements (previously applying also to SDC C). This change is consistent with the treatment of irregular structures in Section 2308.12.6 of the IBC. In addition, weight limitations are moved under requirements for SDC C (and also apply to SDC D). This is consistent with the general exemption of seismic provisions for SDC A/B and also clarifies that wall bracing amount adjustments for weights of materials (and the additional calculation this requires in Chapter 6, Section R602.10) is not necessary for buildings in SDC A/B.

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

Committee Action:

Approved as Modified

Modify the proposal as follows:

R301.2.2.2 Seismic Design Category C. Structures assigned to Seismic Design Category C shall conform to the requirements of this section.

R301.2.2.2.1 Weights of materials. Average dead loads shall not exceed 15 per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal projection) or 10 pounds per square foot (480 Pa) for floor assemblies, except as further limited by Section R301.2.2. Dead loads for walls above grade shall not exceed:

(Portions of proposal not shown remain unchanged)

Committee Reason: This proposal provides an editorial re-organization of the code and establishes a clear concise logical re-alignment of the material. The modification helps to clarify that the seismic limitations only apply to Seismic Design Categories C and higher.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Perry A. Haviland, FAIA and Jim W. Sealy, FAIA, FEMA/BSSC Code Resource Support Committee, representing Building Seismic Safety Council of the National Institute of Building Sciences, requests Approval as Modified by this public comment.

Further modify proposal by relocating Section R301.2.2.3.2 to become Section R201.2.2.2.5:

~~R301.2.2.3.2~~ R301.2.2.2.5 Irregular buildings. Prescriptive construction as regulated by this code shall not be used for irregular structures located in Seismic Design Categories C, D₀, D₁ and D₂. Irregular portions of structures shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. When the

forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, design of the remainder of the building shall be permitted using the provisions of this code. A building or portion of a building shall be considered to be irregular when one or more of the following conditions occur:

1. When exterior shear wall lines or braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required.

Exception: For wood light-frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of the wood floor joists are permitted to support braced wall panels that are out of plane with braced wall panels below provided that:

1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
2. The ratio of the back span to the cantilever is at least 2 to 1.
3. Floor joists at ends of braced wall panels are doubled.
4. For wood-frame construction, a continuous rim joist is connected to ends of all cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 1 1/2 inches (38 mm) wide fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and
5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.

2. When a section of floor or roof is not laterally supported by shear walls or braced wall lines on all edges.

Exception: Portions of floors that do not support shear walls or braced wall panels above, or roofs, shall be permitted to extend no more than 6 feet (1829 mm) beyond a shear wall or braced wall line.

3. When the end of a braced wall panel occurs over an opening in the wall below and ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the opening. This provision is applicable to shear walls and braced wall panels offset in plane and to braced wall panels offset out of plane as permitted by the exception to Item 1 above.

Exception: For wood light-frame wall construction, one end of a braced wall panel shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) wide in the wall below provided that the opening includes a header in accordance with the following:

1. The building width, loading condition and framing member species limitations of Table R502.5(1) shall apply and
2. Not less than one 2x12 or two 2x10 for an opening not more than 4 feet (1219 mm) wide or
3. Not less than two 2x12 or three 2x10 for an opening not more than 6 feet (1829 mm) wide or
4. Not less than three 2x12 or four 2x10 for an opening not more than 8 feet (2438 mm) wide and
5. The entire length of the braced wall panel does not occur over an opening in the wall below.

4. When an opening in a floor or roof exceeds the lesser of 12 feet (3657 mm) or 50 percent of the least floor or roof dimension.
5. When portions of a floor level are vertically offset.

Exceptions:

1. Framing supported directly by continuous foundations at the perimeter of the building.
 2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.
6. When shear walls and braced wall lines do not occur in two perpendicular directions.
 7. When stories above-grade partially or completely braced by wood wall framing in accordance with Section R602 or steel wall framing in accordance with Section R603 include masonry or concrete construction.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code. When this irregularity applies, the entire story shall be designed in accordance with accepted engineering practice.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: Data indicates that Seismic Design Category C buildings should remain subject to the irregular building requirements that may not permit prescriptive construction. Relocate for clarity.

Final Action: AS AM AMPC____ D