RB2-13
R102.7.1

Proposed Change as Submitted

Proponent: David Bonowitz, Chair, Existing Buildings Subcommittee, Code Advisory Committee, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

Revise as follows:

R102.7.1 Additions, alterations or repairs. Additions, alterations or repairs to any structure shall conform to the requirements for a new structure ~~without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building.~~ Alterations and repairs shall be such that the existing structure is no less complying with the provisions of this code than the existing structure was prior to the alteration or repair. For additions, alterations to the existing structure shall be made so that the existing structure with the addition is no less complying with the provisions of this code than the existing structure was prior to the addition.

Reason: This proposal updates the IRC language with respect to existing buildings, in coordination with the IBC and IEBC. It clarifies, but does not change, the current intent.

In general, the IRC (with or without Appendix J) is obsolete in its terminology and language regarding existing buildings. Especially regarding structural issues, its provisions continue to use terms and formulations that have long since been revised in IBC Chapter 34 and the IEBC Work Area method. (For examples, the term "unsafe" and the labels and definitions of project types in Appendix J.) This proposal does not seek complete uniformity with the other codes, but it does attempt to correct some obsolete language that is now prone to incorrect interpretation.

In the first sentence, the proposal clarifies the main purpose, which is to require the intended addition, alteration, or repair work itself to be as for new construction. The second half of the sentence is deleted, as it has been in IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The portion proposed for deletion is redundant, since the next sentence (either as is or as proposed) tells you when and how to consider the existing structure. It is also potentially confusing, since it incorrectly gives the impression that the only possibilities are either no upgrade or total upgrade of the entire building for "all of the requirements of this code."

The proposal replaces the second sentence in order to correct four problems with the current text:

- The proposal removes the word "unsafe." First, this term is redundant in R102.7.1, since any work that would make the building unsafe would certainly also "adversely affect the performance." Second, the IRC does not define "unsafe" and so relies on the IBC, but the IBC's definition is unorthodox, as it comes through the text of section 116.1, not through a formal definition. In any case, from a structural perspective, a building is unsafe when the structure is "dangerous" as defined in the IBC or IEBC, but that definition has in mind an extreme condition verging on collapse. We do not believe it is the intent of the IRC committee to allow structural modifications to dwellings that take them to a condition just shy of dangerous. (IRC Appendix J does have its own definition of dangerous, but section R102.7.1 must be able to stand on its own, since Appendix J will not necessarily be adopted. Besides, the Appendix J definition is obsolete as well and applies only to structural conditions.)
- It replaces the phrase "adversely affect the performance" with "no less complying" language consistent with IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The IRC is compliance-based, not performance-based, so vague reference to "performance" is not enforceable. More important, the "adversely affect" phrase suggests that the existing building cannot be made worse by any measure, a restriction more severe than is probably intended. That is, as long as the building still complies, some reduction in capacity should be allowed.
- It restates the provision as an enforceable instruction, not as a blanket prohibition. That is, provisions for existing buildings are more useful and effective when they say what must be done, not what is prohibited. The IBC and IEBC provisions have been revised and written with this approach since 2009.
- It separates the project types, where necessary. Here, the provisions for additions, alterations, and repairs do not vary much, but the proposal reorganizes the provision to set a precedent and make future revisions by project type easier. This is consistent with the 2009 revisions to IBC Chapter 34, the IEBC Work Area method and IRC Appendix J.

Cost Impact: None

R102.7.1 #1-RB-BONOWITZ

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt this change is not needed. The existing language on performance is already consistent with the IBC and IEBC.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

David Bonowitz, representing NCSEA Code Advisory Committee, Existing Buildings Subcommitteek requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R102.7.1 Additions, alterations or repairs. Additions, alterations or repairs to any structure shall conform to the requirements for a new structure. <u>Where more specific requirements do not apply,</u> alterations or repairs shall be such that the existing structure is no less complying with the provisions of this code than it was prior to the alteration or prior to the occurrence of the damage that is being repaired. For additions, <u>where more specific requirements do not apply,</u> alterations to the existing structure shall be made so that the existing structure with the addition is no less complying with the provisions of this code than the existing structure was prior to the addition.

Commenter's Reason: The IRC committee, which is not expert in existing building provisions or in the IEBC methodology, simply got this one wrong. Perhaps they were confused by incorrect statements made by committee members after testimony was closed. Whatever the reason, the confusion is evident from the fact that the committee's reason for disapproval is plainly false.

The committee reason states: "The existing language on performance is already consistent with the IBC and IEBC." This is plainly false because the existing language is *not at all consistent* with the IBC and IEBC:

- Since 2009, the IBC has separated additions, alterations, and repairs into separate sections to avoid just the sort of over-generality present in R102.7.1. The IEBC Work Area method, of course, has always had separate chapters for separate project types.
- IBC and IEBC provisions for existing buildings are specific and measured. They do not require or even suggest, as the 2012 language of R102.7.1 does, that an existing building *might* be required "to comply with all of the requirements" for new construction.
- The 2012 IRC provision sets the bar for unacceptable projects where they would make the existing building unsafe. Neither the IBC nor the IEBC has any such provision. Rather, the "no less complying" language of the proposal exists in IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1.
- The IBC and IEBC have no such vague provision about projects that would "adversely affect the performance of the building." In fact, extensive revisions to the IBC and IEBC over the last two cycles have quite intentionally removed such unenforceable language. Instead, the IBC and IEBC explicitly allow certain reductions in performance until a measurable and enforceable loss of compliance is reached.

If users of the IRC want the IRC to be taken seriously, they need to allow it to evolve and improve in coordination with the other I-codes. The IRC is clearly falling behind on the issue of existing IRC-eligible buildings. This proposal helps close the gap, as do proposals RB 469 and RB 470, both of which were approved as submitted for similar reasons.

Excerpts from the original proposal's reason statement:

- This proposal updates the IRC language with respect to existing buildings, in coordination with the IBC and IEBC. It clarifies, but does not change, the current intent. This proposal does not seek complete uniformity with the other codes, but it does attempt to correct some obsolete language that is now prone to incorrect interpretation.
- In the first sentence, the proposal clarifies the main purpose, which is to require the intended addition, alteration, or repair work itself to be as for new construction. The second half of the sentence is deleted, as it has been in IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The portion proposed for deletion is redundant, since the next sentence (either as is or as proposed) tells you when and how to consider the existing structure.
- The proposal replaces the second sentence in order to correct four problems with the current text:
    - The proposal removes the word "unsafe." We do not believe it is the intent of the IRC committee to allow modifications to dwellings that take them to a condition just shy of "dangerous" or "unsafe."

- It replaces the phrase “adversely affect the performance” with “no less complying” language consistent with IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The IRC is compliance-based, not performance-based, so vague reference to “performance” is not enforceable. More important, the “adversely affect” phrase suggests that the existing building cannot be made worse by any measure, a restriction more severe than is probably intended. That is, as long as the building still complies, some reduction in capacity should be allowed.
- It restates the provision as an enforceable instruction, not as a blanket prohibition. That is, provisions for existing buildings are more useful and effective when they say what must be done, not what is prohibited. The IBC and IEBC provisions have been revised and written with this approach since 2009.
- It separates the project types, where necessary. Here, the provisions for additions, alterations, and repairs do not vary much, but the proposal reorganizes the provision to set a precedent and make future revisions by project type easier. This is consistent with the 2009 revisions to IBC Chapter 34, the IEBC Work Area method and IRC Appendix J.

The original proposal is modified by this Public Comment to include the phrase “where more specific requirements do not apply” in two places. This modification maintains the intent of the current phrase “unless otherwise stated.”

RB2-13

Final Action: AS AM AMPC____ D

RB4-13

R104.10.1, R105.3.1.1, R112.2.1, R112.2.2, R301.2.4, R322.1

Proposed Change as Submitted

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net)

Revise as follows:

R104.10.1 Flood hazard areas. The building official shall not grant modifications to any provisions related to flood hazard areas as established by Table R301.2(1) ~~without the granting of a variance to such provisions by the board of appeals~~ unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section R322 inappropriate.
2. A determination that failure to grant the modification would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a modification will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
4. A determination that the modification is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, alteration, repair, addition or other improvement of existing buildings or structures located in a flood hazard area as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall make a determination ~~prepare a finding~~ with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamage condition. If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, ~~the finding shall be provided to the board of appeals for a determination of substantial improvement or substantial damage. Applications determined by the board of appeals to constitute substantial improvement or substantial damage~~ the proposed work is a substantial improvement or restoration of substantial damage and the building official shall require all existing portions of the entire building or structure to meet the requirements of R322.

For the purpose of this determination, a substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs necessary to restore the building or structure to its pre-damaged condition are considered substantial improvement regardless of the actual repair work performed. The term does not include:

1. Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or
2. Any alteration of a historic building or structure, provided that the alteration will not preclude the

continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:

2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or

2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or

2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

~~**R112.2.1 Determination of substantial improvement in flood hazard areas.** When the building official provides a finding required in Section R105.3.1.1, the board of appeals shall determine whether the value of the proposed work constitutes a substantial improvement. A substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include:~~

1. ~~Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or~~
2. ~~Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:~~

~~2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or~~

~~2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or~~

~~2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.~~

~~**R112.2.2 Criteria for issuance of a variance for flood hazard areas.** A variance shall only be issued upon:~~

1. ~~A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 322 inappropriate.~~
2. ~~A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.~~
3. ~~A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.~~
4. ~~A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.~~
5. ~~Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.~~

R301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions of Section R322. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

Reason: This proposal does three things related to existing dwellings in flood hazard areas:

1. Moves language from R112.2.2 to R104.10. The effect is to parallel both the IBC and IEBC which charge the building official with making certain determinations before granting modifications, rather than have the Board of Appeals make such determinations.
2. Moves language from R112.2.1 to R105.3.1.1. The effect is to more closely align the IRC with the IBC and IEBC, which rely on the building official to determine whether work on existing buildings in flood hazard areas meets the definitions "substantial improvement" and "substantial damage," rather than have the building official make a finding and have the Board of Appeals make such determinations
3. Clearly identify in R301.2.4 and R322.1, that the flood provisions apply to substantial improvement and substantial damage; R102.7.1 already makes clear that the IRC applies to additions, alterations, or repairs.

The IRC currently requires the Board of Appeals to do two things that are done by the building official under both the IBC and the IEBC – (1) determine whether requests for modifications to the flood provisions meet certain criteria and (2) determine whether work on existing dwellings constitutes substantial improvement or substantial damage (SI/SD). As stated in R112.1, the purpose of a Board of Appeals is to hear appeals of decisions, orders, and determinations of the building official. If the Board is charged with making decisions, such as the granting of a modification (variance) and the determination of SI/SD, then permit applicants and permittees have no recourse to appearl those decisions, except perhaps the courts. If building officials are capable of making these determinations under IBC and IEBC, then they should be permitted to do the same under the IRC.

The proposed changes to R301.2.4 and R322.1, which have the same phrasing, is to make clear that, as stated in R102.7.1, because the IRC applies to work on existing dwellings, the flood provisions apply to substantial improvement and substantial damage of existing dwellings. The added phrase is the same as used in IBC 1612.1.

Cost Impact: Costs will be reduced for permit applicants and permittees who challenge SI/SD determinations and decisions on requests for modifications (variances) because they can appeal the building official's decisions to the Board of Appeals instead of the courts. There is no change in the cost of compliance because the IRC already applies to existing dwellings and communities that participate in the NFIP have long required existing buildings that are SI/SD to be brought into compliance with the requirements for new construction.

R104.10.1-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that it substantially changes the description of a historic building in a manner that puts it in the hands of the federal government, which is the wrong direction.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Gregory Wilson (FEMA) and Rebecca Quinn (RCQuinn Consulting), representing US Dept of Homeland Security, Federal Emergency Management Agency and RCQuinn Consulting, Inc. representing FEMA, requests Approval as Modified by this Public Comment,

Replace the proposal with the following:

Revise as follows:

R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, alteration, repair, addition or other improvement of existing buildings or structures located in a flood hazard area as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall make a determination with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamage condition. If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the proposed work is a substantial improvement or restoration of substantial damage and the building official shall require all existing portions of the entire building or structure to meet the requirements of R322.

For the purpose of this determination, a substantial improvement shall mean any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs necessary to restore the building or structure to its pre-damaged condition are considered substantial improvement regardless of the actual repair work performed. The term shall not include:

1. Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or
2. Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:
   2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or
   2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or
   2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

~~**R112.2.1 Determination of substantial improvement in flood hazard areas.** When the building official provides a finding required in Section R105.3.1.1, the board of appeals shall determine whether the value of the proposed work constitutes a substantial improvement. A substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include:~~

1. ~~Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or~~
2. ~~Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:~~
   ~~2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or~~
   ~~2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or~~
   ~~2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.~~

~~**R112.2.2 Criteria for issuance of a variance for flood hazard areas.** A variance shall only be issued upon:~~

1. ~~A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 322 inappropriate.~~
2. ~~A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.~~
3. ~~A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.~~
4. ~~A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.~~
5. ~~Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.~~

Commenter's Reason: The committee action on this code change proposal was Disapproval, explained only by a concern with the description of historic building. The proposal does not, as perceived by the committee, "substantially change the description of a historic building…." The text proposed for R105.3.1.1 is simply being moved from the existing Section R112.2.1. The same language qualifying the I-Codes definition for "historic building" is in the IBC Chapter 34 Section 3409.2 and in the IEBC 1101.4.

This public comment replaces the original proposal with ONLY the portions of that proposal that affect Chapter 1, with no change to any of the originally proposed language.

The primary objective is to move certain determinations from R112 Board of Appeals into R104 Duties and Powers of the Building Official and R105 Permits. The result is to be consistent with the administrative provisions of the IBC and the IEBC. If the building official is authorized and capable of making these determinations under the IBC and the IEBC, then the building official is also capable and should be authorized to the same under the IRC. Importantly, having the building official make these determinations rather than the board of appeals increases an applicant's ability to appeal those decisions at the local level.

Public Comment 2:

Gregory Wilson (FEMA) and Rebecca Quinn (RCQuinn Consulting), representing US Dept of Homeland Security, Federal Emergency Management Agency and RCQuinn Consulting, Inc. representing FEMA, requests Approval as Modified by this Public Comment,

Replace the proposal with the following:

Revise as follows:

R301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions of Section R322. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

Commenter's Reason: The committee action on this code change proposal was Disapproval, explained only by a concern with the description of historic buildings.

This public comment replaces the original proposal with ONLY the portions of that proposal that affect Chapter 3, with no change to any of the originally proposed language.

It is clear in IRC Section 102.7.1 that the IRC applies to existing buildings when those buildings have additions, alterations, or repairs. The phrase proposed to be added to R301.2.4 and R322.1 is the same wording used in the IBC 1612.1. This will make it clearer that when the code applies to existing dwellings in flood hazard areas, a determination must be made as to whether the proposed work constitutes Substantial Improvement or repair of Substantial Damage (see current provisions in R105.3.1.1 and R112.2.1, which call for the building official to make a finding and for the Board of Appeals to make determinations of substantial improvement and substantial damage).

RB4-13

Final Action: AS AM AMPC____ D

RB5-13
R105.1

Proposed Change as Submitted

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Revise as follows:

R105.1 Required. Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any <u>impact protective system</u>, electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *building official* and obtain the required *permit*.

Reason: Opening protection by impact protective systems is an important aspect in maintaining structural integrity during a hurricane event. In addition to increasing the structural performance of buildings, they play a role in the life safety of the people weathering the storm out in their residence. Observations in the field reveal many installations do not meet the standards adopted for these devices as became apparent during storms in recent years. Unfortunately, many jurisdictions do not require permits or inspections for these important structural safeguards and life safety devices because they are not addressed in the section of the code addressing required permits. With the emphasis of emergency management shifting to defending in place due to the inability of the infrastructure to handle mass evacuations, these impact protective systems, be they impact rated glass or devices, and their proper installation becomes even more important.

The hurricane protection industry estimates annual sales in unapproved and mostly bogus “hurricane protection devices” at $30M to $40M at the minimum. These products have not been tested or investigated by anyone and meet no standards. The sellers of these products target citizens and give residents a false sense of security. Requiring permits and inspections for all impact protective systems would dramatically increase the protection provided to the residents of single family dwellings.

Cost Impact: The proposal may result in a slight increase for the cost of a permit solely for projects involving installation, alteration, repair or replacement projects. For new construction there should be no cost as the permit for the building would include the installation of the impact protective system. The benefit of the requirement, however, will far outweigh any added cost in permitting by increasing the assurance that these important structural and life safety protection devices are properly designed and installed. The industry has noted cases of substandard materials, inappropriate testing or claims of testing, and improper installation of products. We believe closer scrutiny of the design and installation of these important property protection and life safety systems will result in greater protection to the public and a better value to the consumer.

Staff Analysis: Mr. Belcher has a companion change for a new Section 614 that has criteria for impact protective systems. Requirements for these types of systems are in the IRC in Section 301.2.1.2 and 612.6.

R105.1-RB-BELCHER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Requiring a permit has the potential for unintended consequences of delay action before a storm. Could be further delay if a permit is required for WSP. The local jurisdiction can decide if a permit is required for this protective system.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Joseph D. Belcher, JDB Code Services, Inc., representing International Hurricane Protection Association (IHPA), requests Approval as Submitted.

Commenter's Reason: The purpose of this public comment is to request Approval as Submitted of a requirement for building permits for the installation of impact protective systems. The provision would not apply for new construction, as the building permit for the dwelling would include opening protection where required by the code. However, in light of recent history many states are engaged in wind mitigation programs to increase the ability of a structure to resist high winds encountered during hurricanes. Since the code requires opening protection in wind-borne debris regions, it only follows that permits should be required to assure oversight and code compliance to increase the safety of the public.

Opening protection by impact protective systems is an important aspect in maintaining structural integrity during a hurricane event. In addition to increasing the structural performance of buildings, they play a role in the life safety of the people weathering the storm out in their residence. Emergency management is moving toward defending in place as opposed to evacuation due to the inability of the infrastructure to safely evacuate many areas. As became apparent during storms in recent years many installations do not meet the standards adopted by the code for these devices. Unfortunately, many jurisdictions do not require permits or inspections for these important structural safeguards and life safety devices because they are not addressed in the section of the code addressing required permits. With the emphasis of emergency management shifting to defending in place due to the inability of the infrastructure to handle mass evacuations, these impact protective systems, be they impact rated glass or devices, and their proper installation becomes even more important.

The hurricane protection industry estimates annual sales in unapproved and mostly bogus "hurricane protection devices" at $30M to $40M at the minimum. These products have not been tested or investigated by anyone and meet no standards. The sellers of these products target citizens and give residents a false sense of security. Requiring permits and inspections for all impact protective systems would dramatically increase the protection provided to the residents of single family dwellings.

RB5-13

Final Action: AS AM AMPC____ D

RB6-13
R105.2

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

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 200 square feet (18.58 m^2).
2. Fences not over 7 feet (2134 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 ~~not exceeding 200 square feet (18.58 m^2) in area,~~ that are not more than 30 inches (762 mm) above *grade* at any point~~, are not attached to a *dwelling*~~ and do not serve the exit door required by Section R311.4.

Reason: This proposal deletes certain provisions of the exemption for decks. 200 square feet is an arbitrary limit and without basis. If a jurisdiction wishes to limit the size of a deck, they may do so through their local zoning regulations. There is nothing unique about these structures that make a deck that is 210 square feet in area more dangerous than one that is 190 square feet.

Furthermore, whether or not it is attached to the dwelling should make no difference. It is common practice to set these low decks adjacent to the dwelling and often homeowners wish to attach them to the dwelling for added stability. Why would we want to discourage them from making their deck more secure by requiring a permit? All too often the regulations start to get pretty restrictive regarding the connections for these low decks. The owner may wish to add a few lag bolts to stabilize the deck or they may wish to support one entire length of the deck from the house.

The risks posed do not warrant the close regulations that permitting requires. Building department resources are stretched thin. Permit fees on these decks rarely cover the cost of enforcement. Public dollars can be better spent on more significant projects.

A common argument for requiring permits for these structures is for zoning compliance. That is a lousy reason for requiring a building permit. Local zoning ordinances often regulate other structures when a building permit is not required. Certain fences, arbors, trellises, and small accessory structures come to mind. Let the zoning folks carry their own water.

Cost Impact: None

R105.2 #1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that it is possible to have the same condition that is regulated by this code section on decks of any size.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Glenn Mathewson, MCP, City of Westminster, Colorado, representing North American Deck and Railing Association, requests Disapproval.

Commenter's Reason: The proponent's reason statement fails to recognize all the hazards associated with deck construction. Homeowners relying on guidance from box stores or TV shows are misled into construction practices that are hazardous to their wellbeing and to the longevity of their property. The larger the deck, the more occupants it carries and the greater the probability of someone getting hurt. As a deck gets larger, so usually does its interface with the home. With this comes a greater likelihood that commonly overlooked hazards will occur. Decks constructed over emergency escape and rescue opening windows, over cat. IV appliance vents, ledgers blocking brick weepholes and foundation vents, decks under low overhead service cables, stairs near glazing, clearances at dryer exhaust vents, combustion air intake openings, and electrical service equipment working clearances…these are all subject to code violations from a poorly designed deck. With any regulation, a line has to be drawn. Why 30" of height, not 29"? Why 200 sf and not 210 sf? A line has to be drawn somewhere, 200 SF seems fair.

As for the connection to the house, poorly flashed connections will cause damage to the structure of the home. Exterior claddings such as stucco, adhered and anchored veneers, EIFS and vinyl siding must be appropriately handled when a deck is connected.

Pictures tell a thousand words.

This category IV appliance vent was going to be buried under this deck, as was the 24" egress window well for the basement of the house (note: constructed prior to 1994 UBC when 24" was the minimum).

The contactor attached it over siding with no flashing, and buried the siding with about eight inches of dirt excavated from the piers.

Public Comment 2:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Disapproval.

Commenter's Reason: I do not agree with the proponent's original reason statement where he claims that since the existing 200 square foot limit is an arbitrary number and therefore we should just delete this limit and actually not require permits for any deck that is 30 inches or less. I do not think that most jurisdictions require permits for decks just due to zoning requirements but to verify structural designs.

I would argue that by requiring permits for decks we are able to verify that the structure is meeting the IRC requirements for structural design and therefore safe. In reality, the larger the deck, the bigger the number of people that can fit on the deck. There would be a very real possibility that if there was a failure of a deck that was 29" or 30" above the ground that people could get hurt or killed even falling at this height.

I would also argue that the best way to approach this would be to require permits for all decks no matter the size and no matter the height above ground rather than the approach that this proponent took.

RB6-13
Final Action: AS AM AMPC____ D

RB8-13
R106.1.4 (New), R702.8 (New), R703.13 (New); Chapter 44, AJ301.1.1.1 (New), AJ701 (New)

Proposed Change as Submitted

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

IRC SECTION R106
CONSTRUCTION DOCUMENTS

R106.1.4 Certifications and plans where painted surfaces are disturbed. Where a dwelling was completed prior to 1978 and repair, alteration or addition being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official one of the following:

1. Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance in accordance with 40 CFR 745 requirements for renovations.
2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.

IRC SECTION R702
INTERIOR COVERINGS

R702.8 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

IRC SECTION R703
EXTERIOR COVERING

R703.13 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

CHAPTER 44
REFERENCED STANDARDS

EPA
U.S. Environmental Protection Agency

40 CFR 745-July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

SECTION AJ301
REPAIRS

AJ301.1.1.1 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION AJ701
REFERENCED STANDARDS

EPA
U.S. Environmental Protection Agency

40 CFR 745 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Reason: This code change proposal is to incorporate protection from lead-based paint by specifying (1) that additions, alterations, and repairs to pre-1978 homes comply with federal health-protective requirements to protect children from lead poisoning and (2) that permit applicants include, with the other construction documents, evidence of compliance.

The purpose of this proposed code language is to incorporate protection from lead-based paint into the Code through the requirement for construction documents. Once the Code requires permit applicants to demonstrate up front their knowledge of, and plans to follow, the federal and state renovation rule requirements, the code official will be positioned to provide important oversight and leadership in preventing lead poisoning without even leaving the office. This oversight will help level the playing field between contractors who are complying with the rule and noncompliant entities who are under-pricing and undercutting their competitors. By merely asking an applicant for the missing documents, the code official can influence entities not following the law into compliance before the work even starts. In a few cases, these entities may be unaware of the regulations. Although these regulations have been in effect since April 2010, and have been adopted by 12 states, reported non-compliance is affecting the compliant contractor and continuing the problem of lead poisoning in the US.

The proposed “plan for compliance in accordance with 40 CFR 745 requirements for renovations” with the federal disclosure and work practice requirements” can take different forms depending on what documents the builder is already using. Some builders who work on pre-1978 homes are already using a form to track their upfront assessments and another form for recordkeeping. Anyone working in pre-1978 homes should have an EPA or state certification for their firm, along with at least one individual renovator certification that the renovator received at the end of the required one-day training course. These requirements are already in effect in federal and state regulation.

The plan and certifications would only be needed for a structure likely to contain lead-based paint: a pre-1978 home. As noted under the exception, the requirement is waived if paint testing proves that the paint is not lead-based paint. A rebuttable presumption of lead’s presence allows the builder to demonstrate that lead is not present and obtain exemption from the requirements. EPA-approved tests include lead-based paint inspection or risk assessment, test kit used by a certified renovator, and collection of a lead-based paint chips for laboratory analysis.

Renovation of painted surfaces is a significant source of lead dust that poisons children. The dangers associated with lead poisoning are well-known: serious health effects, detrimental effects on cognitive and behavioral development, with serious personal and social consequences that may persist throughout their lifetime.

Multiple studies have demonstrated that lead dust is the major source of lead poisoning for young children. There is no safe level of lead exposure for children; lead affects intelligence even at very low levels.[1,2,5,8,9] Indeed, the rate of IQ loss per 1 microgram of lead per deciliter of blood (μg/dL) is greatest at lead levels below 10 μg/dL. As a child’s BLL increases from 1 to 10 μg/dL, experts estimate a child may lose anywhere from 3.9 to 7.4 IQ points, but from 10 to 30 μg/dL the decrement is 2.5 to 3.0 IQ points. Low-level chronic exposure may have an even greater effect on IQ than a single instance of very high BLL.[10]

Research indicates that a five-point negative shift in IQ at the population level would increase the number of children with an “extremely low” IQ by 57%, substantially increasing the cost of special education programs.[3] Considering the costs to the special education system alone, one study conservatively estimated that it costs $38,000 over three years to educate a child with lead poisoning.[11] Low-level exposure to lead has also been linked to factors other than IQ that can further impact educational outcomes. EBLLs are associated with Attention Deficit Hyperactivity Disorder (ADHD) and antisocial behavior, which in turn increase the likelihood of conduct disorder, criminal activity, and drug abuse.[1,4] Each 1 μg/dL reduction in the average preschool blood lead level saves $13.4 billion from the direct and indirect costs of crime.[1]

Several recent studies have explored the specific effects of lead on educational outcomes. These studies show a strong relationship between slightly elevated blood lead levels in young children and decreased scores on end-of-grade tests in elementary school. While similar educational effects were documented for higher blood levels decades ago,[12] the recent studies confirm that the connection between blood lead and poor educational outcomes remains true for blood levels as low as 3-4 μg/dL. A more recent study of 57,000 North Carolina children found that children with a BLL as low as 4 μg/dL at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 μg/dL.[6]

The consequences of lead exposure are clear. This code change proposal seeks to reduce the risk of lead exposure during and after work performed on a pre-1978 home – and level the playing field among contractors working on pre-1978 properties.

The EPA 40 CFR 745 standard is available at http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml.

References:

1. Gould E. Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. Environ. Health Perspect. 2009;117(7):1162–1167.
2. Jusko TA, Henderson CR, Lanphear BP, Cory-Slechta DA, Parsons PJ, Canfield RL. Blood lead concentrations. Environ. Health Perspect. 2008;116(2):243–248.
3. Mazumdar M, Bellinger DC, Gregas M, Abanilla K, Bacic J, Needleman HL. Low-level environmental lead exposure in childhood and adult intellectual function: a follow-up study. Environ Health. 2011;10:24.
4. Chandramouli K, Steer CD, Ellis M, Emond AM. Effects of early childhood lead exposure on academic performance and behaviour of school age children. Arch. Dis. Child. 2009;94(11):844–848.
5. Miranda ML, Kim D, Galeano MA, Paul CJ, Hull AP, Morgan SP. The relationship between early childhood blood lead levels and performance on end-of-grade tests. Environ. Health Perspect. 2007;115(8):1242–1247.
6. Miranda ML, Maxson P, Kim D. Early childhood lead exposure and exceptionality designations for students. Int J Child Health Hum Dev. 2010;3(1):77–84.
7. Advisory Committee on Childhood Lead Poisoning Prevention. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. 2012:1–68. Available at: http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf. Accessed March 6, 2012.
8. Lanphear BP, Hornung R, Khoury J, et al. Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. Environ. Health Perspect. 2005;113(7):894–899.
9. Canfield RL, Henderson CRJ, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. N. Engl. J. Med. 2003;348(16):1517–1526.16.
10. Lanphear BP, Dietrich K, Auinger P, Cox C. Cognitive deficits associated with blood lead concentrations. Public Health Rep. 2000;115(6):521–529.17.
11. Korfmacher KS. Long-term costs of lead poisoning: How much can New York save by stopping lead? Rochester, NY: University of Rochester; 2003.
12. Needleman HL, Leviton A, Bellinger D. Lead-associated intellectual deficit. N Engl J Med. 1982; 306(6):367.

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

Staff analysis: A review of the standard proposed for inclusion in the code, EPA 40 CFR 745-July 1, 2012, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R106.1.4 (NEW)-RB-MORLEY

Committee Action Hearing Results

Committee Action: Disapproved

For staff analysis of the content of U.S. EPA 40 CFR 745 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Reason: The committee disapproved this proposed code change because they felt that the requirements dealing with lead are federal and should remain in that domain. All federal requirements do not belong in the code.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Mark Henshall, representing US Environmental Protection Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R106
CONSTRUCTION DOCUMENTS

R106.1.4 Certifications and plans where painted surfaces are disturbed. Where a dwelling was completed prior to 1978 and repair, alteration or addition being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official ~~one of the following:~~

~~1.~~ a copy of a current Renovation Repair and Painting firm certification issued by either EPA in accordance with 40 CFR 745.89 or by a state program authorized by EPA in accordance with 40 CFR 745 Subpart Q. ~~Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance in accordance with 40 CFR 745 requirements for renovations.~~

~~2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.~~

~~SECTION R702~~
~~INTERIOR COVERINGS~~

~~**R702.8 Disturbance of existing painted surfaces.** In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.~~

~~**Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.~~

~~SECTION R703~~
~~EXTERIOR COVERING~~

~~**R703.13 Disturbance of existing painted surfaces.** In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.~~

~~**Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.~~

CHAPTER 44
REFERENCED STANDARDS

EPA
U.S. Environmental Protection Agency

40 CFR 745-~~July 1, 2012~~ Lead-Based Paint Poisoning Prevention in Certain Residential Structures – July 1, 2012

Commenter's Reason: This code change proposal is to incorporate protection from lead-based paint by specifying that permit applicants include, with the other construction documents, evidence of compliance with the firm certification requirements of EPA's or an authorized states Renovation, Repair and Painting Regulation. The local building code official would have no other responsibility than to request a copy of a current Renovation Repair and Painting firm certification

EPA's Lead-Based Paint Renovation, Repair and Painting (RRP) Rule aims to protect the public from lead-based paint hazards associated with renovation, repair and painting activities. These activities can create hazardous lead dust when surfaces with lead paint, are disturbed. The rule requires workers to be certified and trained in the use of lead-safe work practices, and requires renovation, repair and painting firms to be EPA-certified. This training and adherence to lead-safe work practices will help ensure residents are not exposed to hazardous levels of lead contaminated dust.

The original proposal required "a plan for compliance for renovations in accordance with 40 CFR 745 requirements for renovations." Questions were raised as to what constituted a plan and what would be expected in terms of the code official approving such a plan. In addition, the original proposal could be interpreted to mean that local building officials were being asked to enforce a federal regulation. This modification to the original proposal has addressed these concerns.

Public Comment 2:

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

R702.8 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall not leave behind visible dust, debris or residue.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

R703.13 Disturbance of existing painted surfaces. On any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall not leave behind visible dust, debris or residue.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

CHAPTER 44
REFERENCED STANDARDS

EPA

U.S. Environmental Protection Agency

40 CFR 745-July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

SECTION AJ301
REPAIRS

AJ301.1.1.1 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alterations and additions where painted surfaces are disturbed shall leave behind no visible dust, debris or residue.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Commenter's Reason: Based on the Committee decision, we have reduced this code change from a requirement for full compliance with the federal regulation to the essential but simple performance standard that will protect occupant's and worker's children from exposure to harmful lead. It is consistent with the federal regulation in that clean-up is required at the end of renovation work. This requirement can be enforced by the code official with a visual inspection: no testing or special information is needed.

The exemption applies if the project meets one of these standards at 40 CFR 745.82(a):

1. a written determination has been made by a certified inspector or risk assessor that the components affected by the renovation are free of paint or other surface coatings that contain lead;
2. a certified renovator, using an EPA recognized test kit, has tested each component affected by the renovation and determined that the components are free of paint or other surface coatings that contain lead;
3. a certified renovator has collected a paint chip sample from each painted component affected by the renovation and a laboratory recognized by EPA has determined that the samples are free of paint or other surface coatings that contain lead.

RB8-13

Final Action: AS AM AMPC____ D

RB12-13
R202

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

SECTION R202
DEFINITIONS

ATTIC. The unfinished space between the ceiling assembly ~~of the top *story*~~ and the roof assembly.

Reason: The current definition of "attic" is insufficient in that it excludes spaces that clearly should be regulated. Attics exist at locations other than the top story. It encourages a lack of uniformity in enforcement and confusion from all users of the code.

Examples of areas where the current definition becomes problematic include rules regarding attics with limited storage, exposed foam plastics, insulation requirements, fire separations, draft stops, structural requirements, access, and ventilation. These rules are intended to apply to all attics, not just those defined as being above the top story.

Cost Impact: None

R202-ATTIC-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the term "top story" needs to be maintained for clarity purposes.

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, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: This proposal deletes the reference to "top story" from the definition of attic. This proposal was disapproved by the IRC Committee because the reason statement says the term "top story" is needed for "clarity purposes". At the beginning of the IRC is a section titled "Effective Use of the International Residential Code". In that section is an explanation of terms defined in the IRC. It states that when a term is italicized it means that the definition is uniquely used in the IRC and in those cases the published definition applies.

What follows are a number of sections from the IRC where the italicized word "*attic"* is used and therefore the definition in the IRC is clearly intended to apply.

I ask that you read through some of these code sections and apply the IRC definition of the word "attic". Every place you see "attic", think only of the top story. Does the defined term add clarity as was stated by the IRC Committee? Or, are commonly used applications of the code null and void because the definition does not include attics that may not be in the top story of a building but where applications of the code would normally occur?

As a permit holder, I would be willing to push the envelope if I didn't feel a particular code section was necessary and the definition suited my needs. Prosecutions of such "violations" would never get past the city attorney's desk. You need to be able to prosecute violations, not just write correction orders.

For example, suppose I construct a 2 story dwelling with an attached one story garage. I place a lid on the garage ceiling. I don't provide an access. I don't install collar ties in my hand framed garage roof. And, I don't ventilate the space. Can you prosecute any of these items as a code violation even though they would clearly be required in the attic of the top story of the dwelling? Not given the current text in the code and knowledge by the persons involved of the definitions.

Those who enforce the code need to be able to explain the requirements to the public. When you have differing rules that apply to very similar conditions in the same structure, that task becomes difficult and suggests to the public that the rules makers don't know what they are doing and that in turn impacts credibility. The proposed code change needs to be approved to achieve clarity and consistency.

Effective Use of the International Residential Code
Where understanding a term's definition is key to or necessary for understanding a particular code provision, the term is shown in italics where it appears in the code. This is true only for those terms that have a meaning that is unique to the code. In other words, the generally understood meaning of a term or phrase might not be sufficient or consistent with the meaning prescribed by the code; therefore, it is essential that the code-defined meaning be known.

ATTIC. The unfinished space between the ceiling assembly of the top *story* and the roof assembly.

DRAFT STOP. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and *attics*.

R302.3 Two-family dwellings. *Dwelling units* in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than a 1-hour fire-resistance rating when tested in accordance with ASTM E 119 or UL 263. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the *exterior wall*, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.
2. Wall assemblies need not extend through *attic* spaces when the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board and an *attic* draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the *dwellings*. The structural framing supporting the ceiling shall also be protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

R302.10.1 Insulation. Insulation materials, including facings, such as vapor retarders and vapor-permeable membranes installed within floor/ceiling assemblies, roof/ ceiling assemblies, wall assemblies, crawl spaces and *attics* shall have a flame spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84 or UL 723.

R302.10.4 Exposed attic insulation. All exposed insulation materials installed on *attic* floors shall have a critical radiant flux not less than 0.12 watt per square centimeter.

R314.3 Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional *story* of the *dwelling*, including *basements* and habitable attics but not including crawl spaces and uninhabitable *attics*. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

R314.4 Power source. Smoke alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power.
2. Hard wiring of smoke alarms in existing areas shall not be required where the *alterations* or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an *attic*, crawl space or *basement* available which could provide access for hard wiring without the removal of interior finishes.

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. *Attic* access is required by Section R807.1.

R316.5.12 Sheathing. Foam plastic insulation used as sheathing shall comply with Section R316.3 and Section R316.4. Where the foam plastic sheathing is exposed to the *attic* space at a gable or kneewall, the provisions of Section R316.5.3 shall apply.

R501.1 Application. The provisions of this chapter shall control the design and construction of the floors for all buildings including the floors of *attic* spaces used to house mechanical or plumbing fixtures and *equipment*.

R502.3.1 Sleeping areas and attic joists. Table R502.3.1(1) shall be used to determine the maximum allowable span of floor joists that support sleeping areas and *attics* that are accessed by means of a fixed stairway in accordance with Section R311.7 provided that the design live load does not exceed 30 pounds per square foot (1.44 kPa) and the design dead load does not exceed 20 pounds per square foot (0.96 kPa). The allowable span of ceiling joists that support *attics* used for limited storage or no storage shall be determined in accordance with Section R802.4.

R502.3.2 Other floor joists. Table R502.3.1(2) shall be used to determine the maximum allowable span of floor joists that support all other areas of the building, other than sleeping rooms and *attics*, provided that the design live load does not exceed 40 pounds per square foot (1.92 kPa) and the design dead load does not exceed 20 pounds per square foot (0.96 kPa).

R603.3.2 Minimum stud sizes. Cold-formed steel walls shall be constructed in accordance with Figure R603.3.1(1), R603.3.1(2) or R603.3.1(3), as applicable. Exterior wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(31). Interior load-bearing wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(31) based upon an 85 miles per hour (38 m/s) Exposure A/B wind value and the building width, stud spacing and snow load, as appropriate. Fastening requirements shall be in accordance with Section R603.2.4 and Table R603.3.2(1). Top and bottom tracks shall have the same minimum thickness as the wall studs. Exterior wall studs shall be permitted to be reduced to the next thinner size, as shown in Tables R603.3.2(2) through R603.3.2(31), but not less than 33 mils (0.84 mm), where both of the following conditions exist:

1. Minimum of 1/2 inch (12.7 mm) gypsum board is installed and fastened in accordance with Section R702 on the interior surface.
2. Wood structural sheathing panels of minimum 7/16-inch-thick (11 mm) oriented strand board or 15/32-inch-thick (12 mm) plywood is installed and fastened in accordance with Section R603.9.1 and Table R603.3.2(1) on the outside surface.

Interior load-bearing walls shall be permitted to be reduced to the next thinner size, as shown in Tables R603.3.2(2) through R603.3.2(31), but not less than 33 mils (0.84 mm), where a minimum of 1/2-inch (12.7 mm) gypsum board is installed and fastened in accordance with Section R702 on both sides of the wall. The tabulated stud thickness for load- bearing walls shall be used when the *attic* load is 10 pounds per square feet (480 Pa) or less. A limited *attic* storage load of 20 pounds per square feet (960 Pa) shall be permitted provided that the next higher snow load column is used to select the stud size from Tables R603.3.2(2) through R603.3.2(31).

R611.2 Applicability limits. The provisions of this section shall apply to the construction of exterior concrete walls for buildings not greater than 60 feet (18 288 mm) in plan dimensions, floors with clear spans not greater than 32 feet (9754 mm) and roofs with clear spans not greater than 40 feet (12 192 mm). Buildings shall not exceed 35 feet (10 668 mm) in mean roof height or two stories in height above-grade. Floor/ceiling dead loads shall not exceed 10 pounds per square foot (479 Pa), roof/ceiling dead loads shall not exceed 15 pounds per square foot (718 Pa) and *attic* live loads shall not exceed 20 pounds per square foot (958 Pa).

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9), and the rafter shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or securely joined in accordance with Table R802.5.1(9) where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building when such joists are parallel to the rafters. Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the *attic* shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie…

Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the *attic* space in accordance with Table R602.3(1).

R804.3.1.1 Minimum ceiling joist size. Ceiling joist size and thickness shall be determined in accordance with the limits set forth in Tables R804.3.1.1(1) through R804.3.1.1(8). When determining the size of ceiling joists, the lateral support of the top flange shall be classified as unbraced, braced at mid-span or braced at third points in accordance with Section R804.3.1.4. Where sheathing material is attached to the top flange of ceiling joists or where the bracing is spaced closer than third point of the joists, the "third point" values from Tables R804.3.1.1(1) through R804.3.1.1(8) shall be used. Ceiling joists shall have a bearing support length of not less than 11/2 inches (38 mm) and shall be connected to roof rafters (heel joint) with No. 10 screws in accordance with Figures R804.3.1.1(1) and R804.3.1.1(2) and Table 804.3.1.1(9). When continuous joists are framed across interior bearing supports, the interior bearing supports shall be located within 24 inches (610 mm) of midspan of the ceiling joist, and the individual spans shall not exceed the applicable spans in Tables R804.3.1.1(2), R804.3.1.1(4), R804.3.1.1(6) and R804.3.1.1(8). When the *attic* is to be used as an *occupied space,* the ceiling joists shall be designed in accordance with Section R505.

R806.1 Ventilation required. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow.

R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented *attic* assemblies (spaces between the ceiling joists of the top *story* and the roof rafters) and unvented enclosed rafter assemblies (spaces between ceilings that are applied directly to the underside of roof framing members/rafters and the structural roof sheathing at the top of the roof framing members/rafters) shall be permitted if all the following conditions are met:
1. The unvented *attic* space is completely contained within the *building thermal envelope.*

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an *attic* access opening to *attic* areas that exceed 30 square feet (2.8 m2) and have a vertical height of 30 inches (762 mm) or greater. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members. The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics.*

R1006.2 Exterior air intake. The exterior air intake shall be capable of supplying all *combustion air* from the exterior of the *dwelling* or from spaces within the *dwelling* ventilated with outside air such as nonmechanically ventilated crawl or *attic* spaces. The exterior air intake shall not be located within the garage or *basement* of the *dwelling* nor shall the air intake be located at an elevation higher than the firebox. The exterior air intake shall be covered with a corrosion-resistant screen of 1/4-inch (6 mm) mesh.

M1305.1.3 Appliances in attics. *Attics* containing *appliances* shall be provided with an opening and a clear and unobstructed passageway large enough to allow removal of the largest *appliance*, but not less than 30 inches (762 mm) high and 22 inches (559 mm) wide and not more than 20 feet (6096 mm) long measured along the centerline of the passageway from the opening to the *appliance*. The passageway shall have continuous solid flooring in accordance with Chapter 5 not less than 24 inches (610 mm) wide. A level service space at least 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present along all sides of the *appliance* where access is required. The clear access opening dimensions shall be a minimum of 20 inches by 30 inches (508 mm by 762 mm), and large enough to allow removal of the largest appliance.

RB12-13
Final Action: AS AM AMPC____ D

RB23-13
R202

Proposed Change as Submitted

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Add new definition as follows:

R202
DEFINITIONS

IMPACT PROTECTIVE SYSTEM: Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached, or locked over exterior glazing.

Reason: Definition is added as companion to proposed change to Section R105.1 adding impact protective systems to the permitting requirements of the code. The definition is taken from ASCE 7-10 to assure consistency.

Cost Impact: The proposal is to add a definition and will have no cost.

Staff Analysis: Mr. Belcher has a companion change for a new Section 614 that has criteria for impact protective systems. Requirements for these types of systems are in the IRC in Section R301.2.1.2 and R612.6.

R202 IMPACT PROTECTIVE SYSTEM (NEW)-RB-BELCHER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This definition is not needed since the term is not used in the IRC. Also, there are alternate means other than testing that could be used.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Joseph D. Belcher, JDB Code Services, Inc., representing International Hurricane Protection Association (IHPA), requests Approval as Submitted.

Commenter's Reason: Impact protective systems are one means for complying with code requirements for opening protection in wind-borne debris regions. The code does not contain a definition for this important element in providing wind resistance in hurricane conditions. Both ASTM 1996 and ASCE 7-10 define Impact Protective System and the definition should be in the code to assure compliance. The definition is added as a companion to proposed change to Section R 105.1 (RB5-13) adding impact protective systems to the permitting requirements of the code. The definition is taken from ASCE 7-10 to assure consistency and because the ASCE definition indicates the requirement for testing.

RB23-13
Final Action: AS AM AMPC____ D

RB30-13
R202 (New)

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., representing National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Add new text as follows:

R202
DEFINITIONS

SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing, or other building components such that upper layers of material are placed overlapping lower layers of material to provide for drainage via gravity and moisture control.

Reason: The purpose of this code change is to introduce to the IRC a definition for "shingle fashion". This term is used in the IBC and IRC to describe the required method of applying moisture control layers such as roof underlayment and water-resistive barriers to the building. The intent is to direct the builder, contractor or installer to place upper layers of material lapping over lower layers of material, in the fashion of placing roof shingles, so moisture is provided with a clear path to drain down and away from the building. In field investigations of buildings with mold and moisture issues, it is frequently discovered that flashing, WRBs or underlayment have been placed in ***reverse*** shingle fashion, with the upper layer tucked behind the lower layer. This permits moisture to drain behind or below the intended protective layer or material where it can be trapped and lead to mold and decay of building components. The above definition was approved earlier this cycle (G21-12) for inclusion in the 2015 IBC.

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

R202-SHINGLE FASHION (NEW)-RB-EHRLICH

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing, or other building components such that upper layers of material are placed overlapping lower layers of material to provide ~~for~~ drainage and protect against water intrusion at unsealed penetrations and joints or in combination with sealed joints ~~via gravity and moisture control~~.

Committee Reason: This adds a needed and important definition. This is consistent with the action for the IBC in Group A. The modification clarifies what the method is protecting against.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Theresa A. Weston, PhD., representing DuPont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing, or other building components such that upper layers of material are placed overlapping lower layers of material to provide for drainage and protect against water intrusion at penetrations and joints ~~via gravity and moisture control.~~

Commenter's Reason: This modification simplifies the definition approved as modified by the committee. It does not need to be stated explicitly that shingle fashion can pertain to either sealed or unsealed joints as there are no other type of joint and this can be more simply stated as just "penetrations and joints" alone.

RB30-13

Final Action: AS AM AMPC____ D

RB38-13
Table R301.2(1)

Proposed Change as Submitted

Proponent: Matthew L. Mlakar, Barrish Pelham & Associates, Inc., representing Structural Engineers Association of California

Revise as follows:

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

GROUND SNOW LOAD	WIND DESIGN				SEISMIC DESIGN CATEGORY[f]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Wind-borne debris zone[m]	

(Portions of table not shown to remain unchanged.)

a through k *(No changes to text)*

l. In accordance with Table R301.2(4)B, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with “YES” and identify any specific requirements. Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

m. In accordance with Table R301.2(4)C, the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

Reason: Currently, the special wind regions in Table R301.2(4)B and the wind-borne debris regions in Table R301.2(4)C are shown on a single map for the entire continental United States. Attempting to interpret the map in areas where the contour lines occur can be difficult and may lead to mis-application of the tables especially since the contour lines do not follow county lines or readily identifiable borders. The identification of the transitions should be provided by the local *jurisdiction* to ensure that the proper coefficients are used.

Cost Impact: The proposed change will not impact the cost of construction.

R301.2(1)T-RB-MLAKAR

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because of potential conflicts if proposal RB39 does not pass at the Public Comment Hearings.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Matthew L. Mlakar, Barrish Pelham & Associates, representing Structural Engineers Association of California, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

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

GROUND SNOW LOAD	WIND DESIGN				SEISMIC DESIGN CATEGORY[f]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Wind-borne debris zone[m]	

(Portions of table and footnote not shown remain unchanged)

l. In accordance with ~~TableR301.2(4)B~~ FigureR301.2(4)A, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with "YES" and identify any specific requirements. Otherwise, the jurisdiction shall indicate "NO" in this part of the table.
m. In accordance with ~~TableR301.2(4)C~~ SectionR301.2.1.2.1, the jurisdiction shall indicate the wind- borne debris wind zone(s). Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

Commenter's Reason: The Committee's reasoning for disapproval during the hearing was that this code change proposal could cause potential conflicts if RB39 does not pass at the Public Comment Hearings. With the passage of the RB39 by the Committee and certain passage during the Public Comment Hearings, the inclusion of this proposal as amended by the Public Comment will provide clarity and needed direction to the user of the International Residential Code. The proposal requires the Authority Having Jurisdiction to include Special Wind Region Requirements and Wind-borne debris zone information into the Design Criteria table.

While these design requirements do not apply to most of the United States, when they are applicable they can have a major impact on the design and construction of the residential structure. With the passage of RB39 (and also in the current wind maps), the special wind regions in Figures R301.2(4)A and B are shown on a single map for the entire continental United States. Attempting to interpret the map in areas where the contour lines occur can be difficult and may lead to mis-application of the tables especially since the contour lines do not follow county lines or readily identifiable borders. The identification of the transitions should be provided by the local jurisdiction to ensure that the proper coefficients are used. It is important that these requirements be properly identified so as to be included in the construction requirements where applicable.

If there are uncertainties in the border location, then the Special Wind Requirements may be applied to locations where the requirements are not warranted. This can potentially drive up the cost of construction for sites adjacent to the Special Wind Regions.

RB38-13

Final Action: AS AM AMPC____ D

RB39-13

R202, R301.2.1, R301.2.1.1, R301.2.1.2, R301.2.1.2.1 (New), R301.2.1.3, R301.2.1.4, Table R301.2(2), Table R301.2(4)A, Table R301.2(4)B, Table R301.2(4)C, Table R301.2.1.2, Table R301.2.1.3, Table R301.2.1.5.1, Table R301.2(2), Table 301.7, Figure R301.2(4)A (New), Figure R301.2(4)B, Figure R301.2(4)C, Figure R301.2(7)

Proposed Change as Submitted

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

Revise definitions as follows:

SECTION R202
DEFINITIONS

HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes, defined as the U.S. Atlantic Ocean and Gulf of Mexico coasts where the, ultimate design wind speed, V_{ult}, ~~basic wind speed~~ is greater than 115 ~~90~~ miles per hour (51~~40~~ m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands, and America Samoa.

WIND-BORNE DEBRIS REGION. Areas within *hurricane-prone regions* located ~~as designated in accordance with Figure R302.1(4)C.~~ :

1. Within 1 mile (1.61 km) of the coastal mean high water line where the ultimate design wind speed, V_{ult} is 130 mph (58 m/s) or greater; or
2. In areas where the ultimate design wind speed, V_{ult} is 140 mph (63.6 m/s) or greater; or Hawaii.

Revise as follows:

R301.2.1 Wind design criteria. Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design ~~basic~~ wind speed in Table R301.2(1) as determined from Figure R301.2(4)A. The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. 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 not otherwise specified, the wind 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 R905.2.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section R802.11.1 from the roof assembly to the foundation.

R301.2.1.1 Wind limitations and wind design required. The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed from Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)~~.

Exceptions:

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R611.
2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R613.

In regions where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed shown on Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)~~, the design of buildings for wind loads shall be in accordance with one or more of the following methods:

1. AF&PA *Wood Frame Construction Manual* (WFCM); or
2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600); or
3. ASCE *Minimum Design Loads for Buildings and Other Structures* (ASCE 7); or
4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings* (AISI S230); or
5. *International Building Code*.

The elements of design not addressed by the methods in Items 1 through 5 shall be in accordance with the provisions of this code. When ASCE 7 or the *International Building Code* is used for the design of the building, the wind speed map and exposure category requirements as specified in ASCE 7 and the *International Building Code* shall be used.

~~TABLE R301.2(2)~~
~~COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)~~

~~FIGURE R301.2(4)A~~
~~BASIC WIND SPEEDS~~

~~FIGURE R301.2(4)B~~
~~REGIONS WHERE WIND DESIGN IS REQUIRED~~

~~FIGURE R301.2(4)C~~
~~WIND-BORNE DEBRIS REGIONS~~

R301.2.1.2 Protection of openings. Exterior glazing in buildings located in windborne debris regions shall be protected from windborne debris. Glazed opening protection for windborne debris shall meet the requirements of the Large Missile Test of ASTM E 1996 and ASTM E 1886 as modified in Section R301.2.1.2.1 ~~referenced therein~~. ~~The applicable wind zones for establishing missile types in ASTM E 1996 are shown on Figure R301.2(4)C.~~ Garage door glazed opening protection for windborne debris shall meet the requirements of an *approved* impact-resisting standard or ANSI/DASMA 115.

> **Exception:** Wood structural panels with a minimum thickness of 7/16 inch (11 mm) and a maximum span of 8 feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut and attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be predrilled as required for the anchorage method and shall be secured with the attachment hardware provided. Attachments shall be designed to resist the component and cladding loads determined in accordance with either Table R301.2(2) or ASCE 7, with the permanent corrosion-resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table R301.2.1.2 is permitted for buildings with a mean roof height of 45 ~~33~~ feet (10 058 mm) or less where the ultimate design wind speed, V_{ult} is 180 mph or less. ~~located in Wind Zones 1 and 2 in accordance with Figure R301.2(4)C~~.

TABLE R301.2.1.2
WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS[a,b,c,d]

a. This table is based on ~~130~~ 180 mph ultimate design wind speeds, V_{ult} and a 45 ~~33~~-foot mean roof height.

(Table and footnotes not shown to remain unchanged.)

R301.2.1.2.1. Application of ASTM E 1996. The text of Section 2.2 of ASTM E 1996 shall be substituted as follows:

> 2.2 *ASCE Standard:*

ASCE 7-10 American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures
The text of Section 6.2.2 of ASTM E 1996 shall be substituted as follows:

6.2.2 Unless otherwise specified, select the wind zone based on the strength design wind speed, V_{ult}, as follows:

6.2.2.1 *Wind Zone 1*—130 mph ≤ ultimate design wind speed, V_{ult} < 140 mph.

6.2.2.2 *Wind Zone 2*—140 mph ≤ ultimate design wind speed, V_{ult} < 150 mph at greater than one mile (1.6 km) from the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.3 *Wind Zone 3*—150 mph (58 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 160 mph (63 m/s), or 140 mph (54 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 160 mph (63 m/s) and within one mile (1.6 km) of the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.4 *Wind Zone 4*— ultimate design wind speed, V_{ult} >160 mph (63 m/s).

R301.2.1.3 Wind speed conversion. When referenced documents are based on nominal design ~~fastest mile~~ wind speeds, the ultimate design ~~three-second gust basic~~ wind speeds, V_{ult} ~~V_{3s}~~, of Figure R301.2(4)A shall be converted to nominal design ~~fastest mile~~ wind speeds, V_{asd} ~~V_{fm}~~, using Table R301.2.1.3.

~~**TABLE R301.2.1.3**~~
~~**EQUIVALENT BASIC WIND SPEEDS**~~

TABLE R301.2.1.3
WIND SPEED CONVERSIONS[a]

V_{ult}	110	115	120	130	140	150	160	170	180	190	200
V_{asd}	85	89	93	101	108	116	124	132	139	147	155

a. Linear interpolation is permitted

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. For a site where multiple detached one- and two-family dwellings, townhouses or other structures are 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.~~

1~~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.

2~~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 and grasslands.

3~~4~~. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water for a distance of at least 5000 feet (1,524 m) ~~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 600 feet (183 m) ~~1500 feet (457 m)~~ or 20 ~~10~~ times the height of the building or structure, whichever is greater. This category includes smooth mud flats, salt flats and unbroken ice.

~~TABLE R301.2.1.5.1~~
~~BASIC WIND MODIFICATION FOR TOPOGRAPHIC WIND EFFECT~~

TABLE R301.2.1.5.1
BASIC WIND MODIFICATION FOR TOPOGRAPHIC WIND EFFECT[a]

BASIC WIND SPEED FROM FIGURE R301.2(4)	AVERAGE SLOPE OF THE TOP HALF OF HILL, RIDGE OR ESCARPMENT (percent)						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25
	Required Basic Wind Speed, Modified for Topographic Wind Speed-Up (rounded)						
110	132	137	142	147	152	158	162
115	138	143	148	154	159	165	169
120	144	149	155	160	166	172	176
130	156	162	168	174	179	N/A	N/A
140	168	174	181	N/A	N/A	N/A	N/A
150	180	N/A	N/A	N/A	N/A	N/A	N/A

a. Table applies to a feature height of 500 feet or less and dwellings sited a distance equal or greater than half the feature height.

TABLE R301.2(2)
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (ASD)(psf)[a, b, c, d, e]

	ZONE	EFFECTIVE WIND AREA (feet2)	ULTIMATE DESIGN WIND SPEED, V_{ULT} (mph)																	
			110		115		120		130		140		150		160		170		180	
Roof 0 to 7 degrees	1	10	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-35.0
	1	20	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.2	-	10.6	-	11.9	-	13.3	34.1
	1	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	8.5	-	10.0	-	10.8	-	12.2	-32.9
	1	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	7.8	-	10.0	-	10.0	-	11.3	-32.0
	2	10	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-58.7
	2	20	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.2	-	10.6	-	11.9	-	13.3	-52.4
	2	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	8.5	-	10.0	-	10.8	-	12.2	-44.1
	2	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	7.8	-	10.0	-	10.0	-	11.3	-37.9
	3	10	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-88.3
	3	20	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.2	-	10.6	-	11.9	-	13.3	-73.1
	3	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	8.5	-	10.0	-	10.8	-	12.2	-53.1
	3	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	7.8	-	10.0	-	10.0	-	11.3	-37.9

	ZONE	EFFECTIVE WIND AREA (feet2)	ULTIMATE DESIGN WIND SPEED, V_{ULT} (mph)																	
			110		115		120		130		140		150		160		170		180	
Roof > 7 to 27 degrees	1	10	10.0	-	10.0	-	10.0	-	10.5	-	12.2	-	14.0	-	15.9	-	17.9	-	20.2	-32.0
	1	20	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.8	-	14.5	-	16.4	-	18.4	-31.1
	1	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.7	-	14.3	-	16.0	-29.9
	1	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-29.0
	2	10	10.0	-	10.0	-	10.0	-	10.5	-	12.2	-	14.0	-	15.9	-	17.9	-	20.2	-55.8
	2	20	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.8	-	14.5	-	16.4	-	18.4	-51.2
	2	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.7	-	14.3	-	16.0	-45.4
	2	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-40.9
	3	10	10.0	-	10.0	-	10.0	-	10.5	-	12.2	-	14.0	-	15.9	-	17.9	-	20.2	-82.4
	3	20	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.8	-	14.5	-	16.4	-	18.4	-77.0
	3	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.7	-	14.3	-	16.0	-69.9
	3	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-64.6
Roof > 27 to 45 degrees	1	10	11.9	-	13.1	-	14.2	-	16.7	-	19.4	-	22.2	-	25.3	-	28.5	-	32.0	-35.0
	1	20	11.6	-	12.7	-	13.8	-	16.2	-	18.8	-	21.6	-	24.6	-	27.7	-	31.1	-33.2
	1	50	11.2	-	12.2	-	13.3	-	15.6	-	18.1	-	20.8	-	23.6	-	26.7	-	29.9	-30.8
	1	100	10.9	-	11.9	-	12.9	-	15.1	-	17.6	-	20.2	-	22.9	-	25.9	-	29.0	-29.0
	2	10	11.9	-	13.1	-	14.2	-	16.7	-	19.4	-	22.2	-	25.3	-	28.5	-	32.0	-40.9
	2	20	11.6	-	12.7	-	13.8	-	16.2	-	18.8	-	21.6	-	24.6	-	27.7	-	31.1	-39.1
	2	50	11.2	-	12.2	-	13.3	-	15.6	-	18.1	-	20.8	-	23.6	-	26.7	-	29.9	-36.8
	2	100	10.9	-	11.9	-	12.9	-	15.1	-	17.6	-	20.2	-	22.9	-	25.9	-	29.0	-35.0
	3	10	11.9	-	13.1	-	14.2	-	16.7	-	19.4	-	22.2	-	25.3	-	28.5	-	32.0	-40.9
	3	20	11.6	-	12.7	-	13.8	-	16.2	-	18.8	-	21.6	-	24.6	-	27.7	-	31.1	-39.1
	3	50	11.2	-	12.2	-	13.3	-	15.6	-	18.1	-	20.8	-	23.6	-	26.7	-	29.9	-36.8
	3	100	10.9	-	11.9	-	12.9	-	15.1	-	17.6	-	20.2	-	22.9	-	25.9	-	29.0	-35.0
Wall	4	10	13.1	-	14.3	-	15.5	-	18.2	-	21.2	-	24.3	-	27.7	-	31.2	-	35.0	-37.9
	4	20	12.5	-	13.6	-	14.8	-	17.4	-	20.2	-	23.2	-	26.4	-	29.7	-	33.4	-36.4
	4	50	11.7	-	12.8	-	13.9	-	16.3	-	19.0	-	21.7	-	24.7	-	27.9	-	31.3	-34.3
	4	100	11.1	-	12.1	-	13.2	-	15.5	-	18.0	-	20.6	-	23.5	-	26.5	-	29.8	-32.7
	4	500	10.0	-	10.6	-	11.6	-	13.6	-	15.8	-	18.1	-	20.6	-	23.2	-	26.1	-29.0
	5	10	13.1	-	14.3	-	15.5	-	18.2	-	21.2	-	24.3	-	27.7	-	31.2	-	35.0	-46.8
	5	20	12.5	-	13.6	-	14.8	-	17.4	-	20.2	-	23.2	-	26.4	-	29.7	-	33.4	-43.7
	5	50	11.7	-	12.8	-	13.9	-	16.3	-	19.0	-	21.7	-	24.7	-	27.9	-	31.3	-39.5
	5	100	11.1	-	12.1	-	13.2	-	15.5	-	18.0	-	20.6	-	23.5	-	26.5	-	29.8	-36.4
	5	500	10.0	-	10.6	-	11.6	-	13.6	-	15.8	-	18.1	-	20.6	-	23.2	-	26.1	-29.0

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

Notes:

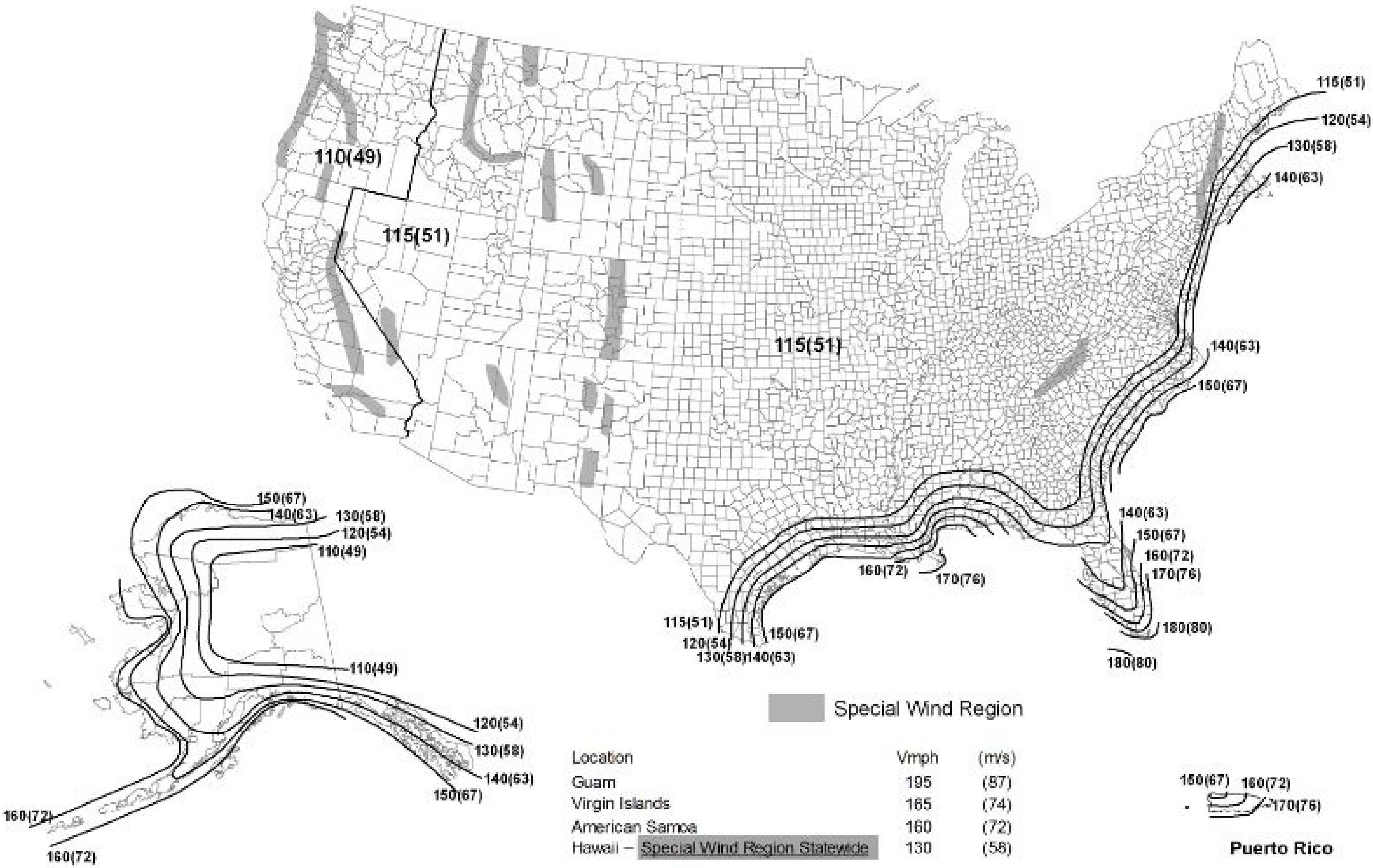
a. The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not be less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.

b. For effective areas between those given above, the load may be interpolated; otherwise, use the load associated with the lower effective area.

c. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).

d. See Figure R301.2(7) for location of zones.

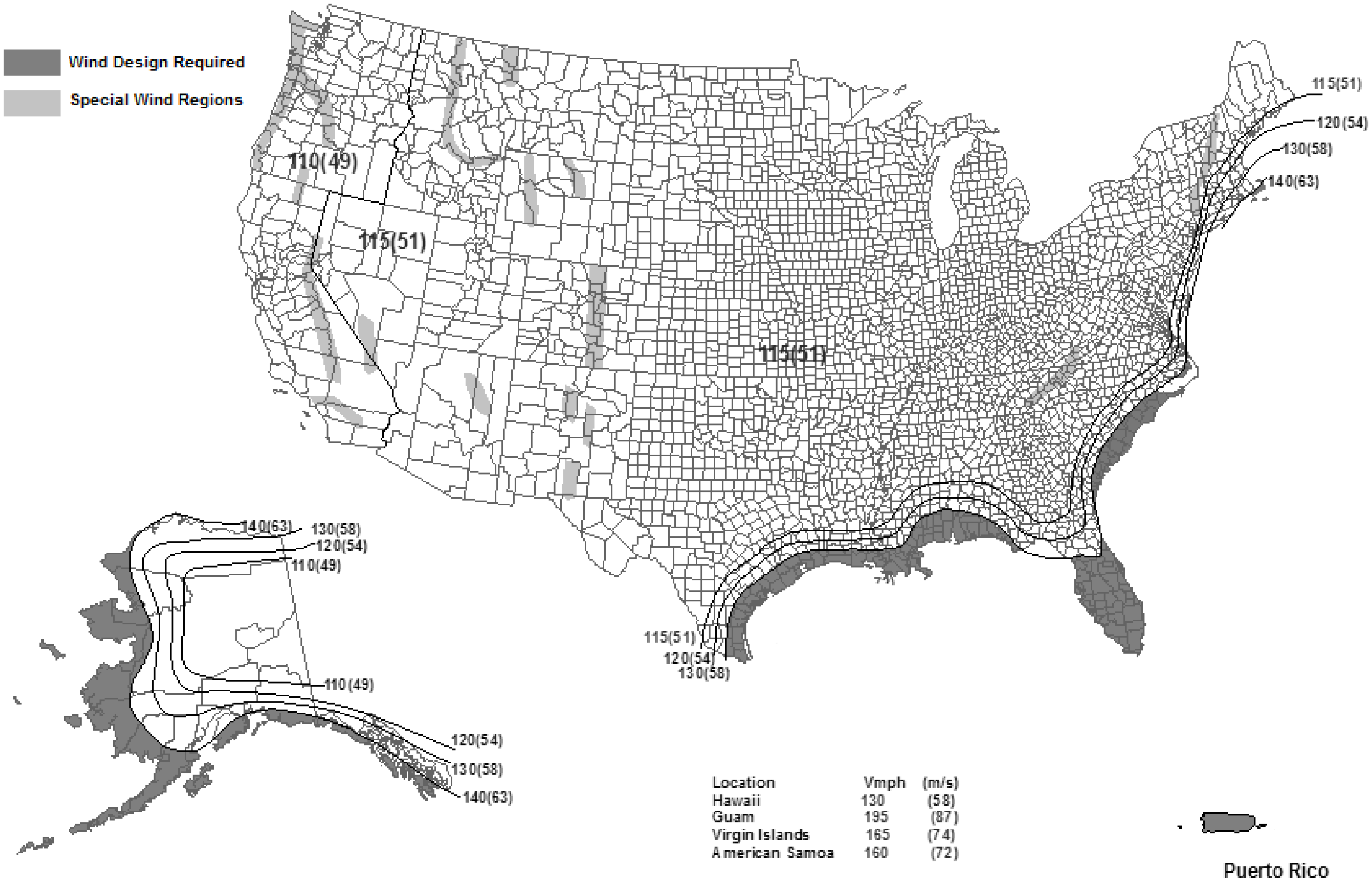
e. Plus and minus signs signify pressures acting toward and away from the building surfaces.



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

FIGURE R301.2(4)A
ULTIMATE DESIGN WIND SPEEDS



Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years.

FIGURE R301.2(4)B
REGIONS WHERE WIND DESIGN IS REQUIRED

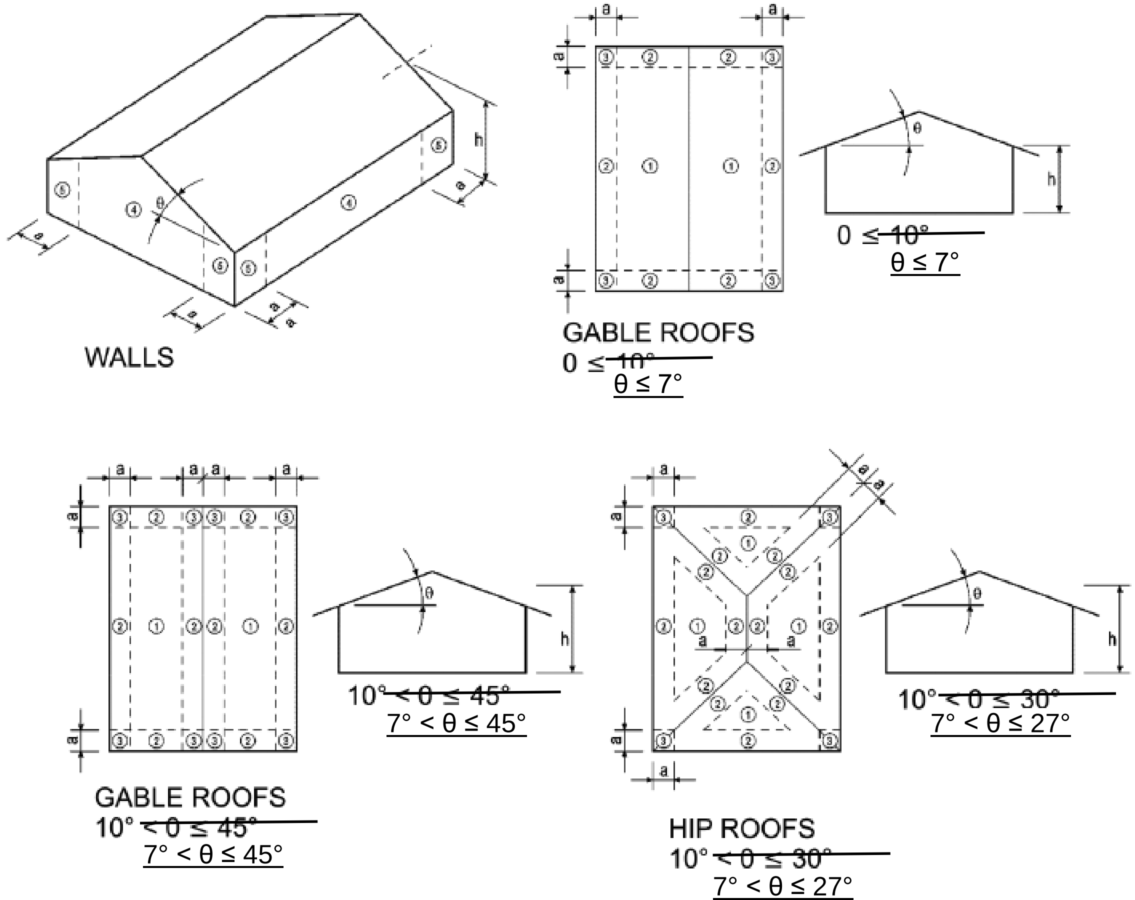


FIGURE R301.2(7)
COMPONENT AND CLADDING PRESSURE ZONES

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[a, b, c, d, e]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Exterior walls[a] ~~— wind loads[a]~~ with plaster or stucco finish	H/360
Exterior walls[a] with other brittle finishes	H/240
Exterior walls[a] with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: L = span length, H = span height.

a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding (ASD) loads obtained from Table R301.2(2) for the purpose of determining deflection limits herein.

(Footnotes not shown to remain unchanged.)

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle changes, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates the Chapter 3 design criteria, including definitions, a new ultimate wind speed map, a new map of the regions where special high-wind design is required, a conversion table to the nominal (ASD) wind speed basis for use with those standards which have not updated their provisions, and a revised table of component and cladding pressures.

It is noted the component and cladding pressure table is set up using the ultimate design wind speed, but reports pressures at an ASD level. That is, the listed pressures incorporate the 0.6 multiplier on wind loads per the allowable stress design load combinations shown in Section 1605.3 of the *International Building Code* and Section 2.3.2 of ASCE 7-10. This is done here and throughout this series of proposals to allow for easy adaptation of existing stock designs, construction documents and guidelines to the 2015 IRC, as the loads and pressures will be comparable to previous editions of the IRC for most sites.

The region in revised Figure R301.2(4)B where the use of alternate prescriptive high-wind standards or engineered design is required is defined using the 130mph contour along the Gulf Coast and along the southern portions of the Atlantic coast from Florida up to North Carolina. The 140mph contour is used for the northern portions of the Atlantic coast from Virginia up to Maine, and for Alaska. A 130mph trigger is also used for the assorted Caribbean and Pacific islands that are also considered part of the "hurricane-prone" region. This creates a region that approximately equals the region defined by the 110mph contour under the wind map used in the 2000 through 2009 IRC, maintains areas of Florida and the Gulf Coast traditionally outside of the prescriptive limits of the IRC, and maintains areas of New England traditionally included within the prescriptive limits of the IRC.

Code users desiring a more accurate determination in areas near or along a particular contour (or in general) can make use of the Applied Technology Council's Windspeed by Location web site (http://www.atcouncil.org/windspeed/) to obtain site-specific wind speeds using latitude/longitude or site address. This site was developed by ATC using the same data used to develop the wind maps for ASCE 7, the IBC and the IRC. As the site is not a reference standard or maintained by a government agency, we could not make a direct reference in the code figures. However, we include mention of the Windspeed by Location web site here to draw code users' attention to its existence and in hopes that mention of the web site could become part of the IRC Commentary.

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

R301.2.1-RB-EHRLICH

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Committee Action: Approved as Submitted

Committee Reason: The committee approved this proposed code change because they felt that it creates consistency between the International Codes and ASCE 7.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Gary J Ehrlich, P.E., representing National Association of Home Builders (NAHB); Joseph D. Belcher, JDB Code Services Inc., representing the International Hurricane Protection Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.2.1 Application of ASTM E 1996. The text of Section 2.2 of ASTM E 1996 shall be substituted as follows:

2.2 *ASCE Standard:*
ASCE 7-10 American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures

The text of Section 6.2.2 of ASTM E 1996 shall be substituted as follows:

6.2.2 Unless otherwise specified, select the wind zone based on the ultimate ~~strength~~ design wind speed, V_{ult}, as follows:

6.2.2.1 *Wind Zone 1*—130 mph ≤ ultimate design wind speed, V_{ult} < 140 mph.

6.2.2.2 *Wind Zone 2*—140 mph ≤ ultimate design wind speed, V_{ult} < 150 mph at greater than one mile (1.6 km) from the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.3 *Wind Zone 3*—150 mph (58 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 170 ~~160~~ mph (76~~63~~ m/s), or 140 mph (54 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 170 ~~160~~ mph (76~~63~~ m/s) and within one mile (1.6 km) of the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.4 *Wind Zone 4*— ultimate design wind speed, V_{ult} > 170 ~~160~~ mph (63 m/s).

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this public comment is to amend the definition for Wind Zone 4 in ASTM E1996. The original intent of Wind Zone 4 was to address higher requirements for impact-resistant glazing and impact-resistive systems in Miami-Dade County only. When similar language was added to the IBC last cycle to amend ASTM E1996 to work with ultimate design wind speeds, a direct conversion of the previous trigger was made. It was not realized until Florida was in the process of adopting the 2012 IBC that this had the effect of extending Wind Zone 4 north into Broward, Palm Beach, Martin and St. Lucie counties where it had not previously applied and was not intended to apply. The result is a potential increase of $2424 to $4248 for wind-borne debris protection of residential buildings in those counties.

The Florida Building Code was amended to correct the inadvertent extension of Wind Zone 4. The IHPA attempted a floor modification at the Committee Action Hearing which NAHB was prepared to support, but was ruled out of order by the moderator. This public comment advances the proposed modification and fixes the unintended consequences of the original ASTM E1996 amendment.

One editorial change is also made to correct "strength design wind speed" to "ultimate design wind speed" to correlate with the remainder of the IRC wind update proposals.

Public Comment 2:

Gary J Ehrlich, P.E., representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the 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 arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, townhouses or other structures are 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 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.
2. 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 and grasslands.
3. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water, smooth mud flats, salt flats or unbroken ice for a distance of at least 5000 feet (1,524 m). This exposure shall also apply ~~only~~ to any ~~those~~ building~~s~~ located within Exposure B or C type terrain where the site is within ~~and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of~~ 600 feet (183 m) or 20 times the height of the building ~~or structure~~, whichever is greater from an Exposure D condition. ~~This category includes smooth mud flats, salt flats and unbroken ice~~.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this public comment is to better correlate the definition of Exposure D with ASCE 7-10. The language proposed here is similar in concept to language proposed by SEAOC in RB45, but with better clarity. NAHB had worked with SEAOC to develop this language as a floor modification to RB39, but the modification was ruled out of order. A correlating public comment has been submitted for disapproval of RB45 if this public comment is approved.

Public Comment 3:

Gary J Ehrlich, P.E., representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R301.2.1.5.1
~~BASIC~~ ULTIMATE DESIGN WIND SPEED MODIFICATION FOR TOPOGRAPHIC WIND EFFECT[a]

~~BASIC~~ ULTIMATE DESIGN WIND SPEED FROM FIGURE R301.2(4)	AVERAGE SLOPE OF THE TOP HALF OF HILL, RIDGE OR ESCARPMENT (percent)						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25
	Required Ultimate Design ~~Basic~~ Wind Speed, Modified for Topographic Wind Speed-Up (rounded)						
110	132	137	142	147	152	158	162
115	138	143	148	154	159	165	169
120	144	149	155	160	166	172	176
130	156	162	168	174	179	N/A	N/A
140	168	174	181	N/A	N/A	N/A	N/A
150	180	N/A	N/A	N/A	N/A	N/A	N/A

a. Table applies to a feature height of 500 feet or less and dwellings sited a distance equal or greater than half the feature height.
b. Where the ultimate design wind speed as modified by Table R301.2.1.5.1 equals or exceeds 140mph, the building shall be considered as "wind design required" in accordance with Section R301.2.1.1

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[a, b, c, d, e]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Exterior walls - wind loads[a] with plaster or stucco finish	H/360
Exterior walls - wind loads[a] with other brittle finishes	H/240
Exterior walls - wind loads[a] with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: L = span length, H = span height.
a The wind load shall be permitted to be taken as 0.7 times the Component and Cladding (ASD) loads obtained from Table R301.2(2) for the purpose of determining deflection limits herein.
b. (No changes)
c. (No changes)
d. (No changes)
e. (No changes)

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this public comment is to insure the comprehensive Chapter 3 wind update is internally consistent with terminology and to correlate RB39 with other proposals.

In developing RB39, the wind speeds in Table R301.2.1.5.1, which provides simplified adjustments to wind speed for topographic effects, were updated to the new ultimate design wind speed basis. However, the term "basic wind speed" in the table was not changed to "ultimate design wind speed" as is done throughout the rest of the wind update (and in the 2012 IBC). This public comment picks up the change in terminology. A new footnote is also provided to clarify when the topographic wind effects make the site a "wind design required" region where use of the alternate standards (ICC-600, WFCM, AISI 230, etc.) are required.

The change to table R301.7 correlates RB39 with RB62, both of which were approved by the IRC Building Committee. As it stands, the committee actions would result in "wind loads" being deleted from the first exterior wall condition (plaster or stucco finish) but added to the other two conditions (brittle finishes and flexible finishes). This change will correlate the two proposals by insuring the "wind loads" language appears for all three conditions

Public Comment 4:

Bonnie Manley, American Iron and Steel Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.3 Wind speed conversion. When referenced documents are based on nominal design wind speeds and do not provide the means for conversion between the ultimate design wind speeds and the nominal design wind speeds, the ultimate design wind speeds, V_{ult}, of Figure R301.2(4)A shall be converted to nominal design wind speeds, V_{asd} using Table R301.2.1.3.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this comment is to ensure that the conversion table, Table R301.2.1.3, does not override Table A1-3 of AISI S230-07 w/S3-12, as follows:

Table A1-3
Conversion of ASCE 7 Basic Wind Speeds to AISI S230 Basic Wind Speeds (mph) [1]

ASCE 7 Basic Wind Speed	110	115	126	139	152	164	177	190
AISI S230 Basic Wind Speed	85	90	100	110	120	130	140	150

[1] ASCE 7 permits linear interpolation between the contours of the basic wind speed maps.

This table is based upon ASCE 7-10 Table C26.5-6 and provides a direct conversion between the wind speeds, where V_{ult} is effectively listed as the row titled "ASCE 7 Basic Wind Speed" and V_{asd} is effectively listed as the row titled "AISI S230 Basic Wind Speed." This differs slightly from the conversion incorporated into Proposal RB39. However, for the purposes of cold-formed steel framing, it is important that the conversion process remains consistent between the IRC and AISI S230. Therefore, it is necessary to introduce a qualifier to the charging language in section R301.2.1.3 that recognizes that reference documents may include conversion tables of their own.

Public Comment 5:

Bonnie Manley, American Iron and Steel Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.1 Wind limitations and wind design required. The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B.

Exceptions:

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R611.
2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R613.
3. For cold-formed steel light frame construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R505, R603 and R804.

In regions where wind design is required in accordance with Figure R301.2(4)B, the design of buildings for wind loads shall be in accordance with one or more of the following methods:

1. AF&PA *Wood Frame Construction Manual (WFCM)*; or
2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600); or
3. ASCE *Minimum Design Loads for Buildings and Other Structures* (ASCE 7); or
4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings* (AISI S230); or
5. *International Building Code*.

The elements of design not addressed by the methods in Items 1 through 5 shall be in accordance with the provisions of this code. When ASCE 7 or the International Building Code is used for the design of the building, the wind speed map and exposure category requirements as specified in ASCE 7 and the *International Building Code* shall be used.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this comment is to ensure that the IRC wind design applicability limits for cold-formed steel light frame construction remain consistent with AISI S230-07 w/S3-12. AISI developed AISI S230-07 w/S3-12 to allow the 2007 edition of AISI S230 to be used in conjunction with the 2010 edition of ASCE 7. AISI S230-07 w/S3-13 incorporates the following conversion table:

Table A1-3
Conversion of ASCE 7 Basic Wind Speeds to AISI S230 Basic Wind Speeds (mph) [1]

ASCE 7 Basic Wind Speed	110	115	126	139	152	164	177	190
AISI S230 Basic Wind Speed	85	90	100	110	120	130	140	150

[1] ASCE 7 permits linear interpolation between the contours of the basic wind speed maps.

This table is based upon ASCE 7-10 Table C26.5-6 and provides a direct conversion between the wind speeds, which differs slightly from the conversion incorporated into Proposal RB39. Specifically, AISI has chosen to convert the ASCE 7-05 design wind speed ("AISI S230 Basic Wind Speed" in Table A1-3) of 110 mph to 139 mph instead of 140 mph. Since this particular wind speed is often a trigger for additional requirements, it is important that it remains consistent throughout the IRC – in Sections R301, R505, R603 and R804 – and AISI S230. Therefore, it is necessary to introduce an exception to Section R301.2.1.1 for cold-formed steel light frame construction similar to the ones in place for concrete and structural insulated panels.

RB39-13

Final Action: AS AM AMPC____ D

RB40-13

R301.2.1.1.1 (New), Chapter 44

Proposed Change as Submitted

Proponent: Julie Ruth, P.E., JRuth Code Consulting, representing the American Architectural Manufacturers Association (julruth@aol.com); Daniel J. Walker, P.E., Thomas Associates, representing the National Sunroom Association

Add new text as follows:

R301.2.1.1.1 Sunrooms. Sunrooms shall comply with the wind loads, structural requirements and testing provisions of Section 5.2.1 of AAMA/NPEA/NSA 2100, with the following modifications:

1. Basic wind speed in miles per hour (mph) shall be determined in accordance with Section R301.2.1 of this code; and
2. Sunrooms including exposed structure, components, cladding, and roof covering shall be designed to resist the wind loads as established in Section R301.2.1 of this code.

For the purpose of applying the criteria of AAMA/NPEA/NSA-2100 based on the intended use, sunrooms shall be identified as one of the following categories by the permit applicant, design professional or the property owner in the *construction documents*. Component and Cladding pressures shall be used for the design of elements that do not qualify as main wind force resisting systems. Main wind force resisting systems pressures shall be used for the design of elements assigned to provide support and stability for the overall *sunroom*.

Category I: A *Thermally Isolated Sunroom* with walls that are open or enclosed with insect screening or 0.5 mm (20 mil) maximum thickness plastic film. The space is nonhabitable and unconditioned.

Category II: A *Thermally Isolated Sunroom* with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The space is nonhabitable and unconditioned.

Category III: A *Thermally Isolated Sunroom* with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The sunroom fenestration complies with additional requirements for air infiltration resistance and water-penetration resistance. The space is nonhabitable and unconditioned.

Category IV: A *Thermally Isolated Sunroom* with enclosed walls. The sunroom is designed to be heated or cooled by a separate temperature control or system and is thermally isolated from the primary structure. The sunroom fenestration complies with additional requirements for water penetration resistance, air infiltration resistance, and thermal performance. The space is nonhabitable and *conditioned*.

Category V: A *Sunroom* with enclosed walls. The sunroom is designed to be heated or cooled and is open to the main structure. The sunroom fenestration complies with additional requirements for water-penetration resistance, air infiltration resistance, and thermal performance. The space is *habitable* and *conditioned*.

Add standards to Chapter 44 as follows:

AAMA American Architectural Manufacturers Association
1827 Walden Office Square, Suite 550
Schaumburg, IL 60173

AAMA/NSA/NPEA 2100-12   Specifications for Sunrooms

NSA   National Sunroom Association
1300 Sumner Ave.
Cleveland, OH 44115-2851

AAMA/NSA/NPEA 2100-12   Specifications for Sunrooms

NPEA   National Sunroom Association
1300 Sumner Ave.
Cleveland, OH 44115-2851

AAMA/NSA/NPEA 2100-12   Specifications for Sunrooms

Reason: The 2012 *International Residential Code* defines a sunroom as "A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's *exterior walls* and roof." These structures are typically constructed in one of two manners: 1) using typical wood framing techniques, or 2) using a stick system that consists of prefabricated framing of aluminum, fiberglass, wood or other materials, with glass or opaque wall or roof panels, and steel or aluminum connections.

The first technique can be done in accordance with the current provisions of the IRC for wood framed construction. There are no provisions in the IRC for the second method of constructing a sunroom other than by engineering analysis or demonstrating equivalence to the current provisions of the *International Residential Code* by some other means.

This proposal seeks to clarify the requirements for sunrooms under the IRC by adding reference to the provisions of AAMA/NPEA/NSA 2100 - 12 *Specifications for Sunrooms* to the available options for approval of sunroom construction in the IRC. Sunrooms designed and constructed in accordance with AAMA/NPEA/NSA 2100 are required within the standard to meet the structural provisions of the IRC or the IBC. Therefore, the appropriate engineering analysis has already been conducted for these structures. In addition, the standard establishes the specific requirements for these unique structures based upon their designated Category.

In 2002 the American Architectural Manufacturers Association (AAMA), the National Sunroom Association (NSA) and the National Patio Enclosure Association (NPEA) published the first U.S. standard for the design and specification of sunrooms – AAMA/NPEA/NSA 2100 – 02. The standard established five categories of sunrooms based upon the intended use of the space, and established specific design and performance criteria for them based on the end use.

As the document began to be used and referenced in various local codes (such as the Florida Building Code) the members of the AAMA Sunroom Council and NSA became aware that improvements and updates were needed. These improvements included revisions that would bring the document in line with the requirements of AAMA/WDMA/CSA 101/I.S.2/A440 for the design, testing and labeling of windows, glass doors and skylights, and revisions that would bring the foundation requirements more closely in line with the requirements of the *International Residential Code*. The most recent edition of the standard is AAMA/NPEA/NSA 2100-12. The table below provides an overview of the requirements of AAMA/NPEA/NSA 2100-12, as they apply to the various categories of sunrooms.

Minimum Requirements	**Cat. I**	**Cat. II**	**Cat. III**	**Cat. IV**	**Cat. V**
Structural Design in accordance with IRC or IBC.	x	x	x	x	x
Fenestration products comply with AAMA/WDMA/CSA 101/I.S.2/A440 (includes resistance to air leakage, water penetration, forced entry, etc. as well as structural design pressure rating).		x	x	x	x
Comply with IECC or IRC Chapter 11.				x	x
Comply with the Foundation/footings, site location, and emergency escape and rescue openings requirements of the IRC or local code.	x	x	x	x	x
Emergency escape and rescue openings are permitted to open onto sunroom.	x				
Comply with the natural lighting requirements of the IRC or local code.	x	x	x	x	x
Openings for natural lighting are permitted to open onto sunroom.	x				
Comply with the requirements of the IRC or local code for stairway and egress illumination.	x	x	x	x	x
Required to have exit lighting.		x	x	x	x
Receptacle outlets as required by NFPA 70, Article 314.				x	x

The 2002 edition of AAMA/NPEA/NSA 2100 has been used successfully in previous editions of the Florida Building Code. Reference to the 2012 edition in the 2015 IRC to facilitate its use on a nationwide basis is appropriate at this time.

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

Analysis: A review of the standard proposed for inclusion in the code, [AAMA/NSA/NPEA 2100-12] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R301.2.1.1.1 (NEW)-RB-RUTH-WALKER

Committee Action Hearing Results

For staff analysis of the content of AAMA/NSA/NPEA 2100 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because there was no provision in the proposal for non-prefabricated sun rooms.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.1.1 Sunrooms. Sunrooms shall comply with ~~the wind loads, structural requirements and testing provisions of Section 5.2.1 of~~ AAMA/NPEA/NSA 2100. ~~with the following modifications:~~

1. ~~Basic wind speed in miles per hour (mph) shall be determined in accordance with Section R301.2.1 of this code; and~~
2. ~~Sunrooms including exposed structure, components, cladding, and roof covering shall be designed to resist the wind loads as established in Section R301.2.1 of this code.~~

(Portions of code change not shown remain unchanged).

Commenter's Reason: The committee disapproved the proposed reference at the Code Development Hearings in Dallas, at least in part, due to confusion regarding the scope of the document. Concern was expressed that it only applies to prefabricated sunrooms. The standard, however, is not limited to prefabricated sunrooms and the opponents who spoke against it have not identified a single reference in the standard that would limit its application. Questions regarding matters such as egress, natural lighting and ventilation, resistance to air leakage and water penetration, etc. are pertinent to both site built and prefabricated sunrooms. Addressing them does not limit the application of the standard in any way.

The design wind load requirements of the IRC were converted from allowable stress design to strength design through the approval of RB39-13 and related proposals.

The original proposal provided specific cross references to determine the appropriate design wind pressures for the sunroom. There is now confusion with regards to these cross references, due to the changes in wind speed model on Section R301.

This Public Comment removes the potential cause for concern, and simply references AAMA/NPEA/NSA 2100 for sunrooms. This is consistent with language that has been included in the Florida Building Code – Residential since the 2004 edition.

AAMA/NPEA/NSA 2100, and the 5 categories of sunrooms it established, clarifies the criteria for these types of spaces with regards to egress, natural ventilation, resistance of the exterior envelop to air leakage and water penetration, etc.

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RB43-13

Tables R301.2.1.2, R602.3(2), R602.3.1, R602.3(3), R602.10.1.3, R602.10.3(1), R602.10.4, R602.10.5, R602.10.6.1, R603.3.1, R603.3.2(2), R603.3.2.1(1) through (4), R603.8, R611.6(1) through (4) and R613.5(1); and Sections R505.1.1, R602.10.6.5.1, R602.10.8.2, R603.1.1, R603.9.4.1, R611.2, R613.2, R802.10.2.1, R804.1.1, R804.3.2.1, R804.3.3 and R905.3.7

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

TABLE R301.2.1.2
WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE
FOR WOOD STRUCTURAL PANELS

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.448 N,
1 mile per hour = 0.447 m/s.

a. This table is based on a 130mph basic wind speed~~s~~ and a 33-foot mean roof height.

b through d *(No change to current text)*

Revise as follows:

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span, and less than or equal to three stories above *grade* plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa).

Revise as follows:

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS[b, c, d] ~~EXPOSED TO WIND SPEEDS OF 100 mph OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D0, D1 and D2~~

(Portions of table not shown remain unchanged)

a. Design required.

b. Table is limited to buildings located where the basic wind speed is 100mph or less and for which the seismic design category is A, B, C, D0, D1, or D2

c~~b~~. Applicability of this table assumes the following: Snow load not exceeding 25 psf, *fb* not less than 1310 psi determined by multiplying the AF&PA NDS tabular base design value by the repetitive use factor, and by the size factor for all species except southern pine, E not less than 1.6 × 106 psi, tributary dimensions for floors and roofs not exceeding 6 feet, maximum span for floors and roof not exceeding 12 feet, eaves not over 2 feet in dimension and exterior sheathing. Where the conditions are not within these parameters, design is required.

d~~c~~. Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

TABLE R602.3(2)
ALTERNATE ATTACHMENTS TO TABLE R602.3(1)

(Portions of table not shown remain unchanged)

a through f *(No change to current text)*

g. Specified alternate attachments for roof sheathing shall be permitted for basic wind speeds less than 100 mph. Fasteners attaching wood structural panel roof sheathing to gable end wall framing shall be installed using the spacing listed for panel edges.

TABLE R602.3(3)
REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES [a, b, c]

MINIMUM NAIL		MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING		MAXIMUM BASIC WIND SPEED (mph)		
Size	Penetration (inches)				Edges (inches o.c.)	Field (inches o.c.)	Wind exposure category		
							B	C	D

(Portions of table not shown remain unchanged)

TABLE R602.10.1.3
BRACED WALL LINE SPACING

APPLICATION	CONDITION	BUILDING TYPE	BRACED WALL LINE SPACING CRITERIA	
			Maximum Spacing	Exception to Maximum Spacing
Wind bracing	Basic wind speed 85mph to 110 mph	Detached, Townhouse	60 feet	None

(Portions of table not shown remain unchanged)

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.

a through b *(No change to current text)*

c. Method CS-SFB does not apply where the basic wind speed is greater than 100 mph.

TABLE R602.10.4
BRACING METHODS

(Portions of table not shown remain unchanged)

a through c *(No change to current text)*

d. Method CS-SFB does not apply in Seismic Design Categories D0, D1 and D2 and in areas where the basic wind speed exceeds 100 mph.

e. *(No change to current text)*

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		MINIMUM LENGTH [a] (in)					CONTRIBUTING LENGTH (in)
		Wall Height					
		8 feet	9 feet	10 feet	11 feet	12 feet	
ABW	SDC A, B and C basic wind speed < 110 mph	28	32	34	38	42	48
	SDC D_o, D_1 and D_2, basic wind speed < 110 mph	32	32	34	NP	NP	

(Portions of table not shown remain unchanged.)

TABLE R602.10.6.1
MINIMUM HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS

SEISMIC DESIGN CATEGORY AND WIND SPEED	SUPPORTING/STORY	HOLD DOWN FORCE (lb)				
		Height of Braced Wall Panel				
		8 ft	9 ft	10 ft	11 ft	12 ft
SDC A, B and C Basic w~~W~~ind speed < 110 mph	One story	1800	1800	1800	2000	2200
	First of two story	3000	3000	3000	3300	3600
SDC D_0, D_1 and D_2 Basic w~~W~~ind speed < 110 mph	One story	1800	1800	1800	NP [a]	NP [a]
	First of two story	3000	3000	3000	NP [a]	NP [a]

(Portions of table not shown remain unchanged.)

R602.10.6.5.1 Length of bracing. The length of bracing along each braced wall line shall be the greater of that required by the basic ~~design~~ wind speed and braced wall line spacing in accordance with Table R602.10.3(1) as adjusted by the factors in the Table R602.10.3(2) or the Seismic Design Category and braced wall line length in accordance with Table R602.10.6.5. Angled walls shall be permitted to be counted in accordance with Section R602.10.1.4, and braced wall panel location shall be in accordance with Section R602.10.2.2. The seismic adjustment factors in Table R602.10.3(4) shall not be applied to the length of bracing determined using Table R602.10.6.5. In no case shall the minimum total length of bracing in a braced wall line, after all adjustments have been taken, be less than 48 inches (1219 mm) total.

R602.10.8.2 Connections to roof framing. Top plates of exterior braced wall panels shall be attached to rafters or roof trusses above in accordance with Table R602.3(1) and this section. Where required by this section, blocking between rafters or roof trusses shall be attached to top plates of braced wall panels and to rafters and roof trusses in accordance with Table R602.3(1). A continuous band, rim, or header joist or roof truss parallel to the braced wall panels shall be permitted to replace the blocking required by this section. Blocking shall not be required over openings in continuously-sheathed braced wall lines. In addition to the requirements of this section, lateral support shall be provided for rafters and ceiling joists in accordance with Section R802.8 and for trusses in accordance with Section R802.10.3. Roof ventilation shall be provided in accordance with Section R806.1.

1. For Seismic Design Categories A, B and C and basic wind speeds less than 100 mph (45 m/s) where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is 91/4 inches (235 mm) or less, blocking between rafters or roof trusses shall not be required. Where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is between 91/4 inches (235 mm) and 151/4 inches (387 mm), blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).
2. For Seismic Design Categories D0, D1 and D2 or basic wind speeds of 100 mph (45 m/s) or greater, where the distance from the top of the braced wall panel to the top of the rafters or roof trusses is 151/4 inches (387 mm) or less, blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).
3. Where the distance from the top of the *braced wall panel* to the top of rafters or roof trusses exceeds $15^1/_4$ inches (387 mm), the top plates of the *braced wall panel* shall be connected to perpendicular rafters or roof trusses above in accordance with one or more of the following methods:
   3.1. Soffit blocking panels constructed in accordance with Figure R602.10.8.2(2);
   3.2. Vertical blocking panels constructed in accordance with Figure R602.10.8.2(3);
   3.3. Full-height engineered blocking panels designed in accordance with the AF&PA WFCM; or
   3.4. Blocking, blocking panels, or other methods of lateral load transfer designed in accordance with accepted engineering practice.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane*. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa).

TABLE R603.3.1
WALL TO FOUNDATION OR FLOOR CONNECTION REQUIREMENTS [a,b]

FRAMING CONDITION	BASIC WIND SPEED (mph) AND EXPOSURE					
	85 B	90 B	100 B 85 C	110 B 90C	100 C	< 110 C

(Portions of table not shown remain unchanged.)

TABLE R603.3.2(2)
24-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY[a, b, c]
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)		
				8-foot Studs	9-foot Studs	10-foot Studs
Exp. B	Exp. C			Ground Snow Load (psf)		

(Portions of table not shown remain unchanged.)

TABLE R603.3.2(31)
40-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING[a, b, c]
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)		
				8-foot Studs	9-foot Studs	10-foot Studs
Exp. B	Exp. C			Ground Snow Load (psf)		

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(1)
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT[a, b, c]
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot Studs	9-foot Studs	10-foot Studs

(Portions of table not shown remain unchanged.)

(TABLE R603.3.2.1(2)
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT[a, b, c]
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot Studs	9-foot Studs	10-foot Studs

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(3)
ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT[a, b, c]
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)					
				Stud Height, *h* (feet)					
Exp. B	Exp. C			10 < *h* □ 12	12 < *h* □ 14	14 < *h* □ 16	16 < *h* □ 18	18 < *h* □ 20	20 < *h* □ 22

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(4)
ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT[a, b, c]
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)					
				Stud Height, *h* (feet)					
Exp. B	Exp. C			10 < *h* □ 12	12 < *h* □ 14	14 < *h* □ 16	16 < *h* □ 18	18 < *h* □ 20	20 < *h* □ 22

(Portions of table not shown remain unchanged.)

TABLE R603.8
HEAD AND SILL TRACK SPAN

(Portions of table not shown remain unchanged.)

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

a. Deflection limit: *L*/240.
b. Head and sill track spans are based on components and cladding wind pressures ~~speeds~~ and 48 inch tributary span.
c. For openings less than 4 feet in height that have both a head track and sill track, the above spans are permitted to be multiplied by 1.75. For openings less than or equal to 6 feet in height that have both a head track and a sill track, the above spans are permitted to be multiplied by a factor of 1.5.

R603.9.4.1 Wind speeds greater than 100 mph. Where the basic wind speed~~s are in excess of~~ exceeds 100 miles per hour (45 m/s) and~~,~~ Exposure C or D applies, walls shall be provided with ~~wind~~ direct uplift connections in accordance with AISI S230, Section E13.3, and AISI S230, Section F7.2, as required for 110 miles per hour (49 m/s), Exposure C.

R611.2 Applicability limits. The provisions of this section shall apply to the construction of exterior concrete walls for buildings not greater than 60 feet (18 288 mm) in plan dimensions, floors with clear spans not greater than 32 feet (9754 mm) and roofs with clear spans not greater than 40 feet (12 192 mm). Buildings shall not exceed 35 feet (10 668 mm) in mean roof height or two stories in height above-grade. Floor/ceiling dead loads shall not exceed 10 pounds per square foot (479 Pa), roof/ceiling dead loads shall not exceed 15 pounds per square foot (718 Pa) and *attic* live loads shall not exceed 20 pounds per square foot (958 Pa). Roof overhangs shall not exceed 2 feet (610 mm) of horizontal projection beyond the exterior wall and the dead load of the overhangs shall not exceed 8 pounds per square foot (383 Pa).

Walls constructed in accordance with the provisions of this section shall be limited to buildings ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 130 miles per hour (58 m/s) Exposure B, 110 miles per hour (49 m/s) Exposure C and 100 miles per hour (45 m/s) Exposure D. Walls constructed in accordance with the provisions of this section shall be limited to detached one- and two-family *dwellings* and townhouses assigned to Seismic Design Category A or B, and detached one- and two-family *dwellings* assigned to Seismic Design Category C.

TABLE R611.6(1)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT ABOVE-GRADE WALLS [a, b, c, d, e]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT—BAR SIZE AND SPACING (inches)[f, g]							
Exposure Category				Nominal[h] wall thickness (inches)							
				4		6		8		10	
B	C	D		Top[i]	Side[i]	Top[i]	Side[i]	Top[i]	Side[i]	Top[i]	Side[i]

(Portions of table not shown remain unchanged.)

TABLE R611.6(2)
MINIMUM VERTICAL REINFORCEMENT FOR WAFFLE-GRID ABOVE-GRADE WALLS[a, b, c, d, e]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)[f, g]			
Exposure Category				Nominal[h] wall thickness (inches)			
				6		8	
B	C	D		Top[i]	Side[i]	Top[i]	Side[i]

(Portions of table not shown remain unchanged.)

TABLE R611.6(3)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH SCREEN-GRID ABOVE-GRADE WALLS[a, b, c, d, e]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)[f, g]	
Exposure Category				Nominal[h] wall thickness (inches)	
				6	
B	C	D		Top[i]	Side[i]

(Portions of table not shown remain unchanged.)

TABLE R611.6(4)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT, WAFFLE- AND SCREEN-GRID ABOVE-GRADE WALLS DESIGNED CONTINUOUS WITH FOUNDATION STEM WALLS[a, b, c, d, e, k, l]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			HEIGHT OF STEM WALL[h, i] (feet)	MAXIMUM DESIGN LATERAL SOIL LOAD (psf/ft)	MAXIMUM UNSUPPORTED HEIGHT OF ABOVE-GRADE WALL (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)[f, g]						
Exposure Category						Wall type and nominal thickness[j] (inches)						
						Flat				Waffle		Screen
B	C	D				4	6	8	10	6	8	6

(Portions of table not shown remain unchanged.)

R613.2 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 (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall 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 where the basic ~~subjected to a maximum design~~ wind speed is not greater than ~~of~~ 130 miles per hour (58 m/s), the

Exposure Category is A, B or C, ~~and a maximum~~ the ground snow load is not greater than ~~of~~ 70 pounds per foot (3.35 kPa), and the Seismic Design Category is ~~Categories~~ A, B, or ~~and~~ C.

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)

BASIC WIND SPEED ~~(3-second gust)~~ (mph)			**MINIMUM STUD THICKNESS (mils)**														
			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**	**SNOW LOAD (psf)**	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**

(Portions of table not shown remain unchanged.)

Revise as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not greater than two stories in height with each *story* not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is A, B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 *p*g.

R804.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm)in width parallel to the joist span or truss, less than or equal to three stories above *grade* plane and with roof slopes not less than 3:12 (25-percent slope) or greater than 12:12 (100 percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa).

R804.3.2.1 Minimum roof rafter sizes. Roof rafter size and thickness shall be determined in accordance with the limits set forth in Tables R804.3.2.1(1) and R804.3.2.1(2) based on the horizontal projection of the roof rafter span. For determination of roof rafter sizes, reduction of roof spans shall be permitted when a roof rafter support brace is installed in accordance with Section R804.3.2.2. The reduced roof rafter span shall be taken as the larger of the distance from the roof rafter support brace to the ridge or to the heel measured horizontally.

For the purpose of determining roof rafter sizes in Tables R804.3.2.1(1) and R804.3.2.1(2), basic wind speeds shall be converted to equivalent ground snow loads in accordance with Table R804.3.2.1(3). Roof rafter sizes shall be based on the higher of the ground snow load or the equivalent snow load converted from the basic wind speed.

R804.3.3 Hip framing. Hip framing shall consist of jack-rafters, hip members, hip support columns and connections in accordance with this section, or shall be in accordance with an *approved* design. The provisions of this section for hip members and hip support columns shall apply only where the jack rafter slope is greater than or equal to the roof slope. For the purposes of determining member sizes in this section, basic wind speeds shall be converted to equivalent ground snow load in accordance with Table R804.3.2.1(3).

Revise as follows:

R905.3.7 Application. Tile shall be applied in accordance with this chapter and the manufacturer's installation instructions, based on the following:

Clay and concrete roof tiles shall be fastened in accordance with this section and the manufacturer's installation instructions. Perimeter tiles shall be fastened with a minimum of one fastener per tile. Tiles with installed weight less than 9 pounds per square foot (0.4 kg/m2) require a minimum of one fastener per tile regardless of roof slope. Clay and concrete roof tile attachment shall be in accordance with the manufacturer's installation instructions where applied in areas where the basic wind speed exceeds 100 miles per hour (45 m/s) and on buildings where the roof is located more than 40 feet (12 192 mm) above *grade*. In areas subject to snow, a minimum of two fasteners per tile is required. In all other areas, clay and concrete roof tiles shall be attached in accordance with Table R905.3.7.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The purpose of this proposal is to coordinate terminology in the code. Figure R301.2.4(A) supplies the "basic wind speed", defined as the "three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section R301.2.1). This wind speed, derived from ASCE 7, is a design wind speed based on an extensive modeling process using historical data, wind characteristics and computer simulations. It is not necessarily the "maximum" wind speed that can be experienced by a site, nor does it suggest the "maximum" wind speed an element is capable of resisting due to factors of safety in material standards and design procedures. This proposal corrects references throughout the IRC to properly refer to "basic wind speed."

Cost Impact: None

R301.2.1.2T-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because the proponent requested disapproval in order to clean it up and bring it back in the public comment period.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal with the following:

Revise Chapter 6 as follows:

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

(Portions of table and footnotes not shown remain unchanged)

f. Where the ultimate design ~~For regions having basic~~ wind speed is ~~of~~ ~~110~~140 mph or greater, 8d deformed (21/2" × 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.

g. Where the ultimate design ~~For regions having basic~~ wind speed is ~~of~~ ~~100~~130 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. Where the ultimate design ~~When basic~~ wind speed is greater than ~~100~~130 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

TABLE R602.3(2)
ALTERNATE ATTACHMENTS TO TABLE 602.3(1)

(Portions of table and footnotes not shown remain unchanged)

g. Specified alternate attachments for roof sheathing shall be permitted where the ultimate design wind speed is ~~for windspeeds~~ less than ~~100~~130 mph. Fasteners attaching wood structural panel roof sheathing to gable end wall framing shall be installed using the spacing listed for panel edges.

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS ~~EXPOSED TO WIND SPEEDS OF 100 mph OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D0, D1 and D2~~

(Portions of table not shown remain unchanged)

a. Design required.
b. Table is limited to buildings located where the ultimate design wind speed is 130 mph or less and for which the seismic design category is A, B, C, D0, D1, or D2
c~~b~~. Applicability of this table assumes the following: Snow load not exceeding 25 psf, *fb* not less than 1310 psi determined by multiplying the AF&PA NDS tabular base design value by the repetitive use factor, and by the size factor for all species except southern pine, E not less than 1.6 × 106 psi, tributary dimensions for floors and roofs not exceeding 6 feet, maximum span for floors and roof not exceeding 12 feet, eaves not over 2 feet in dimension and exterior sheathing. Where the conditions are not within these parameters, design is required.
d~~c~~. Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

R613.2 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 288mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall 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~~ where the ultimate design wind speed (V_{ult}) is not greater than of ~~120~~ 155 miles per hour (~~54~~ 69 m/s), Exposure ~~A or~~ B or ~~110~~ 140 miles per hour (~~49~~ 63 m/s) Exposure C, the ~~and a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per foot (3.35 kPa), and the Seismic Design Category is ~~ies~~ A, B or ~~and~~ C.

Revise Chapter 8 as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not greater than two stories in height with each *story* not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the ultimate design wind speed is not greater than ~~of~~ 140 ~~110~~ miles per hour (63~~49~~ m/s), the Exposure Category is ~~A,~~ B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 p_g.

Revise Chapter 9 as follows:

R905.2.4.1 Wind resistance of asphalt shingles. Asphalt shingles shall be tested in accordance with ASTM D 7158. Asphalt shingles shall meet the classification requirements of Table R905.2.4.1 for the appropriate maximum ultimate design ~~basic~~ wind speed. Asphalt shingle packaging shall bear a label to indicate compliance with ASTM D 7158 and the required classification in Table R905.2.4.1(1).

R905.3.7 Application. Tile shall be applied in accordance with this chapter and the manufacturer's installation instructions, based on the following:

1. Climatic conditions.
2. Roof slope.
3. Underlayment system.
4. Type of tile being installed.

Clay and concrete roof tiles shall be fastened in accordance with this section and the manufacturer's installation instructions. Perimeter tiles shall be fastened with a minimum of one fastener per tile. Tiles with installed weight less than 9 pounds per square foot (0.4 kg/m2) require a minimum of one fastener per tile regardless of roof slope. Clay and concrete roof tile attachment shall be in accordance with the manufacturer's installation instructions where applied in areas where the ultimate design wind speed exceeds 130 ~~100~~ miles per hour (58~~45~~ m/s) and on buildings where the roof is located more than 40 feet (12 192 mm) above *grade*. In areas subject to snow, a minimum of two fasteners per tile is required. In all other areas, clay and concrete roof tiles shall be attached in accordance with Table R905.3.7.

Commenter's Reason: The Building Code Action Committee (BCAC) is submitting this public comment to coordinate terminology in the code. A comprehensive set of proposals was developed by a task group led by NAHB to update the IRC wind provisions to the ultimate wind speed basis of the 2012 IBC and ASCE 7-10. As part of that update, the term "basic wind speed" was changed to "ultimate design wind speed" to be consistent with the term used in the 2012 IBC (and also implemented in a similar update to ICC-600). RB43 as submitted would not have been consistent with those actions, and thus the BCAC requested disapproval during the Committee Action Hearings.

In correlating the actions taken on the comprehensive set of proposals to update the IRC wind provisions to the ultimate wind speed basis of the 2012 IBC and ASCE 7-10, several instances were found where the term "basic wind speed" was not changed to "ultimate design wind speed". This public comment has been developed to make the correlating change in one swoop, in lieu of submitting three separate public comments to RB271, RB396 and RB418. To avoid confusion, the corresponding changes to the wind speed contained in those proposals has been reflected here.

RB43-13

Final Action: AS AM AMPC____ D

RB45-13
R301.2.1.4

Proposed Change as Submitted

Proponent: Matthew L. Mlakar, Barrish Pelham and Associates, Inc., representing Structural Engineers Association of California

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. For a site where multiple detached one- and two-family dwellings, *townhouses* or other structures are 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 and grasslands.
4. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water, smooth mud flats, salt flats and unbroken ice for a distance of at least ~~1 mile (1.61 km)~~ 5000 feet (1,524m). ~~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~~ unobstructed area. Exposure D extends ~~inland~~ downwind from the ~~shoreline~~ edge of the unobstructed area a distance of ~~1500 feet (457 m)~~ 600 feet (183 m) or ~~10~~ 20 times the height of the building or structure, whichever is greater.

Reason: The 2012 IRC definition for wind exposure category D does not match the definition in either the 2012 IBC or ASCE 7-10. Under ICC CP#28 policy section 1.3.1 the provisions of all codes shall be consistent with one another so that conflicts between codes do not occur. The proposed change is to incorporate the language of ASCE 7-10 section 26.7.3 into the IRC. It should be noted that ASCE 7-10 now requires the use of exposure D along hurricane coastlines. ASCE 7-10 commentary section C26.7, cites recent research which provides data showing that the surface roughness over the ocean in a hurricane is consistent with that of exposure D rather than exposure C.

The change to the exposure categories will bring the IRC in line with the IBC and industry standards.

Cost Impact: The proposal is editorial and will not impact the cost of construction.

R301.2.1.4 #2-RB-MLAKAR

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it created consistency with ASCE 7.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Gary J. Ehrlich, P.E., representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter's Reason: The purpose of this public comment is to request disapproval of RB45. While NAHB supports in concept efforts to correlate the definition of Exposure D with ASCE 7-10, the implementation of the "flat unobstructed area" language in this proposal is potentially confusing. Also, the definition here does not correlate with the comprehensive update of the Chapter 3 wind provisions in RB39, which was approved unanimously by the IRC Building Committee.

NAHB worked with SEAOC to develop a floor modification to RB39 to revise the Exposure D definition along the lines of RB45, but with better clarity. The floor modification was ruled out of order, but has been submitted as a public comment to RB39. With approval of that public comment, RB45 should be disapproved.

RB45-13
Final Action: AS AM AMPC____ D

RB48-13

R301.2.2.2.5, R301.2.2.1.2, R502.2.2 (New), R502.3.3.1 (New), Table R502.3.3(1), R502.10.1 (New), R602.10, R602.10.9, R603.1.1, R802.9.1, AJ104.1

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (bajnaic@chesterfield.gov)

Revise as follows:

~~**R301.2.2.2.5 Irregular buildings.** The seismic provisions of 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 11/2 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 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide; or~~
3. ~~Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) wide; or~~
4. ~~Not less than three 2 × 12 or four 2 × 10 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 (3658 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* plane 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.~~

R301.2.2.1.2 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 D 2 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 permit-ted 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 <u>or portions of the building are constructed in accordance with the requirements for structures assigned to Seismic Design Category D2 elsewhere in this code.</u> ~~is within all of the requirements of Section R301.2.2.2.5 for being considered as regular.~~

Revise as follows:

R502.2 Design and construction. Floors shall be designed and constructed in accordance with the provisions of this chapter, Figure R502.2 and Sections R317 and R318 or in accordance with AF&PA/NDS.

R502.2.1 Framing at braced wall lines. A load path for lateral forces shall be provided between floor framing and *braced wall panels* located above or below a floor, as specified in Section R602.10.8.

R502.2.2 Vertically offset floor diaphragms in Seismic Design Category C, D0, D1 and D2. In structures or portions of structures in Seismic Design Category C, D0, D1 and D2, floor diaphragms or portions of floor diaphragms shall not be 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.

R502.3.3 Floor cantilevers. Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3(1) shall be permitted when supporting a light frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3(2).

R502.3.3.1 Floor cantilevers in Seismic Design Categories D0, D1 or D2. Floor cantilevers supporting *braced wall panels* in all structures assigned to *Seismic Design Categories* D0, D1 or D2 and in townhouses in Seismic Design Category C shall be constructed in accordance with Section R602.10.9.

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLYa, b, c, f, g, h
(Floor Live Load ☐ 40 psf, Roof Live Load ☐20 psf)

(Potions of table not shown remain unchanged)

a through e *(No changes to text)*
f. See Section ~~R301.2.2.2.5~~ R602.10.9, Item 1, for additional limitations on cantilevered floor joists for ~~detached one- and two-family~~ dwellings in Seismic Design Category D0, D1, or D2 and townhouses in Seismic Design Category C.~~, D0, D1 or D2.~~
g through h *(No change to text)*

R502.10 Framing of openings. Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

R502.10.1 Framing of openings in Seismic Design Categories C, D0, D1 and D2. In structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, where an opening in a floor exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor dimension, that portion of the structure shall be designed in accordance with accepted engineering practice to the extent that the opening affects the performance of the remaining structural system.

Revise as follows:

R602.10 Wall bracing. Buildings shall be braced in accordance with this section or, when applicable, Section R602.12. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1.

For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, stories above *grade* plane partially or completely braced by wood wall framing in accordance with this section shall not include masonry or concrete construction or the entire *story* shall be designed in accordance with accepted engineering practice.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code.

R602.10.9 Braced wall panel support. *Braced wall panel* support shall be provided as follows:

1. Cantilevered floor joists complying with Section R502.3.3 shall be permitted to support *braced wall panel*s.

   For structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, cantilevered floor joists supporting braced wall panels shall also comply with all of the following:

   1. Floor joists shall be 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 shall be at least 2 to 1.
   3. Floor joists at ends of *braced wall panels* shall be doubled.
   4. For wood-frame construction, a continuous rim joist shall be 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) in thickness and 11/2 inches (38 mm) in width 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 shall be limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.

2. Elevated post or pier foundations supporting *braced wall panel*s shall be designed in accordance with accepted engineering practice.
3. Masonry stem walls with a length of 48 inches (1219 mm) or less supporting *braced wall panel*s shall be reinforced in accordance with Figure R602.10.9. Masonry stem walls with a length greater than 48 inches (1219 mm) supporting *braced wall panel* s shall be constructed in accordance with Section R403.1 Methods ABW and PFH shall not be permitted to attach to masonry stem walls.
4. Concrete stem walls with a length of 48 inches (1219 mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall have reinforcement sized and located in accordance with Figure R602.10.9.
5. For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, the end of a *braced wall panel* over an opening in the wall below shall not extend a horizontal distance greater than 1 foot (305 mm) from the end of the panel to the edge of the opening. This provision is applicable to *braced wall panels* offset in plane and to *braced wall panels* offset out of plane as permitted by the exception to Item 1 above.

   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 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide; or
   3. Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) wide; or
   4. Not less than three 2 × 12 or four 2 × 10 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.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane* . All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s) Exposure B or C and a maximum ground snow load of 70 pounds per square foot (3.35 kPa).

For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, stories above *grade* plane walls partially or completely braced by cold-formed wall framing in accordance with this section shall not include masonry or concrete construction or the entire *story* shall be designed in accordance with accepted engineering practice.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code.

Revise as follows:

R802.9 Framing of openings. Openings in roof and ceiling framing shall be framed with header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

R802.9.1 Framing of openings in Seismic Design Categories C, D0, D1 and D2. For structures or portions of structures in Seismic Design Category C, D0, D1 or D2 when an opening in a roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least roof dimension, that portion of the structure shall be designed in accordance with accepted engineering practice to the extent the opening affects the performance of the remaining structural system.

Revise as follows:

SECTION AJ104
EVALUATION OF AN EXISTING BUILDING

AJ104.1 General. The *building official* may require an existing building to be investigated and evaluated by a registered design professional in the case of proposed reconstruction of any portion of a building. The evaluation shall determine the existence of any potential non-conformities to these provisions, and shall provide a basis for determining the impact of the proposed changes on the performance of the building. The evaluation shall use the following sources of information, as applicable:

1. Available documentation of the existing building.
   1.1. Field surveys.
   1.2. Tests (nondestructive and destructive).
   1.3. Laboratory analysis.

   Exception: Detached one- or two-family dwellings that comply with Section R102.7. ~~are not irregular buildings under Section R301.2.2.2.5~~ and are not undergoing an extensive reconstruction shall not be required to be evaluated.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

This proposal is to delete the concept of "Irregular Structures" from Section R301.2.2.2.5 from the code and relocate the specific construction requirements of the irregular structures into the applicable sections of the code where they are relevant. As currently written, the list of items defining "Irregular Structures" in high seismic categories is a laundry list of items that cause the structure to be outside of the scope of this code. Then, for most of the defined irregularities there is an exception including technical construction requirements that, when done, allow the structure to not be classified as "Irregular". So, in essence, the current section of "Irregular structures" items are exceptions to the code. Then the exceptions to each item are exceptions to the exception. This makes poor code language.

In addition, many code users are not aware of these requirements because they are located in Chapter 3. As an example, when a code user is looking to the code to determine how to construct cantilever floor joists, they would go to Chapter 5, "Floor Framing". There is a section addressing cantilevers. However, in this section in Chapter 3 it says when a floor cantilevers and supports a wall above (not in the same vertical plane) it is irregular. Then the exception to the exception defines how to construct the floor so that it will not be considered irregular. The BCAC determined that it would be much better to actually include the cantilever construction requirements in the actual section in Chapter 5 that describes cantilevered floor construction.

This proposal does not make any technical changes to the code. It merely moves the construction requirements and limitations therein to the applicable sections that already exist in Chapter 5, Floor framing, Chapter 6, Wall framing and Chapter 8 Roof framing. The limitations are still applicable and by relocating them they will be more noticeable and apparent. The current code already has language and provisions to cover construction that exceeds the limitations of this code.

As shown below, R301.1 states that when, **"… construction is in accordance with the provision of this code…"** it is deemed to comply and the converse is true as well. When construction is NOT in accordance with the provisions it does not comply. Further, Section R301.1.3 it states that, **"…elements exceeding the limits of Section R301 or otherwise not conforming to this code."** shall require an engineered design. With the specific construction requirements now in the applicable code sections, those two provisions already exist and adequately address the cases when mandatory code requirements are exceeded.

> ***R301.1 Application.*** *Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures* ***in accordance with the provisions of this code*** *shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.*

> ***R301.1.3 Engineered design.*** *When a building of otherwise conventional construction contains structural* ***elements exceeding the limits of Section R301 or otherwise not conforming to this code****, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design in accordance with the International Building Code is permitted for all buildings and structures, and parts thereof, included in the scope of this code.*

The existing Section R301.2.2.2 defines limitations for the use and scope of this code for structures in Seismic Design Category C such as weights of materials, stone and masonry veneer, masonry and concrete construction. The existing Section R301.2.2.3 defines further limitations for Seismic Design Category D0, D1 and D2 in addition to the Seismic Design Category C limitations such as height limitations. These two sections remain as is and the current limitations apply.
The net effect is the same and proposal makes the code much more user friendly and will prevent the oversight of the specific construction requirements and limitations that now exist in Chapter 3.

Cost Impact: The code change does not change the existing requirements of the code and will not increase the cost of construction.

R301.2.2.2.5-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the proposed simplification reduces clarity and usability of the code. In addition, the torsional irregularities are missing and the cold formed steel industry has concerns that they are receiving benefits to which they may not be entitled.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal with the following:

R502.2 Design and construction. Floors shall be designed and constructed in accordance with the provisions of this chapter, Figure R502.2 and Sections R317 and R318 or in accordance with AF&PA/NDS.

R502.2.1 Framing at braced wall lines. A load path for lateral forces shall be provided between floor framing and *braced wall panels* located above or below a floor, as specified in Section R602.10.8. In all structures or portions of structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, vertical offsets in floor diaphragms and braced wall support shall comply with the requirements of Section R301.2.2.2.5

R502.3.3 Floor cantilevers. Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3(1) shall be permitted when supporting a light frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3(2). Floor cantilevers supporting *braced wall panels* in all structures assigned to *Seismic Design Categories* D0, D1 or D2 and in townhouses in Seismic Design Category C shall be constructed in accordance with Section R301.2.2.2.5, Item 1.

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLY[a, b, c, f, g, h]
(Floor Live Load ≤ 40 psf, Roof Live Load ≤ 20 psf)

Member & Spacing	Maximum Cantilever Span (Uplift Force at Backspan Support in Lbs.)[d, e]											
	Ground Snow Load											
	≤ 20 psf			30 psf			50 psf			70 psf		
	Roof Width			Roof Width			Roof Width			Roof Width		
	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft
2 × 8 @ 12″	20″ (177)	15″ (227)	—	18″ (209)	—	—	—	—	—	—	—	—
2 × 10 @ 16″	29″ (228)	21″ (297)	16″ (364)	26″ (271)	18″ (354)	—	20″ (375)	—	—	—	—	—
2 × 10 @ 12″	36″ (166)	26″ (219)	20″ (270)	34″ (198)	22″ (263)	16″ (324)	26″ (277)	—	—	19″ (356)	—	—
2 × 12 @ 16″	—	32″ (287)	25″ (356)	36″ (263)	29″ (345)	21″ (428)	29″ (367)	20″ (484)	—	23″ (471)	—	—
2 × 12 @ 12″	—	42″ (209)	31″ (263)	—	37″ (253)	27″ (317)	36″ (271)	27″ (358)	17″ (447)	31″ (348)	19″ (462)	—
2 × 12 @ 8″	—	48″ (136)	45″ (169)	—	48″ (164)	38″ (206)	—	40″ (233)	26″ (294)	36″ (230)	29″ (304)	18″ (379)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

(No change to the table)

(footnotes not shown remain unchanged)

f. See Section R301.2.2.2.5, Item 1, for additional limitations on cantilevered floor joists for ~~detached one- and two-family dwellings~~ all structures in Seismic Design Category D0, D1, or D2 and townhouses in Seismic Design Category C.~~, D0, D1 or D2.~~

R502.10 Framing of openings. Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm). In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, openings shall be subject to the limitations of Section R301.2.2.2.5, Item 4.

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span, and less than or equal to three stories above *grade* plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure B or C, and a maximum ground snow load of 70 pounds per square foot (3.35 kPa). <u>All structures or portions of structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, shall comply with the requirements of Section R301.2.2.2.5</u>

R505.3.8 Framing of floor openings. Openings in floors shall be framed with header and trimmer joists. Header joist spans shall not exceed 6 feet (1829 mm) or 8 feet (2438 mm) in length in accordance with Figure R505.3.8(1) or R505.3.8(2), respectively. Header and trimmer joists shall be fabricated from joist and track members, having a minimum size and thickness at least equivalent to the adjacent floor joists and shall be installed in accordance with Figures R505.3.8(1), R505.3.8(2), R505.3.8(3), and R505.3.8(4). Each header joist shall be connected to trimmer joists with four 2 inch by 2 inch (51 mm by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The clip angles shall have a thickness not less than that of the floor joist. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous). <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, openings shall be subject to the limitations of Section R301.2.2.2.5,</u>

R602.10 Wall bracing. Buildings shall be braced in accordance with this section or, when applicable, Section R602.12. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1. <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, wall bracing support shall comply with the requirements of Section R301.2.2.2.5.</u>

R602.10.9 Braced wall panel support. *Braced wall panel* support shall be provided as follows:

1. Cantilevered floor joists complying with Section R502.3.3 shall be permitted to support *braced wall panel*s. <u>In all structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, cantilevered floor joists supporting braced wall panels shall comply with the requirements of Section R301.2.2.2.5, Item 1.</u>
2. *No change*.
3. *No change*
4. *No change*
5. <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, the end of a *braced wall panel* over an opening in the wall below shall comply with the requirements of Section R301.2.2.2.5, Item 3.</u>

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane* . All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s) Exposure B or C and a maximum ground snow load of 70 pounds per square foot (3.35 kPa). <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, wall bracing shall comply with the requirements of Section R301.2.2.2.5.</u>

R802.9 Framing of openings. Openings in roof and ceiling framing shall be framed with header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm). <u>In all structures or portions of structures in Seismic Design Category C, D0, D1 or D2 and in townhouses in Seismic Design Category C, openings in roofs shall comply with the requirements of Section R301.2.2.2.5, Item 4.</u>

R804.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist span or truss, less than or equal to three stories above *grade* plane and with roof slopes not less than 3:12 (25- percent slope) or greater than 12:12 (100-percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure B or C, and a maximum ground snow load of 70 pounds per square foot (3350 Pa). <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, cold-formed steel roof framing shall comply with the requirements of Section R301.2.2.2.5.</u>

R804.3.6 Framing of openings in roofs and ceilings. Openings in roofs and ceilings shall be framed with header and trimmer joists. Header joist spans shall not exceed 4 feet (1219 mm) in length. Header and trimmer joists shall be fabricated from joist and track members having a minimum size and thickness at least equivalent to the adjacent ceiling joists or roof rafters and shall be installed in accordance with Figures R804.3.6(1) and R804.3.6(2). Each header joist shall be connected to trimmer joists with a minimum of four 2-inch by 2-inch (51 by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The steel thickness of the clip angles shall be not less than that of the ceiling joist or roof rafter. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous). <u>In all structures or portions of structures in Seismic Design Category C, D0, D1 or D2 and in townhouses in Seismic Design Category C, openings in roofs shall comply with the requirements of Section R301.2.2.2.5, Item 4.</u>

Reason: The Building Code Action Committee (BCAC) is requesting approval of this public comment that addresses the code development committees concerns. The original proposal intended to remove the requirements of “Irregular Structures” from Section R301.2.2.2.5 and relocate them into the applicable sections of the code where they are relevant. The reason was that many code users are not aware of these limitations and requirements because they are located in Chapter 3. Neither the original proposal nor this public comment make any technical changes to the code.

1. At the Committee Action Hearings, some of the code development committee members thought that the original proposal to remove the requirements from Section R301.2.2.2.5 reduced clarity and usability of the code. Therefore this public comment takes the opposite tact and leaves the current provisions in R301.2.2.2.5 and adds a pointer in each of the applicable code sections that might otherwise be overlooked. The provisions for torsional irregularities mentioned by the code development committee are also now unaffected and remain intact in Section R301.2.2.2.5.

In addition, there were comments made that the provisions for cold-formed steel construction were not adequately addressed. As stated, this public comment leaves the requirements and limitations in R301.2.2.2.5 where they are currently located and adds pointers to the applicable provisions of the cold-formed steel construction section.

Cost Impact: The code change does not change the existing requirements of the code and will not increase the cost of construction.

RB48-13

Final Action: AS AM AMPC____ D

RB56-13
R301.5, Table R301.5

Proposed Change as Submitted

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates Inc., representing self (skerr@jwa-se.com)

Revise as follows:

R301.5 Live load. The minimum uniformly distributed and concentrated live loads shall be as provided in Table R301.5.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
AND MINIMUM CONCENTRATED LIVE LOADS
~~(in pounds per square foot)~~

~~OCCUPANCY OR~~ USE	~~LIVE LOAD~~ UNIFORM (psf)	CONCENTRATED (lbs.)
Uninhabitable attics without storage[b]	10	-
Uninhabitable attics with limited storage[b,g]	20	-
Habitable attics and attics served with fixed stairs	30	-
Balconies (exterior) and decks[e]	40	-
Fire escapes	40	-
Guardrails and handrails[d]	- ~~200[h]~~	200[h]
Guardrail in-fill components[f]	- ~~50[h]~~	50[h]
Passenger vehicle garages~~[a]~~	40 ~~50[a]~~	Note a
Rooms other than sleeping room	40	-
Sleeping rooms	30	-
Stairs	40~~[c]~~	300[c]

a. Elevated garage floors shall be capable of supporting a 3,000 ~~2,000~~ pound load applied on an area of ~~over a~~ 20 square-inches ~~area~~.

b *(No change to current text)*

c. The minimum concentrated load on stair treads shall be applied on ~~Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over~~ an area of 4 square inches. This load need not be assumed to act concurrently with the uniform load.~~, whichever produces the greater stresses.~~

d through h *(No change to current text)*

Reason: As currently presented, the tile of Table R301.5 states that the loads as uniformly distributed and that the loads are in pounds per square foot. However, this is incorrect, since the guardrail and handrail loads shown are concentrated loads. By splitting the loads into two columns, the Live Load table will accurately represent what type of live load is shown. The passenger vehicle garage loads were also changed to reflect the changes that occurred to the live load in the 2012 IBC.

These changes will make the IRC Live Load table match the format and values of the IBC and ASCE 7 Live Load tables.

Cost Impact: This code change proposal will not increase construction cost.

R301.5-RB-KERR

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because a) no analysis was given for additional construction costs in accordance with CP#28, b) the stair criteria needs tweaks and c) we are dealing with residential garages, not apartment buildings, and 2,000 pounds has proved to be adequate for residential garages.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Stephen Kerr, Josephson Werdowatz and Associates, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.5 Live load. The minimum uniformly distributed and concentrated live loads shall be as provided in Table R301.5.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS,
AND MINIMUM CONCENTRATED LIVE LOADS,

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
Uninhabitable attics without storage[b]	10	-
Uninhabitable attics with limited storage[b,g]	20	-
Habitable attics and attics served with fixed stairs	30	-
Balconies (exterior) and decks[e]	40	-
Fire escapes	40	-
Guardrails and handrails[d]	-	200[h]
Guardrail in-fill components[f]	-	50[h]
Passenger vehicle garages[a]	40	Note a
Rooms other than sleeping room	40	-
Sleeping rooms	30	-
Stairs	40[c]	300[c]

a. Elevated garage floors shall be capable of supporting a ~~3,000~~ 2,000-pound load applied on an area of 20 square-inches.

c. The minimum concentrated load on stair treads shall be applied on an area of 4 square inches. This load need not be assumed to act concurrently with the uniform load.

(Footnotes not show to remain unchanged)

Commenter's Reason:

A) The issue of construction cost was raised with the original proposal changing the elevated garage floor point load to 3000 pounds. With the proposed modification to the keep the 2000 pound point load intact, there are no substantial changes to the language, and so the design under this As Modified proposal would be identical to a design under the current 2012 IRC. Therefore, there is no change in cost of construction as a result of the proposed change.

B) There was a comment that the stair point load needs to be tweaked. We disagree with the commenter's reasoning. With one exception, the proposed language is copied word-for-word from footnote f of the 2012 IBC. The only change, for consistency with the other footnotes in IRC Table R301.5, is that the point load is shown as "4 square inches" versus the IBC which uses "2 inch by 2 inch" to describe the size of the point load. The proposed change will bring consistency between the IBC and IRC and does not reflect any new loading on stair treads.

C) The concentrated point load for elevated garage floors is revised to keep the 2000 pound point load in the IRC. This will maintain continuity between the 2012 and 2015 IRC editions.

Public Comment 2:

Edwin T. Huston, Smith & Huston, Inc., Consulting Engineers, representing National Council of Structural Engineers Association (NCSEA) Code Advisory Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.5 Live load. The minimum uniformly distributed and concentrated live loads shall be as provided in Table R301.5.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS,
AND MINIMUM CONCENTRATED LIVE LOADS,

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
Uninhabitable attics without storage[b]	10	-
Uninhabitable attics with limited storage[b,g]	20	-
Habitable attics and attics served with fixed stairs	30	-
Balconies (exterior) and decks[e]	40	-
Fire escapes	40	-
Guardrails and handrails[d]	-	200[h]
Guardrail in-fill components[f]	-	50[h]
Passenger vehicle garages[a]	40	Note a
Rooms other than sleeping room	40	-
Sleeping rooms	30	-
Stairs	40[c]	300[c]

a. Elevated garage floors shall be capable of supporting a 3,000 pound <u>wheel</u> load applied on an area of 20 square-inches.
b. The minimum concentrated load on stair treads shall be applied on an area of 4 square inches. This load need not be assumed to act concurrently with the uniform load.

(Portions of footnotes not shown remain unchanged)

Commenter's Reason: The IBC load for garages includes a 40 psf design load and a 3,000 pound concentrated load. This change in the 2003 IBC and was based on a Code Change Proposal S14-02 submitted by Jim Rossberg, then of the Structural Engineering Institute of ASCE. That Code Change Proposal read in part:

> SEI funded a study to arrive at an appropriate design value. A load survey of vehicle weights was conducted at 9 commercial parking garages in Chicago and Champaign, Illinois and Boston and Cambridge, Massachusetts. Statistical analyses of the maximum load effects on beams and columns due to vehicle loads over the garage's life were carried out using the survey results. The equivalent uniformly distributed loads that would product the 30-year maximum column axial force and mid-span beam bending moment are conservatively estimated at 34.8 (psf). The EUDL (Equivalent Uniform Design Load) is not sensitive to bay-size variation. Details of this study can be found in Wen and Yeo (1999).
>
> Because of the observation of the continued increase consumption by the public of very heavy passenger vehicles such as sport-utility vehicles, a design load of 40 psf was approved by the ASCE 7 standards committee with no allowance for reduction according to bay area and a corresponding increase in the concentrated load.
>
> Based on the above rationale and the published study by Wen and Yeo, the ASCE 7 standards committee approved a change to the live load provisions for passenger vehicle parking garages. This change would make the provisions of the IBC consistent with those of ASCE 7-02.
>
> REFERENCES
>
> *Wen Y.K. and Yeo, G. L.,.* "Design Live Loads for Parking Garages" available from ASCE, 1801 Alexander Bell Drive, Reston, Virginia, 20191. 1-800-548-2723.

This Public comment would add the word "wheel" so that this concentrated load is not confused with an axle load.

The IRC Building Committee noted in their reason for disapproval that "we are dealing with residential garages, not apartment buildings, and 2,000 pounds has proved to be adequate for residential garages".

A review of Gross Vehicle Weights (GVW) and Gross Axle Weight Ratings (GAWR) from manufacturer's specifications indicates that many popular light trucks and large sport-utility vehicles have axle ratings that exceed the 2,000 pound concentrated load. For example, consider the following:

Manufacturer	Model	GVW	GAWR
Ford	F 350	10,100 Pounds	6,262 pounds
Ford	F 450	14,000 Pounds	9,500 pounds
Chevrolet	Silverado 3500 HD	9,900 Pounds	6,390 pounds
Chevrolet	Suburban 2500	8,600 Pounds	5,500 pounds
Dodge	Ram 3,500	10,100 Pounds	6,200 Pounds

There are of course, many vehicles which are much lighter. One opponent at the Code Change Hearings also noted that there were Smart Cars and Minis being sold as well. Clearly, the provisions of the IRC should be based on typical heavy vehicles, not typical light vehicles.

If this Public Comment is approved, there will be a modest increase in construction costs for that small percentage of garages which are elevated. The majority of garages are built on a slab-on-grade. This change will not impact garages built on a slab-on-grade.

This change will align the IRC with the IBC with respect to the magnitude of the loads. This alignment meets the intent of CP-05 section 1.3.1 regarding code correlation.

"1.3.1 Code Correlation: The provisions of all Codes shall be consistent with one another so that conflicts between the Codes do not occur. Where a given subject matter or code text could appear in more than one Code, the ICC Board shall determine which Code shall be the primary document, and therefore which code development committee shall be responsible for review and maintenance of the code text. Duplication of content or text between Codes shall be limited to the minimum extent necessary for practical usability of the Codes, as determined in accordance with Section 4.4."

We urge you to overturn the committee so that we can bring this Public Comment to the floor.

RB56-13

Final Action: AS AM AMPC____ D

RB57-13
Table R301.5

<u>Proposed Change as Submitted</u>

Proponent: Larry Wainright, Qualtim, representing the Structural Building Components Association (lwainright@qualtim.com)

Revise as follows:

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)

(Portions of table not shown remain unchanged)

a through f *(No change to current text)*

g. Uninhabitable attics with limited storage are those where the maximum clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches.
2. The slopes of the joists or truss bottom chords are no greater than 2 inches vertical to 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed <u>non-</u>concurrent live load of not less than 10 lb/ft2.

h. *(No change to current text)*

Reason The intent of this proposal is to bring the IRC into agreement with the IBC, Table 1607.1, footnote 'i"; ASCE 7, Table 4-1, footnotes "l" and "m" and the IRC Table R301.5, footnote "b".

The requirement for the 10 PSF live load on those portions of the bottom chords not serving as storage areas was originally intended to reflect the requirement to provide a 10 PSF load per Table R301.5, footnote "b" for uninhabitable attics without storage on those portions of the joist or truss where a storage load is not applied. Footnote b clearly indicates that this is a non-concurrent load (intended for occasional access for maintenance).This is confirmed by the Commentary to the 2012 IBC, Table 1607.1 which states in part, "…Historically, a minimum load of 10 psf (0.48 kN/m2) has been viewed as appropriate where occasional access to the attic is anticipated for maintenance purposes, but significant storage is restricted by physical constraints, such as low clearance or the configuration of truss webs. It provides a minimum degree of structural integrity, allowing for occasional access to an attic space for maintenance purposes. ***Allowing the application of this load to be independent of other live loads is deemed appropriate, since it would be rare for this load and other maximum live loads to occur at once."[emphasis added]***

Current truss design methodology also treats this 10 PSF non-storage load as a non-concurrent live load intended for occasional access for maintenance purposes. Furthermore, the change to this section (S57-09/10) was intended to coordinate the language with the ASCE 7-10 which was in draft form at the time the original proposal was submitted. During the public comment period, ASCE 7 was corrected to show that this is a non-concurrent load but the change was not picked up in the IRC. This code change simply coordinates this footnote with Table 1607.1, Table R301.5 footnote b, ASCE 7, and with the original intent of S57-09/10.

For reference, Table R301.5, footnote "b" states:

b. Uninhabitable attics without storage are those where the maximum clear height between the joist and rafter is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirements.**

ASCE 7-10, Table 4-1,footnotes "l" and "m" state:

[l] Uninhabitable attic areas without storage are those where the maximum clear height between the joist and rafter is less than 42 in. (1,067 mm), or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 in. (1,067 mm) in height by 24 in. (610 mm) in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirement.**

[m] Uninhabitable attic areas with storage are those where the maximum clear height between the joist and rafter is 42 in. (1,067 mm) or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 in. (1,067 mm) in height by 24 in. (610 mm) in width, or greater, within the plane of the trusses. At the trusses, the live load need only be applied to those portions of the bottom chords where both of the following conditions are met:

i. The attic area is accessible from an opening not less than 20 in. (508 mm) in width by 30 in. (762 mm) in length that is located where the clear height in the attic is a minimum of 30 in. (762 mm); and
ii. The slope of the truss bottom chord is no greater than 2 units vertical to 12 units horizontal (9.5% slope).

The remaining portions of the bottom chords shall be designed for a uniformly distributed nonconcurrent live load of not less than 10 Ib/ft2 (0.48 kN/m2).
IBC Table 1607.1, footnote "I" states:

i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirements.**

Note that the IBC, Table 1607.1 footnote "j" is also inconsistent with ASCE 7, the IRC and the IBC, table 1607.1, footnote "i".

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

R301.5-RB-WAINRIGHT

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that it correlates the International Residential Code requirements with those of the International Building Code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Edwin T. Huston, Smith & Huston, Inc., Consulting Engineers, representing National Council of Structural Engineers Association (NCSEA) Code Advisory Committee, requests Disapproval.

Commenter's Reason: The committee reason for Approval as Submitted was "*The committee approved this proposed code change because they felt that it correlates the International Residential Code requirements with those of the International Building Code*".

The proponent of RB57-13 opens their reason statement by saying that "*The intent of this proposal is to bring the IRC into agreement with the IBC, Table 1607.1, footnote 'i"; ASCE 7, Table 4-1, footnotes "l" and "m" and the IRC Table R301.5, footnote "b"."* This intent needs to be carefully followed to be understood. As written, the reason statement is, at best, unclear, if not deceptive. The IBC Table 1607.1, footnote 'i"; ASCE 7, Table 4-1, footnote "l" and the IRC Table R301.5, footnote "b" all deal with "uninhabitable attics ***without*** storage". The change is being made to "uninhabitable attic ***with*** storage". The intent of RB57-13 is to apply a provision from "uninhabitable attics without storage" to "uninhabitable attic with storage", and in so doing to lessen the requirements of the IRC. The result is **not** alignment of similar provisions of the IRC with the IBC, but to break that alignment!

The 10 psf live load in the IBC and the IRC for uninhabitable attics without storage "need not be assumed to act concurrently with any other live load requirement" to accommodate unanticipated storage loads as described below. This wording is the same in both codes.

When the attic has a large enough access opening; placed where the clear height in the attic is a minimum of 30 inches; is tall enough that "an assumed rectangle 42 inches in height by 24 inches in width, or greater" can be accommodated; it is considered to be an "uninhabitable attic with storage".

In the IBC and in the 2012 IRC the live load of an "uninhabitable attic with storage" is 20 psf where that assumed rectangle 42 inches in height by 24 inches in width, or greater" can be accommodated, and the "remaining portions of the joists or truss bottom chords shall be designed for a uniform concurrent live load of not less than" 10 psf. In other words, where you have enough height that you could store a couple of bankers boxes of old papers, a 20 psf load is required. When the roof slope reduces the clear height below 42 inches, then the load can be stepped down to 10 psf. This makes sense. There is less clear height, so those portions can be designed for a smaller load.

The intent of RB57-13 is to make the 10 psf portion of the load **non-**concurrent. This language is ambiguous, and may be unenforceable. Non-concurrent with what? Non-concurrent with the 20 psf load? Non-concurrent with "any other live load requirement"? The proponent doesn't say.

If home owners are storing material in an attic, they are not going to be only storing it in those areas where there is 42 inches of clear height. They will store more material where there is 42 inches of clear height, but they will also store material in those portions of the attic where there is less than 42 inches of clear height.

For example, if the attic access is at a location where there is only 30 inches of clear height, and a home owner is going to store material where there is 42 inches of clear height, then it stands to reason that they will also store material between that taller area and the attic access.

I have been in many attics after wind storms to document fallen tree damage to trusses, and I have routinely seen material being stored in areas where there is less than 42 inches of clear height.

If material is being stored, it will be present when there is live load or snow load on the roof, and it needs to therefore be concurrent.

Neither the IBC nor the IRC footnotes align with the footnotes of ASCE 7-10 on the loading requirements for "uninhabitable attic with storage". While RB57-13 would bring the IRC into closer alignment with ASCE 7-10, there would still be misalignment in other parts of these same footnotes. This section of ASCE 7-10 is currently being modified, so attempting to align with ASCE 7 is premature.

The committee may have been persuaded that they were correlating the IRC with the IBC, but in reality, they were not. I urge you to overturn the committee and disapprove the proposal.

RB57-13

Final Action: AS AM AMPC____ D

RB60-13
Table R301.7

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS [b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors~~/ceilings with plaster or stucco finish~~ (including deck floors)	L/360
Ceilings with brittle finishes (plaster, stucco, etc)	L/360
Ceilings with flexible finishes (gypsum board, etc)	L/240
All other structural members	L/240
Exterior walls—wind loads [a] with plaster or stucco finish	H/360
Exterior walls with other brittle finishes	H/240
Exterior walls with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: *L* = span length, *H* = span height.
a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of the determining deflection limits herein.
b For cantilever members, *L* shall be taken as twice the length of the cantilever.
c. For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed *L*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *L*/175 for each glass lite or *L*/60 for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed *L*/120.
d. Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of *H*/180.
e. Refer to Section R703.7.2.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

This code change was intended to clarify two issues.

1. There is confusion regarding the deflection allowed for deck joists. It was not clear if the original authors intended deck joists to be considered as a floor joist (L/360) or as "other structural members" (L/240). This clarifies the intention.
2. The other significant change addresses the flexibility/stiffness of gypsum board which is a lot more common than either plaster of stucco in most parts of the country. There is now cleaner differentiation between materials and is consistent with the allowable deflection limits in Table R802.4(1) and R802.4(2).

Cost Impact: None.

R301.7T-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that, although it was a good idea conceptually, there was not enough consensus regarding the stiffness of the decking.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS [b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors ~~(including deck floors)~~	L/360
Ceilings with brittle finishes (including plaster~~,~~ and stucco~~, etc~~)	L/360
Ceilings with flexible finishes (including gypsum board~~, etc~~)	L/240
All other structural members	L/240
Exterior walls—wind loads [a] with plaster or stucco finish	H/360
Exterior walls with other brittle finishes	H/240
Exterior walls with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: *L* = span length, *H* = span height.

a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of the determining deflection limits herein.
b For cantilever members, *L* shall be taken as twice the length of the cantilever.
c. For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed *L*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *L*/175 for each glass lite or *L*/60 for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed *L*/120.
d. Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of *H*/180.
e. Refer to Section R703.7.2.

Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committees concerns:

The revisions to the original proposal are intended to do the following:

1) Removes a proposed reference to decks. There was no consensus as to whether deck floors meant deck boards or deck joists. We leave this controversy unresolved by removing the reference to decks from the original proposal.
2) Retains the separate lines in the table for floors and ceilings, so it is clear that all floors are L/360, which is the current intent of the table (the current entry for “floors/ceilings with plaster or stucco finish” is intended to apply to all floors and all ceilings with plaster or stucco finish);
3) Makes it clear that gypsum board is considered a flexible finish
4) Makes some minor editorial changes to remove “etc.” which is not typical code language.

In short, there are no technical changes to the content of this table with this public comment, only clarification.

RB60-13
Final Action: AS AM AMPC____ D

RB61-13
Table R301.7

Proposed Change as Submitted

Proponent: Cole Graveen PE, SE, Raths, Raths & Johnson, Inc., representing self (cwgraveen@rrj.com)

Revise as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
All other structural members	L/240
Guards[f,g] Post (horizontal deflection) Top Rail (horizontal deflection) Top Rail (vertical deflection)	 H/12 H/24 + L/96 L/96

(Portions of table not shown remain unchanged)

a through e *(No change to current text)*
f. For the guard post, H shall be taken as the distance from the top of the top rail to the first point of support.
g. For the guard top rail, H shall be taken as the height of the rail and L shall be taken as the distance between edges of the post supports. The deflection of the top rail is measured relative to the center of the two posts.

Reason: Specific deflection limits for guards are proposed to clarify serviceability requirements and to help ensure occupant safety and comfort.

The serviceability requirements for guards in the both the IBC and IRC are vague and open to interpretation. The IBC requires all structural systems and members to have adequate stiffness to limit deflections and lateral drift, Section 1604.3, however it contains no specific deflection limits for guards. The IRC contains a general deflection limit of L/240 in Table R301.7 for all structural members not otherwise listed in the table. However, it is not likely that this limit was originally intended to apply to guards nor does it appear that this limit is commonly applied to guards in design or code enforcement.

The deflection limits proposed in this code change are based upon existing requirements in ASTM E985, *Standard Specification for Permanent Metal Railing Systems and Rails for Buildings*, ASTM D7032, *Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)*, and ICC-ES AC273, *Acceptance Criteria for Handrails and Guards*. The proposed limits allow reasonable deflection of the guard post and top rail while still ensuring that the guard will perform its intended function of preventing accidental falls. It is important to note that while excessive deflection is undesirable, some deflection is desirable[4] as it can provide warning to the occupant that they are at an edge of an elevated surface and may be unduly loading the guard.

Specific deflection limits are needed not only for clarity, but also to establish acceptable performance. Guards are provided to minimize the possibility of occupants accidentally falling from an elevated surface. The ability of a guard to prevent such an accidental fall depends on its stiffness as well as its height and strength. Guards that meet the strength and height requirements of the code but that move excessively under load could potentially not prevent an accidental fall. Limiting guard deflections to appropriate amounts will help protect occupants against accidentally falling from an elevated surface.

In addition, specific deflection limits are also necessary to help ensure that occupants are comfortable and feel safe. Similar to floor deflection limits that ensure that occupants are not uncomfortable or annoyed with bouncy floors or building drift limits that ensure that occupants are not uncomfortable or sick due to the swaying motion of tall buildings, reasonable lateral deflection limits for guards will help ensure that occupants do not feel that the guard is unsafe.

Example: Under the proposed deflection provisions, the post for a residential guard with a top rail height of 36" above the walking surface and a point of support 3" below the walking surface would have a deflection limit of (36 + 3)/12 = 3.25 inches. The top rail spanning between 4" wide posts that are spaced 4' apart would have a horizontal deflection limit of (48 – 4)/96 + (36 + 3)/24 = 2.10 inches.

References:

1. ASTM E985-00(2006), Standard Specification for Permanent Metal Railing Systems and Rails for Buildings
2. ASTM D7032-08, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)
3. ICC-ES AC273, Acceptance Criteria for Handrails and Guards, Corrected January 2009
4. Loferski, J., Albright, D., and Woeste, F. (July 2007) Tested Guardrail Post Connections for Residential Decks, Structure Magazine

Cost Impact: This code change proposal may increase the cost of construction by increasing the design costs. Designers may have to perform additional serviceability calculations.

R301.7T-RB-GRAVEEN

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that a) it permitted excessive levels of deflection that would be disconcerting to homeowners and b) there are problems with footnotes f and g that were pointed out in testimony on the floor.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Cole Graveen, Raths, Raths & Johnson, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
All other structural members	L/240
Guards[f,g] Post (horizontal deflection) Top ~~Rail~~ of the guard (horizontal deflection) Top ~~Rail~~ of the guard (vertical deflection)	 H/12 H/24 + L/96 L/96

(*Portions of table not shown do not change)*

f. For the guard post, H shall be taken as the distance from the top of the ~~top rail~~ guard to the first point of support. The post deflection shall consider the rotation of the post support.

g. For the top of the guard ~~top rail~~, H shall be taken as the height of the ~~rail~~ guard and L shall be taken as the distance between edges of the post (vertical) supports. The deflection of the top ~~rail~~ of the guard is measured relative to the center of the two posts (vertical supports).

Commenter's Reason: This proposal, as modified, changes the deflection limits for guards in the IRC. The general deflection limit of L/240 which currently applies to guards under the *All other structural members* listing was most likely never intended to apply to guards and does not appear to be commonly applied to guards in design or code enforcement. Appropriate allowable deflections for guards, limits which are currently contained in ASTM and ICC-ES documents, are inserted into Table R301.7.

The modifications improve the original proposal by revising the text to more clearly indicate the proposed allowable deflection for guards.

The removal of the reference to the top rail addresses comments made at the public hearing that not all guards have rails. The text of the proposal was revised to simply refer to the top of the guard rather than the top rail.

The additional sentence in footnote f was added to make it clear that the post deflection includes the movement of the post and its support. If the effects of the support are not accounted for, a stiff post attached to a flimsy support could be considered to comply with the proposed limits even though the rotation at the bottom of the post would cause considerable deflection. Think of holding a long stick in your hand. Even slightly rotating your hand will cause the top of the stick to move. This effect cannot be ignored in deflection calculations.

In addition, the committee commented that they felt that this code change would permit excessive levels of deflection that would be disconcerting to homeowners. I disagree. The proposed limits are taken directly from ASTM E985, *Standard Specification for Permanent Metal Railing Systems and Rails for Buildings*, ASTM D7032, *Standard Specification for Establishing Performance*

Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails), and ICC-ES AC273, *Acceptance Criteria for Handrails and Guards*. These documents are currently in use and I am unaware of any problems that have resulted from the application of these deflection limits.

It should be noted that if the current deflection limit of L/240 for *All other structural members* is applied to wood guards on common residential decks, as it should be per the current text of the IRC, it is highly likely that many of the typical wood guard constructions would not comply with L/240. The deflection of a typical mid-grade wood 4x4 post connected to a 2x10 band joist will exceed L/240 when both the bending deflection of the post and the rotation of the support is considered.

The proposed limits allow reasonable deflection of the guard post and the top of the guard while still ensuring that the guard will perform its intended function of preventing accidental falls. The proposed limits are taken from active published standards. The general deflection limit for *All other structural members* of L/240 was most likely never intended to apply to guards and this proposal clarifies this by inserting appropriate deflection limits for guards.

RB61-13

Final Action: AS AM AMPC____ D

RB64-13
R302.1

<u>Proposed Change as Submitted</u>

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

<u>Where non-residential buildings are located on the same *lot* containing dwellings and their accessory structures, exterior wall and opening protection and the protection of projections based on fire separation distance shall be determined in accordance with the *International Building Code*.</u>

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Section R302.1 of the IRC is not clear as to when an imaginary line shall be used to determine protection due fire separation distance between dwellings and buildings other than dwellings or accessory structures thereto located on the same lot. Furthermore, the IBC in Chapter 5 allows for options other than assuming an imaginary line when determining fire separation distance.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

This code change makes a reference to the IBC to make clear that the protection due to fire separation distance shall be determined based on the requirements of the IBC for both a dwelling and the non-residential building that is regulated by the IBC. Without this code change IBC Section 503.1.2 may be construed to not apply. While the IRC has been designed to be a standalone code, the building official will be regulating the non-residential building based on the IBC and this code change provides a clean reference.

Cost Impact: None. This code change will not increase the cost of construction.

R302.1 #1-RB-FATTAH

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that a) the term “non-residential” is not appropriate, b) the concept is good but the proposal should be changed to replace “non-residential” with “a structure built in accordance with the International Building Code,” and c) it is inappropriate to subject IRC buildings to the IBC for those standards.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

<u>Where structures constructed in accordance with the International Building Code are located on the same *lot* containing dwellings and their accessory structures, exterior wall and opening protection and the protection of projections based on fire separation distance shall be determined in accordance with the *International Building Code*.</u>

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Commenter's Reason: Section R302.1 of the IRC is not clear on how to establish the imaginary line between when buildings conforming to the fire separation requirements of the IBC are located on the same lot as dwellings and their accessory conforming to the fire separation requirements of the IRC. Furthermore, the IBC in Chapter 5 allows for options other than assuming an imaginary line when determining fire separation distance.

IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

This code change makes a reference to the IBC to make clear that the protection due to fire separation distance shall be determined based on the requirements of the IBC for both a dwelling and the non-residential building that is regulated by the IBC. Without this code change IBC Section 503.1.2 may be construed to not apply. While the IRC has been designed to be a standalone code, the building official will be regulating the non-residential building based on the IBC and this code change provides a clean reference.

The fire hazards of buildings conforming to the international Building Code are more severe than those envisioned by the international Residential Code. While the requirements in the IBC due to fire separation distance may different, they address the same exterior wall and opening exposures and limitations on exterior projections in a similar fashion.

Public Comment 2:

Homer Maiel, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Where ~~non-residential buildings~~ <u>structures built in accordance with the International Building Code</u> are located on the same *lot* containing dwellings and their accessory structures, exterior wall and opening protection and the protection of projections based on fire separation distance shall be determined in accordance with the *International Building Code*.

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.

2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Commenter's Reason: This change is a code clarification more than anything else. The committee in Dallas disapproved it based on 1) using "non-residential building" in lieu of what is added here. 2) the committee also disapproved based on the fact that it is inappropriate to subject IRC buildings to IBC requirement. That was a misunderstanding on their part. IBC requirements are not brought into IRC. This code change is basically is saying that whatever that is built under IBC should abide with IBC requirements in terms of fire separation distance, projections, etc.

RB64-13

Final Action: AS AM AMPC____ D

RB65-13
R302.1

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fireseparation distance*.
2. Walls of *dwellings* <u>shall not be separated from </u>~~and~~ *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Exception 2 of Section R302.1 of the IRC is not clear and can be read in two different ways. It may be read to exempt only accessory structures other than those discussed in exception 3 and 4 or all dwellings and structures accessory to any of them from the fire separation distance requirements. The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in “NIST Technical Note 1600 - Residential Structure Separation Fire Experiments” (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that “… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft).” The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

It is not clear why the IBC and IRC are different with respect to the issue of fire separation. Neither IBC Chapter 6 nor Chapter 7 exempts structures from protections due to fire separation distance, however the IRC through this exception 2 can be construed to exempt a dwelling from being protected relative to an adjacent dwelling owned and operated by a different owner. The definition of fire separation distance in Section R202 includes the use of an imaginary line between buildings, and without this proposed code change the IRC may only require fire separation distance to buildings on the same lot that are not dwellings or accessory structures.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

R302.1 #2-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it was unclear and may be interpreted to require separation.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls ~~of~~, projections, openings or penetrations in walls located adjacent to the line used to determine the *fire separation distance* between *dwellings* and their *accessory structures* where located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Exception 2 of Section R302.1 of the IRC is not clear and can be read in two different ways. It may be read to exempt only accessory structures other than those discussed in exception 3 and 4 or all dwellings and structures accessory to any of them from the fire separation distance requirements. The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

It is not clear why the IBC and IRC are different with respect to the issue of fire separation. Neither IBC Chapter 6 nor Chapter 7 exempts structures from protections due to fire separation distance, however the IRC through this exception 2 can be construed to exempt a dwelling from being protected relative to an adjacent dwelling owned and operated by a different owner. The definition of fire separation distance in Section R202 includes the use of an imaginary line between buildings, and without this proposed code change the IRC may only require fire separation distance to buildings on the same lot that are not dwellings or accessory structures.

The proposed code change has been modified to clarify the original proposal that had an error as pointed out by the committee. The committee did not feel that the change was not appropriate.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB65-13

Final Action: AS AM AMPC____ D

RB66-13
R302.1

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.
6. <u>Detached patio covers and deck structures located greater than 5 feet from dwellings or lot lines.</u>

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in “NIST Technical Note 1600 - Residential Structure Separation Fire Experiments” (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that “… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft).” The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

R302.1 #3-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it does not clearly address attached and detached decks and whether they are in the middle of the yard or adjacent to the building.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.
6. ~~Detached patio covers and deck structures located greater than 5 feet from dwellings or lot lines.~~ <u>Exterior walls and openings on detached or attached patio covers and deck structures accessory to a dwelling that are located greater than 5 feet (1524.0 mm) from lot lines.</u>

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in “NIST Technical Note 1600 - Residential Structure Separation Fire Experiments” (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that “… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft).” The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls and to separate unprotected combustible construction.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

The modified code change addresses fire separation relative to lot lines only since the IRC seems uninterested in requiring fire separation between dwellings and their accessory structures.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB66-13

Final Action: AS AM AMPC____ D

RB68-13
Table R302.1(1)

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	^{3} 5 feet
Projections	Fire-resistance rated	1 hour on the underside	^{3} 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	^{3} 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< ~~5~~ 3 feet
		None required	~~5~~ 3 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

Reason: This proposal reduces the penetration protection requirements for non sprinklered buildings to the same level as sprinklered buildings. The code currently allows walls 3 feet from a lot line to have openings up to 25% of the wall area but penetrations are required to be protected. This is senseless. The code overreacts to penetration protection. Foundation vents can be installed without limitation up to a lot line. Walls can have openings up to 25% of the area of the wall at 3 feet from the lot line. But install a penetration for a sill cock at 4 feet and it needs protection! This proposal creates some sense of reason to this section of the code.

Cost Impact: None

R302.1(1)T-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that, while doors and windows are generally visible, penetrations are not. Penetrations more readily allow a fire to enter into an assembly.

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, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: There are significant inconsistencies in how walls, openings, penetrations, parapets, and other components of walls are treated when they approach the line used to determine fire separation distance.

For example, openings are prohibited in walls less than 3 feet from the line used to determine fire separation distance in both sprinklered and non-sprinklered buildings. But foundation vents are permitted in walls right up to the line used to determine fire separation distance. The main purpose of the vents is to allow free movement of air and this will include smoke, flames, and hot gases in fire situations. This is an inconsistency.

Roofs are prohibited from having openings within 4 feet of the parapet wall for townhouses (even though permitted in the IBC), yet foundation vents are permitted.

RB84 was approved by the IRC Committee. If that proposal is not challenged it will allow an unlimited amount of attic vents be placed in an exterior wall (gable) that could be adjacent the line used to determine fire separation distance. Like foundation vents, the sole purpose of these vents is to draw air into a space and vent it out someplace else. These openings can also readily draw in flames, smoke, and hot gases. Again, this is an inconsistency.

This proposal chips away at but a small piece of the problem. It will allow unprotected penetrations in walls that are 3 feet or more from the line used to determine the fire separation distance. These penetrations may be a water spigot or a cable TV wire. The code already allows openings to occupy 25% of the area of the wall. The code allows unlimited openings for foundation vents (and possible attic vents) in walls right up to the line used to determine fire separation distance. There are not suggested to be any limits on the number of penetrations because realistically the number and size of common penetrations will never exceed the potential area of openings, foundation vents, and attic vents. Penetrations must be sealed for weather resistance and protection against intrusion by insects and rodents. This proposal will not result in gaping holes that would allow a fire to penetrate deep into the framework of a dwelling.

Let's look at a real world example. I construct a new building 4 ½ feet from the lot line. I can have an unlimited area of foundation vents. I can have up to 25% of the wall in openings. These openings are not required to have doors or glazing in them. They can be gaping holes in the walls. By RB84 I can have unlimited attic vents. But, if I install a water spigot in this wall, I need to make a trip down to the local building supply store and purchase a tube of expensive fire stop material of which I will use a small fraction and throw the rest away. Explain the rationale to your mayor or other elected official. Would you undergo the effort to write a correction notice and follow it up with a complaint to the local courts? Would you feel justified in explaining the need to seal a cable TV wire next to a large opening in the wall? Of course not. It isn't enough just to write a correction notice. You need to feel confident in bringing an action against the individual in court.

The IRC Committee suggests that penetrations more readily allow fire to penetrate an assembly than an opening would! The assembly will almost always have the stud cavity filled with insulation. The opening, foundation vent, or attic vent provides ample openings allowing free movement of air through them.

It is simply overregulation to require protection of these penetrations when one could have large unprotected openings nearby. Ironically, some of the penetrations labeled as a problem are sometimes run through windows and vents.

Public Comment 2:

Steve Orlowski, representing National Association Of Home Builders, requests Approval as Submitted.

Commenter's Reason: The committee's reason for disapproval misses the point that the proponent was attempting to make. There is a need for the code to make reasonable concessions regarding penetrations of the fire-resistant rated assemblies for small penetrations such as sill cocks, dryer vent terminations, mechanical draft terminals and electrical equipment. Keep in mind that these are small penetrations, often smaller then foundation vents which are currently exempt from complying with Table R302.1(1).

RB68-13

Final Action: AS AM AMPC____ D

RB69-13

Table R302.1(1), R302.1(2)

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	³ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	³ >2 feet to < 5 feet distance to projection
	Not fire-resistance rated	0 hours	³ >5 feet distance to projection
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

TABLE R302.1(2)
EXTERIOR WALLS-DWELLINGS WITH FIRE SPRINKLERS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet[a]
Projections	Fire-resistance rated	1 hour on the underside	2 feet[a] distance to projection
	Not fire-resistance rated	0 hours	3 feet distance to projection
Openings in walls	Not allowed	N/A	< 3 feet

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
	Unlimited	0 hours	3 feet[a]
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet[a]

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable
a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

Reason: Table R302.1(1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring "from the building face" to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection. The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, he famous 1/3 to ½ the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user.

This code change is being offered in a text format or tabular format in separate code changes to allow the membership a choice in the way that the regulations are adopted into the 2015 IBC.

Cost Impact: None. This code change will not increase the cost of construction.

R302.1(1)T-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proposed information is already covered in the code and, therefore, is unnecessary.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Commenter's Reason: The original proposal is being re-submitted as proposed based on a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change. Committee feedback has been incorporated into the proposed code change. We disagree with the committee reason. Table R302.1 (1) were developed in the 2009 IRC to consolidate the requirements based on fire separation distance into a tabular format. However it has become clear that certain items in the table are incorporated within an exterior wall (openings, penetrations, wall construction) and as a consequence the wall position drives requirements. Projections on the other hand are different as the code intends to limit how close they can get to a lot line or imaginary line where applicable. As it currently exists in the 2009 IRC an exterior wall located 7 ft from a lot line may include projection that encroach into the 5 ft or 3 ft zone used to determine fire separation distance and a permit applicant can insist that the combustible projection can be non-rated and can project as close as desired to lot line.

The code change as proposed merely clarifies that the quantity in column 3 is triggered based on the distance to the projection rather than the wall it projects from. Alternatively the table needs to be restructured to pull out projections into a separate section as currently exists in the IBC. Code change RB71-13 was approved by the committee and addresses another deficiency in the table by prohibiting projections less than 2 ft and it is the intent of the RB66 proponent that the code correlation committees consolidate the two code changes.

Note staff: A typographical error appears in the submitted table R302.1(1) where the superscript 3 precedes the text in rows 2, 3 and 4 in column 3 and should not be included in the code change.

Public Comment 2:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Submitted.

Commenter's Reason: Commenter's Reason: The proponent is making a very good case that definition of "Fire Separation Distance" is "distance measured from the building face.."

This proposal clarifies the distance, in case of projection, should be measured FROM the edge of the projection. The committee was not correct in saying that the proposed information is already covered in the code.

RB69-13

Final Action: AS AM AMPC____ D

RB72-13
Table R302.1(1)

Proposed Change as Submitted

Proponent: Maureen Traxler, Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area per story	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

Reason: The IRC is ambiguous about how to calculate the percentage of openings allowed in exterior walls. The limitation could be calculated either as a percentage of the area of the entire exterior wall, or as a percentage of each story. This proposal requires that openings in exterior walls be calculated for each story. This method is consistent with IBC Section 705.8.1. Consider this example of the potential consequence of not using the proposed interpretation. If the area of openings was allowed to be calculated based on the entire face of the wall, on a 3-story building the first story of a building 3 feet from a property line could have 75% openings if there were no openings in the other 2 stories.

Cost Impact: None

R302.1(1)T-RB-TRAXLER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it limits design flexibility and is not appropriate for the residential code. If the intent is to limit, it should limit each story.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Submitted.

Commenter's Reason: This proposal is needed to make the code requirement clear. In addition to proponent's example in her statement of reason, another example can be cited here. What if the second floor is popped out for couple of feet and it is has less FSD than the first floor? This is another reason for adding "per story" in the code. The committee's reason for disapproval was not a sound reason.

Public Comment 2:

C. Ray Allshouse AIA, CBO, City of Shoreline, Washington, representing WABO – Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area ~~per~~ in any story	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

Commenter's Reason: In response to the Committee's reason statement for disapproval suggesting that this change should limit the extent of maximum openings at each story, it is proposed that identical language be lifted from the IBC section as reflected by this public comment. This will remove any doubt as to how this limitation is to be applied and attains consistency with the IBC. This also removes what otherwise can be construed as a serious loophole to an important fire safety provision of the code. This proposed change provides clarification language to ensure an equivalent fire protection installation for a comparable condition.

RB72-13
Final Action: AS AM AMPC____ D

RB74-13
R302.1.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

<u>**R302.1.1 Exterior stairways.** Exterior stairways located above grade shall have a minimum fire separation distance of 5 feet (1524 mm) as measured from the exterior edge of the *stairway*, including landings, to adjacent *lot lines* and from other buildings on the same lot.</u>

<u>**Exception:** Where the *exterior walls* and openings on the adjacent building on the same lot are protected in accordance with Table R302.1(1) based on *fire separation distance.*</u>

Reason: Section R302.1 of the IRC is not clear insofar as exterior stairways located in close proximity to lot lines. The IBC Section 1026.5 requires a fire separation distance of not less than 10 ft since it considers exterior stairways to be exits. The IRC does not fire protection for stairways and as a consequence a dwelling unit located on the second floor served independently with an exterior stairway can be served with a stairway located at a fire separation distance of 0 ft. This lack of protection to a combustible exterior exit element is not prudent as has been demonstrated by full scale fire testing for building exposures.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in “NIST Technical Note 1600 - Residential Structure Separation Fire Experiments” (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that “… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft).” The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls and by extension the reason that it is necessary to protect or separate elevated exterior exit ways.

Cost Impact: This code change will have a minimal increase to the code of construction since lad use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

R302.1.1 (NEW) #1-RB-FATTAH

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it needs more work. It appears that it may have been developed to address the exits for stacked two-family dwellings, but it has other obvious implications.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

R302.1.1 Exterior stairways. ~~Exterior stairways located above grade shall have a minimum fire separation distance of 5 feet (1524 mm) as measured from the exterior edge of the *stairway*, including landings, to adjacent *lot lines* and from other buildings on the same lot.~~ <u>Exterior exit stairways located above grade and serving the primary means of egress door to a dwelling shall have a minimum fire separation distance of 5 feet (1524 mm) as measured from the exterior edge of the *stairway*, including landings, to adjacent *lot lines*.</u>

~~**Exception:** Where the *exterior walls* and openings on the adjacent building on the same lot are protected in accordance with Table R302.1(1) based on *fire separation distance.*~~

Commenter's Reason: Section R302.1 of the IRC is not clear insofar as exterior stairways located in close proximity to lot lines. IBC Section 1026.5 requires a fire separation distance of not less than 10 ft since it considers exterior stairways to be exits. The IRC does not require fire protection for stairways and as a consequence a dwelling unit located on the second floor served independently with an exterior stairway can be served with a stairway located at a fire separation distance of 0 ft. Additionally buildings located on sloping sites may provide access to the public way with a stairway that is not directly supported on grade and may also be located immediately adjacent to a lot line. This lack of protection to a combustible exterior exit element is not prudent as has been demonstrated by full scale fire testing for building exposures. In addition to providing protection for the egress path, the proposed code change provided protection for the stairway itself.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls and by extension the reason that it is necessary to protect or separate elevated exterior exit ways.

The committee did not feel that the proposed code change was without merit however the reason statement was not consistent with the original proposal.

Cost Impact: This code change will have a minimal increase to the code of construction since lad use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB74-13

Final Action: AS AM AMPC____ D

RB75-13
R302.1.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

<u>**R302.1.1 Attached and detached accessory structures.** Accessory structures such as patio covers and deck structures, whether attached or detached, shall be located not less than a fire separation distance of 5 ft or more from lot lines.</u>

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in “NIST Technical Note 1600 - Residential Structure Separation Fire Experiments” (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that “… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft).” The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

Cost Impact: This code change will have a minimal increase to the cost of construction since lad use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

(NEW) #2-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that accessory structures and decks should have more flexibility than allowed by the proposal.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Commenter's Reason: The proponent was not able to attend the Code Development Hearing to explain the proposed code change. Committee feedback has been considered based on a review of the published REPORT OF THE PUBLIC HEARING.

Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IRC unlike the IBC does not appear to be interested in the exposures to/from their accessory structures located on the same lot. Patio covers can include significant combustible loading due to plastics and upholstered furniture as well as what is typically constructed of unprotected combustible framing. Deck structures may or may not include patio covers and pose ladder fuels exposing a dwelling to which the deck structure is attached from an adjacent building that can be a building regulated by the IBC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot and that those accessory structures should at least be separated from lot lines as if they were dwellings.

RB75-13

Final Action: AS AM AMPC____ D

RB76-13
R302.1.1 (New)

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC(afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

<u>**R302.1.1 Projections.** Projections shall be located a minimum distance from the line used to determine fire separation distance based on Table R302.1(1) and Table R302.1(2). Projections shall be fire resistance rated where required by Table R302.1(1) and Table R302.1(2).</u>

Reason: Table R302.1(1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring "from the building face" to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection. The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, he famous 1/3 to ½ the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user.

This code change is being offered in a text format or tabular format in separate code changes to allow the membership a choice in the way that the regulations are adopted into the 2015 IBC.

Cost Impact: None. This code change will not increase the cost of construction.

R302.1.1 (NEW) #3-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the language it contained was redundant.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Reason: We respectfully disagree with the committee that this is redundant language. We submitted RB69 and RB76 to allow the membership a choice however we favor RB76.

Table R302.1 (1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring "from the building face" to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection.

The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, the famous projection encroachment of 1/3 to ½ into the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user. The 2009 IBC created a tabular form to display fire separation protection ad inadvertently mixed the separation of items protecting the exterior wall under consideration, as well as penetrations or openings in such wall with exterior wall projections that need to be protected based on how far they are from a lot line or imaginary line.

RB76-13

Final Action: AS AM AMPC____ D

RB77-13
R302.2

<u>Proposed Change as Submitted</u>

Proponent: Matt Archer, Douglas County, CO representing Colorado Chapter Code Change Committee (marcher@douglas.co.us)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

> **Exception:** A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. ~~The wall shall be rated for fire exposure from both sides. and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.~~

Reason: This language is redundant and needs to be deleted because it is already covered in the next section, R302.2.1, Continuity**.**

"The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*."

The language about electrical installations is not needed. This section is about fire-resistance-rated construction, not about how to wire a home.

Cost Impact: None

R302.2-RB-ARCHER

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the electrical references in the code should not be deleted and that the existing language is not redundant.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

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

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

> **Exception:** A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the

common wall. The wall shall be rated for fire exposure from both sides~~ and shall extend to and be tight against exterior walls and the underside of the roof sheathing~~. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

Commenter's Reason: The redundant portion of this section, which is repeated in Section R302.2.1, is deleted. The rest of the section is remaining unchanged.

RB77-13

Final Action: AS AM AMPC____ D

RB79-13
R302.2, R302.2.4

Proposed Change as Submitted

Proponent: Jeffrey M. Shapiro, representing IRC Fire Sprinkler Coalition (jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exceptions:

1. Where a fire sprinkler system in accordance with Section P2904 is provided, a~~A~~ common 1-hour-fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, a common 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses where such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual *townhouse* shall be structurally independent.

Exceptions:

1. Foundations supporting *exterior walls* or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. *Townhouses* separated by a common ~~1-hour fire resistance-rated~~ wall as provided in Section R302.2, Exceptions 1 or 2.

Reason: The 1-hour separation requirements in these sections were reduced from 2-hour ratings in prior editions of the IRC based on the assumption that fire sprinklers mandated by the IRC would be present in all townhouses. Because some jurisdictions are amending the IRC to remove the fire sprinkler requirement, it is essential that the IRC provide for townhouse separation fire ratings to be returned to 2-hours if sprinklers are not provided. No justification, other than sprinklers, was ever provided for allowing a 1-hour separation, and this reduced rating is inappropriate for non-sprinklered buildings.

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

R302.2-RB-SHAPIRO

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that a) it takes care of an important omission in the code related to fire sprinkler systems and b) it addresses the many ways in which jurisdictions adopt the code and modify sprinkler requirements.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jonathan Humble, representing American Iron and Steel Institute; Wayne Jewell, Green Oak Charter Township, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.2 Townhouses. ~~Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.~~ Common walls separating townhouses shall be assigned a fire resistance rating in accordance with Section R302.2 Item 1 or Item 2. The common wall shared by two *townhouses* shall be constructed without plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

~~**Exceptions:**~~

1. Where a fire sprinkler system in accordance with Section P2904 is provided, ~~a~~ the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263**.** ~~is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.~~
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, ~~a~~ the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263**.** ~~is permitted for townhouses where such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.~~

R302.2.4 Structural independence. Each individual *townhouse* shall be structurally independent.

Exceptions:

1. Foundations supporting *exterior walls* or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. *Townhouses* separated by a common 1-hour fire resistance-rated wall as provided in Section R302.2, Items ~~Exceptions~~ 1 or 2.

Commenter's Reason: This public comment proposes to further modify RB79-13 as follows:

Deletion of the original charging language:
When this proposal was developed there was no longer a need to retain the reference to Section R302.1 and Table R302.1 as the proposed language now covers the fire resistance requirements in R302.2. As a result, we propose to delete that language as part of this modification since it is redundant and rely on the new text to articulate the fire resistance requirements for common walls.

Addition of instructions:
We are proposing new charging language which allows the user to choose the design and construction of the common wall. This is consistent with the RB79-13 and the choice allowed in the exceptions.

Removal of duplicative language in the exceptions:
We also propose the removal of the construction limitations language from the two parts of RB79-13 as it is duplicative, and instead suggest it be relocated into the charging section, thus stating the limitations only once.

Exceptions to Parts:
We propose that the exceptions be labeled as items in order to coordinate with the other modification concerning the revised charging language where the user is allowed to choose a 1-hour or 2-hour rated wall design.

RB79-13

Final Action: AS AM AMPC____ D

RB81-13

R302.2, R302.2.4, R313.1, R313.2 and R313.3 (New)

Proposed Change as Submitted

Proponent: Jason Thompson, P.E., National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

> **Exception:** A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for *townhouses* with automatic fire sprinkler systems in accordance with Section R313.1 if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common ~~1-hour fire-resistance-rated~~ wall as provided in Section R302.2 or Section R313.3.

R313.1 Townhouse automatic fire sprinkler systems. Except as provided in Section R313.3, ~~A~~ an automatic residential fire sprinkler system shall be installed in *townhouses*.

> **Exception:** An automatic residential fire sprinkler system shall not be required when *additions* or *alterations* are made to existing *townhouses* that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904.

R313.2 One- and two-family dwellings automatic fire systems. Except as provided in Section R313.3, ~~A~~ an automatic residential fire sprinkler system shall be installed in one- and two-family *dwellings*.

> **Exception:** An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing buildings that are not already provided with an automatic residential sprinkler system.

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.3 Automatic fire sprinkler system alternative. Where an automatic fire sprinkler system is not required to be installed by the adopting authority, the following requirements shall be met.

1. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* shall comply with Table R302.1(1);
2. *Townhouses* constructed with a common wall assembly in accordance with the exception to Section R302.2 shall have a minimum 2-hour fire-resistance-rating. The common wall shall not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations for electrical outlet boxes shall be in accordance with Section R302.4.

Reason: Where adoption of the 2009 and 2012 editions of the International Residential Building Code have been considered, many adopting authorities have made modifications to negate the requirement for mandatory automatic fire sprinkler protection. In some instances the adopting authorities have re-instated the previous requirements for the fire resistance for exterior walls for dwellings and the fire resistance for common walls separating townhouses to those established in the 2006 edition. However, some jurisdictions negated the mandatory automatic fire sprinkler protection but did not require the previous fire resistance requirements for these exterior walls and common walls resulting in reduced fire safety for the occupants and property.

This proposal provides an alternative within the code to permit adopting authorities an option to permit townhouses and one- and two-family dwellings to be unsprinklered provided the fire resistance rating for exterior walls and common walls are established at the code prescribed levels prior to the 2009 IRC.

Cost Impact: This proposal will not increase the cost of construction.

R302.2 #2-RB-THOMPSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal a) because the proponent requested disapproval and b) based on prior committee action on RB79.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards, requests Approval as Submitted.

Commenter's Reason: Where adoption of the 2009 and 2012 editions of the International Residential Building Code have been considered, many adopting authorities have made modifications to negate the requirement for mandatory automatic fire sprinkler protection. In some instances the adopting authorities have re-instated the previous requirements for the fire resistance for exterior walls for dwellings and the fire resistance for common walls separating townhouses to those established in the 2006 edition. However, some jurisdictions negated the mandatory automatic fire sprinkler protection but did not require the previous fire resistance requirements for these exterior walls and common walls resulting in reduced fire safety for the occupants and property.

During the first public hearing the IRC-B Code Development Committee approved Code Change RB79-13 which accomplished the same intent as this proposal. If the membership determines the format of RB79-13 is not acceptable then this proposal provides alternative language within the code to permit adopting authorities an option to permit townhouses and one- and two-family dwellings to be unsprinklered provided the fire resistance rating for exterior walls and common walls are established at the code prescribed levels prior to the 2009 IRC.

RB81-13
Final Action: AS AM AMPC____ D

RB83-13
302.2.1

<u>Proposed Change as Submitted</u>

Proponent: C. Ray Allshouse AIA, CBO, City of Shoreline, WA, representing the Washington Association of Building Officials Technical Code Development Committee (rallshouse@shorelinewa.gov)

Revise as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. <u>Where a *story* extends beyond the *exterior wall* of a *story* below, one of the following shall apply:</u>

1. <u>The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper *story*; or</u>
2. <u>The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302.</u>

Reason: Current townhouse code language is vague regarding the continuity of fire-resistance-rated assemblies, specifically in those instances where an upper story extends beyond the face of the wall immediately below. This represents a potential breach in the integrity of the fire resistance rated construction deemed necessary to ensure full dwelling unit separation in townhouse configured construction. This change clarifies the needed protection requirements. It is not uncommon for local zoning ordinances to include provisions specifically intended to break up continuous building facades as well as the large scale presentation of multifamily buildings. Developers typically utilize offsets between units to achieve these building modulation requirements that frequently result in this configuration. This proposed change provides language to cover this condition thereby helping ensure that the required dwelling separation is achieved.

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

R302.2.1-RB-ALLSHOUSE

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the fire separation requirement would extend to the whole building and not just to a perpendicular wall. The proponent should come back with a public comment and graphics to support the proposal.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

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

Public Comment 1:

C. Ray Allshouse AIA, CBO, City of Shoreline, Washington, representing WABO – Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. Where a *story* extends beyond the *exterior wall* of a *story* below, one of the following shall apply:

1. The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper *story*; or
2. The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302 <u>for a perpendicular distance of 4 feet (1219 mm) from the separating wall</u>.

Commenter's Reason: The code change proposal language has been revised in consideration of concerns raised by the Committee regarding a potential unintended consequence of requiring fire separation of the whole building and their additional recommendation to provide graphics in support of the proposal. The original proposal uses language consistent with that covering parapets in the immediately following section regarding extensions of separating walls; so this portion of the requirement is sound. However, questions were raised in testimony as to the extent of the protection on the underside of the exposed floor-ceiling assembly. A further referral to existing parapet construction exception language provides the basis for a minimum protection of 4 feet. The attached graphics are provided to help the assembly understand the two available options deemed necessary to ensure continuity of fire separation proposed by this change -- Items 1 and 2 depicted by Figures 1 and 2, respectively

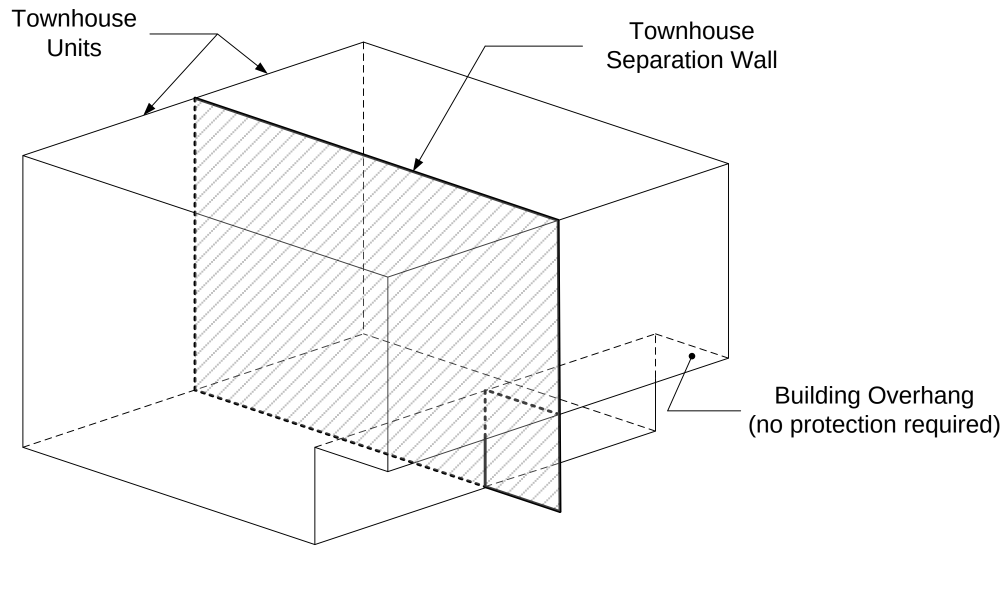


FIG. 1 – EXTENDED SEPARATION WALL

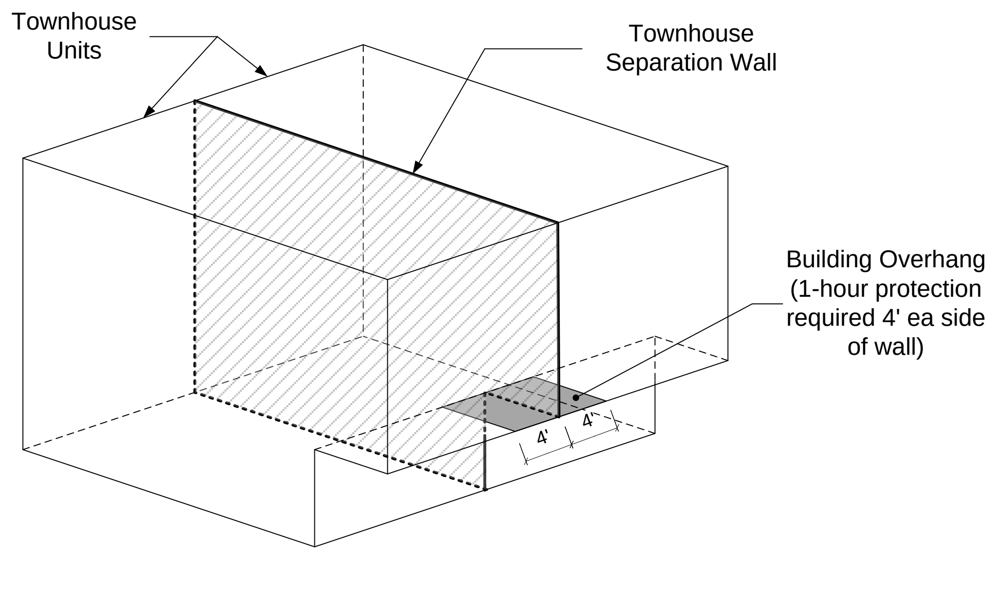


FIG. 2 – OVERHANG PROTECTION

Public Comment 2:

Lee Kranz, representing City of Bellevue, Washington and self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. Where a *story* extends beyond the *exterior wall* of a *story* below, one of the following shall apply:

1. The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper *story*; or
2. The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302. <u>The protection shall extend the full depth of the soffit, but need not extend more than 4 feet on each side of the separating wall.</u>

Commenter's Reason: The proposed language has been revised in consideration of concerns raised by the Committee regarding a potential unintended consequence of requiring fire separation of the whole soffit area of the projecting floor or element above. It is acknowledged that protection of the entire underside of the exposed soffit assembly is not necessary and ought to be limited. The proposed text provides a reasonable alternative to extending the separation wall all the way out to the outside edge of the story or projecting element above to prevent a conflagration fire from occurring. This provision will provide clear direction in the design of the fire separation to keep a fire from spreading from one unit to another and give the fire department adequate time to arrive and put the fire out.

RB83-13

Final Action: AS AM AMPC____ D

RB84-13
R302.1

<u>Proposed Change as Submitted</u>

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB) (sorlowski@nahb.org)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation <u>and attic</u> vents installed in compliance with this code are permitted.

Reason: After reviewing several UL listed fire-resistant rated assemblies, the NAHB discovered a problem between attempting to provide adequate attic ventilation to certain roof types (hip roofs, cathedral ceilings, etc) and achieving the one-hour fire resistance rating. The UL listed roof assemblies do not allow for any openings in the rated assembly for roofs, thereby creating a problem for proper roof ventilation as required in section R806. The NAHB proposes this code change to balance the needs of both adequate fire protection for exposure fires and proper ventilation of the attic. Under the 2012 IRC, projections are not permitted within two feet of the fire separation distance and the required ventilation opening for attics are minimal, 1/150 of the area of the vented space. The IRC also currently allows 25% of the wall space to be occupied by windows in exterior walls that are within 3'-0" of the fire separation distance. The IRC currently exempt foundation vents from being protected. NAHB suggest that due to the minimal openings required to provide ventilation in the attic, these openings should also be exempted.

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

R302.1-RB-ORLOWSKI

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because: they felt that attic vents are necessary; this does not compromise fire safety significantly; and because representatives of NAHB testified that less than 1% of fires are related to fires entering adjacent building through soffit vents.

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, representing Colorado Chapter Code Change Committee, requests Disapproval.

Commenter's Reason: It does not make any sense to allow unlimited attic vents when located close to property lines and when fire rated construction is required.

The reason statement and testimony talked to the fact that these vents are typically not very large and are needed to satisfy the other code requirement for attic ventilation but the fact of the matter is the new language does not restrict the number nor the size so there could be many more than the minimum. I also understand the proponent was comparing this to the allowance to have unlimited size foundation vents (in a crawl space wall) but I would argue that these are very low to the ground and attic vents are up high and in the soffit overhang. If there was a fire on adjacent property this would be the perfect place for the fire to spread to this house and right into the attic space through these attic vents which are installed on the horizontal soffit.

It is very easy (and not expensive) to provide attic vents located on the slope of the roof located up off the wall line and these will perform adequately to meet the attic ventilation requirements. It would also make it easier for the builders who are in the climate zones which require the higher insulation depths since they would not have to use the baffles to allow the soffit vents work.

RB84-13

Final Action: AS AM AMPC____ D

RB86-13
R302.2.2

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R302.2.2 Parapets. Parapets constructed in accordance with Section R302.2.3 shall be constructed for *townhouses* as an extension of exterior walls or common walls in accordance with the following:

1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.
2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

   Exception: A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or *approved* fire-retardant treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls ~~and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the exterior or common walls~~.

3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.

Reason: The language proposed to be deleted was added in last code cycle and it was argued by the proponent that the change put the IRC in sync with the IBC. That is, it was argued that openings were not permitted within a certain distance of a townhouse separation wall in the IBC and the proposal made the IRC consistent with the IBC. This proposal was disapproved by the ICC IRC Committee with the following comment: "**Committee Reason:** This change would impose severe restrictions on penetrations at the roof. This does not mirror the IBC requirement on this issue." The IRC Committee action was right. However the membership approved the code change anyway.

The result is a more restrictive requirement in the IRC than in the IBC for the exact same application. This proposal deletes the conflicting language so that the IRC and IBC rules are again the same.

This proposal is necessary to maintain equivalencies for the same type of structures regulated by the IBC and IRC. The following language is from the IBC for information only (note the bold italicized text). Note that there is no regulation of openings under method 5.

2012 IBC

705.11 Parapets. Parapets shall be provided on *exterior walls* of buildings.

Exceptions: A parapet need not be provided on an *exterior wall* where any of the following conditions exist:

1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of *fire separation distance*.
2. The building has an area of not more than 1,000 square feet (93 m2) on any floor.
3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck or slab and supporting construction, is constructed entirely of noncombustible materials.
4. One-hour fire-resistance-rated *exterior walls* that terminate at the underside of the roof sheathing, deck or slab, provided:
   4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220

mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.

4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction.

4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire resistance-rated *exterior wall* for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.

4.4. The entire building shall be provided with not less than a Class B roof covering.

5. In Groups R-2 and R-3 where the entire building is provided with a Class C roof covering, the exterior wall shall be permitted to terminate at the underside of the roof sheathing or deck in Type III, IV and V construction, provided:

5.1. The roof sheathing or deck is constructed of approved noncombustible materials or of fire-retardant-treated wood for a distance of 4 feet (1220 mm); or

5.2. The roof is protected with 0.625-inch (16 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm).

6. Where the wall is permitted to have at least 25 percent of the *exterior wall* areas containing unprotected openings based on *fire separation distance* as determined in accordance with Section 705.8.

There are no restrictions on openings in the roof under item #5 in the IBC. The IRC should follow suit.

Cost Impact: None

R302.2.2.2-RB-DAVIDSON

<u>Committee Action Hearing Results</u>

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the existing four foot separation requirement for openings is appropriate in relation to the parapet. Parapets are different in the IRC and IBC. It would be too easy for a fire in the IRC to jump from skylight to skylight.

Assembly Action: None

<u>Individual Consideration Agenda</u>

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

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: This proposal would delete the prohibition of openings in roofs adjoining a parapet for townhouse construction. The IRC has some conflicting exterior wall requirements and this is one of them.

The IBC does not prohibit openings in roof areas adjacent to a parapet ***<u>that is an extension of an exterior wall</u>*** for R-2 and R-3 occupancies (apartment houses, hotels, one and two family dwellings, and townhouses) of Types III, IV, and V construction. The IRC does prohibit openings so the IRC is more restrictive. For the IRC to prohibit openings is over-regulation.

There have been many statements made regarding the validity of the claim that the IBC does not regulate openings adjacent to parapets. That is understandable because there are two sections in the IBC that address parapets and some folks may be reading the wrong section.

The IBC sections are 705.11 and 706.6. IBC section 705.11 is the section of the IBC that regulates exterior walls and is the companion section of IRC Section R302.2.2. ***<u>Only IBC Section 705.11 and IRC Section 302.2.2 regulate exterior walls.</u>***

Let's be clear about this. IRC Section R302.2 regulates these walls as ***<u>exterior walls</u>***. The text that follows leaves no doubt: "**R302.2 Townhouses.** Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls."

The other IBC section that requires and regulates parapets is Section 706.6 which is the section on ***<u>fire walls</u>***. Fire walls separate buildings on the same lot and are not regulated in the same manner as exterior walls. Fire walls ***<u>do restrict</u>*** openings adjacent the fire wall but comparing the fire wall requirements in the IBC and the property line requirements of the IRC is comparing apples to oranges. The appropriate comparison is R302.2.2 in the IRC and 705.11 in the IBC.

The IRC Committee disapproved this code change for a number of reasons (see following). First, the reason statement says parapets are different in the IRC and IBC. A side by side comparison follows. The two codes are identical. There are no differences in parapet requirements for buildings of similar use and construction type. It is apparent that some committee members may have been directed to the wrong IBC section.

Second, the reason statement says it would be too easy for a fire in the IRC to jump from skylight to skylight. There was no testimony given to suggest that fires react differently depending on which code was used. Skylights are permitted in both the IRC and IBC.

But most puzzling is the action taken to deny this proposal coming on the heels of RB84 that was approved by the Committee. RB84 (assuming it survives the public comment period) will allow unlimited openings when used for attic ventilation in walls of all structures, not just townhouses, adjacent the line used to determine fire separation distance. The illustration following shows the area where unlimited attic vents would be allowed. This creates the situation where attic vents would not be permitted within 4 feet of the edge of the roof but would be unregulated in the wall that the parapet alternate is intended to protect! This is a blatant and unexplainable inconsistency.

A fire moving across the roof of one building doesn't need to breech an opening and burn down into the attic below. It can enter the adjoining attic through the unlimited vent openings.

The committee action statement for RB84 stated that NAHB Representatives had stated less than 1% of fires entered adjacent buildings through soffit vents. If less than 1% of fires enter through soffit vents, it stand to reason that very few, if any, enter an adjacent building through roof openings.

An owner can construct townhouses under the IBC and will not be limited by openings adjacent property line walls and they can be of greater height than under the IRC. Under the IRC those same openings are not permitted.

There is no justification for the IRC to be more restrictive than the IBC for these circumstances. When this text went into the code the only reason given was for consistency with the IBC. That reason was never true or the codes were misunderstood and the following comparison illustrates that. This unnecessary requirement needs to go and consistency must exist.

RB86-13

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the existing four foot separation requirement for openings is appropriate in relation to the parapet. Parapets are different in the IRC and IBC. It would be too easy for a fire in the IRC to jump from skylight to skylight.

Assembly Action: **None**

IRC	IBC
R302.2.2 Parapets. Parapets constructed in accordance with Section R302.2.3 shall be constructed for *townhouses* as an extension of exterior walls or common walls in accordance with the following: 1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces. 2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.	**705.11 Parapets.** Parapets shall be provided on *exterior walls* of buildings. **Exceptions:** A parapet need not be provided on an *exterior wall* where any of the following conditions exist: 1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of *fire separation distance*. 2. The building has an area of not more than 1,000 square feet (93 m^2) on any floor. 3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck or slab and supporting construction, is constructed entirely of noncombustible materials. 4. One-hour fire-resistance-rated *exterior walls* that terminate at the underside of the roof sheathing, deck or slab, provided: 4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220 mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall. 4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction. 4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire resistance-rated *exterior wall* for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall. 4.4. The entire building shall be provided with not less than a Class B roof covering.
Exception: A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or *approved* fire-retardant-treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the common walls. 3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.	5. In Groups R-2 and R-3 where the entire building is provided with a Class C roof covering, the *exterior wall* shall be permitted to terminate at the underside of the roof sheathing or deck in Type III, IV and V construction, provided: 5.1. The roof sheathing or deck is constructed of *approved* noncombustible materials or of *fire-retardant-treated wood* for a distance of 4 feet (1220 mm); or 5.2. The roof is protected with 0.625-inch (16 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm). 6. Where the wall is permitted to have at least 25 percent of the *exterior wall* areas containing unprotected openings based on *fire separation distance* as determined in accordance with Section 705.8.

RB84-13

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because: they felt that attic vents are necessary; this does not compromise fire safety significantly; and because representatives of NAHB testified that less than 1% of fires are related to fires entering adjacent building through soffit vents.

Assembly Action: **None**

RB86-13

Final Action: AS AM AMPC____ D

RB88-13
R302.4.2

Proposed Change as Submitted

Proponent: Mark Nowak, M Nowak Consulting LLC, representing Steel Framing Alliance

Revise as follows:

R302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.

Exceptions:

1. Membrane penetrations of maximum 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m^2) in area provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m^2) in any 100 square feet (9.29 $m)^2$ of wall area. The annular space between the wall membrane and the box shall not exceed $^1/_8$ inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:
   1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities;
   1.2. By a horizontal distance of not less than the depth of the wall cavity when the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
   1.3. By solid fire blocking in accordance with Section R302.11;
   1.4. By protecting both boxes with listed putty pads; or
   1.5. By other listed materials and methods.
2. Membrane penetrations by listed electrical boxes of any materials provided the boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The annular space between the wall membrane and the box shall not exceed $^1/_8$ inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:
   2.1. By the horizontal distance specified in the listing of the electrical boxes;
   2.2. By solid fireblocking in accordance with Section R302.11;
   2.3. By protecting both boxes with listed putty pads; or
   2.4. By other listed materials and methods.
3. The annular space created by the penetration of a fire sprinkler provided it is covered by a metal escutcheon plate.
4. <u>Ceiling membranes of 1- and 2-hour fire-resistant assemblies are permitted to be interrupted by wall assembly double wood top plates, or steel top tracks complying with Sections 702.3.3 or R603.2.1, where the wall assembly complies with all of the following:</u>
   <u>4.1 The wall assembly is sheathed with Type X gypsum board,</u>
   <u>4.2 All penetrations through the top plate or track are protected in accordance with Section R302.4.1 and</u>
   <u>4.3 The ceiling membrane is installed tight to the top plate or track.</u>

Reason: This proposal is consistent with approved proposal FS76-12 for the 2015 IBC. However, it is inclusive of both wood top plates and steel top tracks. This proposal is needed only for the stacked duplex case in the IRC where the floor may be supported by a wall having at least equivalent fire resistance (R302.3.1) or where non-loadbearing walls are framed prior to installation of the membrane as is often necessary to route mechanical and electrical equipment. Thus, penetrations through the top plate or track are required to be protected per Section R302.4.1 to maintain the integrity and intent of the fire resistance requirement of floors separating stacked duplexes.

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

R302.4.2-RB-NOWAK

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal because the proponent requested disapproval and because the committee felt that the proposal might work for 1-hour ratings, but not 2-hour ratings. Penetrations in and out of the wall and through floor assemblies need to be addressed. This should be improved and brought back in the public comment period.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.

Exceptions:

1. Membrane penetrations of maximum 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m2) in area provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m2) in any 100 square feet (9.29 m)2 of wall area. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:
   - 1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities;
   - 1.2. By a horizontal distance of not less than the depth of the wall cavity when the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
   - 1.3. By solid fire blocking in accordance with Section R302.11;
   - 1.4. By protecting both boxes with listed putty pads; or
   - 1.5. By other listed materials and methods.
2. Membrane penetrations by listed electrical boxes of any materials provided the boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:
   - 2.1. By the horizontal distance specified in the listing of the electrical boxes;
   - 2.2. By solid fireblocking in accordance with Section R302.11;
   - 2.3. By protecting both boxes with listed putty pads; or
   - 2.4. By other listed materials and methods.
3. The annular space created by the penetration of a fire sprinkler provided it is covered by a metal escutcheon plate.
4. Ceiling membranes of 1- ~~and 2-~~hour fire-resistant assemblies are permitted to be interrupted by wall assembly double wood top plates, ~~or steel top tracks complying with Sections 702.3.3 or R603.2.1~~, where the wall assembly complies with all of the following:
   - 4.1. The wall assembly is sheathed with Type X gypsum board,
   - 4.2. All penetrations through the top plate ~~or track~~ are protected in accordance with Section R302.4.1 and
   - 4.3. The ceiling membrane is installed tight to the top plate ~~or track~~.

Commenter's Reason: As I testified at the Dallas hearings there are no approved tested firestopping assemblies that can be used on a steel top plate that does not have a gypsum membrane that extends over the top of the steel top plate. The balance of the original code change is a good one in that it will match the same language that is now in the 2012 and 2015 IBC. I was the original proponent of getting this type of language into the IBC and encourage the membership in approving this code change as modified above.

I am also proposing to delete the reference to a 2 hour rated assembly since you would never have this condition under the IRC – this would effectively only apply to a stacked duplex which would have a 1 hour rated horizontal assembly.

Public Comment 2:

Dennis Pitts, representing American Wood Council, requests Disapproval.

Commenter's Reason: In residential construction it is common for joists to bear directly on the top plates of the wall below. Continuity of a fire-rated floor assembly is assumed from plate to plate, and there are no code provisions requiring uninterrupted continuity at the floor/wall intersection. If the wall/floor intersection needs protection, that question should be addressed more directly. This is adding an exception to a code requirement that doesn't exist, and by so doing implies that the intersection is already regulated as a membrane penetration. However, it is not, nor should it be.

If special protection is needed for steel top plates in this application, a positive requirement for their protection could be introduced into the code.

RB88-13

Final Action: AS AM AMPC____ D

RB90-13
R302.5.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1-3/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1-3/8 inches (35 mm) thick, or 20-minute fire-rated doors~~, equipped with a self-closing device~~.

Reason: The IRC Committee and the ICC membership has consistently opposed closers on the door between a garage and dwelling in the past for a number of legitimate reasons not the least of which is the danger the closers pose to small children.

The effort to require closers on garage doors continued at the national level every year for perhaps fifteen years or more. Each year the membership denied the request because there was no statistical data to support the requirement and there had been no equivalent requirement in several of the legacy codes without an apparent problem.

During the last code cycle, this proposal was approved but again with erroneous and irrelevant arguments. There was no justification for the change and no evidence that a problem exists. Following is the justification from the fire service for the change published in the monograph during the last cycle.

> ***Reason:*** *There are times when proposed code submittals require a very lengthy substantiation, and then there are times when code change proposals just make sense. I would believe this is one of those times where a code change proposal makes a lot of sense. We are seeking a requirement to install items for very minimal costs yet great life saving potentials.*

If it “just makes sense”, then there should be a justifiable reason for the requirement. If there is no reason, then it is overregulation. The presumption that the door between the house and garage will be left open is not rational. There is no evidence that the cost is minimal, that the benefit is real, or that any life saving would occur. Closers require maintenance and can easily be defeated by the homeowner. There is no standard specified in the code. It is obvious that there was no thought put into the proposal regarding the practicality, the need, or the ability to enforce. The closing force to engage the lock on a gasketed door can potentially be a hazard to young children who may get knocked over by the door or get fingers pinched in the closing side of the door or the latch side of the door upon closing. The vague language provides little guidance to install or approve these devices which can result in greater liability for the builder. Closers on these doors have not been required in many parts of the country for decades and there is no indication that it has created any hazard to life safety in those regions. This is a non-rated door in a non-rated frame in a non-rated wall.

Furthermore, there is no similar requirement for car ports. In fact, the code requires no protection of the wall between a dwelling and a carport. Windows are permitted. Hollow doors with glazing are permitted. Both structures house the same items including motor vehicles. A carport is enclosed on two or fewer sides. A garage is enclosed on more than two sides but one side can be completely open. And no vehicle door is required in either.

This amendment is necessary because it eliminates a potential for injury to small children, there is no data to support that there is a need for this rule, and it eliminates a source of potential liability for builders.

Cost Impact: None

R302.5.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal to create consistency as the language in this section has gone back and forth in various editions of the code. In accordance with the commentary to the IRC, the primary reason for this section is to limit the free flow of carbon monoxide and other products of combustion from entering the living area and that was not addressed at all by the proponent.

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, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: There has never been justification for closers on the door between the garage and the dwelling. There is no statistical evidence to suggest that homes are any safer because of the closers. For every anecdote that a home was saved, there is another anecdote where the closer caused frequent and severe injuries to children or the door was closed by the occupant when they sensed a fire as they had been taught to do since 1st grade.

The IRC Committee disapproved the proposal with the statement that "the primary reason for the section is to limit the free flow of carbon monoxide and other products of combustion from entering the living area…" The reason for the separation between the dwelling and garage has never been a barrier for carbon monoxide entering the home much less a primary one. The title of the section in which this requirement is located is "**FIRE-RESISTANT CONSTRUCTION".** There are no requirements in this section of the code that the membrane on the garage wall nor the door be air tight and serve as a barrier to carbon monoxide.

The requirement for this separation in the legacy codes for decades was as a fire separation and existed long before carbon monoxide became an issue in homes. Furthermore, no one speaking in opposition to the proposal or on the committee offered any evidence to suggest that any health issues are occurring because of these doors being left open and a home being contaminated by carbon monoxide. In fact, it isn't happening.

And for CO to be a problem, two things would need to occur. First, an automobile would need to be left running and unattended for long enough to pollute the air to dangerous levels. Numerous studies now show that the amount of CO given off by modern automobile engines is insufficient to cause a health issue. Second, the door between the garage and the dwelling would need to be left open. The primary reason someone would leave a car running would be to warm the car in a cold climate. If the car is in a cold garage and needed warming, the occupants of the dwelling would not leave the door open and subject themselves to the influx of cold air. To think otherwise lacks logic.

You will likely hear arguments about not changing rules back and forth from year to year. Baloney! That is a really lousy reason to keep a poor code requirement in the code. We should only have reasonable and necessary requirements in the code and shouldn't have to struggle to come up with reasons why they are there.

This is an unnecessary requirement that creates more injuries than it does good. There is no evidence to suggest any benefit. That being said, it is the worst possible code requirement; one that only serves to increase the cost of construction.

Public Comment 2:

Andrew J Hyun, Fire Door Consultant, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between garage and residence shall be equipped with ~~solid wood doors not less than 1-3/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1 3/8 inches (35 mm) thick, or~~ 20-minute fire-rated ~~doors~~ door assemblies, equipped with a self-closing device and fire rated weather seal gasket.

Commenter's Reason:

1. Decision of Committee, to disapprove Rick Davidson's proposal (RB90-13) to remove requirement of closing device, is very reasonable. Proponent, Rick Davidson, stated that "This (the door) is in a non-fire rated wall". However, Table R302.6 of IRC below indicates that (1) minimum ½" gypsum board is required for garage side wall as a separation to residence and (2) minimum ½" gypsum board is required for interior side of exterior walls which is located less than three feet from detached garage. Wall with ½ inch thick gypsum board is a fire rated wall as enclosed UL Directory Design No. U317 or No. U380. Therefore the intension of the IRC is to separate garage from residence with fire rated wall and fire rated opening.

Table R302.6 Dwelling/garage separation (Page 51 of IRC 2012)

Separation	Material
From the residence and attics	No less than ½ -inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage	No less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	No less than ½ -inch gypsum board or equivalent
Garage located less than 3 feet from a dwelling unit on the same lot	No less than ½ -inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

2. Additionally “fire door assembly”, instead of “fire door”, shall be specified in the code. All fire door, door frame and hardware set shall be fire rated for proper protection of opening. The door set would fail to maintain intended fire resistance, when only door is fire rated but door frame is not fire rated components. Currently State of Wisconsin and State of New York require “fire rated door assembly” with fire label attached.
3. Also, the descriptive definition of the fire door in the current code is not fire rated doors. Thickness of most fire door is typically 1-3/4 inch as specified in the enclosed typical fire door listing (20-min steel door by Therma-Tru). Contractor would select least expensive doors as long as the subjected doors comply with code. Less expensive, non-fire rated, doors would be installed, and opening protection would not be established to the level of fire protection intended by IRC code. “20-minute rated fire door assembly” must be required in order to provide adequate fire protection intended.

   Note: Problem of descriptive fire doors in 302.5.1.
   “solid wood doors not less than 1-3/8 inches (35 mm) in thickness”: 1-3/8 inch thick door is not sufficient for 20-min fire protection (fire penetration property). Most wood fire door is 1-3/4 inch in thickness. Stile and Rail doors would be considered as acceptable “solid wood doors” in current code description, however the joint between panel and stile/rail is recessed in thickness (such as only 1 inch thick) and may not sufficient to prevent fire penetration at joint area.
   “solid or honeycomb core steel doors not less than 1 3/8 inches (35 mm) thick”: 1-3/8 inch in thickness is not sufficient to prevent excessive door warp and separation of door from frame. Most of 20-minute rated steel door is 1-3/4 inch thick to prevent excessive door warp. Even 1-3/4 inch thick steel doors made with thin steel skin (such as 25 gauge) is not fire rated door due to the excessive warp of the door under heat.

4. Finally fire rated weather seal gasket should be included in the fire door assembly to prevent smoke infiltration to the living area from the origin of fire (garage). It is well known that spreading of smoke, including carbon monoxide, is the main killer in case of fire.

RB90-13
Final Action: AS AM AMPC____ D

RB94-13

R302.12, R302.12.2 (New)

<u>Proposed Change as Submitted</u>

Proponent: Sean DeCrane, Battalion Chief, representing Cleveland Division of Fire, International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R302.12 Draftstopping. <u>Draftstopping shall be provided in construction in accordance with this section.</u>

<u>R302.12.1 Concealed spaces.</u> In combustible construction where there is usable space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m2). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

<u>R302.12.2. Attics.</u> <u>Draftstopping shall be provided in attics with an area that exceeds 1,500 square feet (92.9 m^2). The draftstopping shall be installed such that each draftstopped area of the attic does not exceed 1,500 square feet (92.9 m^2).</u>

Reason: Void spaces, are areas of potentially large fire growth that can have explosive results for responding and operating fire fighters. We have seen multiple incidents where large single-family residences can simulate commercial size fires due to the large open areas. Modern construction techniques are providing home owners with a number of options including large open spaces. These large floor plans lead to increased amounts of void spaces in the attic and floor systems. When fire travels into these attic spaces, they are fuel enriched by the combustible wood truss and in many instances the sprayed insulation.

With large amounts of oxygen the fire can grow unchecked and on many occasions showing very little evidence on the exterior of amount of fire present. One side discovery of the original Underwriters Laboratories studies on lightweight construction in 2006, was the performance of the plastic ridge vent which when subjected to elevated temperatures would melt and create a seal at the peak of the ridge causing the increased pressures from the fires to push downward on top of operating fire fighters.

We have seen instances where fire fighters have been killed or injured. In 2010 Fire Fighter Kyle Wilson, of Price William County, was killed while performing Search and Rescue operations from a wind driven exterior fire that accumulated in the attic space until it exploded downward trapping Fire Fighter Wilson in the Master Bedroom causing him to burn to death.

In 2012 in Huntington, MD, ten fire fighters were injured, two seriously, when they were investigating the smell of smoke on the second floor. The fire originated in the chimney and travelled into the attic space where it had plenty of air to grow uncontrolled until the building pressure caused the fire to explosively escape from the attic downward on the fire fighters. Fire fighters were forced to dive down the stairwell and out the second story windows causing one fire fighter to break his back.

The author will acknowledge the lack of technical justification at the time of submission. There is current testing being conducted at Underwriters Laboratories and NIST and we hope to have additional test data available at the code hearing in Dallas.

Cost Impact: This proposal will increase the cost of construction

R302.12-RB-DECRANE

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because the proponent acknowledged the current lack of justification for the 3,000 square feet criteria. The committee felt that the attic draftstopping would definitely be an issue. Furthermore, the test data referenced by the proponent has not been completed and, therefore, has not been available for review by the committee.

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, representing Cleveland Division of Fire / International Association of Fire Fighters, requests Approval as Submitted.

Commenter's Reason: Tests are continuing at Underwriters Laboratories, with test results demonstrating a performance time of an exterior wall fire gaining access into the attic space from 2 minutes 30 seconds to over 8 minutes with a combustible wall covering. This is demonstrating the importance of confining these fires once they gain entry into the attic spaces. These attic spaces are not protected with sprinkler systems and have a large volume of available air to sustain burning. If we can limit the available air pocket and provide some compartmentation we can reduce the larger fire growth in the attic space and reduce the danger to the occupants and responding fire fighters.

Public Comment 2:

Steve Orlowski and Tim Ryan, representing National Association Of Home Builders (NAHB) and International Association of Building Officials (IABO), requests Disapproval.

Commenter's Reason: We agree with the committee's action to disapprove the proposed code change based on the lack of technical justification to require draftstopping every 1,500 square feet in attic spaces. While the proponent has given examples of events that have led to the creation of the proposed code change, without some credible research which shows that dividing the attic space into 1,500 square foot compartments will prevent similar events from occurring this is premature. Until UL completes its study of the dynamics of fire growth in attics and the influence it will have on fire mitigation tactics and prevention, we urge the assembly to support the committee's action of disapproval.

RB94-13
Final Action: AS AM AMPC____ D

RB96-13, Part I

R302.13 (New)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC COMMITTEE. PART II WILL BE HEARD BY THE IECC COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Duncan Prahl, IBACOS Inc, representing self (dprahl@ibacos.com)

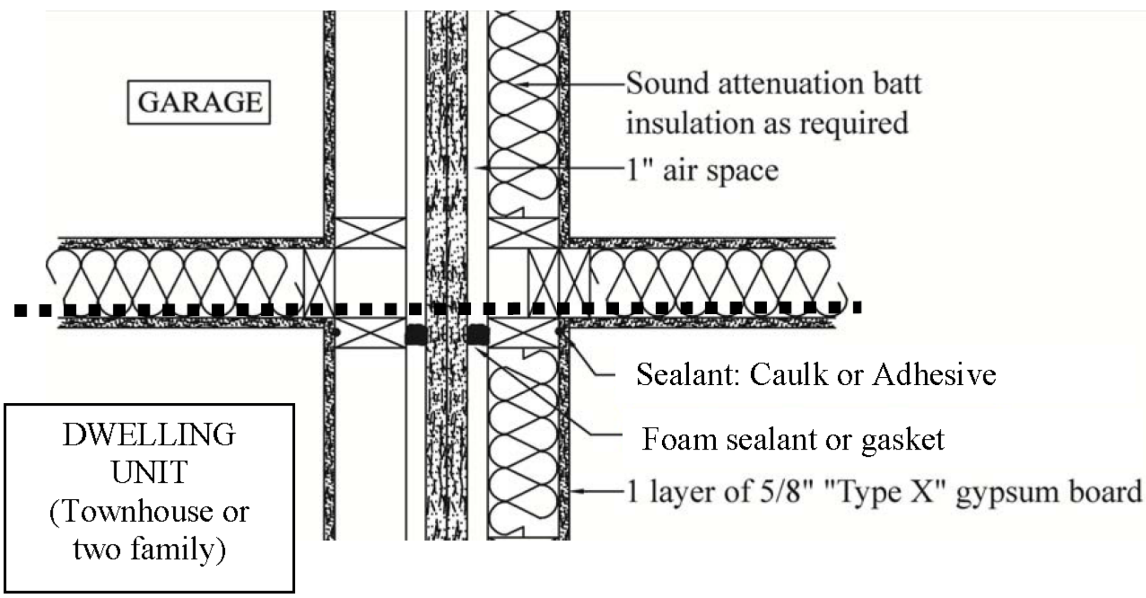
PART I - IRC-RB

Add new Text as follows:

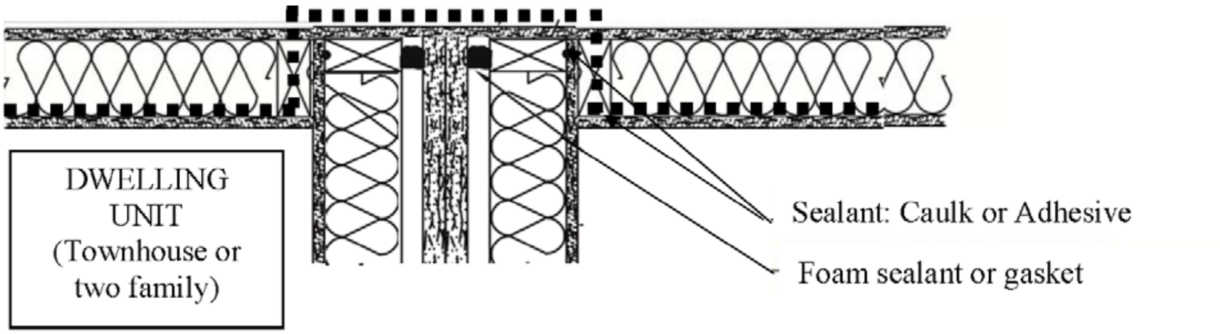
R302.13 Sealants. In combustible construction, sealants that are used to limit air leakage in accordance with Section N1102.4 and Table N1102.4.1.1 shall not be required to comply with ASTM E 136 and shall not be required to be included in the fire tests required in association with the following:
1. Fire resistant assemblies where required by Sections R302.1, R302.2, R302.4, and R302.6;
2. Fireblocking where required by Section R302.11 and
3. Draftstopping where required by Section R302.12.
(Existing Section R302.13 to be renumbered.)

Reason: Many ASTM E119 tested assemblies do not include any sealant materials for airtightness at the location where the assembly intersects the thermal enclosure of the building in the real world. Builders and code officials should be guided specifically on the airsealing that should be included at these locations. The materials used for sealing this location fall under the same criteria as sealants that the committee approved in for sealants used to fireblock annular spaces per R302.11. Many common sealants have an auto ignition temperature that is the same as or higher than the wood framing within the assembly and, as such, would only burn if the wood in the assembly was already on fire.

Examples of locations that are indicative of the need for sealants within fire separation assemblies follow. The heavy dotted line indicated the desired location of the airtightness layer within the constructed assembly as it appears in some typical details:



Two hour separation, plan view at garage



Two hour separation, plan view at exterior wall

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

R302.13 (NEW)-RB-PRAHL

Committee Action Hearing Results

PART I – IRC Building
Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that, if something is part of a fire assembly, it must meet the criteria for that assembly. If you change the assembly, the rating is no longer valid. Section R302.11 in the proposal basically says that compliance with the proposal should not reduce the fire rating, but no justification has been provided to support that. If a building burns down due to fire safety issues, it takes a lot of energy to rebuild. The balance between fire safety and energy concerns are not level. The concept of this proposal may be good, but many details need to be addressed.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Duncan Prahl, IBACOS, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.13 Sealants~~.~~ ~~In combustible construction,~~ Sealants that are used to limit air leakage in accordance with Section N1102.4 and Table N1102.4.1.1 shall meet the *approved material* requirements of Section R302.11. 4. ~~not be required to comply with ASTM E 136 and shall not be required to be included in the fire tests required in association with the following:~~

~~1. Fire resistant assemblies where required by Sections R302.1, R302.2, R302.4, and R302.6;~~
~~2. Fireblocking where required by Section R302.11 and~~
~~3. Draftstopping where required by Section R302.12.~~

(Existing Section R302.13 to be renumbered.)

Commenter's Reason: ASTM E119-00a, section 4.4.4 states that the test method is not applicable to the "Simulation of the fire behavior of joints between building elements such as floor-wall or wall-wall, etc., connections."

The committee was concerned that the proposal would add something to the fire assembly. As the location is not actually part of the assembly, but at the joint between assemblies, this concern should now be addressed. Language has been modified to reflect that the sealant is to be used only at the joint, and not inside the assembly.

The intent of this proposal is to clarify that the location between interior fire assemblies and the building thermal envelope fire assemblies are to be considered a "joint. Since the IRC is silent on the subject of joints as they relate to fire separation assemblies, this language clarifies what is an acceptable material is to meet the requirements of Section N1102.4. As ASTM E119 is not intended to describe the fire behavior of joints, materials that are acceptable in other sections of the code should be considered to be acceptable in this “joint”.

RB96-13, Part I

Final Action: AS AM AMPC____ D

RB96-13, Part II
Table N1102.4.1.1 (R402.4.1.1)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC COMMITTEE. PART II WILL BE HEARD BY THE IECC COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Duncan Prahl, IBACOS Inc, representing self (dprahl@ibacos.com)

PART II - IECC-RE

Revise as follows:

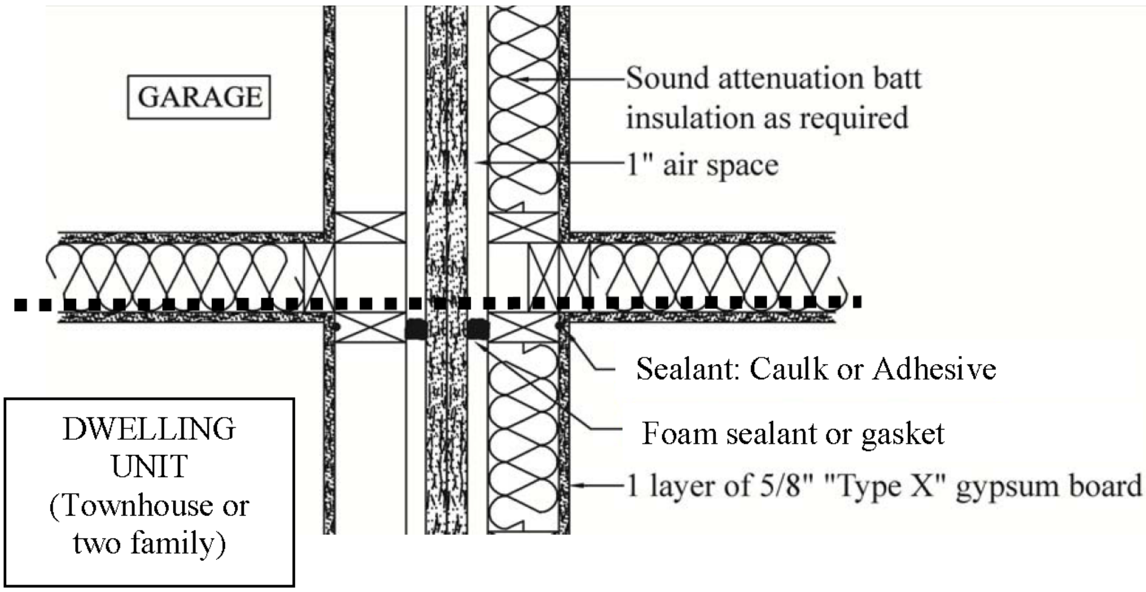
TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

Fire separation assemblies in accordance with *International Residential Code* Sections R302.1, R302.2, R302.4, and R302.6, and fireblocking and draftstopping in accordance with *International Residential Code* Sections R302.11 and R302.12, respectively.	Air sealing shall be provided in all fire separation assemblies where the assembly, fireblocking or draftstopping is part of or intersects the thermal enclosure.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces

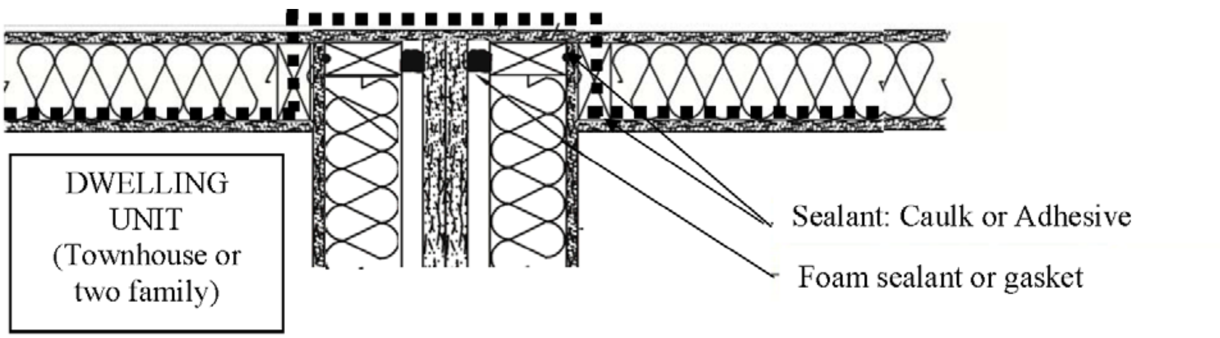
(Portions of table not shown to remain unchanged)

Reason: Many ASTM E119 tested assemblies do not include any sealant materials for airtightness at the location where the assembly intersects the thermal enclosure of the building in the real world. Builders and code officials should be guided specifically on the airsealing that should be included at these locations. The materials used for sealing this location fall under the same criteria as sealants that the committee approved in for sealants used to fireblock annular spaces per R302.11. Many common sealants have an auto ignition temperature that is the same as or higher than the wood framing within the assembly and, as such, would only burn if the wood in the assembly was already on fire.

Examples of locations that are indicative of the need for sealants within fire separation assemblies follow. The heavy dotted line indicated the desired location of the airtightness layer within the constructed assembly as it appears in some typical details:



Two hour separation, plan view at garage



Two hour separation, plan view at exterior wall

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

R302.13 (NEW)-RB-PRAHL

Committee Action Hearing Results

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This area related to thermal envelope installation could easily be overlooked. Therefore the installation table is a good place to mention this.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Duncan Prahl, IBACOS, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

Joints between fire separation assemblies in accordance with International Residential Code Sections R302.1, R302.2, R302.4, and R302.6, and fireblocking and draftstopping in accordance with International Residential Code Sections R302.11 and R302.12, respectively.	Air sealing shall be provided ~~in all~~ at the joint between fire separation assemblies that are part of the *building thermal envelope* and fire separation assemblies required by Section R302.2 ~~where the assembly, fireblocking or draftstopping is part of or intersects the thermal enclosure.~~
Garage separation	Air sealing shall be provided between the garage and conditioned spaces

Commenter's Reason: ASTM E119-00a, section 4.4.4 states that the test method is not applicable to the "Simulation of the fire behavior of joints between building elements such as floor-wall or wall-wall, etc., connections."

The committee was concerned that the proposal would add something to the fire assembly. As the location is not actually part of the assembly, but at the joint between assemblies, this concern should now be addressed. Language has been modified to reflect that the sealant is to be used only at the joint, and not inside the assembly.

The intent of this proposal is to clarify that the location between interior fire assemblies and the building thermal envelope fire assemblies are to be considered a "joint. Since the IRC is silent on the subject of joints as they relate to fire separation assemblies, this language clarifies what is an acceptable material is to meet the requirements of Section N1102.4. As ASTM E119 is not intended to describe the fire behavior of joints, materials that are acceptable in other sections of the code should be considered to be acceptable in this "joint".

RB96-13, Part II

Final Action: AS AM AMPC____ D

RB97-13, Part I
R303.1

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-RB COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Joe Lstiburek, Building Science Corporation; Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com); Thomas D. Culp, Birch Point Consulting, representing the Glazing Industry Code Committee

PART I-IRC-RB

Revise as follows:

R303.1 Habitable rooms. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

~~1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system is installed in accordance with Section M1507.~~

~~2~~1. The glazed areas need not be installed in habitable rooms without exterior walls, where an opening is not required by Section R310, mechanical ventilation is installed in accordance with Section M1507, and ~~Exception 1 above is satisfied and~~ artificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

~~3~~2. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

Reason: Experience from decades of work with builders confirms that achieving a home air tightness of around 3 to 5 ACH 50 is not difficult if the builder just addresses the "big holes" during construction.[1] The practice of addressing big holes was initially tackled by builders to reduce call backs associated with comfort complaints from homebuyers. Once builders figured out that plugging the big holes reduced callbacks, the practice went mainstream. In 2009, the steps required to plug the big holes were codified in the mandatory air barrier table (IRC Table N1102.4.2; IECC Table R402.4.1.1). At the end of 2012, 55% of the states had adopted the 2009 IECC or more stringent. Fast forward to 2015, and 76% of states (which accounted for 86% of the single family starts in 2011) are expected to have adopted the 2009 IECC or more stringent.[2]

This timeline shows that building tight (3 to 5 ACH 50) has become the new standard, regardless of whether or not a builder confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it can have on indoor air quality if mechanical ventilation is not provided; and there is broad consensus that air quality begins to be compromised at or below 5 ACH 50 if mechanical ventilation is not provided. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

With today's typical, code-minimum construction resulting in homes that easily achieve 3 to 5 ACH 50, a blower door test is not needed to confirm that these homes are less than 5 ACH 50 and in need of mechanical ventilation. At this point, mechanical ventilation is needed to provide minimum acceptable air quality for code-minimum construction. This change will ensure that the comfortable, energy efficient homes that builders are now building are also provided with minimum indoor air quality.

At the same time, we do not want to discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

References:

1. J.W. Lstiburek, "Just Right and Airtight" ASHRAE Journal, May 2011.
2. U.S. DOE Building Energy Codes Program, "Status of State Energy Code Adoption, Residential: Projected" accessed from http://www.energycodes.gov/adoption/states on Nov 29, 2012.

Cost Impact: Because new standard construction practices will typically result in building envelope tightness levels of 3 to 5 ACH 50, these dwellings should already be provided with mechanical ventilation (based on R303.4). So, no additional costs should be incurred for mechanical ventilation systems. Also, removing the loophole of trading off windows for mechanical ventilation in habitable rooms is not expected to affect the practice of the overwhelming majority of builders who tend towards more windows, versus less, based on consumer demand.

R303.1-RB-CULP-LSTIBUREK-MOORE

Committee Action Hearing Results

PART I – IRC Building
Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt the proposal does not work well without Part II, which was disapproved. The proponent points to another code section in their reason statement, but that section basically requires you to take a guess at what the air rates are, or requires a blower door test, before you can decide whether you need mechanical ventilation or not. That is after the fact and does not seem to be the proper order. Finally, there is no reason that a media room must be on an exterior wall.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Submitted.

Commenter's Reason: The specification of mechanical ventilation should not be used to over-write requirements for operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

RB97-13, Part I

Final Action: AS AM AMPC____ D

RB97-13, Part II
R303.4, M1507.1

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-RB COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Joe Lstiburek, Building Science Corporation; Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com); Thomas D. Culp, Birch Point Consulting, representing the Glazing Industry Code Committee

PART II-IRC-RM

Revise as follows:

R303.4 Mechanical ventilation. ~~Where the air infiltration rate of a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the d~~Dwelling unit<u>s</u> shall be provided with <u>local exhaust and</u> whole-house mechanical ventilation in accordance with Section M1507~~.3~~.

M1507.1 General. ~~Where l~~<u>L</u>ocal exhaust ~~or~~ <u>and</u> whole-house mechanical ventilation ~~is provided, the equipment~~ <u>systems</u> shall be designed <u>and installed</u> in accordance with this section.

Reason: Experience from decades of work with builders confirms that achieving a home air tightness of around 3 to 5 ACH 50 is not difficult if the builder just addresses the "big holes" during construction.[1] The practice of addressing big holes was initially tackled by builders to reduce call backs associated with comfort complaints from homebuyers. Once builders figured out that plugging the big holes reduced callbacks, the practice went mainstream. In 2009, the steps required to plug the big holes were codified in the mandatory air barrier table (IRC Table N1102.4.2; IECC Table R402.4.1.1). At the end of 2012, 55% of the states had adopted the 2009 IECC or more stringent. Fast forward to 2015, and 76% of states (which accounted for 86% of the single family starts in 2011) are expected to have adopted the 2009 IECC or more stringent.[2]

This timeline shows that building tight (3 to 5 ACH 50) has become the new standard, regardless of whether or not a builder confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it can have on indoor air quality if mechanical ventilation is not provided; and there is broad consensus that air quality begins to be compromised at or below 5 ACH 50 if mechanical ventilation is not provided. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

With today's typical, code-minimum construction resulting in homes that easily achieve 3 to 5 ACH 50, a blower door test is not needed to confirm that these homes are less than 5 ACH 50 and in need of mechanical ventilation. At this point, mechanical ventilation is needed to provide minimum acceptable air quality for code-minimum construction. This change will ensure that the comfortable, energy efficient homes that builders are now building are also provided with minimum indoor air quality.

At the same time, we do not want to discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

References:

1. J.W. Lstiburek, "Just Right and Airtight" ASHRAE Journal, May 2011.
2. U.S. DOE Building Energy Codes Program, "Status of State Energy Code Adoption, Residential: Projected" accessed from http://www.energycodes.gov/adoption/states on Nov 29, 2012.

Cost Impact: Because new standard construction practices will typically result in building envelope tightness levels of 3 to 5 ACH 50, these dwellings should already be provided with mechanical ventilation (based on R303.4). So, no additional costs should be incurred for mechanical ventilation systems. Also, removing the loophole of trading off windows for mechanical ventilation in habitable rooms is not expected to affect the practice of the overwhelming majority of builders who tend towards more windows, versus less, based on consumer demand.

R303.1-RB-CULP-LSTIBUREK-MOORE

Committee Action Hearing Results

PART II – IRC – Mechanical

Committee Action: Disapproved

Committee Reason: Builders need a choice. The proposal will require mechanical ventilation whether or not it is needed. Section N1102.4.1.2 states how to provide outdoor air ventilation and this proposal deletes the reference to that section.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R303.4 Mechanical ventilation. Dwelling units shall be provided with ~~local exhaust and whole-house~~ mechanical ventilation in accordance with Section M1507.

M1507.1 General. ~~Local exhaust and whole-house m~~Mechanical ventilation systems shall be designed and installed in accordance with this section.

Commenter's Reason: In Dallas, the committee disapproved this proposal because they said that "Builders need a choice. The proposal will require mechanical ventilation whether or not it is needed." However, the problem with the current language is that 75% of new residential starts are currently being built to the 2009 or 2012 IECC, and that *all* of these homes are subject to the mandatory air sealing requirements of Table R402.4.1.1. Multiple, independent studies have shown that a large percentage of these homes are being built tighter than 5 ACH 50, meaning that mechanical ventilation IS needed according to the 2012 IRC (R303.4).[3,4]

The problem is that despite being needed, mechanical ventilation is not required for these homes by the IRC because the requirement is based on an optional test. We already know that new residential starts across the nation are being built to very tight standards based on widespread adoption of the 2009 IECC, regardless of whether they're being tested. The way the code is currently written, it doesn't matter how tight the home is, because as long as the home isn't tested, no mechanical ventilation is required.

The IRC needs to respond to this current problem of building tight homes with inadequate ventilation. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts. Does anyone remember the sick building syndrome of the 1970s?[6]

The solution is to require mechanical ventilation for all new homes, understanding that new homes are tight homes. End the "don't ask; don't tell" policy for mechanical ventilation of tight homes, and provide home owners with the opportunity to have a safer and healthier environment.

At the same time, we do not want to discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

References:

1. J.W. Lstiburek, "Just Right and Airtight" ASHRAE Journal, May 2011.
2. U.S. DOE Building Energy Codes Program, "Status of State Energy Code Adoption, Residential: Current," http://www.energycodes.gov/adoption/states. Data overlaid with NAHB Single Family Housing Starts Forecast, Oct 2012.

3. Ecotope, Inc, 2011 Residential Building Stock Assessment: Single-Family Characteristics And Energy Use, Prepared for Northwest Energy Efficiency Alliance, http://neea.org/docs/reports/residential-building-stock-assessment-single-family-characteristics-and-energy-use.pdf?sfvrsn=8.
4. NMR Group, Massachusetts 2011 Baseline Study of Single-family Residential New Construction, Prepared for various MA utilities, http://www.ma-eeac.org/Docs/8.1_EMV%20Page/2012/2012%20Residential%20Studies/Final-MA-Baseline%20Study%20of%20Single%20Family%20Residential%20New%20Contruction%208-16-12.pdf.
5. LBL Residential Diagnostics Database, http://resdb.lbl.gov/#.
6. EPA. Indoor Air Facts No. 4, Sick Building Syndrome, http://www.epa.gov/iaq/pdfs/sick_building_factsheet.pdf.

RB97-13, Part II

Final Action: AS AM AMPC____ D

RB99-13
R303.1

Proposed Change as Submitted

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R303.1 Habitable rooms. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

~~1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system is installed in accordance with Section M1507.~~

~~2~~1. The glazed areas need not be installed in rooms ~~where Exception 1 above is satisfied and~~ without *exterior walls* where all of the following conditions are met:
   1.1 An opening is not required by Section R310.
   1.2 A~~a~~rtificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.
   1.3 A whole-house mechanical *ventilation* system is installed in accordance with Section M1507.

~~3~~2. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

Reason: While whole-house mechanical ventilation systems can provide adequate ventilation when in operation, natural ventilation should still be provided as an option and more importantly, needs to be provided as a back-up in the event of power outages, especially when power outages can be prolonged for many hours or many days, or for problems that may occur with the ventilation system, or for in-home events such as cooking or burning food when supplemental natural ventilation may be needed or desired. Therefore, a blanket exception should not be provided.

The amendment to Exception 2 is proposed to maintain an exception for providing glazed areas in rooms (such as certain basement rooms) with no *exterior walls* as defined by the IRC provided they meet all of the same conditions required by the current provisions in order for the exception to R303.1 to apply.

Cost Impact: This code change may increase the cost of construction in some cases where fixed glazing may have been used in lieu of openable glazing and then depending on the glazing options being considered.

R303.1 #4-RB-INKS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proponent's reason statement promotes retaining natural ventilation as an option or as a supplement to whole house ventilation. However, this proposal would make the whole house ventilation redundant except in a room without exterior walls. Only anecdotal evidence is provided to support such a change in philosophy. If the mechanical component of another proposed change that required mechanical ventilation had passed, the committee may have been able to support this proposal. The general logic is good, but it is too architecturally restrictive as proposed. Under the performance path in the energy code, given proposals passed at these hearings previously, you can go above 3 or 5 ACH50 using trade-offs under the performance path.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Jeff Inks, representing Window & Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: We are requesting approval as submitted for the reasons stated in our proposal above, which we do not believe are anecdotal. In addition and in response to the committee's other reasons for disapproval: (1) This proposal does not retain or create an option for using natural ventilation in lieu of whole house mechanical ventilation where it may be or is required. The intent of the proposal is to ensure natural ventilation is provided as an option in most habitable rooms even when whole house mechanical ventilation is provided. (2) Ensuring natural ventilation is also provided as a supplement to whole house ventilation is precisely the intent of the proposal which better provides for ensuring occupant comfort, health and safety. (3) We do not believe limiting the exception makes whole house ventilation redundant for the reasons just stated. Both serve important purposes. (4) We respect the concern/opinion that limiting the exception to where glazed areas and natural ventilation do not have to be provided may be too architecturally restrictive however, we believe the exception should be more limited than it currently is, again for the reasons stated. (5) Even if 3 or 5 ACH (respectively) are exceeded, that does not alleviate the need for the providing adequate natural ventilation.

For these reasons in addition to the reasons provided in the proposal, we urge approval as submitted.

Public Comment 2:

Dr. Thomas D. Culp, Birch Point Consulting LLC, representing Glazing Industry Code Committee, requests Approval as Submitted.

Commenter's Reason: We were a co-proponent of RB97, but are instead asking for you to approve RB99 As Submitted as a simpler solution to the issue. The debate on RB97 Part 2 whether or not to require mechanical ventilation seemed to confuse the issue in RB97 Part 1 and this proposal RB99. Contrary to some of the discussion at the preliminary code hearings, this proposal does <u>not</u> require mechanical ventilation. It is simply modifying the exceptions so that <u>*if*</u> mechanical ventilation is installed (especially with tighter homes being required in the energy code), then operable windows should still be installed in accordance with the charging section. This is accomplished by deleting exception 1, and modifying exception 2 so that windows obviously don't need to be installed in interior rooms with no exterior walls.

We believe that much of the discussion of this proposal was confused with issues in other proposals. For example, the committee statement that this proposal is "too architecturally restrictive" simply does not make sense. This proposal does not cause a design change of the home layout – it simply requires that a portion of the windows that *already* must be installed to satisfy section R303.1 be operable windows, and not switched out for all fixed windows.

Mechanical ventilation is not foolproof, and the code should not discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control his or her own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout).

We ask that you vote "NO" on the initial motion for disapproval, and then to vote "YES" on a motion to approve RB99 as-submitted.

Public Comment 3:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: The 2012 IECC and 2012 IRC require that the air leakage of the building thermal envelope of homes be less than 3 Air Changes per Hour (ACH) when tested at 50 Pa. The 2012 IRC requires a whole house mechanical ventilation system in homes with less than 5 ACH at the same pressure differential.

The 2012 IRC, and earlier editions of the IRC, require windows for natural light and ventilation in the home. An exception is given when artificial light and whole house ventilation are provided.

The tighter air leakage requirements of the 2012 IRC and 2012 IECC would require whole house mechanical ventilation. This would then put into place the exception to the natural ventilation requirement of the IRC. Therefore, if a jurisdiction is enforcing the 2012 IECC without amendment the building must install a whole house mechanical ventilation system and no natural ventilation would be required.

Such a scenario could create significant health and life safety hazards in the home. Relying entirely upon a mechanical ventilation system to provide sufficient oxygen for the occupants to breath, sufficient combustion air for all fuel fired appliances to burn properly, sufficient air movement to prevent the growth of mold, sufficient air changes to remove harmful bacteria and viruses that may have been brought into the home, etc. could significantly impact human life even if the mechanical system operated as intended. If the mechanical system were to fail the results could be catastrophic.

It is important that sufficient means of natural ventilation be maintained in homes, particularly when considered with the increased requirements for air tightness of the building thermal envelope in the 2012 IECC and 2012 IRC.

RB99 keeps an exception to the requirement for natural ventilation when mechanical ventilation is required, but now limits it to specific spaces where it is not practical to provide natural ventilation. Specifically, the exception is limited to interior rooms that do not have exterior walls, are not required to have emergency escape and rescue openings, and which are provided with sufficient artificial lighting.

Limiting reliance upon a mechanical system in the home to provide adequate fresh air to these specific spaces maintains the life safety of the IRC. Since reliance upon natural ventilation in low rise residential construction is consistent with current practice RB99 would not contribute to the cost of a new home significantly.

RB99-13

Final Action: AS AM AMPC____ D

RB100-13
R303.4

Proposed Change as Submitted

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com), Jeremiah Williams representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise as follows:

R303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is ~~less than~~ 5 air changes per hour or less when tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3.

Reason (Moore): The current language is inconsistent with N1103.5, which requires mechanical ventilation for all dwellings, and also requires dwellings in climate zone 1 and 2 to have an air tightness “not exceeding” 5 ACH 50. By changing this language to 5 ACH or less, “the two sections are brought closer into alignment.

Reason (Williams) : Chapter R4 of the International Energy Conservation Code and Chapter 11 of the IRC require air leakage to be equal or less than 5 air changes per hour in climate zones 1 and 2, with lower rates required in other climate zones. This minor code change creates consistency where all buildings constructed to the air tightness levels of the IECC and IRC must have whole house mechanical ventilation systems.

Cost Impact (Moore): There is no additional cost, as mechanical ventilation is already required for these dwellings based on section N1103.5.

Cost Impact (Williams): The code change proposal will increase the cost of construction only if tested air leakage in climate zones 1 and 2 is exactly 5 air changes per hour.

R303.4-RB-MOORE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal increases the cost of construction and takes away the ability to avoid having a whole- house ventilation system.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Mike Moore, P.E., Newport Ventures, representing Broan-NuTone, requests Approval as Submitted.

Commenter’s Reason: In Dallas, the committee disapproved this proposal because they said it, “increases the cost of construction and takes away the ability to avoid a whole-house ventilation system.” This statement shows a misunderstanding on the committee’s part regarding the intent of this section and the limitations of blower door testing.

First, the intent of this section is to require that buildings that are built to the strict air tightness requirements of the IECC are provided with whole-house mechanical ventilation. The current language does not reflect the original intent because it introduces a loop hole for buildings that test to exactly 5.0 ACH 50. The difference in natural air changes between a building that has an air tightness of 5.0 ACH 50 and 4.9 ACH 50 is ridiculously small when taken over the course of the year, and there is no basis to say that a home at 5 ACH 50 should not need ventilation, whereas the 4.9 ACH 50 home does. In other words, we have a loop hole in the code with no technical basis whatsoever.

Another problem with this loop hole (besides the fact that there is no technical basis to justify it) is that specifications of mechanical ventilation systems happen far in advance of when the air tightness test is performed. It's a ridiculous proposition for a builder to plan to achieve exactly 5.0 ACH 50 on homes. The only way for a builder to plan for and consistently achieve a 5 ACH 50 on each home he builds is either to falsify the results or to build tighter than 5 ACH 50 and then punch holes in the envelope until the building leaks at just the right rate. By keeping the language the way that this is, you're incentivizing builders to follow one of these two paths.

Please approve this proposal as submitted to close the loop hole, provide consistency between the IRC and IECC, and stop incentivizing bad building practices.

Public Comment 2:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: Chapter R4 of the International Energy Conservation Code and Chapter 11 of the IRC require air leakage to be 5 air changes per hour or less in climate zones 1 and 2, with lower rates required in other climate zones. This minor code change creates consistency by imposing the same whole-house mechanical ventilation requirements on all buildings constructed to the air tightness levels of the IECC and IRC.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

RB100-13

Final Action: AS AM AMPC____ D

RB101-13
R303.5.1

Proposed Change as Submitted

Proponent: David Hall, CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise text as follows:

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks~~, except as otherwise specified in this code~~. ~~Where a source of contaminant is located within 10 feet (3048 mm) of an intake opening, such opening shall be located a minimum of 3 feet (914 mm) below the contaminant source~~.

For the purpose of this section, the exhaust from *dwelling* unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

<u>**Exceptions:**</u>

1. <u>The 10 foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.</u>
2. <u>Separation distances for appliance vents shall be as allowed in Chapters 18 and 24.</u>

Reason: This proposal is text cleanup**.** The phrase "except as otherwise specified in this code" is not user-friendly since it offers no guidance as to where something else is specified. The new exception # 2 provides the exact text for what is otherwise specified. New exception # 1 is just the original last sentence of this section reworded into an exception format, because it is actually an exception to the 10 foot rule.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

R303.5.1-RB-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Paul Rimel, City of Staunton, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks.

For the purpose of this section, the exhaust from *dwelling* unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

Exceptions:

1. The 10 foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.
2. ~~Separation distances for appliance vents shall be as allowed in Chapters 18 and 24.~~ <u>Vents and chimneys swerving fuel-burning appliances shall be terminated in accordance with the applicable provisions of Chapter 18 and 24.</u>
3. <u>Clothes dryer exhaust ducts shall be terminated in accordance with M1502.3.</u>

Commenter's Reason: RB101-13 does not reference the clothes dryer termination requirements found in M1502.3 and neither does the next section R303.5.2 (Exhaust openings). The 2nd sentence of the reason statement says "The new exception #2 provides the exact text for what is otherwise specified", however, no exception has been included that references the dryer exhaust separation distances found in Chapter 15. Deleting the current language "except as otherwise specified in the code" will only serve to further reduce the likelihood that users of the code will know to look elsewhere for the dryer termination requirements unless #3 is added to the list of exceptions.

The current wording of this proposal will cause many users of the code to think a dryer exhaust is required to meet the more restrictive provisions of R303.5.1 when it's actually M1502.3 that regulates the minimum distance a dryer exhaust duct is permitted to terminate from building openings. Per M1502.3, a dryer exhaust is only required to terminate 3 feet in any direction from building openings unless stated otherwise in the manufacturer's installation instruction. However, the use of R303.5.1 would require a 10 foot horizontal or 3 foot vertical separation for a type of non-hazardous/noxious exhaust that's already defined in the IMC as environmental air.

In the majority of cases, it would be very difficult to terminate a clothes dryer exhaust at least 10 feet horizontally or 3 feet vertically from all building openings in conventional residential construction and the common practice of terminating through a ground floor band board would be virtually eliminated in houses with crawlspaces due to the proximity of nearby crawlspace vents.

Exception #2 has been modified for clarity.

RB101-13

Final Action: AS AM AMPC____ D

RB102-13
R303.7, R303.7 (New), R303.7.1, R303.8 (New)

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

~~**R303.7 Stairway illumination.** All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 footcandle (11 lux) measured at the center of treads and landings. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a *basement* from the outside *grade* level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.~~

> ~~**Exception:** An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.~~

~~**R303.7.1 Light activation.** Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has six or more risers. The illumination of exterior stairways shall be controlled from inside the *dwelling* unit.~~

> ~~**Exception:** Lights that are continuously illuminated or automatically controlled.~~

R303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 foot-candle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers.

> **Exception:** A switch is not required where remote, central, or automatic control of lighting is provided.

R303.8 Exterior door illumination. At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each exterior door having grade level access, including exterior stairways providing access to a basement.

> **Exception:** A switch is not required where remote, central, or automatic control of lighting is provided.

(Renumber subsequent sections)

Reason: This section is proposed for revision for one reason – it is confusing. The first sentence says that all interior and exterior stairways, including treads and landings, shall be illuminated. The next two sentences state that interior stairs must have lights near the landings and provide a minimum of 1 foot-candle of light. Then the next sentence states that exterior stairs must be provided with a light source in the immediate vicinity of the top landing but seems to exclude treads and landings. So, going back to the first sentence, the code says exterior stairs need landings and tread illuminated. Now just the top landing is illuminated for exterior stairs. Which one is it? The reference to 1 foot-candle of light is only applicable to interior stairs. It seems there is no standard for exterior stairs. But some code officials apply the 1 foot-candle standard to exterior stairs and others do not. Some code officials require exterior stairs to be illuminated along their entire length. Others only require light at the top landing. Then there is the exception that appears to apply only to interior stairs but can be misconstrued to support the contention that exterior stairs must be lit for their entire length.

Furthermore, the code requires the light source be in specific locations and meet certain intensities. If the intensity is met, what difference does it make where the light source is? The text referencing the location of the light source for interior stairs is proposed for deletion since the interest is in the amount of light on the walking surface, not on the light location.

The electrical code will require a switched light at exterior doors but that may not illuminate exterior stairs. This proposal would not waive any requirement found in the electrical code but there seems to be a conflict between what could be argued is the intent of R303.7, which is to illuminate exterior stairs, and the electrical code which only requires illumination of the exterior side of exterior doors having access to grade.

E3903.3 Additional locations. *At least one wall-switch-controlled lighting outlet shall be installed in hallways, stairways, attached garages, and detached garages with electric power.* ***At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each outdoor egress door having grade level access****, including outdoor egress doors for attached garages and detached garages with electric power. A vehicle door in a garage shall not be considered as an outdoor egress door. Where one or more lighting outlets are installed for interior stairways, there shall be a wall switch at each floor level and landing level that includes an entryway to control the lighting outlets where the stairway between floor levels has six or more risers.*

Exception: *In hallways, stairways, and at outdoor egress doors, remote, central, or automatic control of lighting shall be permitted.*

The proposed revisions create separate sections for interior stairways and exterior doorways. It eliminates a term that is difficult to enforce - "immediate vicinity". It uses the same text found in the electrical code to identify the light location at exterior doors and the exception addressing controls. Some text is editorially revised to eliminate repetitive language but the basic intent is left unchanged. The light levels and exceptions are retained as they are in the current rule. It is believed that this change helps to eliminate some confusion and improve uniformity of application and creates consistency between the building and electrical portions of the IRC.

Cost Impact: None

R303.7-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it should include language that requires that the light must shine on the stair.

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, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 foot-candle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers.

Exception: A switch is not required where remote, central, or automatic control of lighting is provided.

R303.8 Exterior ~~door~~ stairway illumination. ~~At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each exterior door having grade level access, including exterior stairways providing access to a basement~~. Exterior stairways shall be provided with an artificial light source located at the top landing of the stairway. Exterior stairways providing access to a *basement* from the outside *grade* level shall be provided with an artificial light source located at the bottom landing of the stairway.

~~**Exception:** A switch is not required where remote, central, or automatic control of lighting is provided.~~

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: This proposal was presented as an ***editorial*** revision to the stair illumination requirements which is necessary to reduce the confusion that is occurring with application of the rule and to prevent a jurisdiction from finding themselves deep in the prosecution of a violation only to determine that no code requirement exists.

In the current code there is one paragraph that regulates both interior and exterior stairways. The proposal seeks to split the paragraph in two with one paragraph regulating interior and one paragraph regulating exterior stairs. There is no intent to change the meaning of the code or expand the requirements. It is believed that the current language confuses the application of stair illumination because of the structure of the paragraph which can lead the reader to believe that there are more to the rules for exterior stair illumination than exists.

Reading the existing text, the first sentence of the paragraph states that interior and exterior stairs must be illuminated. This is the sentence that causes the confusion because it states that exterior stairs must be illuminated. But this directive is clarified in the fourth sentence addressed below.

The second and third sentences provide direction on how ***interior*** stairs must be illuminated. It provides both a prescriptive standard for the location of the light source and a performance standard in the form of a minimum level of illumination. Because meeting the prescriptive standard does not mean meeting the performance standard and vice versa, only a performance standard of 1 foot-candle on each tread and at landings is proposed as the most reasonable and least hazardous.

The fourth (and troublesome) sentence provides direction on how ***exterior*** stairs must be illuminated. Current code language ***only provides that a light source be placed at the top landing of the stairway***. It provides ***no direction on illumination of the stair itself***.

This is supported by the IRC Commentary which follows and which states that "Exterior stairs require illumination only at the top landing".

As was stated at the Dallas hearings, this proposal is not intended to provide illumination on exterior stairs because that is not currently required. That would be another code change. This modification amends the original submittal to include the language in the current code regarding exterior stairs. It does delete references to "immediate vicinity" because the term is undefined and the electrical code provides direction on the location and operation of this light source.

You can argue all you wish that this proposal does not provide for illumination of exterior stairs and you would be right. But you can't get to illuminated exterior stairs with the current rules either.

If you want a light source on the treads of exterior stairs, the current language does not provide that and this proposal does not provide that. Another code change would need to be submitted that directs how exterior stairs should be illuminated and how the illumination would be controlled.

If you should disagree with this line of reasoning, the question that begs asking is "what is the standard of lighting that applies to exterior stairs?" If you believe that exterior stairs must be illuminated and you write a correction notice to that effect, what standard does a compliant lighting system need achieve? If you prosecute this as a violation and you are asked by a judge what standard is necessary to achieve compliance, what code section do you cite? It isn't enough that we just write correction orders for how we thing a building should be built, we need to be able to cite code sections that will withstand challenges on prosecution.

Let's get the language improved so that it is uniformly and rightly applied. If you wish to change expand the rule in the next cycle, please do.

Don't throw the baby out with the bathwater because exterior stair illumination is not provided here. The change is necessary to eliminate the confusion that was readily apparent at the Dallas hearings.

R303.6 Stairway illumination. All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 foot-candle (11 lux) measured at the center of treads and landings. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.

> **Exception:** An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.

❖ Interior and exterior stairs may be illuminated in two ways. The first option is to install artificial lighting in the vicinity of each landing. This would include top, intermediate and bottom landings. For interior stairs, the artificial light must be capable of illuminating treads and landings to not less than 1 foot candle (11 lux). The measurement of 1 foot candle is to be taken at the center of landings and treads. Exterior stairs require illumination only at the top landing. See Commentary Figure R303.6.

Exterior stairs to a basement must have artificial illumination near the bottom landing.

The exception allows the light source to be installed over each individual stair section, thus eliminating the lighting over the landings.

RB102-13

Final Action: AS AM AMPC____ D

RB104-13
R202, R303.8

<u>Proposed Change as Submitted</u>

Proponent: Jonathan Siu, representing City of Seattle Department of Planning & Development (jon.siu@seattle.gov)

Revise text as follows:

SECTION R202
DEFINITIONS

COURT. A <u>minimum 3-foot wide</u> space <u>on the *lot* on which a building is situated</u>, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building. <u>The distance shall be measured at a right angle from the face of the walls.</u>

YARD. ~~An~~ <u>A minimum 3-foot wide</u> open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated. <u>The distance shall be measured at a right angle from the face of the wall.</u>

Revise as follows:

R303.8 Required glazed openings. Required glazed openings shall open directly onto a street or public alley, or a *yard* or court ~~located on the same *lot* as the building~~.

Exceptions:

1. Required glazed openings may face into a roofed porch where the porch abuts a street, *yard* or court and the longer side of the porch is at least 65 percent unobstructed and the ceiling height is not less than 7 feet (2134 mm).
2. Eave projections shall not be considered as obstructing the clear open space of a *yard* or court.
3. Required glazed openings may face into the area under a deck, balcony, bay or floor cantilever provided a clear vertical space at least 36 inches (914 mm) in height is provided.

Reason:

1. The intent of the proposed change to the definition of "court" is to clarify that the court must be on the same property as the building under consideration. This aligns its definition with that for "yard", since "court" only appears in conjunction with "yard" in this code. This proposal also reinforces a general (but unstated) principle in all the I-codes that a building cannot rely on features on an adjacent property to demonstrate compliance with the code. That is, each building must demonstrate compliance within its own property lines unless specifically provided for in the code, such as in Footnote a to Table R302.1(2), or for spaces such as rights-of way.
2. The reason for adding the 3-foot dimension to the definitions for "yard" and "court" is that their minimum dimension is not defined. The 3-foot dimension was chosen because it is consistent with the requirements for minimum separation distance for walls (Table R302.1(2)) and for minimum width of a window well for emergency escape windows (Section R310.2). The requirement to measure the 3 feet perpendicular to the wall is copied from the definition for "Fire Separation Distance" in Chapter 2.

   Such a minimum dimension is needed to define what size yard or court is eligible for consideration of:

   A. What can be called a townhouse. The definition for "townhouse" states the dwelling unit must have a yard or public way on at least two sides. However, because the code does not define a minimum dimension for the yard, a designer can argue that a 1-foot or even a 1-inch distance constitutes a yard, and therefore, dwelling units close to the property line may be considered townhouses. (See Figure 1 below.) That interpretation does not agree with the commonly understood concept of what constitutes a townhouse, so this proposal provides clear guidance to the designer and the building official.

B. What can be used for light and ventilation. Section 303.8 requires that glazed openings used for light and ventilation open into a yard or court. Similar to the argument for "townhouse," a minimum dimension is necessary because the current code provisions could be construed to allow these openings to comply by receiving light and ventilation from a very small space. It stands to reason that some minimum space is required in order to allow sufficient light and ventilation to enter through the opening.

C. What can be used for a pathway to get to a right-of-way from an emergency escape and rescue opening. Section 310.1 requires emergency escape and rescue openings to open "directly into a public way, or to a yard or court that opens to a public way." However, an inadequate width of yard or court would render the emergency escape opening useless. Section R310.2 requires a minimum 3-foot wide window well for below-grade emergency escape and rescue openings, and if at least 3 feet is required for a window well, it stands to reason a yard or court should be at least 3 feet wide as well, in order to provide an adequate pathway to the right-of-way.

It is to be noted that defining a yard as having a width of at least 3 feet will not adversely affect sections different from those mentioned above where "yard" is used (Table R302.1(2), Section R303.8.1, and in Appendix M, Sections AM103.1.1 and AM103.1.3). "Court" is not used in any sections other than those mentioned above.

3. The text being proposed for deletion in Section R303.8 is redundant with the proposed definition of "court" and the existing definition of "yard."

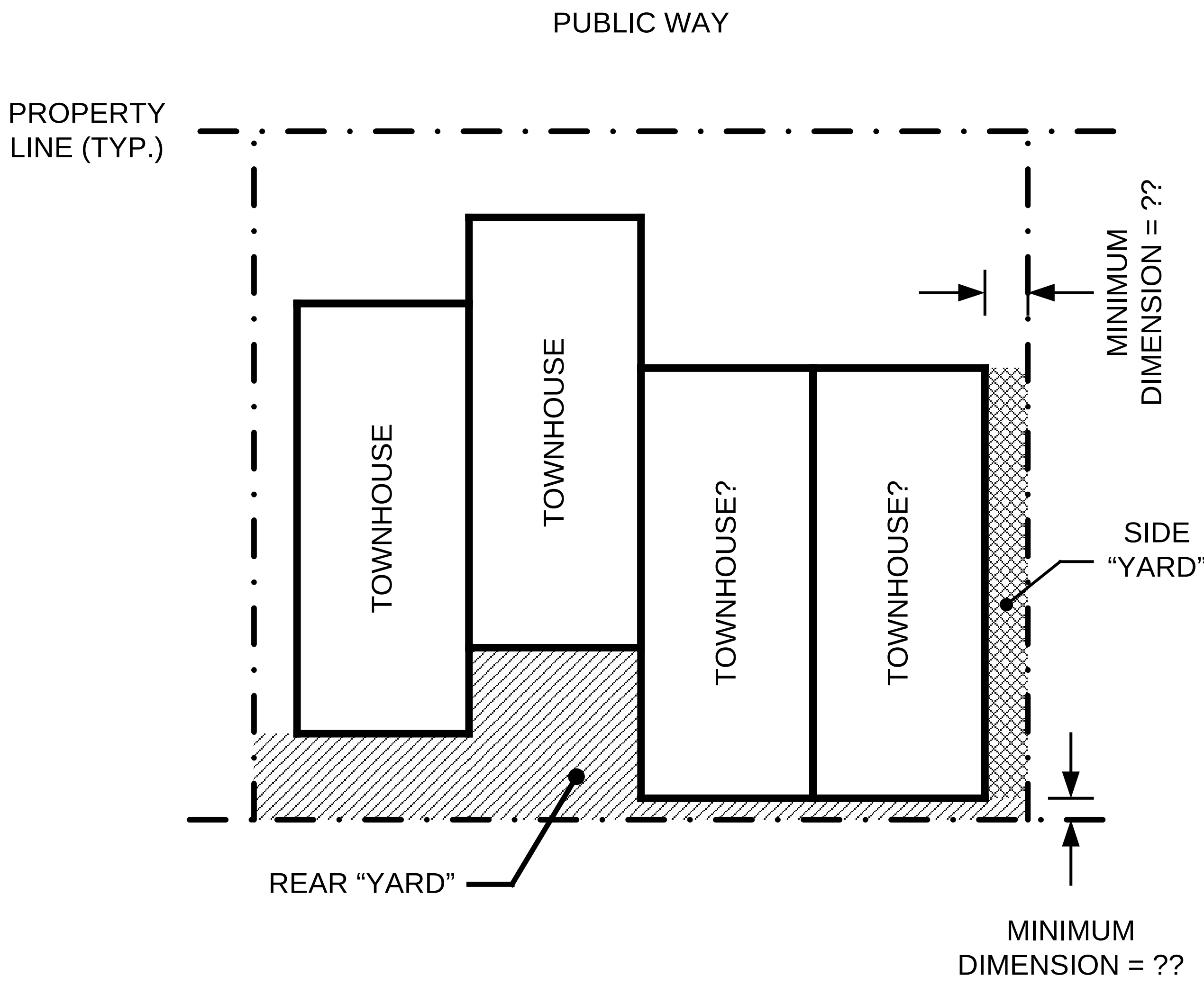


FIGURE 1 – PLAN VIEW

Cost Impact: Minimal, if any, increase to the cost of construction.

R303.8-RB-SIU

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal because it introduced technical requirements into a definition. Technical requirements are appropriate in the body of the code, but not in definitions.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

COURT. A ~~minimum 3-foot wide~~ space on the *lot* on which a building is situated, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building. ~~The distance shall be measured at a right angle from the face of the walls.~~

YARD. ~~A minimum 3-foot wide~~ An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated. ~~The distance shall be measured at a right angle from the face of the wall.~~

R303.8 Required glazed openings. Required glazed openings shall open directly onto a street or public alley, or a *yard* or court. For compliance with Sections R303.8 and R303.8.1, the yard or court shall be at least 3 feet wide, measured at a right angle from the face of the walls.

Exceptions:

1. Required glazed openings may face into a roofed porch where the porch abuts a street, yard or court and the longer side of the porch is at least 65 percent unobstructed and the ceiling height is not less than 7 feet (2134 mm).
2. Eave projections shall not be considered as obstructing the clear open space of a yard or court.
3. Required glazed openings may face into the area under a deck, balcony, bay or floor cantilever provided a clear vertical space at least 36 inches (914 mm) in height is provided.

R303.8.1 Sunroom additions. Required glazed openings shall be permitted to open into sunroom *additions* or patio covers that abut a street, *yard* or court if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening, and the ceiling height of the sunroom is not less than 7 feet (2134 mm).

R310.1 Emergency escape and rescue required. *Basements,* habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a minimum 3 foot wide *yard* or court that opens to a public way.

Exception: *Basements* used only to house mechanical *equipment* and not exceeding total floor area of 200 square feet (18.58 m2).

R310.5 Emergency escape windows under decks and porches. Emergency escape windows are allowed to be installed under decks and porches provided the location of the deck allows the emergency escape window to be fully opened and provides a path not less than 36 inches (914 mm) in height to a *yard* or court that is at least 3 feet wide.

Commenter's Reason: This comment specifies that yards or courts must be at least 3 feet wide. The code doesn't provide minimum dimensions for purposes of determining the size of the yard required for emergency escape windows or for protection of glazing. The 3-foot dimension is consistent with the minimum separation distance for walls required in Table R302.1(2) and the minimum width of a window well for emergency escape windows in Section R310.2. These are the only pertinent places in the IRC where these terms are used.

The original proposal regarding the definition of "court" is modified in this comment to retain the provision stating that courts must be located on the lot on which the building is located but deleting the minimum dimension. As stated in the reason for the original proposal, buildings should not rely on features on adjacent properties to demonstrate compliance with the code. Each property must comply on its own unless the code specifically allows otherwise.

Public Comment 2:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the 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 plane* in height with a separate means of egress and <u>a *yard* or public way not less than 3 feet wide on at least two sides</u>; and their *accessory structures*.

Exceptions:

1. Live/work units complying with the requirements of Section 419 of the *International Building Code* shall be permitted to be built as one- and two-family *dwellings* or townhouses. Fire suppression required by Section 419.5 of the *International Building Code* when constructed under the *International Residential Code for One- and Two-family Dwellings* shall conform to Section P2904.
2. Owner-occupied lodging houses with five or fewer guestrooms shall be permitted to be constructed in accordance with the *International Residential Code for One- and Two-family Dwellings* when equipped with a fire sprinkler system in accordance with Section P2904.

TOWNHOUSE. A single-family *dwelling unit* constructed in a group of three or more attached units in which each unit extends from foundation to roof ~~and with a *yard* or public way on at least two sides~~.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: This comment answers the question of how large a yard must be in order for a townhouse-type building to be allowed under the IRC. A sketch was included with the original proposal that illustrates the problem. With the cost of property escalating, there is increasing pressure on owners to use as much of each lot as possible. Specifying the minimum yard size will assist both owners and building officials by making this threshold requirement explicit.

RB104-13

Final Action: AS AM AMPC____ D

RB108-13
R305.1, R305.1.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways, ~~bathrooms, toilet rooms, laundry rooms~~ and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). <u>Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).</u>

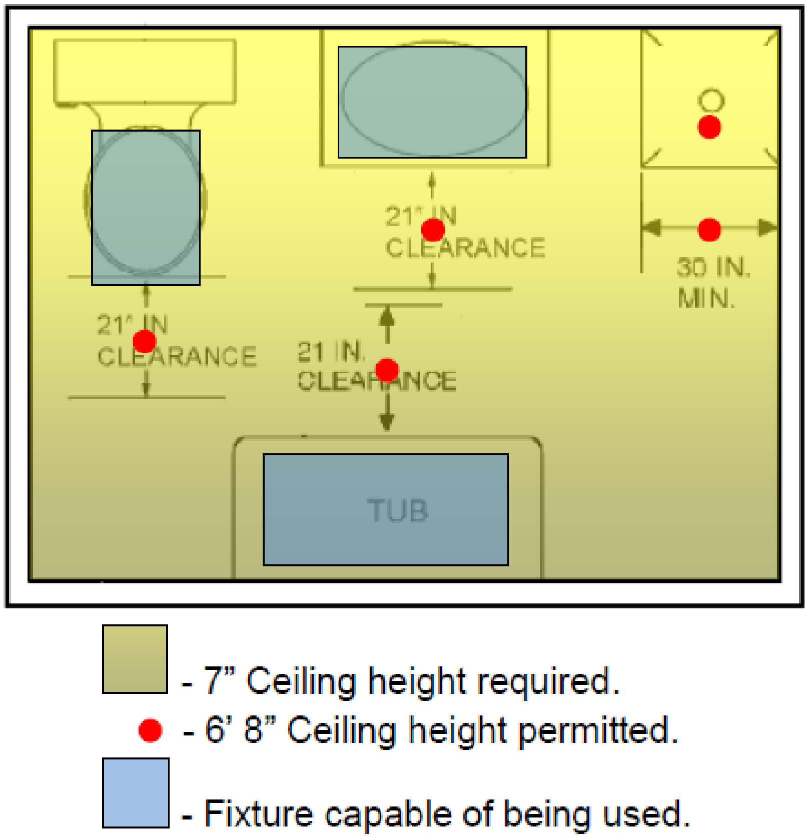
Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1.~~ The ceiling height above <u>bathroom and toilet room</u> fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

R305.1.1 Basements. Portions of *basements* that do not contain *habitable space*~~,~~ <u>or</u> hallways~~, bathrooms, toilet rooms and laundry rooms~~ shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Reason: This proposal sets the required ceiling height for bathrooms, toilet rooms, and laundry rooms at 6 feet 8 inches. The current language requires ceiling heights in these spaces to be 7 feet. Then the exception allows the ceiling height to be 6 feet 8 inches in front of the fixtures (the most used area of the space) so the exception is really the rule. It only makes sense that the entire room be permitted to be 6 feet 8 inches, not just the most used areas of the room.



Cost Impact: None

R305.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that, if the ceiling height can be 6'-8" in front of a plumbing fixture, why not the entire bathroom. This will provide more flexibility in basements. Laundries are similar to bathrooms in that their use is temporary and a lower ceiling in these types of spaces would not create an inconvenience or sacrifice health or safety concerns.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable* ~~*space*,~~ *spaces* and hallways~~, and portions of *basements* containing these spaces~~ shall have a ceiling height of not less than 7 feet (2134 mm). B~~athrooms, toilet rooms and laundry~~ Rooms that are not *habitable spaces* shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exceptions:

1. ~~For~~ Habitable rooms with sloped ceilings~~,~~ shall have at least 50 percent of the required floor area ~~of the room must have~~ with a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose.~~ Rooms that are not habitable spaces with sloped ceilings shall have a ceiling height of not less than 6 feet 8 inches over 50 percent of the provided floor area. Bathrooms and toilet rooms shall have not less than 6 feet 8 inches at the front of fixtures. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

~~**R305.1.1 Basements.** Portions of *basements* that do not contain *habitable space* or hallways shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).~~

~~**Exception:**~~

3. Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committees concerns. The BCAC thinks that RB108 (*approved as submitted)* has technical flaws and reads poorly. The BCAC recommends several changes:

507.1. As we interpret the proponent's change, he wants to allow 7' ceilings in all habitable spaces and hallways and 6'-8" ceilings in all other non-habitable spaces.

In our public comment we rewrote this section to more clearly differentiate the requirements between habitable rooms/hallways with other non-habitable rooms: bathrooms, toilet rooms, laundry rooms plus closets, utility rooms, etc.

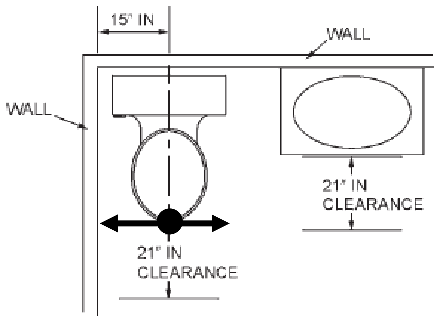
The BCAC tried to close a hole in the proponents proposal: what height are *other* non-habitable spaces, such as closets, utility rooms, corridors, storage rooms, etc, which were not mentioned – you don't know if they are supposed to be 6'-8" or 7'-0".

Exception 1: We tried to more clearly say that this exception only applies to habitable rooms and hallways with sloped ceilings. The existing language never applied to non-habitable rooms anyway, because they never had a "required floor area".

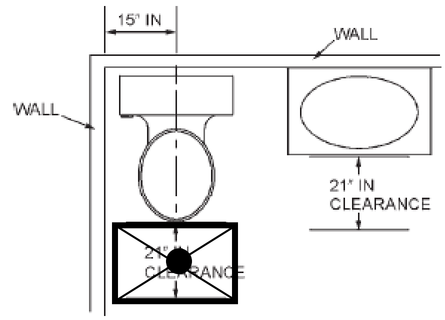
Exception 2 has flaws:

1. The proponent purposely eliminated the 6'-8" headroom requirement in front of bathroom and toilet room fixtures by striking the first sentence. He is relying on vague language that says that the headroom above the fixtures shall be such that it can accommodate the intended purpose of the fixture. THIS IS FUNDAMENTALLY WRONG! We are not designing for the "intended purpose" of the fixture, but rather the height of the user. The code has always designed for 6'-8" tall people (i.e. doorways, stairways, etc).
2. As currently approved, bathrooms and toilet rooms would have to have a minimum head room of 6'-8" and preclude many applications for powder rooms under stairs. Therefore we drafted a new first sentence to mirror exception 1, but for "other non-habitable rooms with sloped ceilings". Similar to exception 1, we added a provision that at least 50% of the *provided* floor area had to have at least 6'-8" headroom. We put back in the 6'-8" headroom requirement in front of fixtures for bathrooms and toilet rooms.
3. From the 2012 IRC: What does "center of the clearance area" really mean? I thought that this was perfectly clear, but after talking with others, I have found out that my interpretation was not universal. The existing language is confusing, and RB108, as submitted, does not rectify the issue.

Interpretation 1



Interpretation 2



Some folks would argue that the word "center" applies to the center of the *front* of the clearance area as in interpretation 1. I have always thought "center" applied to the center of the *clearance area*, as shown in interpretation 2 (i.e. half way back of the 21" clearance as measured from the edge of the fixture). Exception 2 was reworded to say that interpretation 1 is the intention.

R305.1.1

By changing the language in Section R305.1, Section R305.1.1 was no longer required.

We moved the exception up to number 3.

Public Comment 2:

Matt Black, Hampton city, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable spaces~~,~~* and hallways ~~and portions of basements containing these spaces~~ shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms, ~~and~~ laundry rooms, closets, storage rooms and utility spaces shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. Bathrooms, toilet rooms, laundry rooms, closets, storage rooms and utility spaces with sloped ceilings shall have a ceiling height of not less than 6 feet-8 inches over 50 percent of the provided floor area or 35 square feet, whichever is the lesser. ~~The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose.~~ Bathrooms and toilet rooms shall have a ceiling height of not less than 6 feet 8 inches at the front of fixtures. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
3. Crawl spaces and attic spaces shall not have a minimum head room clearance.

~~**R305.1.1 Basements.** Portions of *basements* that do not contain *habitable space* or hallways shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).~~

~~**Exception:**~~

4. Beams, girders, ducts or other obstructions in basements may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Commenter's Reason: RB108 was approved by the Committee but it has an inherent oversight, and this public comment is to fill in the missing blanks. The author specified the ceiling height for bathrooms, toilet rooms and laundry rooms, but did not specify the height of functional spaces, like closets and storage rooms. It also addresses when no ceiling height is required: crawl spaces and attic spaces. This public comment covers these other situations and does not leave the reader in the doubt.

The *50 percent or 35 square feet* is based on two different conditions: If the room is greater than 70 square feet, all you need is 35 square feet of ceiling at 6'-8"; if the room is like a powder room under a stair and is less than 70 square feet, the minimum area would be half of the floor area. In either case, you would need 6'-8" in front of any fixtures. The language of fixtures and their "intended purpose" is extremely vague and not consistent with good code language, and has been replaced.

Public Comment 3:

Michael D. Fischer, Kellen Company, representing American Institute of Building Design, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways, ~~bathrooms, toilet rooms, laundry rooms~~ and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). <u>Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).</u>

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1. The ceiling height above <u>bathroom and toilet room</u> fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
3. <u>Beams,girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931mm) of the finished floor.</u>

R305.1.1 Basements. Portions of *basements* that do not contain *habitable space*, <u>or</u> hallways, ~~bathrooms, toilet rooms and laundry rooms~~ shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Commenter's Reason: During the past several code cycles, there have been numerous changes to the ceiling height and support beam projection height for habitable spaces in basements. This creates an issue when homes built to the previous standards include beams located in unfinished basements at heights that would allow the conversion to habitable space. Once the code changes, these spaces no longer fit the dimensions, and the option to convert this "future finished basement" evaporates. Rarely do codes become retro-active to previous construction, but this is one case where code changes can affect existing designs.

The 2003 IRC allowed ceiling heights in habitable basement spaces to be at 7 feet above the finished floor (a.f.f.), and beams could project 6 inches lower than the ceiling (to 6'6"). Non-habitable spaces in basements could have ceilings at 6'8", with beams at 6'4". Designers could set the non-habitable basement ceiling height at 7', with beams at 6'6", knowing that the space could later be converted to habitable space.

The 2009 IRC removed the 6" projection below the ceiling height as an option. Under this change, designers would have no option for any beam heights below 7' in any habitable basement space. Beams could be located at 6'4" in non-habitable basements. The proposed modification would reinstate the option to accommodate beams and girders in basements containing habitable spaces. With this language added, the designer can establish the ceiling height of an unfinished basement at 7 feet, while setting the beam height at 6'4" a.f.f., thus allowing for the basement to be converted to habitable space.

There are numerous reasons why restoring this design option make sense. Allowing ducts to be located within conditioned basement space can help improve the energy efficiency of the home, and finishing basements to add living space is an important design option- saving space and optimizing the available floor area. The sloped ceiling option would theoretically allow the designer to encase beams within sloped ceilings that are permitted to be as low as 5 feet a.f.f., so restoring this option does nothing to adversely impact ceiling clearances. This option provides greater design flexibility and versatility of the space, while maintaining appropriate levels of safety.

RB108-13

Final Action:	AS	AM	AMPC____	D

RB109-13
R307.2

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Roger Harper, Louisa County, VA, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA), Virginia Building Code Officials Association (VBCOA) and ICC Region 7 (sharper@louisa.org); Richard Grace of Fairfax County representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Delete and substitute as follows:

~~**R307.2 Bathtub and shower spaces.** Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor.~~

R307.2 Bathtub and shower floors and walls. Bathtub floors, shower floors, wall areas above built-in tubs that have installed shower heads and walls in shower compartments shall be constructed of smooth, corrosion-resistant and nonabsorbent waterproof materials. Wall materials shall extend to a height of not less than 6 feet (1829 mm) above the room floor level and not less than 70 inches (1778 mm) above the drain of the tub or shower. Such walls shall form a water-tight joint with each other and with either the tub or shower floor.

Reason: This revised language was approved for the 2015 IPC. There is no reason for the two codes to have different language.
This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was Item no. X8 on the PMGCAC IRC-P list.

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

R307.2-RB-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that determining the height of a finish material above a point that is hard to measure from, such as sloped floors near drains, would be difficult and would create disagreements between those that are attempting to comply with the code and those that are enforcing it. The measurement should be made from a readily identifiable point so that it can be easily verified.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), and ICC Region VII, requests Approval as Submitted.

Commenter's Reason: The new language in this change clarifies that the finish material within the bathtub floor and shower areas must be smooth, corrosion resistant, and nonabsorbent waterproof materials. The previous language only stated nonabsorbent surface. The committee's reason for disapproval was that the point of measurement was not clear however that is what this change was written to do. The current language states 6' above the floor. What floor was this measurement to be taken from the shower or tub floor or the floor just outside of these areas? The new language requires a minimum of 6' of smooth, corrosion resistant and nonabsorbent waterproof materials above the room floor level and not less than 70" above the drain of the tub of shower. This language does provide a readily identifiable point. Again this language would make the IRC and IPC language consistent.

RB109-13

Final Action: AS AM AMPC____ D

RB111-13
R308.4.2

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R308.4.2 Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered a hazardous location ~~where the nearest vertical edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where~~ if the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface ~~shall be considered a hazardous location~~ and it meets either of the following conditions:

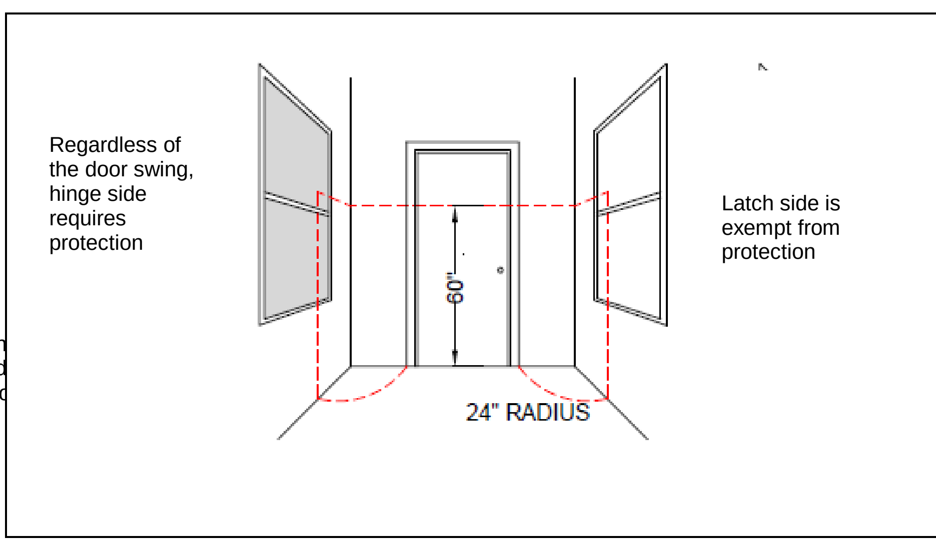
1. Where the glazing is within 24" of either side of the door in the plane of the door in a closed position,
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24" of the hinge side of an in-swinging door.

Exceptions:

1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. ~~Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position~~
4. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with section R308.4.3.
5. Glazing that is adjacent to the fixed panel of patio doors.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

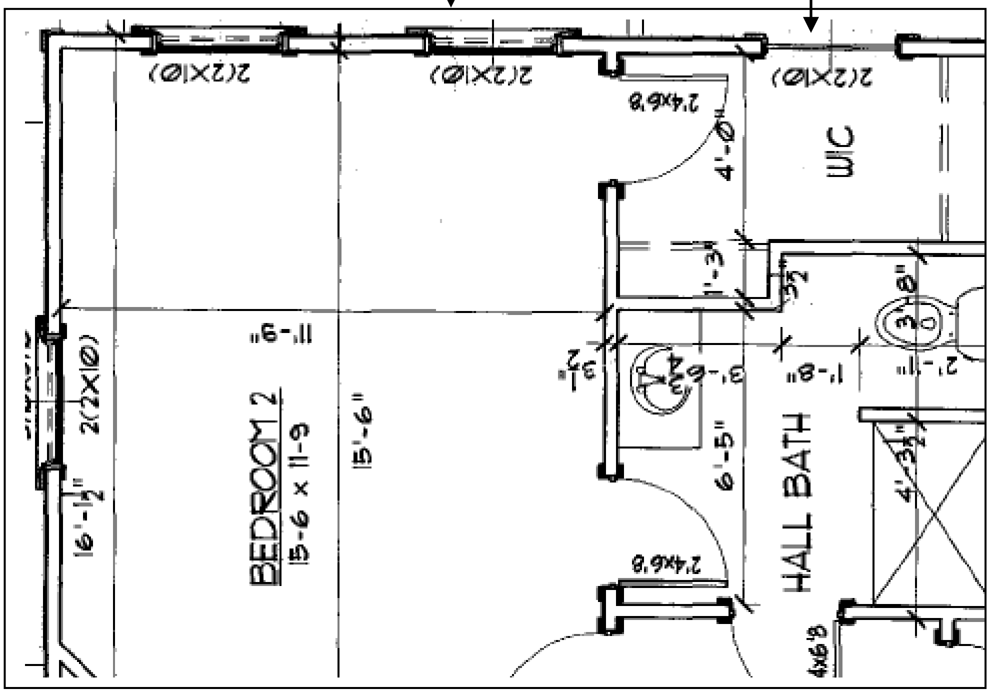
Exception 3: Currently the code requires safety glazing for windows on the hinge side of walls perpendicular to the door plane – regardless of the door swing. See sketch below.

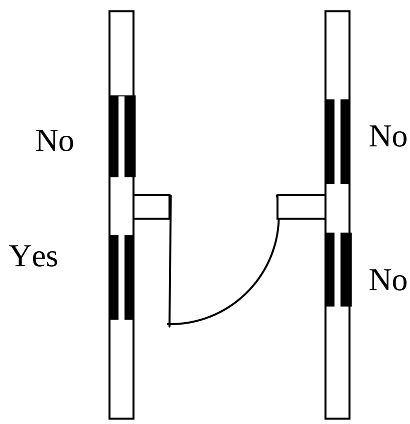


This code chan... oor where someone could... threat for the person on the d...

Currently this window is NOT exempt by rule # 3 (or #4) and would have to be safety glazed. If this proposal is accepted, this window would NOT have to be safety glazed.

This window is currently exempt because the arc is more the 24" from the door hinge.





These are the four possible configurations of windows adjacent/perpendicular to a door. Only the one with an in-swinging door on the hinge side would be required to be safety glazed.

Cost Impact: This proposal may decrease the cost of construction.

R308.4.2 #1-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that the square foot area and height limits are intended to maintain a lesser mass that is appropriate for an accessory structure, and to coordinate with previous committee action on ADM2.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R308.4.2 Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface shall be considered a hazardous location.

Exceptions:

1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position.
4. Glazing in walls on the hinge side of and perpendicular to the plane of the door in a closed position and where the walls are in the direction opposite the door swing.

~~4~~ 5. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with section R308.4.3.

~~5~~ 6. Glazing that is adjacent to the fixed panel of patio doors.

Commenter's Reason: The committee approved the original proposal as submitted, but also noted that some details and wording should be addressed through public comment. The original proposal for R308.4.2 Item 1 appears to require safety glazing within 24" of either door edge only when the glazing is in the plane of the door. Item 2 requires safety glazing within 24" of the hinge side of an in-swinging door when the glazing is perpendicular to the plane of the door. The original proposal does not seem to address glazing in a wall that is not in the plane of the door nor perpendicular to the plane of the door. In other words, there is no requirement for glazing in a wall that is offset from the plane of the door but within the 24" arc, or in a wall that forms an angle between 90 and180 degrees with the plane of the door.

It is agreed with the original proposal that when the windows are perpendicular to a door, only the window on the hinge side of an in-swinging door would be required to be safety glazed. However, when the glazing is offset from the plane of the door or between 90 and 180 degrees to the plane of the door, the glazing and the wall containing the glazing are no longer parallel to the direction of travel to the door user, and the risk of impact would be greater.

The proposed modifications in this public comment would restore the original code language that requires safety glazing within a 24" arc. The proposed Exception 4 clarifies the exemption for glazing perpendicular to the plane of the door that is opposite the door swing direction.

RB111-13

Final Action: AS AM AMPC____ D

RB114-13
R308.4.6, R308.4.7

Proposed Change as Submitted

Proponent: Tim Pate, City and County of Broomfield, CO representing Colorado Chapter Code Change Committee

Revise as follows:

R308.4.6 Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than ~~36 inches (914 mm)~~ 60 inches (1524 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered a hazardous location.

Exceptions:

1. When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above walking surface. The rail shall be capable of capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1 ½ inches (38 mm) in cross sectional height and the plane of glass is more than 18 inches (457 mm) horizontally from the rail.
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.

R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than ~~36 inches (914 mm)~~ 60 inches (1524 mm) above the landing and within 60 inches (1524 mm) horizontally of the bottom tread shall be considered a hazardous location.

Exception: The glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Reason: All of the previous editions of the IRC required glazing that was had bottom edge below 60 inches above the plane of walking surfaces of stairways, landings between flights of stairs and ramps, and adjacent to stair landings to be approved safety glazing. Code change was approved which changed the 36 inches back to 60 inches. There was a comprehensive code change (S218 09/10) that reformatted the entire safety glazing section and also changed the dimension from 60 inches down to 36 inches. This was approved and overrode my code change.

My reason statement for the code change during the 2009/2010 cycle was very clear in helping clean up the inconsistencies in the earlier codes. As you can see it specifically required the wall with glazing to be at least 18 inches away. The reason statement that the IRC change committee gave in approving the comprehensive change was that it should be lowered to 36" which would match the exception. I could never find a good reason as to why my code change that was approved by the IRC committee did not stand and get incorporated into the overall change also approved by the IRC code change committee.

I am copying my code change (RB40-09/10) and reason statement that the2009/2010 IRC committee agreed with:

Revise as follows:

R308.4 The following shall be considered specific hazardous locations for the purposes of glazing:

Items 1 through 6 remain unchanged

7. Glazing adjacent to stairways, landings, and ramps within 36 inches (914 m) horizontally of a walking surface when the exposed surface of the glazing is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.

Exceptions:

1. ~~When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per lineal foot (730 N/m) without contacting the glass and be a minimum of 1 ½ inches (38 mm) in cross sectional height.~~
2. The side of the stairway has a guard~~rail~~ or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or

3. When a solid wall or panel extends from the plane of adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard and the plane of the glazing is more than 18 inches (457 mm) from the wall or panel.

8. Glazing adjacent to stairways within 60 inches (1524 m) horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glazing is less than 60 inches (1524 mm) above he nose of the tread.

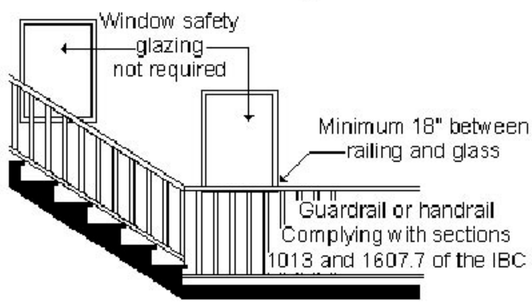
Exceptions:

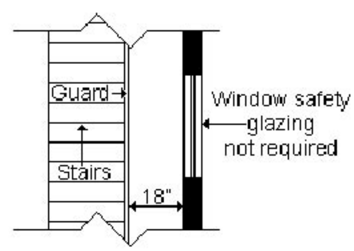
1. The side of the stairway has a guard~~rail~~ or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or
2. When a solid wall or panel extends from the plane of adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard and the plane of the glazing is more than 18 inches (457 mm) from the wall or panel.

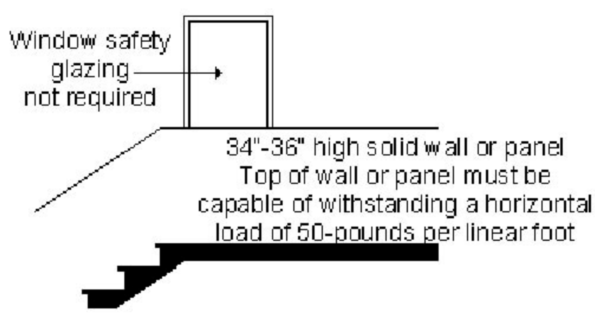
Reason: Code change RB15-00 added exception 9 (9.1 and 9.2) which allowed the protective bar but also required the glazing to be at least 18" away from the stair and bar. Code change RB16-00 was also approved in the same code change cycle which added the reference in exception #5 which would allow the protective bar but not require the 18" separation. This created a direct conflict between the two exceptions in the 2003 IRC and the 2006 IRC. IRC Section R308.4 was modified for the 2009 IRC by reformatting the requirements and exceptions in order to make it more user friendly but no technical changes were made.

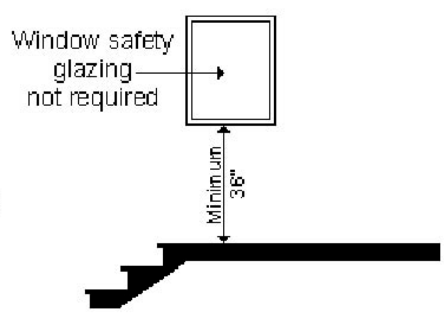
Stairs are inherently more dangerous for tripping hazards than normal walking surfaces. It does not make sense to a allow 1 ½" wide bar or a solid wall directly adjacent to stairs and landings and think this gives adequate protection for someone falling into glazing that is not safety glazing. Requiring the glazing to be at least 18" away would provide better protection if someone trips and falls which is exactly what 2009 IRC section R308.4 #7 Exception 2 requires.

The following diagrams illustrates what R308.4 #7 exception 2 allows which is the guard or handrail but also the 18" separation which is in conflict with what is allowed in #7 exception 1 or 3 which allows a rail or solid wall but does not require the 18" separation.









I was also successful in having the IBC safety glazing section changed back to 60 inches during the past Code Change Hearing in Dallas for the 2015 IBC. Here is the code change (S297-12) to IBC along with the reason statement – this code change was approved by Structural Code Change Committee and was not challenged at Final Action Hearings and therefore was approved on the consent agenda:

Revise as follows:

2406.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than ~~36 inches (914 mm)~~ 60 inches (1524 mm) above the landing and within a 60 inches(1524 mm) horizontally of the bottom tread shall be considered a hazardous location.

Reason: Previous editions of the IBC before the 2012 required glazing that is less than 60" above the landing to be approved safety glazing. It is not clear why this requirement was changed in the 2012. It does not make sense that section 2406.4.6 applies to glazing that is less than 60" above the stairs and intermediate landings but the glazing at bottom landing is treated differently – only when below 36" The potential for falling through the glazing at bottom landing is the same. This change will bring back the 60" height which will then match the requirement at intermediate landings and stairs.

Both 2012 IBC sections 2406.4.6 and 2406.4.7 have exceptions which allow a guard but require the plane of glass to be at least 18" away from the guard.

This code change should be approved in order to make sure that people who use stairs, ramps, and landings remain safe in case they trip and fall and potentially fall through windows adjacent to the stairs and ramps. I do not feel that only protecting glazing that is below 36" above walking surface is adequate but that all glazing below 60" should be protected. The vast majority of people will have their hands and arms outstretched if falling at 48" or so high and would be falling through glass at this height or somewhat higher. Approving this code change will get both the IRC and IBC to match which is extremely important.

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

R308.4.6-RB-PATE

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposal because they felt that there was no justification for the change. If a guard of similar dimensions is good for a stairway, it should be good here too.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Approval as Submitted.

Commenter's Reason: I agree with the IRC code change committee that there has been an exception that allowed glazing that was protected by a rail located between 34" and 38" high above the walking surface. The code change that I had approved by the past IRC committee (as explained in my original reason statement) and then over turned by another larger code change attempted to fix this problem. It just does not make sense to think that a rail located at that height will keep someone from falling into and potentially through glazing. The code requires glazing that is adjacent to bathtubs, showers, etc. to be at least 60" above the floor – it does not make sense to not treat potential trip and falls at stairs and landings the same way.

The requirement for requiring the plane of glass to be at least 18" away from the rail in section R308.4.6 should also match the exception that is already located in section R308.4.7 so the two sections have consistency. The potential for falling through glazing is the same at the bottom stair landing as it is at the sides of stairs.

Finally I would reiterate that this same language was approved by the IBC Structural code change committee and will now be in the 2015 IBC for hazardous locations of glazing. It is imperative that the requirements for requiring safety glazing be the same in both the IBC and the IRC. Stairs and glazing do not know which code they fall under and the potential for severe injuries and potential death are the same when someone falls and hits glass by stairs and landings. Please remember that you will have the same sets of stairs located in single family homes and townhouses located within the same development as multifamily apartments or condos and these requirements should be the same.

As a Code Official these inconsistencies make it extremely difficult to explain why these sections and codes are different.

Public Comment 2:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Submitted.

Commenter's Reason: The proponent is making changes to correlate the IBC and IRC requirements for glazing adjacent to stairways, landings and ramps. The proposal provides consistency between the IBC and IRC and eliminates confusion of code intent.

RB114-13

Final Action: AS AM AMPC____ D

RB115-13
R308.4.7

Proposed Change as Submitted

Proponent: Tim Pate, City and County of Broomfield, CO representing Colorado Chapter Code Change Committee

Revise as follows:

R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm above the landing and within <u>a</u> 60 inch~~es~~ (1524 mm) ~~horizontally of~~ <u>horizontal arc less than 180 degrees from</u> the bottom tread <u>nosing</u> shall be considered a hazardous location.

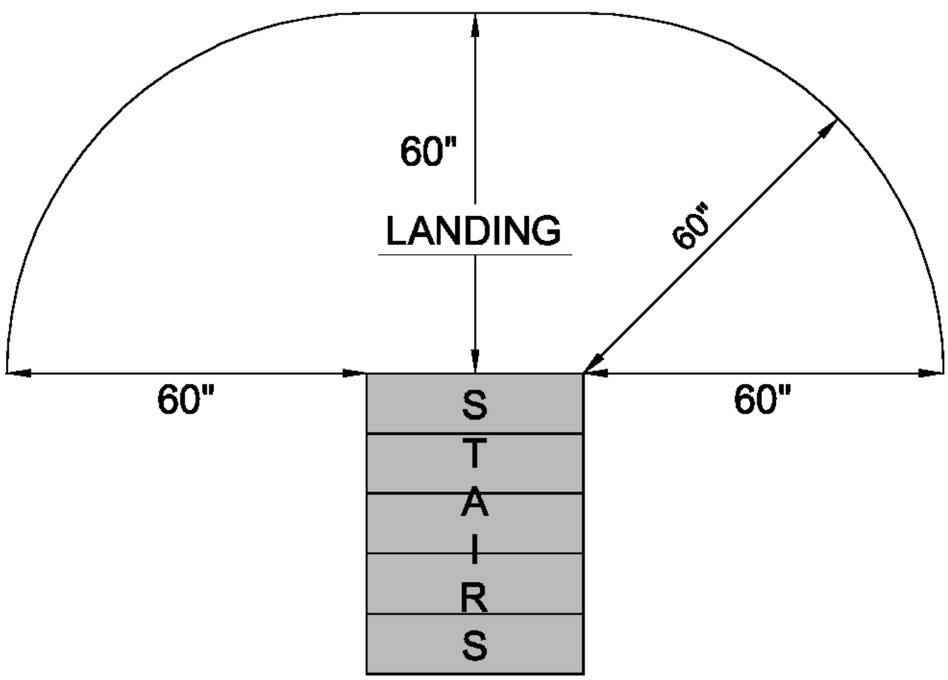
> **Exception:** The glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Reason: Previous editions of the IRC before the 2012 required glazing that is 60" horizontally in any direction to be approved safety glazing. It is not clear why this requirement was changed in the 2012. The previous editions had the additional wording "in any direction" when applying the 60" horizontal rule. This is due to the "splay" factor for when someone gets to the last tread and falls. The tendency is for someone to flail out in any direction.

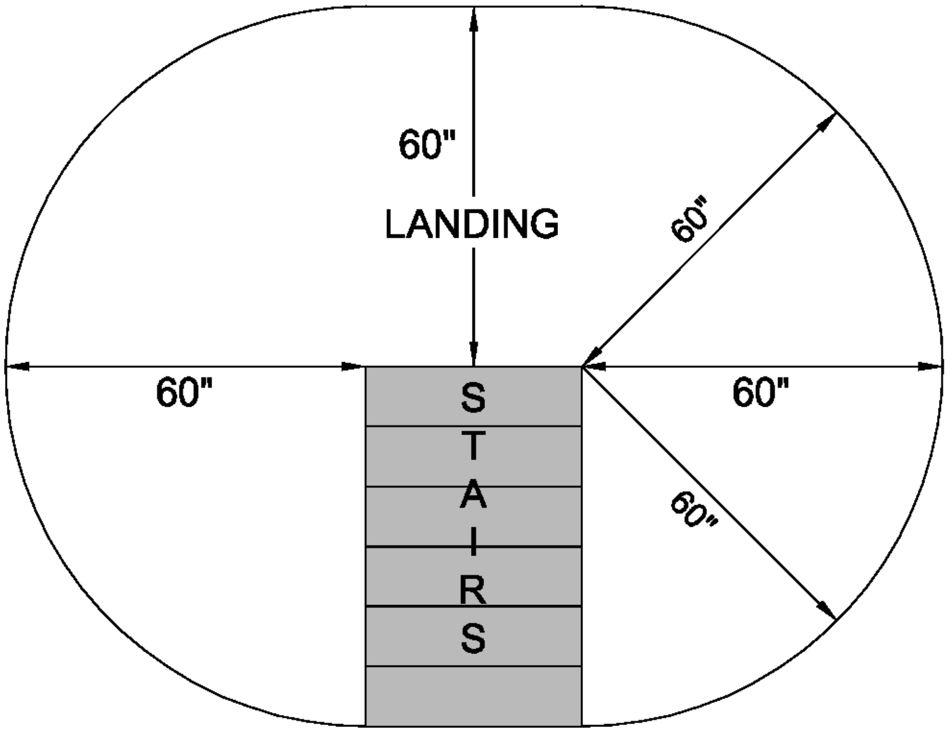
This added wording will make this section only apply to any glazing that is in a wall that is less than 180 degrees from the bottom tread nosing. I believe that adding the wording which would limit the area needing safety glazing to any glazing that falls within a 180 degree arc from bottom tread nosing and extending out 60" makes more sense since it is extremely unlikely that someone will fall out and backwards. I have added an illustration which should help everyone see what this changed wording will do.

Please note that there is still a requirement to provide approved safety glazing when located within 36" horizontally of the sides of the stairs.

The new code language will incorporate the areas shown in the following diagram:



The current code language incorporates the area shown below in the diagram:



This same code change proposal was reviewed and approved at the Final Action Hearings for the 2015 IBC – therefore this proposal for the IRC will get the two code sections to match which is important for consistency.

Cost Impact: This code change will reduce construction cost.

R308.4.7-RB-PATE

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that, in this case, it is beneficial for the International Residential Code and the International Building Code to be coordinated. This language is preferable to other code changes that address similar code requirements. It would be nice if the drawing could be included in the code along with the language.

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, representing Colorado Chapter Code Change Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Add the following figure to the proposal:

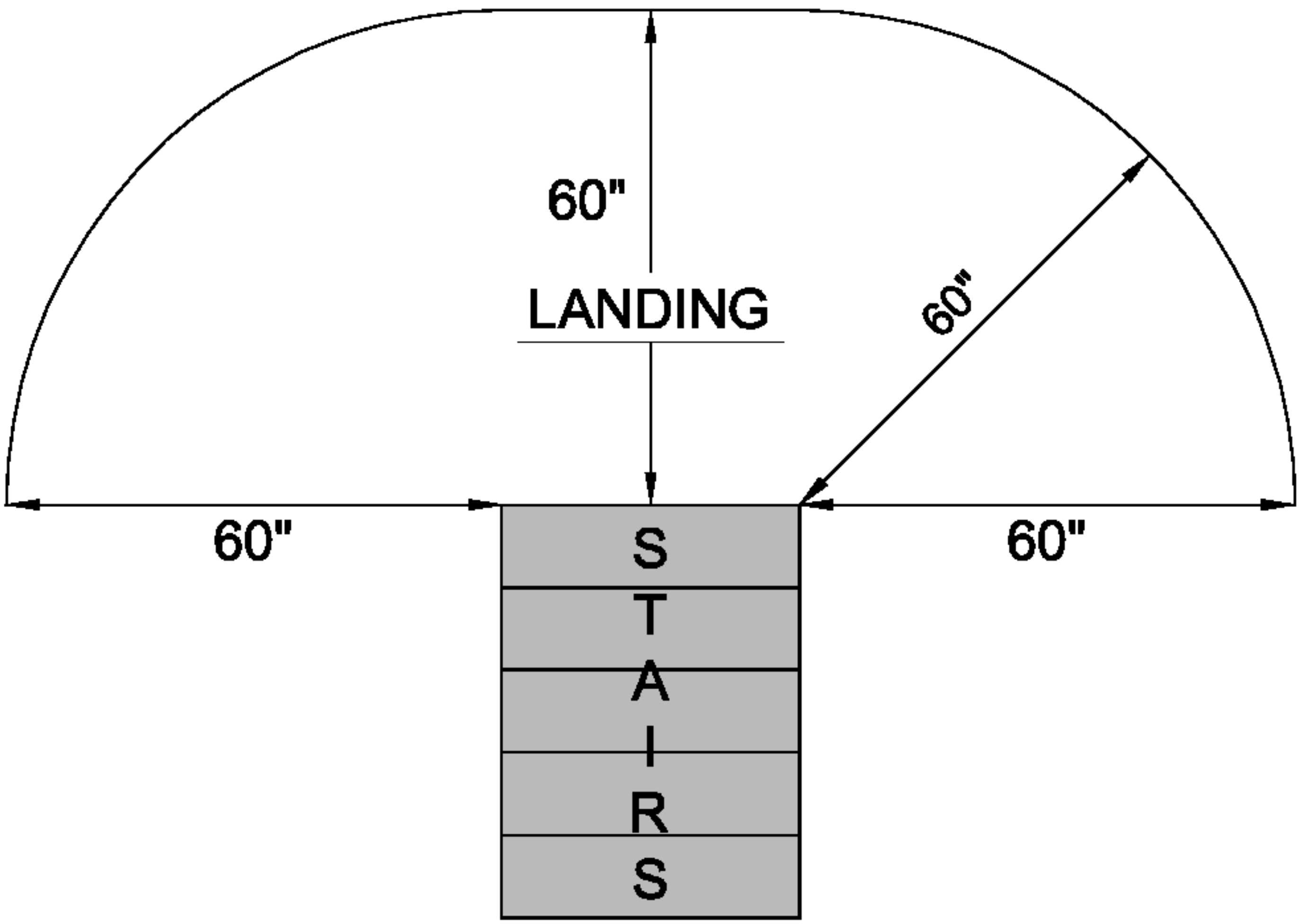


Figure R308.4.7

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: Based on the recommendation from one of the IRC Code Change Committee members when approving my original code change proposal I suggest that the figure I provided in my original code change reason statement be added as a figure within the body of the Code so as to help code users understand the new code language – " a 60 inch horizontal arc less than 180 degrees from the bottom tread nosing …"

RB115-13

Final Action: AS AM AMPC____ D

RB117-13
R310

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (bajnaic@chesterfield.gov)

Delete and substitute as follows:

R310
EMERGENCY ESCAPE AND RESCUE OPENINGS

~~**R310.1 Emergency escape and rescue required.** Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency egress and rescue opening shall be required in each sleeping room. Where emergency escape and rescue openings are provided, they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency and escape rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.~~

> ~~**Exception:** Storm shelters and basements used only to house mechanical equipment not exceeding total floor area of 200 square feet (18.58 m2)~~

~~**R310.1.1 Minimum opening area.** All emergency and escape rescue openings shall have a minimum met clear opening of 5.7 square feet.~~

> ~~**Exception:** Grade floor openings shall have a minimum net clear opening of 5 square feet.~~

~~**R310.1.2 Minimum opening height.** The minimum net clear opening height shall be 24 inches.~~

~~**R310.1.3 Minimum opening width.** The minimum net clear opening width shall be 20 inches (508 mm).~~

~~**R310.1.4 Operational constraints.** Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.~~

~~**R310.2 Window wells.** The minimum horizontal area of the window well shall be 9 square feet (0.9 m2), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.~~

> ~~**Exception:** The ladder or steps required by SectionR310.2.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.~~

~~**R310.2.1 Ladder and steps.** Window wells with a vertical depth greater than 44 inches (1118 m) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm)on center vertically for the full height of the window well.~~

~~**R310.2.2 Drainage.** Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.~~

~~**Exception:** A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.~~

~~**R310.3 Bulkhead enclosures.** Bulkhead enclosures shall provide direct access to the basement. The bulkhead enclosure with the door panels in the fully open position shall provide the minimum net clear opening required by Section R310.1.1. Bulkhead enclosures shall also comply with Section R311.7.8.2.~~

~~**R310.4 Bars, grilles, covers and screens.** Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.~~

~~**R310.5 Emergency escape windows under decks and porches.** Emergency escape windows are allowed to be installed under decks and porches provided the location of the deck allows the emergency escape window to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.~~

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exception: Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m2)

R310. 1.1 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

R310.2 Emergency escape and rescue openings. Emergency and escape rescue openings shall have minimum dimensions as specified in this section.

R310.2.1 Minimum opening area. All emergency and escape rescue openings shall have a minimum net clear opening of 5.7 square feet. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The minimum net clear height opening shall be 24" and the minimum net clear width shall be 20"

Exception: Grade floor or below-grade openings shall have a minimum net clear opening of 5 square feet.

R310.2.2 Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches (1118 mm) above the floor; if the sill height is below-grade, it shall be provided with a window well in accordance with Section R310.2.3.

R310.2.3 Window wells. The minimum horizontal area of the window well shall be 9 square feet (0.9 m2), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section R310.2.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.

R310.2.3.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (1118 m) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm)on center vertically for the full height of the window well.

R310.2.3.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings shall be permitted to be installed under decks and porches provided the location of the deck allows the emergency escape and rescue openings to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.

R310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be permitted to be a side hinged door or a slider. Where the opening is below the adjacent ground elevation, it shall be provided with a bulkhead enclosure.

R310.3.1 Minimum door opening size. The minimum net clear height opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section R310.2.1.

R310.3.2 Bulkhead enclosures. Bulkhead enclosures shall provide direct access from the basement. The bulkhead enclosure shall provide the minimum net clear opening equal to the door in the fully open position.

R310.3.2.1 Drainage. Bulkhead enclosures shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.

Exception: A drainage system for bulkhead enclosures is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.4 Bars, grilles, covers and screens. Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

This code change is primarily for reorganizational purposes. It separates emergency escape and rescue openings (EERO) window and door provisions, which are currently intermingled. It also says that EERO doors do not have to be "egress" doors, that is, side hinged doors. The new code language allows sliders from basements.

Most people think of emergency escape and rescue openings as windows, and in fact, the current subsections in R310 all seem to define and quantify this type of application: minimum opening height, minimum opening width, window wells, ladders and steps from window wells, drainage from window wells, bars and grilles on windows, windows under decks.
However the most basic EERO is a door. In case of a fire, would prefer to exit through a door or a window? Will a fire fighter prefer to enter through a door or a window?

This revision acknowledges doors as a viable EERO and defines the minimum requirements for EERO doors. It allows side hinged doors or sliders to be used as EEROs.

An EERO door would not have to be an egress door but an egress door would automatically be an EERO door.

Cost Impact: None

R310.1-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: The committee approved this proposed code change because they felt that it reorganized the code text in a manner that clarifies the code. While the application to doors is implied in the existing text, it is good to point it out.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R310
EMERGENCY ESCAPE AND RESCUE OPENINGS

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

> **Exception:** Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m^2).

R310. 1.1 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

R310.2 Emergency escape and rescue openings. Emergency and escape rescue openings shall have minimum dimensions as specified in this section.

R310.2.1 Minimum opening ~~area~~ <u>size</u>. All emergency and escape rescue openings shall have a minimum net clear opening of 5.7 square feet. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The minimum net clear height opening shall be 24” and the minimum net clear width shall be 20”.

> **Exception:** Grade floor ~~or below-grade~~ openings shall have a minimum net clear opening of 5 square feet.

R310.2.2 Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches (1118 mm) above the floor; if the sill height is below-grade, it shall be provided with a window well in accordance with Section R310.2.3.

R310.2.3 Window wells. The minimum horizontal area of the window well shall be 9 square feet (0.9 m^2), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section ~~R310.2.1~~ R310.2.3.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.

R310.2.3.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (1118 m) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm) on center vertically for the full height of the window well.

R310.2.3.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section ~~R504.1~~ R405.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings shall be permitted to be installed under decks and porches provided the location of the deck allows the emergency escape and rescue openings to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.

R310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be permitted to be a side hinged door or a slider. Where the opening is below the adjacent ground elevation, it shall be provided with a bulkhead enclosure.

R310.3.1 Minimum door opening size. The minimum net clear ~~height~~ opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section R310.2.1.

R310.3.2 Bulkhead enclosures. Bulkhead enclosures shall provide direct access from the basement. The bulkhead enclosure shall provide the minimum net clear opening equal to the door in the fully open position.

R310.3.2.1 Drainage. Bulkhead enclosures shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section ~~R504.1~~ R405.1 or by an approved alternative method.

Exception: A drainage system for bulkhead enclosures is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.4 Bars, grilles, covers and screens. Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Section~~s R310.1.1 to R310.1.3~~ R310.2.1, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The committee approved the original proposal as submitted.

The proposed modifications in this public comment mainly address editorial changes due to code text reorganization and section renumbering.

This public comment also addresses the 5 square feet exception to the 5.7 square feet minimum opening area. In the original proposal, the exception that allows 5 square feet for grade floor openings is also extended to below-grade openings. Only openings at grade level would be able to afford easier access for emergency escape and rescue that would justify reducing the minimum net clear opening to 5 square feet. Openings below grade would require greater efforts and should meet 5.7 square feet minimum opening area.

RB117-13

Final Action: AS AM AMPC____ D

RB122-13
R310.1.5 (New)

<u>Proposed Change as Submitted</u>

Proponent: Jeff Inks, Window and Door Manufacturers Association, representing the Window & Door Manufacturers Association.

Add new text as follows:

<u>**R310.1.5 Replacement windows**. Replacement windows installed in buildings meeting the scope of this code shall be exempt from the maximum sill height requirements of Sections R310.1 and Sections R310.1.1, R310.1.2, and R310.1.3 provided the replacement window meets the following conditions:</u>

1. <u>The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.</u>
2. <u>The replacement window is not part of a change of occupancy.</u>

Reason: First, while this provision is applicable to existing construction (for the reasons stated below), it is being proposed for inclusion in the main body of the IRC because window replacements are more common than other significant changes made to existing one- or two-family homes and townhomes, and in addition, for consistency with what is being proposed for IRC Appendix J and IEBC Chap 7 by us and the ICC CTC.

The proposed provisions and language are also based on Minnesota's residential code which does effectively incorporate the provisions into the main body of the code in the same location (R310.1.5) being proposed above.

The provisions and language have also already been approved for IEBC Chap. 4 which occurred during the Group A proceedings.

Most importantly, it's important to note that the provisions do not allow for any decrease in safety and rather will help ensure improvements in safety can be made.

More specifically, the intent of this proposal is to ensure that the IRC does not discourage or prevent improvements in emergency escape and rescue openings, especially for fire safety, in older residential occupancies by requiring replacement windows to meet all of the provisions of Section 310 when doing so can only be accomplished by increasing the size of the rough opening or altering the interior wall.

Because many of these older buildings were constructed under codes that did not include the same emergency escape and rescue opening provisions that the IRC now requires for new construction, the only way to fully meet all of the requirements of Section 310 for new construction if required when windows are replaced is to enlarge the rough opening and/or make significant alterations to the interior wall in order to accommodate any increase in window size or lowering of a sill.

At the very least, the significant cost and design challenges of altering the rough opening and/or interior wall can discourage or prevent window replacement and at worst can discourage or prevent the replacement of older windows that are harder to operate or are inoperable all together because of their age or poor maintenance and, that are significantly less energy efficient. When that happens, improvements to safety as well as energy efficiency are needlessly compromised.

Furthermore and on the whole, while some bedroom windows in older homes may not provide the full clear opening that is required for new construction or may have a sill height above 44 inches, they nonetheless still provide a viable emergency and escape rescue opening which is the primary intent of the code. Replacement of these windows with the same type of operating window or other type that can provide an equal or greater clear opening than the existing window -- even if they do not fully meet the clear opening or sill height requirements of Section 310 – is always an improvement in safety, especially when a replacement opening can provide a larger clear opening than the existing window. Such improvements in safety should not be discouraged or prevented by overly onerous requirements for replacement windows.

This proposal will help ensure that doesn't happen by providing limited exceptions to the requirements of Section 310 that can only be applied when certain conditions are met and that as already noted, will not result in a decrease in safety.

The requirements for new construction that emergency escape and rescue openings be provided as well as the operational requirements of Section 310.1.4 are maintained and still applicable to replacement windows.

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

R310.1.5 (NEW) #1-RB-INKS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal because they felt that, although there are difficulties in replacing existing windows, the existing building provisions are a location where it might be appropriate to state conditions where full compliance is required versus some relief. Some older residences had windows for ventilation only that have sill heights that are 52" or are 3 by 3 double-hungs. At some point we need to address emergency escape and rescue openings where there is an opportunity. Where requirements are too restrictive it will discourage the maintenance and upkeep of older homes.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jeff Inks, representing Window & Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: While these same provisions have been approved for the IRC Appendix J (RB-467) and the IEBC Chapter 7 (EB-15) for the reasons stated in those proposals, we are still requesting for approval as submitted of this proposal for the inclusion of them in the main body of the IRC for jurisdictions that do not adopt Appendix J.

The provisions are critical to providing needed, reasonable replacement requirements for EERO windows that do not discourage or prevent EERO window replacements while at the same time ensure there is no reduction in safety (as discussed in the above reason statement for the proposal). Jurisdictions that do not adopt Appendix J will lack these provisions, which is why we have also proposed them for inclusion in Chapter 3. Including them in Chapter 3 clarifies the applicability of **Section R102.7.1, Additions, alternations or repairs,** with respect to EERO window replacements.

We therefore urge approval as submitted for the reasons stated in the proposal to ensure these provisions are in place for all jurisdictions that adopt the IRC regardless of whether or not they adopt Appendix J

RB122-13
Final Action: AS AM AMPC____ D

RB124-13
R310.6 (New), R310.7 (New)

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R310.6 Dwelling additions. Where dwelling additions occur that contain sleeping rooms, an emergency escape and rescue opening shall be provided in each new sleeping room. Where dwelling additions occur that have basements, an emergency escape and rescue opening shall be provided in the new basement.

Exceptions:

1. An emergency escape and rescue opening is not required in a new basement that contains a sleeping room with an emergency escape and rescue opening.
2. An emergency escape and rescue opening is not required in a new basement where there is an emergency escape and rescue opening in an existing basement that is accessible from the new basement.

R310.7 Alterations or repairs of existing basements. An emergency escape and rescue opening is not required where existing basements undergo alterations or repairs.
Exception: New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with R310.1.

(Portions of proposal not shown remain unchanged)

Reason: There continues to be confusion in the code enforcement community as to the requirements for emergency escape and rescue opening requirements as they apply to existing basements and additions. Hopefully this proposal will make it clearer that emergency escape and rescue openings are only required in additions if there are sleeping rooms and/or a basement and then only if the new basement does not have a sleeping room or access to an emergency escape and rescue opening in the existing basement. Furthermore, this amendment is intended to clarify that existing basements that do not undergo expansion and where no sleeping rooms are added need not have emergency escape and rescue openings installed when remodeling occurs. At least in our area, code officials sometimes require emergency escape and rescue openings be installed when basements are finished or remodeled even when no sleeping rooms occur. This was never the intent of the code.

Cost Impact: None

R310.6 (NEW)-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it improves the clarity of the code with regard to existing buildings. Some requirements might be better located elsewhere in the code, but this is an improvement.

Assembly Action: **None**

Individual Consideration Agenda

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

Joseph Day III and Marc St. Jean, DBOA President, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R310.7 ~~Alterations or~~ repairs of existing basements. An emergency escape and rescue opening is not required where existing basements undergo ~~alterations or~~ repairs.

> ~~**Exception:** New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with R310.1.~~

Commenter's Reason: The elimination of an emergency escape and rescue opening for alterations to existing basements weakens the code and the fire safety of the occupants of the dwelling and of the firefighters who will respond to the dwelling in the event of a fire. The conversion of an existing basement into habitable space falls under the definition of alteration. Allowing this type of alteration without requiring the installation of an emergency escape and rescue opening and reduces weakens the code by allowing the dwelling to be less safe after the alterations than its existing condition.

RB124-13

Final Action: AS AM AMPC____ D

RB129-13
R311.7

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Add new text as follows:

R311.7 Stairways. Stairways serving a dwelling or accessory structure shall comply with this section. This shall include, but shall not be limited to, exterior stairs from a dwelling or garage to grade and those stairs serving decks, porches, balconies, sun rooms, and similar structures.

Exceptions:

1. Stairs serving attics or crawl spaces.
2. Stairs that only provide access to plumbing, mechanical, or electrical equipment.
3. Stairs that serve structures or spaces used by children as play areas.

Reason: When reading Section R311 of the IRC regarding stairs, the language supports only two interpretations on how stairs are regulated. Those two interpretations are that either all stairs must comply with the section or only those stairs that are a part of the means of egress should comply. There is no other language that allows vacillation between those interpretations.

The title of the section is "Means of Egress". R311.1 requires a means of egress from "all portions of the dwelling to the exterior of the dwelling…" R311.4 qualifies the charging language by stating that every habitable level including basements must either have an exterior exit door meeting the requirements of R311.2 or have a stair or ramp connecting that level to a level that has such a door. Note that it does not say "stairs" or "ramps" but "stair" or "ramp" (singular).

The text of the code does not support regulating stairs that are not a part of the "means of egress". This theory is apparently wide spread because many building officials are of the opinion that stairs used in landscaping are not regulated. Also, attempts to submit code changes to the ICC IRC Committee to give relief for stairs to attics and crawl spaces have been met with resistance from the Committee with the statement that they are already exempt. One can come to that conclusion only if you interpret the stair rules to apply to the means of egress and only one means of egress is required and that is only required from the dwelling, not attics, crawl spaces, and garages.

But if you take the position that the section only regulates those stairs that are part of the means of egress, stairways serving attics and crawl space and landscaping stairs would not be regulated but also stairs serving decks and the stairs commonly found serving as a path of travel from a dwelling to a garage would not be. In fact, R311.1 specifically prohibits a means of egress from traveling through a garage.

So there is confusion as to whether or not the code does regulate or intends to regulate certain stairs. This proposal makes it clear that all stairs are required to comply with the code unless specifically exempted. If this proposal is supported, stairs that are part of landscaping would be exempt unless they serve as a means of travel from a dwelling or accessory structure to grade. Stairs from a deck or from one level of a deck to another would be regulated. Stairs between a dwelling and garage would be regulated. Stairs serving an attic or crawl space would not be regulated. The current text already exempts stairs to crawl spaces by Section R311.4 but not directly. It exempts them because it does not list crawl spaces as a location where compliant stairs are required. But this also supports the possibility that the code does not regulate stairs serving a deck.

It is necessary to eliminate the confusion and inconsistency that exists in the enforcement of stair requirements that this language be approved. The proposal is reasonable because it puts into written format what is commonly accepted to be code language even if it cannot be supported by that text.

The following is for informational purposes only.

SECTION R311
MEANS OF EGRESS

R311.1 Means of egress. All *dwellings* shall be provided with a means of egress as provided in this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the *dwelling* to the exterior of the *dwelling* at the required egress door without requiring travel through a garage.

And,

R311.4 Vertical egress. Egress from habitable levels including habitable attics and *basements* not provided with an egress door in accordance with Section R311.2 shall be by a ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

Cost Impact: None

R311.7-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that, in proposed Exception 3, "stairs that serve spaces for children used as play areas" is not defined. This is the means of egress section and stairs are included in the proposal in this section that are not part of the means of egress.

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, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: The intent of this proposal was to make clear what stairs were regulated and provide exceptions for certain applications including structures used by children. However, the committee disapproved this proposal with the statement that the proposal addressed stairs that are not part of the means of egress and this was the means of egress section.

I disagree. It is necessary to consider the application of stair requirements to the variety of stairs found in a building regulated by the IRC. Regardless of whether or not you direct a building owner to build in a certain way, you need to be able to prosecute that violation and if the text does not track, you will fail in that prosecution and likely you won't even get it past your city attorney's desk.

The code requires that all ***dwellings*** (not accessory structures) shall be provided with a means of egress (R311.1). Are we to assume that stairs in accessory structures are not regulated? If one creates an art studio on the second floor of a detached garage, is the stair to the second floor not regulated? If you believe it is regulated, what code section do you cite?

The code requires that a means of egress be provided but specifically prohibits that path from traveling through a garage (R311.1). Are we to assume that the stairs commonly found serving as a path of travel between the house and garage is not regulated? If you believe it is regulated, what code section do you cite?

The code requires at least one egress door and provides specific requirements for that door (R311.2). A sliding door commonly used to provide access to a deck does not meet that requirement so a path through one of these doors to grade via the deck and stairs is not a compliant means of egress. Does that mean the stairs to the deck are not regulated? If you believe it is regulated, what code section do you cite?

The code requires vertical egress from a basement but only if there is not an egress door provided from the basement (R311.4). So, for homes with walkout basements and a compliant basement egress door, are we to assume the stair to the main floor is not regulated? If you believe it is regulated, what code section do you cite?

And if you are of the opinion that it is the intent of the code to regulate those stairs that are not part of the means of egress and that serve locations other than the dwelling, you are cornered into applying the stair requirements in all cases unless there are exceptions to those unique situations. Such is the case for stairs serving an attic or a child's playhouse.

Clearly there are differences of opinion over the regulation, or lack thereof, of certain stairs. As code officials, it is imperative that we have clear direction on how we enforce rules on stairs which are one of the most common elements in a home. If you believe you have a violation that needs to be corrected, you need to be able to prosecute that violation.

This proposal starts by requiring all stairs to comply with the code. This includes stairs serving buildings that are not dwellings. It includes stairs from decks to grade. This clears up the question regarding which stairs are regulated.

The proposal then provides specific exemptions for stairs serving attics and crawl spaces and those areas that only house equipment. It also provides an exception for structures or areas used as children's play areas. For example, a two story children's play house is not exempted from permits. Is it reasonable to require stairs intended to serve such a space to meet the geometry and headroom requirements found in the code? Of course not! New and remodeled homes sometimes have elevated areas in bonus rooms for children's play areas. Again, it is appropriate to provide some relief from the strict application of the code to these uses.

This proposal provides some long missing direction and closes some gaps in the path to requiring compliance with stair requirements.

RB129-13

Final Action: AS AM AMPC____ D

RB130-13
R311.7.1

Proposed Change as Submitted

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.1 Width. *Stairways* shall not be less than 36 inches (914 mm) in clear width at all points above the permitted *handrail* height and below the required headroom height. *Handrails* shall not project more than ~~4.5~~ 6.5 inches (~~114~~165 mm) on either side of the *stairway* and the minimum clear width of the *stairway* at and below the *handrail* height, including treads and landings, shall not be less than 31½ inches (787 mm) where a *handrail* is installed on one side and 27 inches (698 mm) where *handrails* are provided on both sides.

Exception: The width of spiral *stairways* shall be in accordance with Section R311.7.10.1.

Reason: The required continuous handrail often needs to project an additional 2 inches from the side of the stairway to maintain the required finger clearance when passing nosing projections at a floor, landing, or return flight. This would not diminish the required width and would provide needed finger clearance to avoid nosing projections into the stairway.

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

R311,7.1-RB-COOPER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proposal would not limit the increased projection to only the stated problem area.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

David W. Cooper, Stair Manufacturing and Design Consulting, representing Stairway Manufacturers' Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise text as follows:

R311.7.1 Width. *Stairways* shall not be less than 36 inches (914 mm) in clear width at all points above the permitted *handrail* height and below the required headroom height. *Handrails* shall not project more than 4.5 inches (114mm) on either side of the *stairway* and the minimum clear width of the *stairway* at and below the *handrail* height, including treads and landings, shall not be less than 31½ inches (787 mm) where a *handrail* is installed on one side and 27 inches (698 mm) where *handrails* are provided on both sides.

Exceptions:

1. The width of spiral *stairways* shall be in accordance with Section R311.7.10.1.

2. Handrails may project an additional 2¼ inches (57 mm) into the stairway where passing nosing projections at a floor, landing or return flight in order to provide the 1½ inches (38 mm) space required in Section R311.7.7.2, provided the handrails do not project into the required stairway widths at and below the handrails.

Commenter's Reason: The committee felt that the original proposal did not limit the additional projection to the problem areas stated in the original reason statement. This modification clearly does so by removing the changes proposed to R311.7.1, Width, and adding Exception 2. The new exception not only limits when additional projection is allowed but provides for handrail continuity and finger clearance with no intrusion into the required width. The additional projection needed will not reduce the width currently required. This most accurately reflects the most common interpretation and enforced solution in the problem areas cited.

RB130-13

Final Action: AS AM AMPC____ D

RB133-13
R311.7.5.1

Proposed Change as Submitted

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.5.1 Risers. The maximum riser height shall be 7¾ inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any *flight* of *stairs* shall not exceed the smallest by more than ⅜ inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that ~~the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.~~ riser openings between treads located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the lower edge of the riser do not permit the passage of a 4 inch diameter (102 mm) sphere.

> ~~**Exception:** The opening between adjacent treads is not limited on stairs with total rise of 30 inches (762 mm) or less.~~

Reason: The exception allows unrestricted openings in risers if the stair has a 30" total rise. This is a flawed requirement. Flights stacked in a well could have a total rise of 30 inches and an exposure to a much greater fall distance to the next level or flight below. This change correctly identifies the hazard and the needed requirement applies the language found in section R312, Guard and window fall protection.

Cost Impact: This code change would not increase the cost of construction.

R311.7.5.1-RB-COOPER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that it creates enforcement problems in that many different measurements might be required, and because the proposed language was confusing.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

David W. Cooper, Stair Manufacturing and Design Consulting, representing Stairway Manufacturers' Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R311.7.5.1 Risers. The maximum riser height shall be 7¾ inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any *flight* of *stairs* shall not exceed the smallest by more than ⅜ inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided ~~that riser~~ the openings ~~between treads~~ located more than 30 inches (762 mm) measured vertically to the floor or grade below ~~at any point within 36 inches (914 mm) horizontally to the lower edge of the riser~~ do not permit the passage of a 4 inch diameter (102 mm) sphere.

Commenter's Reason: The current exception in the code allows unrestricted openings in risers if the stair has a 30" total rise. This is a flawed requirement. Flights stacked in a well could have a total rise of 30 inches and an exposure to a much greater fall distance to the next level or flight below. This change correctly identifies the hazard. The modification addresses the committee's concern by clearly stating the requirement in simple understandable terms and eliminates the need for the exception

RB133-13

Final Action: AS AM AMPC____ D

RB136-13
R311.7.8.2

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

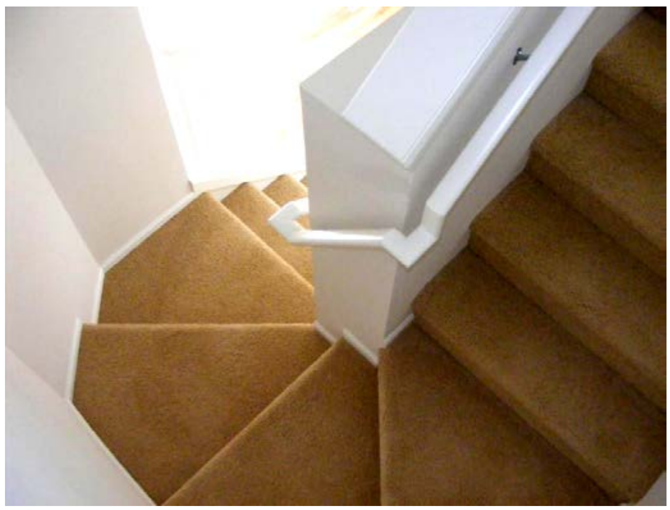
R311.7.8.2 Continuity. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

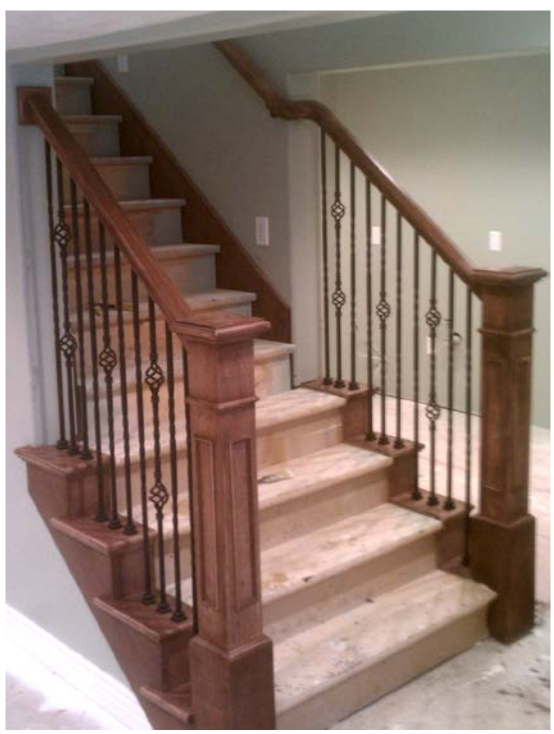
Exceptions:

1. Handrails shall be permitted to be interrupted ~~by a~~ newel posts ~~at the turn~~.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.
3. Handrails shall be permitted to be interrupted at the transition from a wall to a guard.
4. Handrails shall be permitted to be interrupted where a flight changes direction.

Reason: Handrails are required by the IRC to be continuous with two exceptions. The first allows the rail to be interrupted by a newel post "at a turn". The term "at a turn" can be interpreted in different ways. Does this mean a ninety degree turn, a 180 degree turn, or perhaps a 45 degree turn? Does it apply only when flights are interrupted by a landing or does it also apply to winder stairs? But let's face it. These rails are in dwellings, not public settings. These rails are often installed by homeowners who lack even simple joinery skills. The users of the stairs are familiar with their surroundings. The rails are not required for accessibility purposes. Yet they are required to meet the same standard that applies to high occupant load commercial applications. That is overkill.

If it is safe to remove one's hand when maneuvering around a newel post "at a turn", why is it not safe to do the same on a straight run of a stair, or when negotiating a turn on a winder stair, or when transitioning from a stair enclosed on both sides to open on both sides? Following are some attempts at compliance with current code





Does anyone really believe that the user of any of these stairs would maintain contact between their hand and the railing during the complete traverse of the stair? Likely not, because it requires twisting the wrist and hand in ways that are uncomfortable if not impossible.

Let's be realistic. For dwelling applications, it is reasonable to allow greater leeway in handrail designs. Following are some examples of railings designs that are no more hazardous than the ones deemed 100% compliant. The last example is commonly found by field inspectors on owner (and sometimes contractor) constructed deck stairs. Intermediate posts are necessary to stabilize the guard. But the post interrupts the handrail and results in a correction notice to install a continuous rail. This is usually met by complaints by the homeowner that no unsafe condition exists and many people would agree. Installing an additional railing on this type of stair "just to meet the code" smacks of over-regulation, generates complaints about the unsightly finished product, and adds unnecessary cost to the construction of the stair not to mention the ill will created between building departments and taxpaying homeowners.

It is time to add some reasonableness to the handrail requirements for dwellings. This proposal adds a number of changes. First, it allows the rail to be discontinued whenever a newel post occurs. It deletes the ambiguous term "at the turn" and allows the newel post be placed at any change of direction or at mid flight if desired. Either the interruption of a rail by a newel post is a hazard all of the time or none of the time. This proposal takes the position that a newel post poses no hazard. The second change allows the handrail to be discontinued where the stair makes a change from having walls on the side of the stair to having guards as is illustrated below. The basis for the argument is that creating a turn in the handrail that may cause the wrist to make a full ninety degree turn at this transition is not reasonable and that the average individual will take their hand off the rail anyway to make this transition. Furthermore, this situation, oft encountered when basements are finished, is difficult for most homeowners to overcome. The last change adds an exception allowing the handrail to be discontinued when the stair makes a change in direction as may occur with a winder stair. The following pictures illustrate some of those applications.

This proposal will not lessen the safety of stairs. In some cases it may enhance the safety by creating handrails that are more ergonomically useable. It will enable homeowners to comply with the rules and stay within their skill levels thus keeping costs reasonable.

Cost Impact: None

R311.7.8.2-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposed code change because they felt that stairs account for many falls and that a continuous rail is important, whether or not it is held continuously, to reduce the incidence of falls. No technical data was submitted to support the proposal.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

David W. Cooper, Stair Manufacturing and Design Consulting, representing Stairway Manufacturers' Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R311.7.8.2 Continuity. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

Exceptions:

1. Handrails shall be permitted to be interrupted <u>by</u> newel post~~s~~ <u>at a turn or landing</u>.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.
3. ~~Handrails shall be permitted to be interrupted at the transition from a wall to a guard.~~ <u>Handrails serving as the tops of guards shall be permitted to be interrupted by a wall provided a continuing handrail is provided on the same side of the stair at the same height as measured above the line of the nosings.</u>
4. ~~Handrails shall be permitted to be interrupted where a flight changes direction.~~

Commenter's Reason: We spoke against this proposal in Dallas due to the proponent's intent to allow intermediate newels in a straight run to interrupt the handrail allowing newels to interrupt the handrail at any point without restriction. However we mentioned the proposal clearly pointed to other needed provisions within the code.

Exception 1: Our modification proposes language from **IBC 1012.4 Continuity** Exception 1 which states "turn or landing" and is a simple way to eliminate the need for exception 4 that is working well within the code.

Exception 2: Remains unchanged.

Exception 3: This has been reworded to include concerns for a smooth transition assuring both rails are at the same height. As stated in the Dallas testimony of the proponent we have been using "S fittings" for 20 years and the fact is people do not follow them with their hand and they contribute nothing to safe use of stairways. It is time to realize this and provide a solution that can be easily and affordably provided.

RB136-13

Final Action: AS AM AMPC____ D

RB141-13
R311.8.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R311.8.1 Maximum slope. Ramps serving the egress door required by section R311.2 shall have a maximum slope of 1 unit vertical in 12 units horizontal (8.3-percent slope). All other ramps shall have a maximum slope of 1 unit vertical to 8 units horizontal (12.5-percent slope).

Exception: Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical in eight horizontal (12.5-percent slope).

Reason: When ramp slope requirements were changed a few years back, the reason stated was to enable persons with disabilities to stay in their homes. However, the scope of the proposal included all ramps, even those that could not be used by persons with disabilities. For example, dwelling additions to older homes sometimes have new basements at a deeper level and the owner wishes to make the transition by ramp. A 1:12 slope can sometimes be difficult to achieve and absorbs much more space than need be. Media rooms are often designed to have sloping floors with ramps serving the seating and again the 1:12 slope is problematic. This proposal gives some relief for those situations where accessibility may not be an issue. This also is consistent with section 1010.3 of the IBC which allows a 1:8 slope for pedestrian ramps not used as a means of egress.

IBC
SECTION 1010
RAMPS

1010.3 Slope. *Ramps* used as part of a *means of egress* shall have a running slope not steeper than one unit vertical in 12 units horizontal (8-percent slope). The slope of other pedestrian *ramps* shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

Cost Impact: None

R311.8.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that a 1 in 12 ramp slope is a reasonable maximum when serving the egress door, but ramps serving other areas should have more flexible requirements.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved and a public comment was submitted.

Public Comment:

Dominic Marinelli, representing United Spinal Association, requests Disapproval.

Commenter's Reason: United Spinal Association respectfully requests that RB-141-13(below)is disapproved.
The proposed added language to RB 311.8.1 "all other ramps shall have a maximum slope of 1 unit vertical to 8 units horizontal" would essentially create a large loophole given that only one egress door is required by R311.2, this language will permit

all ramps (other than the one ramp designated to serve the egress door), to have a maximum slope of 12.5%. As the intent of “Aging in Place” design features is to increase safety, accessibility, and independence for older adults in their own homes, permitting ramps to be constructed with a slope of 1 unit vertical to 8 units horizontal (12.5-percent slope) falls short of promoting accessibility, or aging in place features, where ramps are provided to areas of the home that would be utilized by the homeowner. Except for those areas where it is technically infeasible due to site constraints to provide a 1:12 maximum slope, United Spinal does not concur that all ramps (other than ramps serving egress doors) should be permitted to have a maximum slope of 1:8.

RB141 – 13 –
AS/DF
R311.8.1

Proponent: Rick Davidson, City of Maple Grove Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)
Revise as follows:

R311.8.1 Maximum slope. Ramps serving the egress door required by section R311.2 shall have a maximum slope of 1 unit vertical in 12 units horizontal (8.3- percent slope). All other ramps shall have a maximum slope of 1 unit vertical to 8 units horizontal (12.5-percent slope).

> **Exception:** Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical in eight horizontal (12.5-percent slope).

RB141-13

Final Action: AS AM AMPC____ D

RB144-13
R312.1.1, Chapter 44

Proposed Change as Submitted

Proponent: Mitch Markham, representing Ascend Restoration Services

Revise as follows:

R312.1.1 Where Required. *Guards* shall be located along open-sided walking surfaces, including stairs, ramps and landings that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard.*

> **Exception:** Permanent fall arrest and restraint anchorage connector devices meeting ANSI/ASSE Z359.1 affixed for use during the entire roof covering lifetime shall be permitted where mechanical equipment, systems, devices and various components that require service are located on roof surfaces. Fall arrest/restraint devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed no more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.

Add new standards to Chapter 44 as follows:

ANSI American National Standards Institute
25 West 43rd Street, Fourth Floor
New York, NY 10036

Z359.1-07 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASSE American Society of Sanitary Engineering
901 Canterbury, Suite A
Westlake, OH 44145

Z359.1-2007 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

Reason: This proposal is intended to correlate with E108-12 which was approved at the 2012 FAH as a consent agenda item during the code Group A process. This proposal is needed so there is consistency and correlation between the ICC codes. E108-12 added clarity to IBC sections 1013.6 and 1013.7, IFC sections 1013.6 and 1013.7, and IMC section 304.11. The existing code provisions requiring the construction of guards do not adequately address the expanding list of equipment, assemblies, systems, devices and items that are now commonly being placed on roof tops and elevated walking surfaces that require routine maintenance. The current requirement needs clarification and a cost effective alternative to constructing a guard on a roof since a guard is a method of fall protection required at the edge of elevated surfaces where people will walk and will provide service to roof-located equipment and other systems or devices. The code change proposal adds clarity to the current code language by identifying items within the exception that are now typical placements on roofs and elevated walking surfaces. This expands the fall protection, life-safety provisions to a growing number of trades and service workers that are working on elevated surfaces. The proposal also provides an alternate method of compliance with the inclusion of an exception which allows for the installation of fall arrest/restraint anchorage connector devices meeting ANSI Z359.1 which is the nationally recognized consensus general industry standard in use across the country. The proposed exception is a choice made by the designer and building owner that provides design flexibility and the opportunity to lower construction cost associated with building guards. The proposal will increase the uniform application of this section of the code. The Bureau of Labor Statistics, US Department of Labor reports the fatalities due to falls for the years from 1998 to 2010 are second to only highway incidents, with an average of 743 fatalities each year over this 12 year period. Of the 635 fatal falls in 2010, one third is from falls from ladders or roofs. In 2010 the construction industry had the highest number of fatal occupational injuries. In 2010 for nonfatal falls the median number of days away from work due to falls to a lower level was 14 days. Clearly the code needs to be improved to provide fall protection where mechanical equipment, appliances, equipment, fans, roof hatch openings, solar arrays, solar water heaters, photovoltaic panels, skylights, chimneys, attic vents, and ventilators, satellite dishes, antennas, television/radio/internet and other communication equipment and all other machinery and other components that require service are located on elevated surfaces more than 30 inches above a lover level.

Cost Impact: The code change proposal will not increase the cost of construction because the current code provisions can be interpreted to have the intent to require guards at all elevated working level more than 30 inches above a floor, roof or grade. The inclusion of an exception provides a choice to the builder and homeowner to lower the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, [ANSI/ASSE Z359.1-2007] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R312.1.1-RB-MARKHAM

Committee Action Hearing Results

For staff analysis of the content of U.S. ANSI/ASSE Z359.1 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that anchorage devices are used primarily for protection of workers and there is no point in leaving them permanently in place. They are not particularly attractive. This proposal may be more appropriate if reworked as an exception to Section M1304.1.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Ed Golden, representing Ascend Restoration Services requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R312.1.1 Where Required. *Guards* shall be located along open-sided walking surfaces, including stairs, ramps and landings that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard.*

> ~~**Exception:** Permanent fall arrest and restraint anchorage connector devices meeting ANSI/ASSE Z359.1 affixed for use during the entire roof covering lifetime shall be permitted where mechanical equipment, systems, devices and various components that require service are located on roof surfaces. Fall arrest/restraint devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed no more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.~~

Ml305.1 Appliance access for inspection service, repair and replacement. *Appliances* shall be accessible for inspection, service, repair and replacement without removing permanent construction, other *appliances,* or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance,* Installation of room heaters shall be permitted with at least an 18-inch (457 mm) working space. A platform shall not be required for room heaters.

> **Exception:** Permanent fall arrest and restraint anchorage connector devices meeting ANSI/ASSE Z359.1affixed for use during the entire roof covering lifetime shall be permitted where mechanical equipment, systems, devices and various components that require service are located on roof surfaces. Fall arrest/restraint devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed no more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.

(Portions of proposal not shown to remain unchanged)

Commenter's reason: Members of the IRC Code Development Committee said during deliberation of this code change that section M1305.1is the preferred location for this proposed exception since M1305.1requires a level working space 30 inches by 30 inches. This exception is appropriate as it is a cost effective alternate to creating a safe working place when mechanical equipment is located on peaked roofs. This proposal is intended to correlate with E108-12 which was approved at the 2012 FAH as a consent agenda item during the code Group A process. This proposal is needed so there is consistency and correlation between the ICC codes. E108-12 added clarity to IBC sections 1013.6 and1013.7,IFC sections 1013.6 and 1013.7,and IMC section 304.11.The existing code provisions requiring the construction of guards do not adequately address the expanding list of equipment, assemblies, systems,devices and items that are now commonly being placed on roof tops and elevated walking surfaces that require routine maintenance.The current requirement needs clarification and a cost effective alternative to constructing a guard on a roof since a guard is a method of fall protection required at the edge of elevated surfaces where people will walk and will provide service to roof-located equipment and other systems or devices. The code change proposal adds clarity to the current code language by identifying items within the exception that are now typical placements on roofs and elevated walking surfaces. This expands the fall protection, life-safety provisions to a growing number of trades and service workers that are working on elevated surfaces. The proposal also provides an alternate method of compliance with the inclusion of an exception which allows for the installation of fall arrest/restraint anchorage connector devices meeting ANSI Z359.1which is the nationally recognized consensus generalindustry standard in use across the country. The proposed exception is a choice made by the designer and building owner that provides design flexibility and the opportunity to lower construction cost associated with building guards. The proposal will increase the uniform application of this section of the code. The Bureau of Labor Statistics,US Department of Labor reports the fatalities due to falls for the years from 1998 to 2010 are second to only highway incidents, with an average of 743 fatalities each year over this 12 year period. Of the 635 fatal falls in 2010, one third is from falls from ladders or roofs. In 2010 the construction industry had the highest number of fatal occupational injuries. In 2010 for nonfatal falls the median number of days away from work due to falls to a lower level was 14 days. Clearly the code needs to be improved to provide fall protection where mechanical equipment, appliances, equipment, fans, roof hatch openings, solar arrays, solar water heaters, photovoltaic panels, skylights, chimneys, attic vents, and ventilators, satellite dishes, antennas, television/radio/internet and other communication equipment and all other machinery and other components that require service are located on elevated surfaces more than 30 inches above a lover level.

RB144-13

Final Action: AS AM AMPC____ D

RB151-13
R313.2

<u>Proposed Change as Submitted</u>

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R313.2 One- and two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in<u> new *dwelling units* and new </u>~~one- and two-family~~ *dwellings*.

> **Exception:** An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing ~~buildings~~ <u>*dwellings or dwelling units*</u> that are not already provided with an automatic residential sprinkler system.

Reason: The 2009 IRC adopted fire sprinkler regulations that continue in the 2012 IRC. However upon implementation of the regulations it is apparent that an inconsistency appears in Section R313.2 when compared with Section R313.1. Section R313.1 in its exception exempts additions and alterations to townhouses that are not already protected with fire sprinklers. The exception does not exempt new townhouses added adjacent to existing townhouses from protection. Section R202 defines a townhouse as "**TOWNHOUSE.** A single-family *dwelling unit* constructed in a group…" and as a consequence R313.1 will require the new townhouse to be protected since it is a "single family dwelling unit".

Section R313.2 address a second configuration of dwelling that may be one dwelling or two attached dwelling units. It is not uncommon in more urban environments for a new dwelling unit to be added and attached to an existing dwelling and as a consequence the new dwelling unit should be protected as would a townhouse added adjacent to another townhouse dwelling unit.

The term building is not defined in the IRC and is not consistent with the heading of Section R313.2 and therefore the terms dwelling and dwelling unit are more appropriate.

Cost Impact: This code change will minimally increase the valuation of construction by less than 1 %.

R313.2-RB-FATTAH

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it contained information that is already sufficiently addressed by the code and there is no point in repeating it.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

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

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Commenter's Reason: The original proposal is being resubmitted after a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change. We respectfully disagree with the committee that the proposed code change includes redundant language. We appreciate that code intends to limit impacts to existing buildings that are not protected with fire sprinklers and intends to regulate the impact to occupants in new dwellings (one or two attached dwelling units) as well as new townhouses (three or more attached townhouse units).

As published the IRC seems to require new fire sprinklers in townhouses that are separated from other townhouses with a common one hour wall. The IRC does not limit the total number of attached townhouses and does not require a lot line between townhouses. As a consequence a new dwelling unit that is attached or stand-alone can be added to an existing dwelling and be separated with a one-hour wall. It would appear that the hazards due to a new living unit whether a dwelling unit or townhouse or dwelling is the same however the latter is clearly required to include a fire sprinkler system. A dwelling unit addition, similar to a townhouse addition, normally includes limited alterations to the existing dwelling.

The 2009 IRC adopted fire sprinkler regulations that continue in the 2012 IRC. However upon implementation of the regulations it is apparent that an inconsistency appears in Section R313.2 when compared with Section R313.1.

- Section R313.1 in its exception exempts additions and alterations to townhouses that are not already protected with fire sprinklers. The exception does not exempt new townhouses added adjacent to existing townhouses from protection. Section R202 defines a townhouse as "**TOWNHOUSE.** A single-family *dwelling unit* constructed in a group…" and as a consequence R313.1 will require the new townhouse to be protected since it is a "single family dwelling unit".
- Section R313.2 address a second configuration of dwelling that may be one dwelling or two attached dwelling units. It is not uncommon in more urban environments for a new dwelling unit to be added and attached to an existing dwelling and as a consequence the new dwelling unit should be protected as would a townhouse added adjacent to another townhouse dwelling unit.

The term building is not defined in the IRC and is not consistent with the heading of Section R313.2 and therefore the terms dwelling and dwelling unit are more appropriate.

RB151-13

Final Action: AS AM AMPC____ D

RB157-13
R314.3.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R314.3.1 Alterations, repairs and additions. When *alterations*, repairs or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

~~1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, or the *addition* or replacement of windows or doors, or the *addition* of a porch or deck, are exempt from the requirements of this section.~~
~~2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.~~
1. Addition, replacement or repair of windows or doors.
2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.
3. Additions of or repairs to porches, decks, or balconies.
4. Work involving detached accessory structures.
5. Installation of retaining walls or fences.
6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.
7. Installation, alteration or repairs of plumbing or mechanical systems within a dwelling unit.

Reason: It is necessary to more definitively identify those circumstances when smoke alarms are not required when alterations, repairs and additions occur because of confusion within the code enforcement community over the current language. The same revision is proposed for the CO alarm section.

For example, if smoke alarms need not be installed when a home is reroofed, are they required when someone builds a storage shed in their back yard? Current language does not seem to exempt such work.

Cost Impact: None

R314.3.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because the proponent requested disapproval so that it can be improved and brought back in the public comment period.

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, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R314.3.1 Alterations, repairs and additions. When *alterations*, repairs or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

1. Work involving the exterior of *dwellings*.
2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.
~~1. Addition, replacement or repair of windows or doors.~~
~~2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.~~
~~3. Additions of or repairs to porches, decks, or balconies.~~
~~4. Work involving detached accessory structures.~~
~~5. Installation of retaining walls or fences.~~
~~6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.~~
~~7. Installation, alteration or repairs of plumbing or mechanical systems within a dwelling unit.~~

Add new definition as follows:

Exterior of dwellings. Exterior of dwellings shall mean the addition, replacement, or repair of windows or doors; exterior coverings regulated in Section R703; roof assemblies regulated in Chapter 9; additions, alterations or repairs to porches, decks, or balconies; and work involving accessory structures.

Commenter's Reason: The first versions of the IRC exempted work involving the exterior of the dwelling from triggering installation of smoke alarms in existing dwellings. Because of confusion over what constituted "work involving the exterior of the dwelling", a phrase was added to the section in an attempt to give direction. The phrase was not mandatory language. It is what many call "commentary language". The phrase starts with "such as". This does not mean all inclusive. It is the same as "for example". The deletion of any of the items in the phrase does not change the application of the section. It may only make it less clear.

The modification re-inserts most of the language that was stricken from the original proposal except for the "such as" phrase. It also creates a definition for the term "exterior of dwellings". Because there is a companion code change for CO alarms, it seems more appropriate to have a definition that fits both sections than repeating the language in each with the possibility of later amendments creating inconsistencies.

The new definition eliminates the commentary language and in its place are references to specific areas of the code that are intended to apply. This clarity is necessary to reduce the confusion that exists with the current commentary language.

RB157-13

Final Action: AS AM AMPC____ D

RB159-13
R314.5 (New)

Proposed Change as Submitted

Proponent: Thomas P. Hammerberg, representing Automatic Fire Alarm Association (TomHammerberg@afaa.org)

Add new text as follows:

R314.5. Residential Sprinkler Monitoring. Where a Residential Sprinkler System is installed, a sprinkler waterflow alarm-initiating device shall be permitted to be connected to the multiple-station alarm or household fire alarm system to activate an alarm signal.

Reason: This language is currently used in NFPA-72-2013, 29.7.7.7.3. The purpose is to provide notification to occupants of waterflow activation. If a sprinkler activates in another part of the dwelling unit, this provides earlier warning of the fire situation and will allow additional time to leave the premises. Since the time to escape has reduced significantly in recent years, this will improve fire safety for the occupants.

Cost Impact: Minimal

R314.5 (NEW)-RB-HAMMERBERG

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the code is not intended to describe what may, can or might be done, but rather what is required to be done.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Thomas Norton, Norel Service Co., Inc, representing self, requests Approval as Submitted.

Commenter's Reason: This proposal seeks to permit the Authority Having Jurisdiction (AHJ) to allow the use of a water flow monitoring device, the installation of which is described in NFPA-72-2013 29.7.7.7.3.

RB159-13
Final Action: AS AM AMPC____ D

RB161-13
R315.3

Proposed Change as Submitted

Proponent: Jerry Anderson, City of Overland Park, Ks, representing self (jerry.anderson@opkansas.org)

Revise as follows:

R315.3 Where required in existing dwellings. Where work requiring a permit occurs in existing dwellings that have attached garages or in existing dwellings within which fuel fired appliances exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Reason: The purpose of the code change is to exempt some minor work from triggering carbon monoxide detectors. The exceptions to the base requirement for installing carbon monoxide detectors in existing dwellings are exactly the same as found in section R314.3.1 for smoke detectors. This change will make the code consistent in its approach in providing early warning detection devices in dwellings. It is unreasonable require the installation of carbon monoxide detectors for any work that is done on an existing dwelling.

Cost Impact: No cost associated with this change

R315.3-RB-ANDERSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it appears to exempt some minor work from carbon monoxide requirements. This action is consistent with the requirements of R314.3.1 for smoke detectors.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Matt Archer, City of Lone Tree, representing Colorado Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R315.3 Where required in existing dwellings. Where work requiring a permit occurs in existing dwellings that have attached garages or in existing dwellings within which fuel fired appliances exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

~~1.~~ Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.

~~2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.~~

Commenter's Reason: Why would we exempt the installation of a carbon monoxide producing appliance from the alarm requirement that protects the occupants from their combustion products?

The exemption of minor work, especially on the outside of the house, is needed to limit the scope from triggering the requirements for a carbon monoxide alarm. To cut and paste the same exceptions from smoke alarms is good for consistency but does not make sense in this case.

RB161-13

Final Action: AS AM AMPC____ D

RB162-13
R315.3

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R315.3 Where required in existing dwellings. Where work requiring a *permit* occurs in an existing *dwelling~~s~~* that ~~have~~ has an attached garage~~s~~ or in an existing dwelling~~s~~ within which fuel fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

1. Addition, replacement or repair of windows or doors.
2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.
3. Additions of or repairs to porches, decks, or balconies.
4. Work involving detached accessory structures.
5. Installation of retaining walls or fences.
6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.
7. Installation, alteration, or repairs of plumbing, mechanical, or electrical systems not involving a fuel fired appliance.

Reason: Given the low number of deaths caused by CO poisoning compared to injuries and deaths caused by falls, fires, and other household accidents, the current rules regarding CO alarms are overly restrictive. Without exception, the code requires CO alarms be installed in a dwelling even when a permit is issued for a such mundane exterior work as retaining wall! This means homeowners must provide access to the interior of their homes to contractors and inspectors to install and inspect CO alarms (but not smoke alarms). Bluntly, this is ridiculous. The proposed revisions create a number of exceptions when CO alarms need not be installed. Unless some relief is given for exterior and other work that does not involve directly the ability to install CO alarms, permits will never get final inspections completed in a timely manner and building departments will be faced with a huge backlog of open permits.

Some folks will argue that the text says CO alarms are only required when work occurs "in" existing dwellings meaning exterior work is exempt. I might agree except the language used for CO alarms is the same used for smoke alarms and we seem to agree, based on exceptions in the code, that exterior work would trigger the smoke alarm requirements unless we have the exceptions. So if the text means one thing in one section, we conclude the same text means the same thing in another section.

R314.3.1 Alterations, repairs and additions. When *alterations*, repairs or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, or the *addition* or replacement of windows or

Cost Impact: None

R315.3-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposed code change because the proponent requested disapproval so that it can be improved and brought back in the public comment period.

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, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R315.3 Where required in existing dwellings. Where work requiring a *permit* occurs in an existing *dwelling* that has an attached garage or in an existing dwellings within which fuel fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

~~1. Addition, replacement or repair of windows or doors.~~
~~2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.~~
~~3. Additions of or repairs to porches, decks, or balconies.~~
~~4. Work involving detached accessory structures.~~
~~5. Installation of retaining walls or fences.~~
~~6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.~~
~~7. Installation, alteration, or repairs of plumbing, mechanical, or electrical systems not involving a fuel fired appliance.~~
1. Work involving the exterior of *dwellings*.
2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Add new definition as follows:

Exterior of dwellings. Exterior of dwellings shall mean the addition, replacement, or repair of windows or doors; exterior coverings regulated in Section R703; roof assemblies regulated in Chapter 9; additions, alterations or repairs to porches, decks, or balconies; and work involving accessory structures.

Commenter's Reason: This proposal is identical to RB157 that addresses exemptions for installation of CO alarms in existing structures when work requiring a permit occurs. Assuming that other proposals survive the public comment period, there will be new text in the code exempting CO alarms when certain work occurs. This is an important step and needs to occur. What this proposal does is address the confusion that occurs when interpreting the meaning of "work involving the exterior of dwellings". As was pointed out in RB157, the code changed with the 2006 edition to include the phrase "such as….." This phrase provided a series of examples to aid in the interpretation of the section. The language is not mandatory but includes examples of work that are suggested would be exempt from triggering CO alarms in existing structures. This proposal seeks to build on the changes approved in Dallas by adding a definition for "exterior of dwellings" that inserts mandatory language rather than commentary language and better itemizes the kinds of work that applies. Even in this cycle, proposals have been submitted to delete terms from the "such as" phrase with the belief that such a change would impact the application of the rule. In fact all it would do is further confuse the issue. This change is needed to complete the need for clarity in applying this section of the code.

RB162-13
Final Action: AS AM AMPC____ D

RB163-13
R316.3

<u>Proposed Change as Submitted</u>

Proponent: Vytenis Babrauskas, PhD, Fire Science & Technology Inc., representing The American Institute of Architects, Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, Perkins + Will, San Francisco Firefighters Cancer Prevention Foundation and the United States Green Building Council of California

Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

~~Exception~~ <u>Exceptions:</u>

<u>1.</u> Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.

<u>2. Foam plastic insulation shall not be subject to this requirement where installed with a thermal barrier in accordance with Section R316.4.</u>

Reason: This proposal addresses a material performance requirement currently in the code which is not supported by available evidence from fire science research. Removal of the performance requirement as proposed would provide choice for manufacturers and consumers by allowing foam plastic insulation materials without flame retardants to be used in compliance with the code in a fire safe way. This would result in a healthier product at a lower cost.

The proposed change considers fire safety, public health, fire fighter and emergency responder safety, and energy efficiency. It is not a tradeoff among them, and improves them in many ways relevant to the current code requirements as described below and in the Substantiation Section.

For applications in which foam plastics are required to meet flame spread and smoke developed requirements of R316.3 and to be separated from interior spaces by an approved thermal barrier per R316.4, research and testing conducted over many years demonstrate the following:

It is the approved thermal barrier and the fireblocking required by the code that provide the fire safety related to foam plastic insulation, not its meeting the required flame spread and smoke developed ratings of R316.3. Even when foam plastic insulation meets the requirements of R316.3, if it is not protected by a thermal barrier it still poses an unacceptable level of fire hazard (Babrauskas et al., 2012).

In order to meet the flame spread and smoke developed requirements of R316.3, flame retardant chemicals are added to foam plastic insulations.

The two most common flame retardants used, hexabromocyclododecane (HBCD or HBCDD) and Tris (1-chloro-2-propyl) phosphate (TCPP), add potential risks throughout the product life cycle. These include environmental pollution, fire toxicity and possible adverse health effects for building occupants, fire service professionals, and the general public (Babrauskas et al., 2012). These chemicals are added only to meet flame spread and smoke developed requirements; they do not prevent foam plastics from burning.

Thermal barriers prevent temperature rise and adequately protect foam plastic insulation from igniting during a fire. Fire statistics show very few fires, no fire deaths and very few injuries attributable to fire started or spread by insulation within structural areas (Ahrens, 2011).

A precedent for a similar approach exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høibye, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam, there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

In light of the available evidence, changing the code as proposed could:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase use of foam plastic insulations which are important for building energy efficiency by decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Substantiation: A thermal barrier meets the criteria of NFPA 275 by preventing the energy of a fire from reaching the foam. Specifically, NFPA 275 states that after 15 minutes of a post-flashover fire, the temperature at the interface of the thermal barrier and foam cannot exceed 121°C average with 163°C at one peak value thermocouple. This is substantially below the auto-ignition temperature of plastic foams, which are in excess of 400°C for polystyrene and polyurethane (Babrauskas, 2003).

Due to protection by thermal barriers, fire statistics show that insulation very rarely starts or spreads home fires. Insulation within a structural area was the item first ignited in 2% of US home structure fires, resulting in 10 civilian deaths and 90 civilian injuries (0% and 1% of the death and injury totals for the whole US, respectively). Insulation within a structural area was the primary item contributing to flame spread in 2% of US home structure fires, resulting in 0 civilian deaths and 40 injuries (0% and 1% of the death and injury totals for the whole US, respectively) (Ahrens, 2011).

HBCD and TCPP are added to foam plastics to meet flame spread and smoke developed requirements. 90% percent of HBCD and 86% of TCPP produced is used for building insulation (EC, 2008; Env Can, 2012; US EPA, 2010). Both chemicals are now widespread global contaminants (Covaci et al., 2006; Marvin et al., 2011; Van der Veen & de Boer, 2012). The presence of flame retardant chemicals can significantly increase the toxicity of fires when materials burn (Stec & Hull, 2011). Materials with flame retardants can produce greater amounts of carbon monoxide, smoke, and soot, compared to non-flame retardant materials (Babrauskas, 1992; Purser, 2000; Schnipper, Smith-Hansen, & Thomsen, 1995; Wichman, 2003). When HBCD burns, it produces dioxins, which are potentially carcinogenic (Birnbaum, Staskal, & Diliberto, 2003; Desmet, Schelfaut, & Sandra, 2005; Ebert & Bahadir, 2003). Firefighters have higher rates of cancers associated with dioxin exposure (IARC, 2010; LeMasters et al., 2006).

Canada and the European Union have scheduled HBCD to be phased out in the next 3-4 years (EC, 2011; Env Can, 2012). The US Environmental Protection Agency states that the chemical is

> "…persistent in the environment, bioaccumulative in living organisms, and highly toxic to aquatic organisms."
> and
> "Human exposure is evidenced by the presence of HBCD in breast milk, adipose tissue, and blood, and it biomagnifies in the food chain. HBCD presents human health concerns based on animal test results indicating potential reproductive, developmental, and neurological effects. People may be exposed to HBCD from products and dust in the home and workplace, as well as its presence in the environment."
> (US EPA, 2012)

Less is known about TCPP but concerns include its persistence in the environment, human exposure, and the potential to cause cancer (Van der Veen & De Boer, 2012).

Sweden uses the Eurocode classification system to rate the combustibility of building components including foam plastic insulation. Foam plastics are classified as combustible, and thus building codes specify how these materials can be used in fire safe ways, such as behind thermal barriers, concrete or masonry, and with other construction techniques (Blomqvist et al., 2011; Lassen et al., 2011; POPRC, 2011; Posner et al., 2010). Since non-flame retardant foam plastics have been used in Sweden, building fires and deaths from building fires have not increased, indicating that fire safety is maintained by the code mandated measures (Harrami & McIntyre, 2006; Lundqvist et al., 2008; Remberger et al., 2004).

From IRC Section R101.3 Intent:

> The purpose of this code is to 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.
>
> From IRC Section R316.4 Thermal Barrier:
> Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

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Links to the following research reports, and other supporting documentation are available for viewing and download at: http://saferinsulation.greensciencepolicy.org/code-change-proposal/

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Wichman, I. S. (2003). Material flammability, combustion, toxicity and fire hazard in transportation. *Progress in Energy and Combustion Science*, *29*(3), 247–299.

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

R316.3 #1-RB-BABRAUSKAS

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposed code change because they felt that there needs to be more research into the health and safety issues related to foam plastics.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

David Eisenberg, Development Center for Appropriate Technology, representing Vytenis Babrauskas of Fire Science & Technology, Inc., Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, San Francisco Firefighters Cancer Prevention Foundation and the United States Green Building Council of California, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exceptions:

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. Foam plastic insulation shall not be subject to this requirement where installed with a thermal barrier in accordance with Section R316.4 <u>on the interior side. Where foam plastic insulation is installed within 5 feet of a lot line it shall also be separated from the exterior of the building by an approved thermal barrier of not less than ½ inch (12.7 mm) gypsum wallboard or shall comply with Section R316.5 or Section R316.6. Where the exterior separation is required, foam plastic insulation shall comply with the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.</u>

Commenter's Reason: This public comment modification addresses a concern raised about the original proposal and now includes protection from the exterior for foam plastic insulation in close proximity to lot lines. Using the thermal barrier requirements of Section R316.4 for exterior protection provides consistency with fire safety requirements already in the code. This addresses increasing concerns about building-to-building fire spread. The fire separation distances in Section R302.1 Exterior Walls, for unlimited openings in non-rated walls is the basis for specifying five feet from the lot line as the distance triggering the exterior thermal barrier requirement.

This change would not require any changes in current practices or preclude the use of flame-retarded foam insulation, but would create the possibility for manufacturers to meet the rapidly rising demand for insulation without halogenated flame retardants. The increasing number of architectural and engineering design firms large and small, their clients, home owners, and green building and product certification programs concerned about the toxicity of flame retardant chemicals is driving market demand that is stymied by the current code provisions. This change would create the opportunity for more diversity in the market, encouraging the development and use of products that are safer for humans and the environment without sacrificing any fire safety.

The US Environmental Protection Agency (EPA) has already identified that halogenated flame retardants are chemicals of concern. Enabling the market to serve the demand for healthier, safer products is not dependent on EPA establishing the degree of human and ecological health hazards related to this family of chemicals, as documented in thousands of independent peer reviewed studies. Rather, the intent of the code mandates that it address public safety, health and general welfare and provide safety to firefighters and emergency responders.

Multiple lines of foam boards already exist, such as termite resistant and non-termite resistant foam. The labeling of rigid foam insulation to differentiate product lines is commonplace. Spray foam insulation can be differentiated either by labeling and reporting requirements for the components as is done now for some products or by development of color-coding.

A precedent exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høibye, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam, there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

The rationale for this code change proposal is the existence of relatively new information about hazards not previously considered in addressing fire safety – namely that the solutions offered to reduce one aspect of fire hazard not create serious hazards elsewhere - such as human and ecological health risks. When such solutions do create other hazards, they are not redundancies representing "a belt and suspenders approach" as was stated in testimony in opposition. Further, redundancy is not a valid basis for minimum building code requirements.

In light of the available evidence, changing the code as proposed would:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase use of foam plastic insulations which are important for building energy efficiency by potentially decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Bibliography: Links to the following research reports, and other supporting documentation are available for viewing and download at: http://saferinsulation.org/bibliography/

RB163-13

Final Action: AS AM AMPC____ D

RB164-13
R316.3

Proposed Change as Submitted

Proponent: Vytenis Babrauskas, PhD, Fire Science & Technology Inc., representing The American Institute of Architects, Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, Perkins + Will, San Francisco Firefighters Cancer Prevention Foundation, the United States Green Building Council of California

Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

~~**Exception**~~ <u>**Exceptions:**</u>

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. <u>Foam plastic insulation shall not be subject to this requirement when used in a wall, floor, foundation or roof assembly where the foam plastic insulation is separated from the interior of the building by a minimum 1-inch (25 mm) thickness of masonry or concrete.</u>

Reason: This proposal addresses a material performance requirement currently in the code which is not supported by available evidence from fire science research. Removal of the performance requirement as proposed would provide choice for manufacturers and consumers by allowing foam plastic insulation materials without flame retardants to be used in compliance with the code in a fire safe way. This would result in a healthier product at a lower cost.

The proposed change considers fire safety, public health, fire fighter and emergency responder safety, and energy efficiency. It is not a tradeoff among them, and improves them in many ways relevant to the current code requirements as described below and in the Substantiation Section.

For applications in which foam plastics are required to meet flame spread and smoke developed requirements of R316.3 and to be separated from interior spaces by an approved thermal barrier per R316.4, research and testing conducted over many years demonstrate the following:

It is the thermal barrier and the fireblocking required by the code that provide the fire safety related to foam plastic insulation, not its meeting the required flame spread and smoke developed ratings of R316.3. Even when foam plastic insulation meets the requirements of R316.3, if it is not protected by a thermal barrier it still poses an unacceptable level of fire hazard (Babrauskas et al., 2012).

In order to meet the flame spread and smoke developed requirements of R316.3, flame retardant chemicals are added to foam plastic insulations.

The two most common flame retardants used, hexabromocyclododecane (HBCD or HBCDD) and Tris (1-chloro-2-propyl) phosphate (TCPP), add potential risks throughout the product life cycle. These include environmental pollution, fire toxicity and possible adverse health effects for building occupants, fire service professionals, and the general public (Babrauskas et al., 2012). These chemicals are added only to meet flame spread and smoke developed requirements; they do not prevent foam plastics from burning.

Thermal barriers prevent temperature rise and adequately protect foam plastic insulation from igniting during a fire. Fire statistics show very few fires, no fire deaths and very few injuries attributable to fire started or spread by insulation within structural areas (Ahrens, 2011).

The Commentary for the 2012 IRC for Section R316.5.1 Masonry or concrete construction states: "No thermal barrier is required when 1 inch (25 mm) or more of masonry or concrete is placed between the foam plastic and the interior of the building. The intent is to accept 1-inch (25 mm) of masonry or concrete as adequate protection against ignition, even though the concrete does not necessarily meet the performance criteria for thermal barriers."

This suggests that when foam plastic is separated from the interior of a building by minimum 1-inch (25mm) concrete or masonry, the flame spread and smoke developed requirements are not needed.

A precedent for a similar approach exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høibye, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam, there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

In light of the available evidence, changing the code as proposed could:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase use of foam plastic insulations which are important for building energy efficiency by decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Substantiation: 1 inch (25 mm) or greater of concrete or masonry protects foam plastic from ignition in the same way as a thermal barrier which meets the criteria of NFPA 275- by preventing the energy of a fire from reaching the foam. Specifically, NFPA 275 states that after 15 minutes of a post-flashover fire, the temperature at the interface of the thermal barrier and foam cannot exceed 121°C average with 163°C at one peak value thermocouple. This is substantially below the auto-ignition temperature of plastic foams, which are in excess of 400°C for polystyrene and polyurethane (Babrauskas, 2003). As stated in the Commentary, concrete or masonry also has these characteristics.

Due to protection by thermal barriers, fire statistics show that insulation very rarely starts or spreads home fires. Insulation within a structural area was the item first ignited in 2% of US home structure fires, resulting in 10 civilian deaths and 90 civilian injuries (0% and 1% of the death and injury totals for the whole US, respectively). Insulation within a structural area was the primary item contributing to flame spread in 2% of US home structure fires, resulting in 0 civilian deaths and 40 injuries (0% and 1% of the death and injury totals for the whole US, respectively) (Ahrens, 2011).

HBCD and TCPP are added to foam plastics to meet flame spread and smoke developed requirements. 90% percent of HBCD and 86% of TCPP produced is used for building insulation (EC, 2008; Env Can, 2012; US EPA, 2010). Both chemicals are now widespread global contaminants (Covaci et al., 2006; Marvin et al., 2011; Van der Veen & de Boer, 2012). The presence of flame retardant chemicals can significantly increase the toxicity of fires when materials burn (Stec & Hull, 2011). Materials with flame retardants can produce greater amounts of carbon monoxide, smoke, and soot, compared to non-flame retardant materials (Babrauskas, 1992; Purser, 2000; Schnipper, Smith-Hansen, & Thomsen, 1995; Wichman, 2003). When HBCD burns, it produces dioxins, which are potentially carcinogenic (Birnbaum, Staskal, & Diliberto, 2003; Desmet, Schelfaut, & Sandra, 2005; Ebert & Bahadir, 2003). Firefighters have higher rates of cancers associated with dioxin exposure (IARC, 2010; LeMasters et al., 2006).

Canada and the European Union have scheduled HBCD to be phased out in the next 3-4 years (EC, 2011; Env Can, 2012). The US Environmental Protection Agency states that the chemical is

"…persistent in the environment, bioaccumulative in living organisms, and highly toxic to aquatic organisms."
and
"Human exposure is evidenced by the presence of HBCD in breast milk, adipose tissue, and blood, and it biomagnifies in the food chain. HBCD presents human health concerns based on animal test results indicating potential reproductive, developmental, and neurological effects. People may be exposed to HBCD from products and dust in the home and workplace, as well as its presence in the environment."
(US EPA, 2012)

Less is known about TCPP but concerns include its persistence in the environment, human exposure, and the potential to cause cancer (Van der Veen & De Boer, 2012).

Sweden uses the Eurocode classification system to rate the combustibility of building components including foam plastic insulation. Foam plastics are classified as combustible, and thus building codes specify how these materials can be used in fire safe ways, such as behind thermal barriers, concrete or masonry, and with other construction techniques (Blomqvist et al., 2011; Lassen et al., 2011; POPRC, 2011; Posner et al., 2010). Since non-flame retardant foam plastics have been used in Sweden, building fires and deaths from building fires have not increased, indicating that fire safety is maintained by the code mandated measures (Harrami & McIntyre, 2006; Lundqvist et al., 2008; Remberger et al., 2004).

From IRC Section 316.5.1 Commentary:

No thermal barrier is required when 1 inch (25 mm) or more of masonry or concrete is placed between the foam plastic and the interior of the building. The intent is to accept 1-inch (25 mm) of masonry or concrete as adequate protection against ignition, even though the concrete does not necessarily meet the performance criteria for thermal barriers. This condition can arise when foam plastics are installed either within a wall or on one side of a wall. Some common examples are when foam plastics are installed:

- In the cavity of a hollow masonry wall,
- As the core of a concrete-faced panel,
- On the exterior face of a masonry wall and covered with an exterior finish, or
- Within the cores of hollow masonry units.
- Encapsulated within a minimum of 1 inch (25 mm) concrete or masonry wall, floor or roof system, as in insulated tilt-up or pour-in-place

Also, the flame spread rating of the foam plastic used must comply with the requirements of Section R316.3, but the smoke-developed rating of the foam plastic is not limited.

From IRC Section R101.3 Intent:

> The purpose of this code is to 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.

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Wichman, I. S. (2003). Material flammability, combustion, toxicity and fire hazard in transportation. *Progress in Energy and Combustion Science*, *29*(3), 247–299.

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

R316.3 #2-RB-BABRAUSKAS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that multiple types of foam may be difficult to identify and the related fire safety issue is too large to risk, and because this action is consistent with prior committee action on RB163. We have recourse in our system for some of the types of issues raised on the floor, that being is civil action. Further research may be in order to explore whether something is happening.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Veena Singla, Green Science Policy Institute, representing Green Science Policy Institute, Vytenis Babrauskas of Fire Science & Technology, Inc., Cascadia Green Building Council, Development Center for Appropriate Technology, Hammond Fine Homes, International Living Future Institute, San Francisco Firefighters Cancer Prevention Foundation and the United States Green Building Council of California, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exceptions:

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. Foam plastic board insulation shall not be subject to this requirement when used in <u>or below</u> a ~~wall,~~ floor~~,~~ <u>or</u> in a foundation ~~or roof assembly~~ where the rigid foam plastic insulation <u>has continuous separation</u> ~~is separated~~ from the interior of the building by a minimum 1-inch (25 mm) thickness of masonry or concrete~~.~~<u>, or is installed below grade in accordance with Section R403.3.</u>

Commenter's Reason: Where there is no fire safety hazard from a particular application of foam plastic insulation in a building, there is no justification for requiring flame spread and smoke development testing.

Flame spread and smoke development requirements lead to the incorporation of halogenated flame retardant chemicals in foam plastics. As these flame retardant chemicals present human health, fire fighter health and environmental concerns, it is desirable to identify applications for which their use can be reduced or eliminated while maintaining fire safety.

Installation below continuous concrete slabs, in floors where a minimum of 1" of concrete separates the foam from the interior of the building, or in foundations where either concrete or soil provides the required separation or protection, represent just such a use. Foam plastic insulation presents no appreciable fire hazard when used in these applications, as there is little to no potential for foam to burn. Thus, it is not necessary for foam plastics to meet flame spread and smoke development requirements in these applications.

This change would not require any changes in current practices or preclude the use of flame-retarded foam insulation, but would create the possibility for manufacturers to meet the rapidly rising demand for foam plastic insulation without halogenated flame retardants. The increasing number of architectural and engineering design firms large and small, their clients, home owners, and green building and product certification programs concerned about the toxicity of flame retardant chemicals is driving market demand that is stymied by the current code provisions. This change would create the opportunity for more diversity in the market, encouraging the development and use of products that are safer for humans and the environment without sacrificing any fire safety.

Multiple lines of building products and foam in particular already exist such as for the use of termite resistant and non-termite resistant foam. The labeling of rigid foam insulation to differentiate product lines is widespread.

This proposal and modification represent a more complete risk assessment than current code as it incorporates a more accurate reflection of fire safety risks along with risks to public health, and fire fighter and emergency responders. As was amply documented in the original proposal, halogenated flame retardants are hazardous or potentially hazardous chemicals which are known to be persistent organic pollutants and global contaminants. Proposed replacements of these chemicals are of the same general class of chemicals and thus are likely to present similar risks (Babrauskas et al., 2012). Thus, the use of these chemicals increases rather than decreases the overall risks from foam building insulation when used in these applications.

In light of the available evidence, changing the code as proposed would:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase the use of foam plastic insulations which are important for building energy efficiency by potentially decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Bibliography: Links to the following research reports, and other supporting documentation are available for viewing and download at: http://saferinsulation.org/bibliography/

Babrauskas, V., Lucas, D., Eisenberg, D., Singla, V., Dedeo, M., & Blum, A. (2012). Flame retardants in building insulation: a case for re-evaluating building codes. *Building Research & Information*, *40*(6), 738–755. doi:10.1080/09613218.2012.744533

RB164-13

Final Action: AS AM AMPC____ D

RB166-13
R316.4, R316.5.1, R316.5.2, R316.5.3, R316.5.7, R316.5.8

Proposed Change as Submitted

Proponent: Sean DeCrane, Battalion Chief, representing Cleveland Division of Fire, International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R316.4 Thermal barrier. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building and the exterior of the building when installed within ten feet of a property line by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

R316.5 Specific requirements. The following requirements shall apply to these uses of foam plastic unless specifically *approved* in accordance with Section R316.6 or by other sections of the code or the requirements of Sections R316.2 through R316.4 have been met.

R316.5.1 Masonry or concrete construction. The thermal barrier specified in Section R316.4 is not required in a masonry or concrete wall, floor or roof when the foam plastic insulation is separated from the interior of the building and the exterior of the building where installed within ten feet of a property line by a minimum 1-inch (25 mm) thickness of masonry or concrete.

R316.5.2 Roofing. The thermal barrier specified in Section R316.4 is not required when the foam plastic in a roof assembly or under a roof covering is installed in accordance with the code and the manufacturer's installation instructions and is separated from the interior of the building by tongue-and-groove wood planks or wood structural panel sheathing in accordance with Section R803, not less than 15/32 inch (11.9 mm) thick bonded with exterior glue and identified as Exposure 1, with edges supported by blocking or tongue-and-groove joints or an equivalent material. The smoke-developed index for roof applications shall not be limited. A thermal barrier meeting the requirements of R316.4 is required where foam plastic in a roof assembly is installed within 10 feet of a property line.

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required in attics where all of the following apply:

1. *Attic* access is required by Section R807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
   3.1. 11/2-inch-thick (38 mm) mineral fiber insulation;
   3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
   3.3. 3/8-inch (9.5 mm) particleboard;
   3.4. 1/4-inch (6.4 mm) hardboard;
   3.5. 3/8-inch (9.5 mm) gypsum board; or
   3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm);
   3.7. 11/2-inch-thick (38 mm) cellulose insulation.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

R316.5.4 Crawl spaces. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. Crawlspace access is required by Section R408.4
2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
   3.1. 11/2-inch-thick (38 mm) mineral fiber insulation;
   3.2. 1/4-inch-thick (6.4 mm) wood structural panels
   3.3. 3/8-inch (9.5 mm) particleboard;
   3.4. 1/4-inch (6.4 mm) hardboard;
   3.5. 3/8-inch (9.5 mm) gypsum board; or
   3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm). The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

R316.5.5 Foam-filled exterior doors. Foam-filled exterior doors are exempt from the requirements of Sections R316.3 and R316.4.

R316.5.6 Foam-filled garage doors. Foam-filled garage doors in attached or detached garages are exempt from the requirements of Sections R316.3 and R316.4.

~~**R316.5.7 Foam backer board.** The thermal barrier specified in Section R316.4 is not required where siding backer board foam plastic insulation has a maximum thickness of 0.5 inch (12.7 mm) and a potential heat of not more than 2000 Btu per square foot (22 720 kJ/m2) when tested in accordance with NFPA 259 provided that:~~

1. ~~The foam plastic insulation is separated from the interior of the building by not less than 2 inches (51mm) of mineral fiber insulation;~~
2. ~~The foam plastic insulation is installed over existing *exterior wall* finish in conjunction with re-siding; or~~
3. ~~The foam plastic insulation has been tested in accordance with Section R316.6.~~

~~**R316.5.8 Re-siding.** The thermal barrier specified in Section R316.4 is not required where the foam plastic insulation is installed over existing *exterior wall* finish in conjunction with re-siding provided the foam plastic has a maximum thickness of 0.5 inch (12.7 mm) and a potential heat of not more than 2000 Btu per square foot (22 720 kJ/ m2) when tested in accordance with NFPA 259.~~

R316.5.9 Interior trim. The thermal barrier specified in Section R316.4 is not required for exposed foam plastic interior trim, provided all of the following are met:

1. The minimum density is 20 pounds per cubic foot (320 kg/m3).
2. The maximum thickness of the trim is 0.5 inch (12.7 mm) and the maximum width is 8 inches (204 mm).
3. The interior trim shall not constitute more than 10 percent of the aggregate wall and ceiling area of any room or space.
4. The flame spread index does not exceed 75 when tested per ASTM E 84 or UL 723. The smoke-developed index is not limited.

R316.5.10 Interior finish. Foam plastics shall be permitted as interior finish where *approved* in accordance with Section R316.6 Foam plastics that are used as interior finish shall also meet the flame spread index and smoke developed index requirements of Sections R302.9.1 and R302.9.2.

R316.5.11 Sill plates and headers. Foam plastic shall be permitted to be spray applied to a sill plate and header without the thermal barrier specified in Section R316.4 subject to all of the following:

1. The maximum thickness of the foam plastic shall be 31/4 inches (83 mm).
2. The density of the foam plastic shall be in the range of 0.5 to 2.0 pounds per cubic foot (8 to 32 kg/m3).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723.

R316.5.12 Sheathing. Foam plastic insulation used as sheathing shall comply with Section R316.3 and Section R316.4. Where the foam plastic sheathing is exposed to the *attic* space at a gable or kneewall, the provisions of Section R316.5.3 shall apply.

R316.5.13 Floors. The thermal barrier specified in Section R316.4 is not required to be installed on the walking surface of a structural floor system that contains foam plastic insulation when the foam plastic is covered by a minimum nominal 1/2-inch-thick (12.7 mm) wood structural panel or equivalent. The thermal barrier specified in Section R316.4 is required on the underside of the structural floor system that contains foam plastic insulation when the underside of the structural floor system is exposed to the interior of the building.

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

R316.7 Termite damage. The use of foam plastics in areas of “very heavy” termite infestation probability shall be in accordance with Section R318.4.

Reason: One of the main challenges the fire service is encountering in today’s environment is a pressing need of resources. Across the United States we are experiencing the loss of structures due to exterior exposures. These exposure fires can have devastating effects on an individual’s home and also place responding fire fighters at risk for rapidly spreading fires.

As the Fire Service encounters the economic realities of smaller budgets and increased demand we are continuously being asked to do more with less. Responding units many times must address growing exposure fires due to the narrow property lines.

In today’s environment there is a growing trend to promote energy conservation. While this is widely supported, and a worthy goal, we must also factor in a level of safety. As with most things in life there must be a balance between efficiency and safety.

A search of the Vinyl Siding Institute’s website www.vinylsiding.org produces a great deal of information on the R-Values and potential cost benefits of increasing the use of foam backing on the vinyl siding. There is little information on the fire performance of these products. It is true many of the foam insulation products are given a Class A flame spread rating in an ASTM E 84 Test Standard. That is one of the problems, the E 84 is a horizontal test standard yet we install the foam insulation products vertically drastically impacting the true fire performance in the field. In fact to demonstrate the safety of vinyl siding it is compared to the performance of vinyl sheathed wiring: *“Additionally, vinyl meets the stringent National Fire Protection Association (NFPA) requirements. The NFPA Electrical Code recognizes the strong fire-safe characteristics of vinyl through its approved use as a residential wiring insulator. Millions of homes have been wired using safe vinyl-sheathed electrical systems for decades.*[1]

They further state; *Safe homes use fire-safe claddings, which include vinyl siding. Why does vinyl siding provide good fire performance? It is composed mainly of polyvinyl chloride, more commonly known as vinyl or PVC. Due to its chlorine base, vinyl siding does not ignite quickly and is inherently flame-retardant. Read on to discover more facts on vinyl siding’s fire performance…..All organic materials (that is, anything containing carbon) will ignite. But the higher the temperature a material has to reach before it flames, the safer it is. PVC won’t ignite, even from another flame, until it reaches about 730°F (387°C) and won’t self-ignite until about 850°F (454°C).* [1] Fire doesn’t propagate until 750°F, what is the temperature of flame? Again, our issue isn’t necessarily the siding it is the foam backing behind it as the siding when exposed to high temperatures will begin to melt and fall away exposing the increasing amounts of foam insulation.

Current tests are being conducted by UL and NIST and additional testimony and data will be presented during the code development process.

1. 2005 National Electrical Code, NFPA 70, Article 334.

Cost Impact: Will not increase the cost of construction

R316.4-RB-DECRANE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that it was confusing and imposed undue restrictions on the use of foam plastics without technical support. It also may be in conflict with energy provisions and the cost related information appears to be inaccurate. The difference in offset requirements could substantially increase costs. The 10 foot distance requirement was not substantiated.

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, representing Cleveland Division of Fire / International Association of Fire Fighters, requests Approval as Submitted.

Commenter's Reason: Tests are continuing at Underwriters Laboratories, with test results demonstrating the performance time of a combustible exterior wall to be very concerning to the fire service. Subjecting combustible wall siding to a 100 kilowatt fire quickly and easily penetrated the vinyl siding exposing the foam insulation behind the siding. This is leading to rapid fire travel up the side of a structure into the attic area.

This code change proposal is attempting to address the concern for the rapidly transferring exposure fire. Recently outside of Myrtle Beach over 100 apartments were lost to a brush fire that suddenly travelled from building to building. The propagation of flame from one structure to another is a challenge to the fire service. We have experienced staffing reductions in many areas of the country. This is causing Incident Commanders to deploy initial arriving companies into a position of exposure fire protection or not being able to provide exposure protection which leads to further damage of the neighboring structures.

This author is interested in identifying various options to protection. We are aware of energy conservation concerns but believe there has to be a balance between energy conservation and fire safety performance. Vinyl siding is engineered to melt and fall away when exposed to temperatures exceeding 750ºF. Again the concern is the unprotected foam, which in many cases is a petroleum based foam insulation product. If we don't want to require the performance of the exterior wall covering then we must provide the protection of distance.

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Public Comment 2:

Steve Orlowski, representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter's Reason: We agree with the committee's action to disapprove the proposed code change based on the lack of technical justification requiring all walls with foam insulation to be protected by a thermal barrier when the exterior wall is within ten feet of the property line. There have been studies conducted by NIST that prove the current requirements for fire separation are more than adequate to deal with the concerns raised by the proponent. These studies conducted by NIST showed that when dwellings are less than five feet from the point used for fire separation distance and are protected by a one-hour fire resistant rating, the potential of a fire from one dwelling to develop enough heat to ignite the adjacent structure is significantly reduced. The study further showed that the one-hour fire-resistant rating between the structures significantly delayed flame spread between dwellings and provide the fire service with a considerable amount of valuable time to respond and suppress the fire, further reducing the ability for an exposure fire. In addition, the proponent has provided no indication where the arbitrary ten foot requirement came from or why a wall within ten feet of a property line is a hazard, considering the face of the wall containing the product could face an alley or street.

RB166-13
Final Action: AS AM AMPC____ D

RB167-13
R316.4

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council, representing American Wood Council (dpitts@awc.org)

Revise as follows:

R316.4 Thermal barrier. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard, 23/32 inch (18.2 mm) wood structural panel or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

Reason: Wood structural panels are permitted prescriptively as a thermal barrier in various thicknesses in subsections of R316.5. R316.5.2 allows 15/32" WSP as a thermal barrier in roofs, R316.5.3 allows ¼" WSP for attics, and R316.5.4 allows ¼" WSP for crawlspaces. This proposal would prescriptively allow a thicker WSP to be used as a thermal barrier in other applications that might arise.

Prior to a recent change in NFPA 275 that essentially requires a Class A flame spread rating for materials used as thermal barriers, 23/32" WSP complied with NFPA 275. This proposal prescriptively recognizes a history of satisfactory service as a thermal barrier, even for thinner panels, although the material isn't a Class A material.

Cost Impact: No increase in cost of construction.

R316.4-RB-PITTS

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that such panels have been used for years between foam and the interior of the house and have served quite well. If the panels burn through, the problem will be greater than those caused by the foam.

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), requests Disapproval.

Commenter's Reason: Foam plastic insulation is required to be separated from the interior of a building to offer protection from fire exposure, because it is well known that a severe fire can result if foam plastic insulation is exposed to a fire and ignites. Therefore, foam plastic insulation is required to be protected from fire (for 15 minutes) by a thermal barrier. Traditionally such protection has been provided by "an approved thermal barrier of minimum ½ inch gypsum wallboard or an approved finish material equivalent to a thermal barrier material" as shown below, for the 2006 code.

> ***R316.4 Thermal barrier****. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an approved thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or an approved finish material equivalent to a thermal barrier material that will limit the average temperature rise of the unexposed surface to no more than 250°F (139°C) after 15 minutes of fire exposure complying with the ASTM E119 or UL 263 standard time temperature curve. The thermal barrier shall be installed in such a manner that it will remain in place for 15 minutes based on NFPA 286 with the acceptance criteria of Section R302.9.4, FM 4880, UL 1040 or UL 1715.*

The verbiage about "equivalent" was replaced by a reference to a material that complies with NFPA 275. NFPA 275 requires that, in order for a material to be listed as a thermal barrier, it must be tested in a room corner test (such as NFPA 286), over the foam plastic insulation intended for use behind the thermal barrier, and that the system complies with the following:

(1) No flashover for 15 minutes
(2) A peak heat release rate of less than 800 kW
(3) A total smoke release of less than 1,000 m^2

When a wood structural panel is tested in the NFPA 286 fire test the panel reaches flashover, irrespective of whether the foam plastic is behind the panel or not. That means that the wood structural panel is not providing the necessary protection that thermal barriers are intended to provide.

This proposal adds prescriptively a 23/32nd inch wood structural panel instead of a thermal barrier protecting the interior from the exposed foam plastic. That is not a safe approach as the fire safety is too low. We have had numerous examples of fires resulting from burning foam plastic insulation to go back to such a system. If the wood panels burn through (and it is known that they do that in just a very few minutes, even without the combustible foam behind them) the fire problem is exacerbated because we now have burning foam plastic. On the other hand, if a thermal barrier is in place, the thermal barrier will protect the interior of the building from the burning foam for a full 15 minutes.

The proposal reason incorrectly states that wood structural panels are permitted as a thermal barrier in sections of 316.5 but the referenced sections talk about "ignition barriers" and not about "thermal barriers", and that is a very different concept. R316.5.3 permits the use of various wood products as ignition barriers (with added protections) for attics. Similarly, R316.5.4 permits the use of various wood products as ignition barriers for crawl spaces, again with added protections. Even R316.5.2, where 15/32nd inch wood structural panel sheathing is allowed instead of a thermal barrier for protection of roof assemblies requires added protections. Moreover, none of these applications would allow plain wood structural panels to be the only protection between foam plastic insulation and the interior of a building, without size limitations.

The "ignition barriers" discussed above (and mentioned by the submitter) all address unoccupiable spaces, while the thermal barriers which would be changed by this proposal address occupied spaces. If this proposal is not disapproved, the entire interior of a residential building can be lined with wood structural panels and foam plastic insulation, without protection from fire.

RB167-13

Final Action: AS AM AMPC____ D

RB174-13
R316.6

<u>Proposed Change as Submitted</u>

Proponent: Tony Crimi, A.C. Consulting Solutions, Inc., representing North American Insulation Manufacturers Association (NAIMA) (tcrimi@sympatico.ca)

Revise as follows:

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. <u>Foam plastics that are used as an interior finish on the basis of special tests shall also conform to the smoke-developed requirements of Section R302.9.4 or Section R316.3.</u> Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

Reason: At a minimum, the provision for special approvals for foamed plastics, which waives other requirements of the IRC for foamed plastics needs to provide a comparable level of performance and safety to the existing provisions. The exception for foamed plastics in R316.6 does not adequately cover smoke developed performance of foamed plastics. Current requirements for glass fiber, mineral fiber, cellulose and reflective plastic core insulation all require both flame spread and smoke development requirements either based on ASTM E84 or UL 723 or R302.10 Alternative methods are acceptable for use, however, their performance level needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material. This proposal makes the section more consistent with the parallel provision in the IBC.

Justification: For all other thermal and sound insulating materials within the IRC, including non-combustible insulation materials, the minimum performance level for materials permitted to be used includes at least some requirements for both flame spread (fire growth) and smoke production. These requirements are primarily based on either ASTM E84 testing or alternative methods such as NFPA 286 and CAN/ULC-S102.2. However, in the case of foamed plastics, of the four alternative test methods permitted by 2603.9, only NFPA 286 contains any limits on smoke developed for any foamed plastics by virtue of the inclusion of a reference to section R302.9.4.

Room corner tests such as FM 4880, UL 1040, NFPA 286 or UL 1715 do evaluate fire growth and flashover. However, with the exception of the criteria for NFPA 286 in R302.9.4, the pass/fail criteria proposed for the room corner tests in the proposed acceptance criteria do not include quantitative evaluation of smoke density. Criteria for fire and smoke performance of building materials are based as much on issues arising from smoke production from burning materials, and smoke migration within the occupied spaces. It is not reasonable to provide an exception to the basic ASTM E84 flame spread and smoked developed requirements which apply to all other types of insulations, even non-combustible insulations, for foamed plastics based on room corner tests unless the limits on smoke production are applied to all of the room corner tests.

There are numerous reported instances of the hazards associated with smoke production from building materials. One is the tragic fire at the Greenwood Health Center in Hartford, CT on Feb 26 2003. The New York Times quoted Chief Charles A. Teale of the Hartford Fire Department as stating that “Most of the 10 residents killed, ranging in ages from 27 to 76, died of smoke inhalation”. The same article further goes on to quote officials as saying: “The nursing home itself suffered little damage, though, and the fire was put out in about 15 minutes. Most of the residents were then led back inside, and by midday, 84 of the 148 residents remained at the center”.

It is reasonable to allow alternative methods of testing materials to determine their acceptability for use, however, their performance criteria needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material.

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

R316.6-RB-CRIMI.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that it duplicated other code requirements and because the proponent needs to clarify what the phrase “special testing” refers to.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Tony Crimi, A.C. Consulting Solutions Inc., representing North American Insulation Manufacturers Association (NAIMA), requests Approval as Submitted.

Commenter’s Reason: This proposal aims to ensure that smoke development requirements are not inadvertently omitted for foamed plastics complying with R316.6.

The IRC has specific requirements for flame spread ratings and smoke developed index for Insulation materials. It begins in R302.10, which requires Insulation materials, including facings, to have a flame spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84 or UL 723. This section provides an exception for foamed plastics complying with R316.

R316.3 still requires foam plastic insulation more than 4 inches (102 mm) thick to have a maximum flame spread index of 75 <u>and</u> a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), <u>provided</u> the end use is <u>also</u> *approved* in accordance with Section R316.6 using the thickness and density intended for use. This exception does not waive the smoke developed requirements of R302.10 or R316.3.

The language in R316.3 begins by stating "Unless otherwise allowed in Section R316.5 or R316.6....". R316.5.10 for interior finish is very clear that foam plastics permitted as interior finish where *approved* in accordance with Section R316.6 shall also meet the flame spread index and smoke developed index requirements of Sections R302.9.1 and R302.9.2.

However, when a Code user goes directly from the Exceptions in R302.10 and R316.3 to <u>R316.6</u>, foam plastics used in all other applications identified in R302.10 and R316.3 such as all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction, or foam plastic insulation, do not clearly require the smoke developed ratings. The requirement to comply with smoke developed ratings is unclear, because, with the exception of NFPA 286 and the criteria in R302.9.4, the room corner tests permitted to be used (such as FM 4880, UL 1040, and UL 1715) <u>do not</u> include quantitative evaluation of smoke density. Also, only the UL 723 and ASTM E84 can provide the "smoke developed" ratings required in the IRC.

At a minimum, the provision for special approvals for foamed plastics, which waives other requirements of the IRC for foamed plastics, needs to provide a comparable level of performance and safety to the existing provisions. The exception for foamed plastics in R316.6 does not adequately cover smoke developed performance of foamed plastics. Current requirements for glass fiber, mineral fiber, cellulose and reflective plastic core insulation all require both flame spread and smoke development requirements either based on ASTM E84 or UL 723 or R302.10 Alternative methods are acceptable for use, however, their performance level needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material. This proposal makes the section more consistent with the parallel provision in the IBC.

Public Comment 2:

Jesse J. Beitel, Hughes Associates, Inc. representing The Extruded Polystyrene Foam Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise text as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in Section R316.5 ~~or R316.6~~, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smokedeveloped index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exception: Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is approved in accordance with Section R316.6 using the thickness and density intended for use.

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections ~~R316.3~~ R316.4 through R316.5 shall be specifically *approved* on the basis of one of the following approved tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM 4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

Commenter's Reason: This comment will require that foam plastic insulations and foam plastic cores evaluated under Section R316.6 also meet the flame spread and smoke-developed requirements of Section R316.3. This requirement will bring the IRC into conformity with the requirements of the IBC.

Public Comment 3:

Marcelo M. Hirschler (GBH International), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as an interior finish on the basis of a fire test that does not assess smoke development shall also demonstrate adequate smoke development requirements such as, but not limited to, compliance with the requirements of Section R302.9.4 ~~shall also conform to the smoke developed requirements of Section R302.9.4 or Section R316.3~~. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

Commenter's Reason: This section requires that foam plastic that is not covered by a thermal barrier needs to meet requirements for flame spread (or heat release) and for smoke release. Moreover, this section also allows the use of other *approved* fire tests "related to actual end-use configurations". However, the section is not explicit that smoke development needs to be assessed in every "special approval" case. The section specifically mentions 4 full scale fire tests, but only 2 of the 4, namely NFPA 286 and UL 1715, require smoke measurements. Neither FM 4880 nor UL 1040 requires smoke measurements. Section R302.9.4 contains the requirements of smoke development for testing to NFPA 286. This proposal would allow the code official the leeway to decide what is an appropriate fire test for the foam plastics, while ensuring that smoke development is adequately assessed. When large scale fire tests are conducted, for example to FM 4880 or UL 1040, information on smoke is always available in the test report even if it may be qualitative or visual. That qualitative (or visual) information is likely to be sufficient for a code official to decide whether the material exhibits adequate smoke development.

RB174-13

Final Action: AS AM AMPC____ D

RB177-13
R320.1, R320.1.1 (New)

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

R320.1 Scope. Where there are four or more *dwelling* units ~~or *sleeping units*~~ in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

R320.1.1 Guest rooms. A dwelling with guestrooms shall comply with the provisions of Chapter 11 of the *International Building Code* for Group R-3. For the purpose of applying the requirements of IBC chapter 11, *guestrooms* shall be considered sleeping units.

> **Exception:** Lodging houses.

Reason: Residential and institutional occupancies with 6 or more residents are within the scope of the IBC only and cannot be constructed under the IRC. This is based on both the scope of the IRC and IBC. Scoping provisions of the IRC and IBC, and code provisions within the IBC permit some residential and institutional occupancies with 5 or fewer occupants to be constructed in accordance with the IRC as an alternative to compliance with the IBC. The IBC occupancies that allow use of the IRC for five or fewer guests are: Group R-3 lodging houses (see G40-13), lodging houses are also in the scope of the IRC in section 101.2 #2; section 308.3.1 for Group I-1 and 308.4.1 for Group I-2.

Per the 2010 ADA Standard for Accessible Design and the IBC 1103.2.11 owner occupied lodging houses with 5 or fewer guests are not required to be accessible. So compliance with the IRC works for this condition without causing any conflicts with the IBC. If the lodging house is not owner occupied or accommodates more than 5 guests the building is outside of the scope of the IRC and accessibility is addressed since the building will be constructed per the IBC.

The issue addressed by this code change is how to handle 2012 IBC Sections 308.3.1 for I-1 and 308.4.1 for I-2. These sections classify the building as Group R-3 or allow use of the IRC for these institutional uses that have 5 or fewer care recipients. If it is classified as Group R-3 then IBC section 1107.6.3 provides requirements for accessibility of the building. Clearly the intent of Section 1107.6.3 is that if you have 4 or 5 care recipients the "sleeping units" must be Type B (subject to Section 1107.7 exceptions). The problem is that IRC structures by scope and definition do not have sleeping units:

> **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.*
>
> **DWELLING.** Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

Adding the IBC definition of sleeping units to the IRC does not work because IBC sleeping units are not part of a dwelling unit. The current IBC definition of sleeping units states that "Such rooms and spaces that are also part of a dwelling unit are not sleeping units". Having a building constructed under the IRC that is not a dwelling unit, but a building with multiple sleeping units, is outside of the scope of the IRC.

Any of the Group I uses for 5 and under that are built to the IRC should have the same accessibility requirements as a Group R-3 constructed building. The IRC does not have sleeping units. Under the IRC such facilities are a dwelling unit with guest rooms. While the IRC contains a definition for guestroom, it is not clear on how the guestrooms should be counted for accessibility. Since the resident rooms are not sleeping units but guest rooms the current Section R320.1 does not require accessibility per Chapter 11 of the IBC for any IRC structures that have multiple guest rooms in one dwelling unit. The solution proposed here is to delete sleeping units from Section R320.1 to remove the confusion about the scope of sleeping units in the IRC and to add new Section R320.1.1 to address guestrooms. The statement that guestrooms shall be considered sleeping units for the purpose of applying IBC Chapter 11 is necessary because we cannot change the IBC language until the 2018 cycle. We plan to propose a more coordinated change for both the IBC and IRC to address this issue in the 2018 cycle. The exception for lodging houses is to maintain the exemption from accessibility requirements for lodging houses consistent with IBC Section 1103.2.11.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

R320.1-RB-BALDASSARRA

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it provided a useful pointer to the related provisions in the International Building Code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee and Steve Orlowski, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R320.1 Scope. Where there are four or more *dwelling* units in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

R320.1.1 Guest rooms. A dwelling with guestrooms shall comply with the provisions of Chapter 11 of the *International Building Code* for Group R-3. For the purpose of applying the requirements of IBC chapter 11, *guestrooms* shall be considered sleeping units.

> **Exception:** ~~Lodging houses.~~ Owner-occupied lodging houses with five or fewer guestrooms constructed in accordance with the *International Residential Code* are not required to be accessible.

Commenter's Reason: The original proposed language deals with townhouses and group homes/hotels separately. Unfortunately, with the passage of both RB177 and RB178, the result will be confusing. The proposed modification to the exception would do 3 things:

1. Include the more specific language for the exception in RB178
2. More closely align with IRC scoped for lodging houses (i.e., bed-n-breakfast), and
3. Would be consistent with the exemption IBC Group R-1 in Section 1103.2.11 (i.e., bed-n-breakfast).

The IRC scope now includes some small group homes, live/work units and bed-n-breakfast hotels. The 2012 IRC scope, Section 101.2, Exception 2, is limited to "Owner-occupied lodging houses with five or fewer guestrooms shall be permitted to be constructed in accordance with the IRC when equipped with a fire sprinkler system in accordance with Section P2904."

Guestrooms and lodging houses are defined in the IRC (see definitions below). Sleeping units are not defined in the IRC, but they are relevant to Fair Housing/Type B unit requirements.

Guestroom – Any room or rooms used or intended to be used by one or more guests for living or sleeping purposes.

Lodging House – A one-family dwelling, where one or more occupants are primarily permanent in nature, and rent is paid for guest rooms.

While some may not prefer to define sleeping rooms in group homes as guestrooms, with the current language, that is the best fit. The CTC will be looking at this next cycle to try and coordinate accessibility requirements and language between the IBC and IRC. They will also look at accessibility for live/work units.

This solution is supported by the proponents of both proposals, RB177 and RB178.

RB177-13

Final Action: AS AM AMPC____ D

RB178-13
R320.1

Proposed Change as Submitted

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB) (sorlowski@nahb.org)

Add new text as follows:

R320.1 Scope. Where there are four or more *dwelling* units or sleeping units in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

> **Exception:** Owner-occupied lodging houses with five or fewer guestrooms or sleeping units constructed in accordance with the *International Residential Code* are not required to be accessible.

Reason: Based on the action taken during the Group A Hearings, Lodging houses are now referenced in the IBC. It was noted during the hearings, that lodging houses with five or fewer guest rooms or sleeping units are not required to be accessible under the 2010 ADA Guidelines. This proposal simply clarifies that lodging houses are not subject to the provisions of Chapter 11 of the IBC if they contain five or fewer guest rooms or sleeping units.

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

R320.1-RB-ORLOWSKI

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify proposal as follows:

R320.1 Scope. Where there are four or more *dwelling* units or ~~sleeping units~~ guestrooms in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

> **Exception:** Owner-occupied lodging houses with five or fewer guestrooms ~~or sleeping units~~ constructed in accordance with the *International Residential Code* are not required to be accessible.

Committee Reason: The committee approved this code change proposal because it clarifies when related provisions in the International Building Code are applicable. The committee modified this proposed code change because the term “sleeping units” is not used in the International Residential Code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee and Steve Orlowski, representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter’s Reason: RB177 and RB178 were developed as options to address accessibility concerns with the scoping to the IRC for small bed-n-breakfast hotels. With both passing, the end result would add confusion in the code. For coordination/clarification, the public comment for RB 177 should be approved, and this change needs to be disapproved. This solution is supported by the proponents of both proposals.

RB178-13

Final Action: AS AM AMPC____ D

RB180-13

R322.1, R322.1.6, R322.1.8, R322.1.9, R322.2, R322.2.1, R322.3, R322.3.2, R322.3.3, R322.3.4, and R106.1.3

Proposed Change as Submitted

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov; Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones and Coastal A Zones) as established in Table R301.2(1) shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1.6 Protection of mechanical and electrical systems. Electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall be located at or above the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones). If replaced as part of a substantial improvement, electrical systems, equipment and components; heating, ventilation, air conditioning and plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall meet the requirements of this section. Systems, fixtures, and equipment and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

> **Exception:** Locating electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment is permitted below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones) provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided they conform to the provisions of the electrical part of this code for wet locations.

R322.1.8 Flood-resistant materials. Building materials used below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones) shall comply with the following:

1. All wood, including floor sheathing, shall be pressure-preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use or be the decay–resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWPA U1.
2. Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA-TB-2.

R322.1.9 Manufactured homes. New or replacement manufactured homes shall be elevated in accordance with Section R322.2 (flood hazard areas including A Zones) or Section R322.3 in coastal high-hazard areas (V Zones and Coastal A Zones). The anchor and tie-down requirements of Sections AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of manufactured homes to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.2 Flood hazard areas (including A Zones). All areas that have been determined to be prone to flooding but not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1.5 feet and 3 feet or otherwise designated by the jurisdiction shall be designated as Coastal A Zones and are subject to the requirements in Section R322.3. All buildings and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R322.2.1 through R322.2.3.

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas not designated as Coastal A Zones shall have the lowest floors elevated to or above the design flood elevation.
~~2. Buildings and structures in flood hazard areas designated as Coastal A Zones shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or to the design flood elevation, whichever is higher.~~
2.~~3~~ In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM, or at least 2 feet (610 mm) if a depth number is not specified.
3.~~4~~ Basement floors that are below grade on all sides shall be elevated to or above the design flood elevation.

Exception: Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R322.2.2.

R322.3 Coastal high-hazard areas (including V Zones and Coastal A Zones, where designated). Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave–induced erosion shall be designated as coastal high-hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1.5 feet and 3 feet or otherwise designated by the jurisdiction shall be designated as Coastal A Zones. All buildings and structures constructed in whole or in part in coastal high-hazard areas and in Coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R322.3.1 through R322.3.6.

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is:
1.1 Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees from the direction of approach, or
1.2 Located at the base flood elevation plus one foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees from the direction of approach.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings, and for support of parking slabs, pool decks, patios, and walkways.

Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

R322.3.3 Foundations. All buildings and structures erected in coastal high-hazard areas and Coastal A Zones, shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. Piling shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave–velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24. Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.

> **Exception:** In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion, and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

R322.3.4 Walls below design flood elevation. Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 (479 Pa) and no more than 20 pounds per square foot (958 Pa); or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), the construction documents shall include documentation prepared and sealed by a registered design professional that:
   - 4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the design flood.
   - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values used shall be those required by this code.
5. In Coastal A Zones walls shall be provided with flood openings that meet the criteria of Section 322.2.2.

Add new text as follows:

R106.1.3 Information for construction in flood hazard areas. For buildings and structures located in whole or in part in flood hazard areas as established by Table R301.2(1), construction documents shall include:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate;
2. The elevation of the proposed lowest floor, including basement; in areas of shallow flooding (AO zones), the height of the proposed lowest floor, including basement, above the highest adjacent finished grade; and

3. The elevation of the bottom of the lowest horizontal structural member in coastal high hazard areas (V Zone) <u>and in Coastal A Zones where such zones are delineated on flood hazard maps identified in Table R301.2(1) or otherwise designated by the jurisdiction</u>; and
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the building official and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

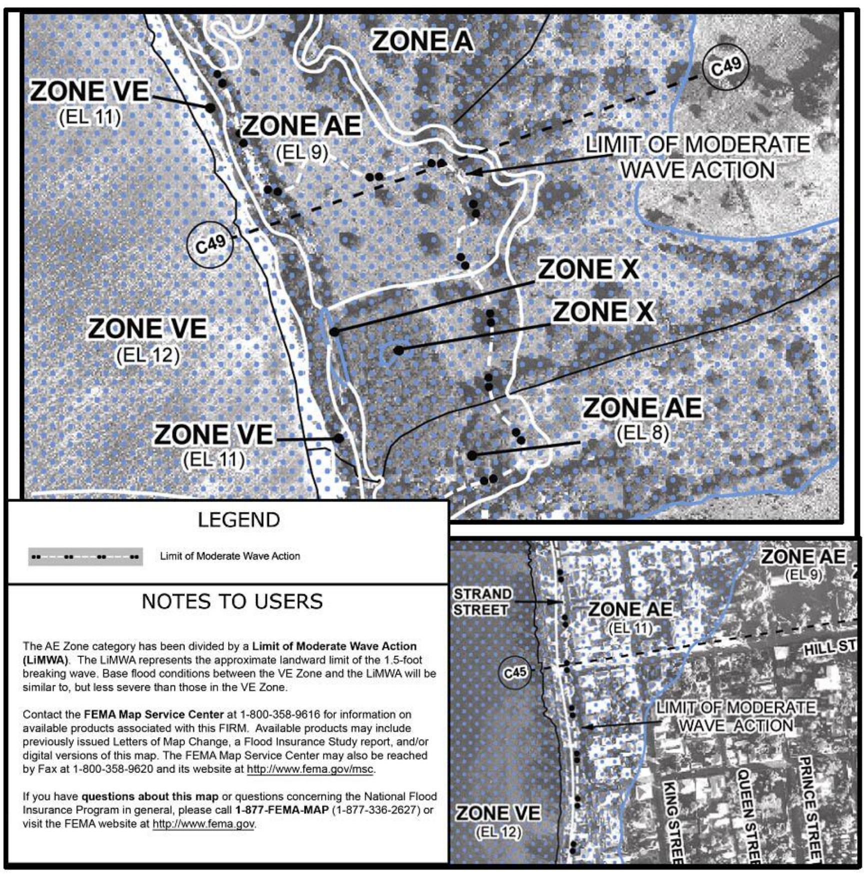
Reason: This proposal would require that dwellings in areas designated as "Coastal A Zones" meet the requirements of Section 322.3 for dwellings in coastal high hazard areas (Zone V), including open foundations (pilings or columns) with an exception that permits filled stemwalls.

The Coastal A Zone (CAZ) has been in ASCE 7 since the late '90s and in ASCE 24 since its initial publication in 1998. Recognition of CAZ was added to the 2009 edition of IRC Section R322.2, with the only requirement that if the area subject to waves between 1.5 ft and 3 ft is delineated, then the area is designated a Coastal A Zone and lowest floors shall be at least one-foot above the design flood elevation (i.e., in all other respects, the 2009 and 2012 IRC requires dwellings in Coastal A Zones to comply with the requirements for Zone A).

The inland boundary of the coastal high hazard area (Zone V) is drawn by FEMA where breaking wave heights are expected to drop below 3.0 ft during base flood conditions. The requirements for foundations of dwellings that are located just landward of the Zone V boundary are predicated on the assumption that hydrodynamic loads associated with waves – even waves that are 2.9-ft – are not significant and that conventional foundations such as perimeter walls can resist those loads and associated erosion and local scour.

FEMA's many post-disaster investigations after severe coastal storms have long recommended application of coastal high hazard area (Zone V) requirements to areas inland of the Zone V/Zone A boundary – in the area subject to waves between 1.5 ft and 3 ft – the area now referred to as "Coastal A Zone". Starting in fiscal year 2009, all coastal flood studies by FEMA will include analyses of moderate wave action and FIRMs will show the Limit of Moderate Wave Action (LiMWA).

The total land area that is likely to be designated as CAZ is small. FEMA has estimated that less than 3 percent of all mapped flood hazard areas are Zone V and the LiMWA generally is determined to be a relatively short distance inland from the Zone V boundary. The graphic below is from the December 2008 Procedure Memorandum No. 50 which established FEMA's policy to delineate the LiMWA on FIRMs



Every FEMA publication on coastal construction since mid-2000 has recommended the use of Zone V construction requirements in Coastal A Zones. As early as 1979 some communities were augmenting the minimum NFIP requirements because of observed wave damage to conventional, closed foundations (Santa Rosa Island Authority, Florida, 1979). FEMA's first Coastal Construction Manual, published in 1981, recognized that "high velocity water may be experienced due to the forward momentum of breaking waves, especially in the vicinity of the V zone/A zone interface." The defined term "Coastal A Zone" is used in the 1986 revision of the Coastal Construction Manual, and numerous papers and investigations have followed. Research performed in 1992 for the U.S. Army Corps of Engineers demonstrated that buildings on typical Zone A foundations (masonry walls, masonry piers, shallow piles, and slabs) "would be subject to failure for shallow erosion and /or wave heights less than 2-3 feet."

Observations after Superstorm Sandy continue to reinforce the damage potential in areas just inland of the Zone V boundary. FEMA's report based on field investigations will be completed mid-2013. Given that open foundations (piles and columns) perform well under velocity and wave conditions, FEMA believes it is time for the IRC to acknowledge that dwellings in Coastal A Zones should meet the same requirements as dwellings in coastal high hazard areas – with the exception of filled stemwalls that account for the potential for scour and erosion. Surveys and press reports after major coastal events such as Superstorm Sandy regularly report that citizens support stricter requirements (see www.reuters.com/article/2012/11/27/us-storm-sandy-newjersey-idUSBRE8AQ0V620121127, http://blog.nj.com/njv_editorial_page/2012/11/editorial_rebuild_carefully.html).

Cost Impact: This proposal will increase the cost of construction in areas shown on Flood Insurance Rate Maps as seaward of the Limit of Moderate Wave Action (or if a community elects to designate areas as "Coastal A Zones"). However, the risk of wave-induced damage or damage due to erosion and local scour is significantly reduced.

R322.1-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the regulatory process provides an opportunity for everyone to participate, that is what congress intended and that is the procedure that needs to be followed. The proposal does not take into account that all coastal areas are not the same with regard to weather or wave action, yet this proposal applies to thousands and thousands of existing and new dwellings. Pulling coastal A areas into V Zones has far reaching implications. There have not been enough studies to justify this.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Submitted.

Commenter's Reason: The committee action on this proposal was Disapproval. The reasons for disapproval are not accurate and appear to be based on a misunderstanding of the forces associated with wave action, FEMA's initiative to delineate areas subject to moderate wave action areas on Flood Insurance Rate Maps, and how those areas are determined. When FEMA delineates such areas, a Limit of Moderate Wave Action (LiMWA) is shown on the FIRM and the area between the LiMWA and the Zone V boundary is called the Coastal A Zone (see R322.2).

By definition, the engineering analyses that evaluate wave action take into account that all coastal areas are not the same. Many locational factors are considered when FEMA evaluates whether to delineate a LiMWA, including fetch (length of open water over which wind blows to generate waves), orientation of the shoreline to prevalent direction of wind and waves, land elevation relative to water depths, and the presence of dunes, buildings, and other elements of the landscape that have the effect of breaking up waves. Many reaches of shoreline subject to tidal flooding do not have conditions that produce moderate wave action, in which case the FIRM will not show a LiMWA.

The concept of the Coastal A Zone and recognition of the fact that waves inland of the Zone V boundary, while less than 3-ft in height, cause damage was first documented in a paper presented by FEMA at the 1990 conference of the Association of State Floodplain Managers. Many subsequent studies and reports, and post-disaster investigations, have reinforced that finding.

For more than 20 years FEMA has documented Mitigation Assessment Team investigations that were conducted after many major coastal disasters. Virtually every report identifies damage due to moderate waves and calls for application of Zone V requirements: Hurricane Opal (1995), Hurricane Fran (1996), Hurricane Georges (1998), Hurricane Isabel (2003), Hurricane Ivan (2004), Hurricane Dennis (2005), Hurricane Katrina (2005), and Hurricane Ike (2008). In addition, the 1998 editions of ASCE 7 and ASCE 24 require consideration of moderate wave action and application of Zone V requirements in Coastal A Zones.

Observations after last year's Hurricane Sandy continue to reinforce the damage potential in open coast areas just inland of the Zone V boundary. FEMA's report based on field investigations will be completed mid-2013.

Given that open foundations (piles and columns) perform well under velocity and wave conditions, it is time for the IRC to acknowledge that dwellings in Coastal A Zones should meet the same requirements as dwellings in Zone V. The exception, as specified in the code proposal, is filled stemwalls that provide resistance to wave loads and that have deeper footings that account for the potential for scour and erosion. Surveys and press reports after major coastal events regularly report that citizens support stricter requirements (see http://www.reuters.com/article/2012/11/27/us-storm-sandy-newjersey-idUSBRE8AQ0V620121127 and http://blog.nj.com/njv_editorial_page/2012/11/editorial_rebuild_carefully.html).

RB180-13

Final Action: AS AM AMPC____ D

RB183-13
R322.1.8

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council, representing American Wood Council (dpitts@awc.org)

Revise as follows:

R322.1.8 Flood damage-resistant materials. Building materials and installation methods used below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones) shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2. ~~comply with the following:~~

1. ~~All wood, including floor sheathing, shall be pressure-preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use or be the decay–resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWPA U1.~~
2. ~~Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA-TB-2.~~

Reason: This proposal reflects changes approved to the IBC in FS150-12. Adoption of this change will make the IBC and IRC consistent. The specific requirement for preservative-treated wood or naturally decay-resistant wood below the elevation required in Section R322.2 is deleted because wood products such as plywood sheathing, plywood panel siding, and stud walls have been shown to be resistant to the effects of flood exposure without the aid of preservatives or the use of naturally durable wood.

Primary considerations for material performance and use in flood hazard areas are outlined in FEMA *TB2, Flood Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*, which is already referenced in the IRC. A flood damage resistant material is one that is "… capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage." Evaluation consists of consideration of material performance following 72 hour immersion and presence of only limited damage requiring no more than cosmetic repair (i.e. cleaning, sanitizing and resurfacing such as sanding, repair of joints, repainting). Research conducted by Oak Ridge National Laboratory and Tuskegee University (ORNL/TM-2005/34 *Field Testing of Energy-Efficient Flood-Damage-Resistant Residential Envelope Systems Summary Report,* June 2004) and field observations of material performance from actual floods were considerations in the update of FEMA TB2-2008. Within TB2 examples of wood that are not required to be preservative treated for flood damage resistance that may form a part of exterior walls and floors include studs and Exterior and Marine plywood used as wall sheathing. While preservative treated studs and preservative treated exterior plywood sheathing were not tested in the ORNL/Tuskegee study, it is not expected that presence of preservative treatment would improve the already acceptable performance of these materials.

General requirements for preservative treated or naturally durable wood for protection from decay and termites are addressed elsewhere in the IRC, and those applications will continue to be in effect, including in flood hazard areas.

Cost Impact: No increase in the cost of construction.

R322.1.8-RB-PITTS

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify proposal as follows:

R322.1.8 Flood damage-resistant materials. Building materials and installation methods used for flooring and interior and exterior walls and wall coverings below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones) shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2.

Committee Reason: The committee approved this code change proposal because they felt that it clarifies where flood damage-resistant materials are required. The modification added language that specified the affected building components, thereby further clarifying the code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dallin Brooks, Western Wood Preservers Institute, representing Ted LaDoux, requests Disapproval.

Commenter's Reason: RB-183 removes the required use of preservative treated wood from FEMA Standard where not specified by other areas of the code in order for wood to be considered flood damage resistant below the base flood elevation. By eliminating the use of preservative treated wood from the code other wood panel products that are not pressure treated such as (for example OSB and fiberboard sheathing) and other engineered wood products can structurally fail upon wetting affecting the strength of various wood products. In addition the proposal lacks sufficient health information, and ignores conditions that may or may not be met by the builder/occupier resulting in higher risks, than if the code were to remain in effect as is.

The basis for RB-183 is a study done by the ORNL/Tuskegee entitled Field Testing of Energy-Efficient Flood-Damage-Resistant Residential Envelope Systems and published in June 2004.

However, as the report points out several factors were not taken into consideration.

1. "While flood damage resistance includes both physical and human health factors, the experimental modules were tested only for resistance to physical degradation that results from the wetting and drying cycle associated with flooding."

Ignoring the human health impact, while, suitable for a study is not suitable for code policy change. It clearly violates the ICC vision to "Protect the **health**, safety and welfare of people by creating safe buildings and communities." Information must be presented on the human health risks of using untreated wood below the base flood elevation in the event of a flood.

2. "Testing did not address the structural impact on the envelope of externally applied hydrostatic pressures."

The hydrostatic pressure is not differentiated between untreated and treated treated wood of the same product (for example treated plywood and untreated plywood) however substitute products such as fiberboard and OSB may preform differently.

3. "Bacteriological and toxic materials testing were not performed during this series of tests."

Bacteria, mold and fungi are more likely to grow on untreated wood than on preservative treated wood, again this brings up the issue of human health in areas after a flood.

The report also concludes

1. "…older, weathered siding of the same materials and/or repeated wetting and drying over several cycles is projected **to significantly degrade the restorability** of these siding materials."

Such a statement clearly indicates that some products need to be preserved more than others. Thus such a code change should address each individual application or should meet the lowest common factor where health and safety are concerned.

2. "Plywood sheathing maintained its integrity and mechanical properties. However, **it had not dried to preflood levels after 30 days**. Because water does not tend to escape quickly from behind plywood siding, the combination of [untreated] plywood siding and sheathing was not considered a good flood damage resistant system."

While pointing out that the strength is there, this does not address the fact that staying wet beyond 30 days raises the concern that no consideration was given for mold and bacteria effecting human health.

3. "*Wood Framing* - Moisture levels in wood studs that were above the flood level returned to preflood levels within the drying period. That portion of the studs below the flood level was drying towards the pre-flood moisture content, but had not in most cases achieved that level during the drying period. The wood studs also maintained their strength (all Modules). Wood studs were considered flood damage resistant **as long as the wall system will permit them to continue to dry to normal levels."**

Without clarifying the condition that a wall system must meet for the wood frame to dry to normal levels, one can assume two things, that some wall systems do not allow the studs to dry to normal levels, and that someone will build such a system below the flood base. Either way, without defining the conditions such a statement may have a negative effect on the building industry and human health and safety.

4. *"Floor Structure* - The sealed concrete floor slab in all slab-on-grade modules remained undamaged during and after flooding. The wood sub-flooring retained very high moisture content throughout the drying period when unfaced fiberglass batt insulation was installed underneath the sub-flooring. When no floor insulation was used, the subflooring returned to pre-flood moisture levels during the drying period. **Wood subflooring and framing insulated with fiberglass batts could experience long term moisture related problems."**

Long term moisture related problems are not as significant if the wood is preservative treated.

5. *"Foundation Vents -* The operable flood vents were closed prior to flooding and opened by themselves during the filling and draining of the flood water. They operated as designed. These vents were blocked open throughout the drying period. The crawl space humidity reached 100% and remained high during the drying period. **This humidity level is unacceptable in the long term since it could contribute to both mold and wood decay.** It is believed that the high humidity level in the crawl space was the result of the test module being placed in a basin that was subjected to significant amount of rain throughout the drying period. In order to keep from providing a path for mold to enter the interior of the module, the crawl space area must be effectively sealed from the interior of the house."

Wood decay is inhibited by the preservative in treated lumber, ensuring that such a situation is minimized.

Additional concerns for human factors that are not accounted for in RB-183.

1. How many people use their flood insurance, or let it go unfixed due to financial constraints such as deductible or increased rates?
2. How many renters, landlords or sellers do not report flooding to the next tenant? Previous flood damage, poses a risk of decay, bacteria and mold growing in the unseen wood structure.
3. It is generally accepted that floods are happening at an increasing rate, intensity and height due to climate change and other factors. This is having an increasingly large cost to insurance and rebuilding efforts. "The Federal Emergency Management Agency (FEMA) reports that each year approximately 90 percent of all disaster-related property damage results from flooding. Over the past decade, the average flood claim in the United States has been more than $46,000 with yearly totals averaging $3.5 billion per year." Structural Damage Due to Floods By Craig D. Rogers, P.E. http://wwpi.info/FloodStructuralDamage

Clearly the practical differs from the ideal, thus the ideal situation is to meet at the lowest common standard. While pressure treated wood is used in many applications already below the flood base, it clearly can meet the lower targets and avoid situations of neglect that may affect public health and safety.

When you have to put conditions on performance and those conditions are not also regulated then the performance to the non-conditioned state must be expected. Including the use of materials such as OSB and fiberboard that do not have the same performance characteristics when wetted. Hence there is significant concern for human health and safety that RB-183 should not be approved to allow untreated wood to be considered flood resistant until further research can be done. RB-183 should be disapproved for these reasons.

RB183-13

Final Action: AS AM AMPC____ D

RB187-13
R322.1.9 (New)

Proposed Change as Submitted

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows

R322.1.9 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Sections R322.2.1 or R322.3.2, as applicable to the flood hazard area, shall either:

1. Be designed and constructed to resist flood-related loads and to minimize transfer of flood-related loads to the building or structure; or
2. Break away during design flood conditions without causing damage to the building or structure; or
3. Be retractable, or be able to be raised, to or above the lowest floor elevations, provided the ability to be retracted or raised prior to onset of conditions of flooding is not contrary to means of egress requirements of the code.

(Renumber subsequent sections)

Reason: This proposal lays out options for satisfying the general requirement in R322.1.3 which requires "All buildings and structures erected in flood hazard areas shall be constructed by methods and practices that minimize flood damage." That means stairways and ramps should resist flood loads along with the dwellings they serve. These same requirements are included in ASCE 24-13.

In coastal high hazard areas (Zone V), stairs that are not properly constructed to meet the free-of-obstructions requirement below elevated buildings can damage the building when they fail. This damage has been observed during FEMA's post-flood investigations after numerous flood events (also see Figure 1 from NFIP Technical Bulletin 2 Free-of-Obstruction Requirements).

Figure 1. Stairs did not break away cleanly, resulting in damage to the elevated building.

Cost Impact: There should be no additional costs because of the existing requirement in R322.1.3.

R322.1.9-(NEW)-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it is difficult to anchor at a breakaway point and because anchorage is more important with regard to stairs. It becomes a life safety issue in the sense that proper anchorage ensures that no one falls and that the stair has a long life. In addition, there is no information to support cost benefits in A Zones and anything that breaks away is likely to damage something.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Gregory Wilson (FEMA) and Rebecca Quinn (RCQuinn Consulting), representing US Dept of Homeland Security, Federal Emergency Management Agency and RCQuinn Consulting, Inc. representing FEMA, requests Approval as Modified by this Public Comment,

Modify the proposal as follows:

~~R322.1.9~~ $322.3.6 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Section R322.3.2 ~~Sections R322.2.1 or R322.3.2, as applicable to the flood hazard area,~~ shall either:

1. Be designed and constructed to resist flood-related loads and to minimize transfer of flood-related loads to the building or structure; or
2. Break away during design flood conditions without causing damage to the building or structure; or
3. Be retractable, or be able to be raised, to or above the lowest floor elevations, provided the ability to be retracted or raised prior to onset of conditions of flooding is not contrary to means of egress requirements of the code.

Commenter's Reason: The committee action on this code change proposal was Disapproval. The proposed modification addresses the committee's concern about applying the requirement in Zone A by moving it to Section R322.3, which applies only in coastal high hazard areas (Zone V) where waves are expected to be 3 ft or higher during the base flood. The committee's reason statement also identified concerns with proper anchorage, however, as evidenced by post-disaster investigations, stairs and ramps may be adequately connected to the building to meet safety requirements but still be designed to break away under flood loads. Plus, the proposal has the alternative that stairs and ramps can remain intact provided they resist flood-related loads and minimize transfer of loads to the building, which has also been observed to be successful.

RB187-13
Final Action: AS AM AMPC____ D

RB190-13

R322.2.3, Table R322.2.3(1) (New), Table R322.2.3(2) (New), R404.1.3

Proposed Change as Submitted

Proponent: Greg Wilson, US Dept of Homeland Security, Federal Emergency Management Agency (Gregory.P.Wilson@dhs.gov); Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R322.2.3 Foundation design and construction. Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4 subject to the following limitations:

1. Plain masonry walls are not permitted.
2. Masonry walls in flood hazard areas not designated as Coastal A Zones, shall comply with Table R322.2.3(1) or shall be designed in accordance with ASCE 24.
3. Masonry walls in flood hazard areas designated as Coastal A Zones, shall comply with Table R322.2.3(2) or shall be designed in accordance with ASCE 24.

~~**Exception:** Unless designed in accordance with Section 404:~~

~~1. The unsupported height of 6-inch (152 mm) plain masonry walls shall be no more than 3 feet (914 mm).~~
~~2. The unsupported height of 8-inch (203 mm) plain masonry walls shall be no more than 4 feet (1219 mm).~~
~~3. The unsupported height of 8-inch (203 mm) reinforced masonry walls shall be no more than 8 feet (2438 mm).~~

~~For the purpose of this exception, unsupported height is the distance from the finished grade of the under-floor space to the top of the wall.~~

TABLE R322.2.3(1)
MASONRY WALLS IN FLOOD HAZARD AREAS NOT DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	MAXIMUM UNSUPPORTED WALL HEIGHT[a] (feet)	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)[b,c]
8-inch, with reinforcing in accordance with Table R404.1.1(2)	7	#4 at 48
	10	#4 at 24 or #5 at 40
10-inch, with reinforcing in accordance with Table R404.1.1(3)	7	#4 at 56
	10	#4 at 32 or #5 at 48
12-inch, with reinforcing in accordance with Table R404.1.1(4)	7	#4 at 72
	10	#4 at 40 or #5 at 64

a. Unsupported wall height is the distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.

b. If unbalanced fill conditions exist, then vertical reinforcement shall be the greater of that required by this table or referenced table in Section R404 (Tables R404.1.2(2) through R404.1.2(4))

TABLE R322.2.3(2)
MASONRY WALLS IN FLOOD HAZARD AREAS DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	MAXIMUM UNSUPPORTED WALL HEIGHT[a] (feet)	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)
8-inch, with reinforcing in accordance with Table R404.1.1(2)	2	#4 at 48
	3	#4 at 32 #5 at 48
10-inch, with reinforcing in accordance with Table R404.1.1(3)	4	#4 at 16 #5 at 24
12-inch, with reinforcing in accordance with Table R404.1.1(4)	5	#4 at 8 #6 at 16

a. Unsupported wall height is the distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when one ~~either~~ of the following conditions exists:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.
3. Masonry walls in flood hazard areas other than coastal high hazard areas that do not conform to the limitations in of R322.2.3 shall be designed in accordance with ASCE 24.

Reason: Current criteria for prescriptive masonry foundation wall construction per Tables R404.1.1(1) through (4) of Section R404 are based on wall height, soil classification, and unbalanced fill. However, for locations in flood hazard areas when wall sections are analyzed with applicable flood loads, the limits on wall height are typically driven by flood depth (per elevation requirements in R322.2.1) and are less often a function of site grade changes that result in lateral loads from unbalanced fill.

IRC Section R322.2.3 permits construction of masonry foundation walls in flood hazard areas per Section R404 with height restrictions on plain masonry and 8" reinforced masonry walls. The wall height limitations in R322.2.3 are based on analyses performed in 1998 for a range of flood depths and flood velocities. FEMA re-examined those limitations this year after observing wall damage.

Foundation walls in flood hazard areas may be susceptible to hydrostatic forces (addressed by the requirement for flood openings in R322.2.2) and hydrodynamic forces imposed by moving water and moderate breaking wave loads on vertical walls with wave heights between 1 ½ feet and 3 feet (see R322.2, if areas subject to such waves are delineated, they are designated "Coastal A Zones"). FEMA evaluated the resistance of masonry walls of variable heights, with flood openings, to a range of velocities and a range of wave heights, in combination with wind loading conditions covered in the IRC. FEMA used Allowable Stress Design (ASD) Load Combination 7, according to ASCE 7-10 Section 2.4.2 (2).

The hydrodynamic load analyses yielded the proposed wall height limitations and the corresponding minimum vertical reinforcement for 8", 10" and 12" thicknesses. Assumptions included:

1. 1- Story wood-framed residential structure supported on masonry foundation walls with flood openings installed per IRC R322.2.2
2. Top of foundation wall braced by elevated floor system
3. Material strengths per standards referenced in the IRC
4. All wood-frame shear resisting walls are on the exterior; foundation wall shear loads are limited by the capacity of the IRC-compliant light-frame braced walls
5. For analysis of wall sections in Zone A other than Coastal A Zones, the maximum flood velocity evaluated is 6 fps

As an example of how the results of the new analyses demonstrate the need to revise the limitations, the analysis indicates 8" reinforced masonry walls per Table 404.1.1.(2), with minimal reinforcement of #4 bar at 48" on center for an 8 ft high wall have a design strength of 32 ksi in axial tension and flexure. When just an 18" breaking wave load is applied to a 3' high wall at mid-height, the resulting ASD factored force in flexure exceeds 38 ksi.

The analyses also demonstrate the need to specify minimal reinforcement. When wind and flood loads are applied under Allowable Stress Design (ASD) Load Combination 7 per ASCE 7-10 Section 2.4.2 (2), net tension results at the top of the foundation wall from the minimum ASCE 7-10 basic wind speed of 115 mph (Exposure Category B). Higher design wind speeds result in greater uplift. The design criteria of ACI-530 Section 2.2.4 specifies that the tensile strength of unreinforced masonry shall be neglected when subjected to axial tension forces. Accordingly, unreinforced wall sections analyzed with net axial tension at the top of wall from the combined effects of wind and flood loading have been disallowed. ACI-530 commentary to Section 2.2.4 further stipulates, "*Net axial tension in unreinforced masonry walls due to axially applied load are not permitted. If axial tension develops in walls due to uplift of connected roofs or floors, the walls must be reinforced to resist the tension. Compressive stress from dead load can be used to offset axial tension."*

Evidence from FEMA's post-disaster Mitigation Assessment Team reports indicates residential unreinforced masonry (URM) wall failure under design wind (see FEMA P-908, Spring 2011 Tornadoes) and flood loads (see FEMA P-765, Midwest Floods of 2008 in Iowa and Wisconsin). MAT teams deployed shortly after Hurricane Sandy have documented numerous examples of failed unreinforced and lightly reinforced walls sections in areas shown on Flood Insurance Rate Maps as Zone A, both with and without moderate wave.

Cost Impact: The code change proposal will increase the cost of construction for a limited set of perimeter wall foundations in flood hazard areas, but will reduce the likelihood of failure under anticipated flood loads, and thus will decrease future costs associated with rebuilding after flood and flood/high wind events.

R322.2.3-RB-OVERCASH-WILSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that it addressed property loss mitigation instead of life safety. The cost would be insignificant as compared to the savings. The increase in the first time costs could be significant. We may not want to use the code to mitigate costs to insurers. The proposal does not provide enough specific guidance.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Greg Wilson, US Dept of Homeland Security, Federal Emergency Management Agency and Glenn Overcash, URS Corporation representing FEMA, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.2.3 Foundation design and construction. Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4 subject to the following limitations:

1. Plain masonry walls are not permitted.
2. Masonry walls in flood hazard areas not designated as Coastal A Zones, shall comply with Table R322.2.3(1) or shall be designed in accordance with ASCE 24.
3. Masonry walls in flood hazard areas designated as Coastal A Zones, shall comply with Table R322.2.3(2) or shall be designed in accordance with ASCE 24.

TABLE R322.2.3(1)
MASONRY WALLS IN FLOOD HAZARD AREAS NOT DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	MAXIMUM UNSUPPORTED WALL HEIGHT[a] ~~(feet)~~	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)[b]
8-inch, with reinforcing in accordance with Table R404.1.1(2)	7 feet 4 inches	#4 at 48
	8 feet	#4 at 40
	8 feet 8 inches	#4 at 32
	9 feet 4 inches	#4 at 24 or #5 at 40
	10 feet	#4 at 24 or #5 at 40
10-inch, with reinforcing in accordance with Table R404.1.1(3)	7 feet 4 inches	#4 at 56
	8 feet	#4 at 48
	8 feet 8 inches	#4 at 40
	9 feet 4 inches	#4 at 32 or #5 at 56
	10 feet	#4 at 32 or #5 at 48
12-inch, with reinforcing in accordance with Table R404.1.1(4)	7 feet 4 inches	#4 at 72
	8 feet	#4 at 64
	8 feet 8 inches	#4 at 48
	9 feet 4 inches	#4 at 40 or #5 at 72
	10 feet	#4 at 40 or #5 at 64

a. Unsupported wall height is the difference in height between the top of foundation wall and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. ~~distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.~~

b. If unbalanced fill conditions exist, then vertical reinforcement shall be the greater of that required by this table or referenced table in Section R404 (Tables R404.1.2(2) through R404.1.2(4))

TABLE R322.2.3(2)
MASONRY WALLS IN FLOOD HAZARD AREAS DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	UNSUPPORTED WALL HEIGHT[a] ~~(feet)~~	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)
8-inch, with reinforcing in accordance with Table R404.1.1(2)	2 <u>feet</u>	#4 at 48
	<u>2 feet 8 inches</u>	<u>#4 at 48 or</u> <u>#5 at 48</u>
	3 <u>feet 4 inches</u>	<u>#4 at 16 or</u> <u>#5 at 32</u>
	4 <u>feet</u>	<u>#5 at 8</u>
10-inch, with reinforcing in accordance with Table R404.1.1(3)	4 <u>feet</u>	#4 at 16 or #5 at 24
	<u>4 feet 8 inches</u>	<u>#5 at 8</u>
12-inch, with reinforcing in accordance with Table R404.1.1(4)	4 <u>feet 8 inches</u>	<u>#4 at 8</u> <u>#5 at 16</u>
	5 <u>feet 4 inches</u>	<u>#5 at 8</u>

a. Unsupported wall height is the <u>difference in height between the top of foundation wall and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level.</u> ~~distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.~~

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when one <u>or more</u> of the following conditions exist:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.
3. Masonry walls in flood hazard areas other than coastal high hazard areas that do not conform to the limitations in of R322.2.3 shall be designed in accordance with ASCE 24.

Commenter's Reason: Modifications to Code Change Proposal RB190-13 are in response to the Committee Reason for Disapproval that includes the statement that "(the) proposal does not provide enough specific guidance". To address the lack of individual prescriptive solutions for wall heights between 7 and 10 feet, rows were added to Table 322.2.3(1) to provide more efficient and economical solutions. Furthermore, wall heights are now indicated in 8" increments to match the format of Chapter 4 masonry wall reinforcement tables (Tables R404.1.1(2-4)). Modified wall height criteria that directly correspond with standard concrete masonry unit height will facilitate field application for the builder and subsequent verification by code officials.

In response to the Committee Reason for Disapproval that asserts Code Change Proposal RB190-13 "address(es) property loss mitigation instead of life safety" and that "(w)e may not want to use the code to mitigate costs to insurers", the following justification is offered: the committee's reason is not consistent with the intent of the IRC:

> "**R101.3 Intent.** The purpose of this code is to safeguard the public safety, health and general welfare through affordability, <u>structural strength</u>, means of egress facilities, <u>stability</u> … and <u>safety to</u> life <u>and property</u> from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations." [emphasis added]

Some homeowners do not carry flood insurance and flood-related damage is not covered by homeowners insurance. Preventing failure of masonry foundation walls by providing prescriptive solutions that specifically address flood hazards clearly meets the intent of the IRC.

The current wall height limitations in R322.2.3 are based on analyses performed in 1998. FEMA re-examined those limitations in 2012 after observing unreinforced masonry wall damage during post-disaster investigations. The new analysis (described in detail in the original Proposal Reason Statement) was developed through collaboration with industry groups and applies flood loads using updated standards that are referenced in the 2012 IRC.

The new analysis results: some masonry wall solutions prescribed in the existing code for flood hazard areas are structurally deficient. Tables 322.2.3(1) and 322.2.3(2) correct those deficiencies and are more user-friendly than the existing provisions. The existing provisions of R322.2.3 are also difficult to interpret; Code Change Proposal RB190-13 clarifies requirements for builders and code officials.

RB190-13
Final Action: AS AM AMPC____ D

RB191-13

R322.2.4 (New), R322.3.3, R322.3.4 (New)

Proposed Change as Submitted

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.2.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located below the base flood elevation shall be structurally independent of the primary foundation systems of buildings or, where structurally connected, the main structure shall be capable of resisting any added flood loads and effects of scour due to the presence of the slabs.

(Renumber subsequent sections.)

R322.3.3 Foundations. Buildings and structures erected in coastal high-hazard areas shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section 401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24. ~~Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.~~

R322.3.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located beneath or adjacent to structures shall be designed and constructed to:

1. Be structurally independent of the primary foundation system of the structure, do not transfer flood loads to the main structure, are constructed to break away cleanly, and are frangible so as to not produce debris capable of causing significant damage to any structure. Reinforcing of concrete slabs, including welded wire reinforcement, shall not be used so as to minimize the potential for concrete slabs being a source of debris. Slabs shall not have turned down edges and slab thickness shall be not more than 4 inches; or
2. Be self-supporting structural slabs capable of remaining intact and functional under base flood conditions, including expected erosion, and the main structure shall be capable of resisting any added flood loads and effects of local scour due to the presence of the slabs.

(Renumber subsequent sections.)

Reason: This proposal includes specifications for concrete slabs that are not found elsewhere in the IRC. Under flood conditions, the presence of concrete slabs can contribute to building damage. The existing language in R322.2 (Zone A) does not provide any specifications and the existing language in R322.3.3 (Zone V) does not provide any specifications for concrete slabs themselves; it only specifies that slabs are to be structurally independent of buildings, unless the buildings are designed to account for the added flood loads. The specific requirements are consistent with revised ASCE 24-13.

Cost Impact: There should be no added cost; the benefits are associated with less potential damage.

R322.2.4 (NEW) #1-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it contained unenforceable language such as the phrase "debris that causes significant damage to a structure." In addition, scouring does not take place in all areas of the United States, yet these proposed changes apply to all areas. Sometimes slabs must have turned down edges for frost protection purposes.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.3.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located beneath or adjacent to structures shall be designed and constructed:

1. To be structurally independent of the primary foundation system of the structure, to ~~do~~ not transfer flood loads to the main structure, and to be frangible and break away under conditions of the base flood ~~are constructed to break away cleanly, and are frangible so as to not produce debris capable of causing significant damage to any structure~~. Reinforcing of concrete slabs, including welded wire reinforcement, shall not be used so as to minimize the potential for concrete slabs being a source of debris. Slabs shall not have turned down edges and slab thickness shall be not more than 4 inches; or
2. To be self-supporting structural slabs capable of remaining intact and functional under base flood conditions, including expected erosion, and the main structure shall be capable of resisting any added flood loads and effects of local scour due to the presence of the slabs.

(Portions of proposal not shown to remain unchanged.)

Commenter's Reason: The committee action on this code change proposal was Disapproval. This public comment replaces the original proposal. It does not change the original proposed new Section R322.2.4 for Zone A flood hazard areas, and it does not change the original proposal to delete the last sentence of Section R322.3.3 for Zone V (coastal high hazard areas where wave heights are 3 feet had higher).

This public comment does modify the proposed new Section R322.3.4 by removing the phrase that the committee found objectionable. Instead, this public comment requires concrete slabs in Zone V to be frangible (means "easily broken") and to break away under flood conditions. The expectation is this will minimize the size of debris and thus minimize the likelihood of causing significant damage to structures. For many years, many local floodplain management ordinances adopted by coastal communities have used the term "frangible."

The limitation on turned-down edges in Zone V is retained. Field experience shows that slabs intended to breakaway but that have turned-down edges do not break away cleanly when undermined by wave scour or erosions, which can cause damage to foundations. In Zone V, concrete slabs are not permitted to be used as structural foundation elements, thus it is not problematic to limit turned-down edges and thickness for nonstructural slabs used for the stated purposes.

RB191-13
Final Action: AS AM AMPC____ D

RB192-13
R322.2.4 (New), R322.3.6 (New)

Proposed Change as Submitted

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

R322.2.4 Decks and porches. Attached and detached decks and porches that are not enclosed by solid, rigid walls and that are located below the elevations specified in Section R322.2.1 shall comply with the following:

1. Attached decks and porches shall be designed to function as a continuation of the building or structure.
2. Detached decks and porches shall be anchored to remain in place during base flood conditions.

R322.3.6 Decks and porches. Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall meet the foundation requirements of this section or be cantilevered from or knee braced to the building or structure. Detached decks and patios that are below the elevation requirements of Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Detached decks and patios shall be designed and constructed to remain intact and shall be anchored to remain in place during base flood conditions, or shall be frangible and break away cleanly so as not to produce debris capable of causing significant damage to any structure.

Reason: The IRC does not have specific requirements for decks and porches that are common elements for dwellings. These same requirements are included in ASCE 24-13.

Attached decks and porches can be elevated to the same requirements as dwellings. If not elevated, they can contribute to loads on buildings under flood conditions, so the buildings should be designed to account for those added loads. Decks and patios can be detached (structurally independent), in which case they can be below the elevation of buildings (provide they are not enclosed with walls – screen and lattice are not walls for this purpose). Detached decks and patios either have to be anchored so they don't become large debris that can batter other buildings or block drainage structures.

Cost Impact: Electing to structurally attach decks or patios would likely increase foundation costs, but the alternative is to choose to use detached decks and patios. Decks and patios are structures and have always been subject to the general NFIP requirement to be constructed by methods and practices that minimize flood damage and to be stable under flood conditions, both are included in the IRC at R322.1.2 and R322.1.3.

R322.2.4 (NEW) #2-RB-QUINN

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it left too many questions unanswered that create confusion for the designer, engineer and code official. Some of the proposed modifications helped, but were not enough. This proposal is far reaching. If it was narrowed down in scope to costal V Zones and areas where there is wave action it might be more worthy of consideration.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

R322.3.6 Decks and porches. Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall either meet the foundation requirements of this section or shall be cantilevered from or knee braced to the building or structure. Detached decks and patios that are below the elevation requirements of Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Detached decks and patios shall be designed and constructed to remain in place during base flood conditions, or shall be frangible and break away under conditions of the base flood.

Commenter's Reason: The committee action on this code change proposal was Disapproval. At the committee's suggestion, this public comment replaces the original proposal with the provision that applies only to decks in coastal high hazard areas (Zone V) where waves are expected to be 3 feet or higher during the base flood.

This public comment also modifies the original proposal for Zone V by removing language about damage to other structures, which the committee found objectionable in another proposal. The expectation is the requirement that decks not designed to remain intact are to be frangible (means "easily broken") which will minimize the size of debris and thus minimize the likelihood of causing significant damage to structures. For many years, many local floodplain management ordinances adopted by coastal communities have used the term "frangible."

RB192-13

Final Action: AS AM AMPC____ D

RB193-13

R322.2.4 (New), R322.3.7 (New), M2201.6

Proposed Change as Submitted

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

R322.2.4 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood and shall be protected from impact by floating debris.

R322.3.7 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2. Where elevated on platforms, the platforms shall conform to the foundation requirements of Section R322.3.

Revise as follows:

M2201.6 Flood-resistant installation. In flood hazard areas as established by Table R301.2(1), tanks shall be installed in accordance with Section R322.2.4 (flood hazard areas including Zone A) or Section R322.3.7 (coastal high-hazard areas including Zone V). ~~at or above the elevation required in Section R322.2.1 or R322.3.2 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the design flood.~~

Reason: This proposal more clearly separates underground tanks from above-ground tanks. Dislodged tanks not only can release contents into floodwaters, but they become battering debris that can contribute to structural damage.

Underground tanks need to be installed in ways that take into consideration the fact that soils may be saturated during flooding, creating conditions that can cause tanks to be dislodged. This occurs after many flood events; most recently, problems with tanks were observed throughout the Hurricane Sandy impact area.

How above-ground tanks that serve dwellings are handled depends on flood zone. In coastal high hazard areas (Zone V) above-ground tanks have to be elevated – they may be elevated on separate platforms or on platforms that are cantilevered from the elevated building/foundation. In other flood hazard areas (Zone A) above-ground tanks may be elevated, or may be below base flood elevation, provided they are adequately anchored.

These same requirements are included in ASCE 24-13. The NFIP considers tanks as structures and structures have always been subject to the general NFIP requirement to be constructed by methods and practices that minimize flood damage and to be stable under flood conditions, both are included in the IRC at R322.1.2 and R322.1.3.

Cost Impact: None. These requirements articulate how the basic NFIP requirements (and the requirements of R322) should have been applied.

R322.2.4 (NEW) #3-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it contained information that was not appropriate for the International Residential Code. Tanks are typically regulated by the fire code, zoning code, or fuel gas code. The proposal also lacks specificity with regard to the language “protected from impact by floating debris.”

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.2.4 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood~~ and shall be protected from impact by floating debris~~.

R322.3.7 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2. Where elevated on platforms, the platforms shall be cantilevered from or knee braced to the building or shall be supported on foundations that conform to the ~~foundation~~ requirements of Section R322.3.

M2201.6 Flood-resistant installation. In flood hazard areas as established by Table R301.2(1), tanks shall be installed in accordance with Section R322.2.4 (flood hazard areas including Zone A) or Section R322.3.7 (coastal high-hazard areas including Zone V).

Commenter's Reason: The committee action on this code change proposal was Disapproval because the committee suggests it is not appropriate for the IRC to have requirements for tanks. However, the IRC does regulate residential oil tanks under M2201 and thus it is appropriate for Section R322 to have specific requirements. In addition, FEMA has received questions about water tanks necessary to meet the IRC fire-suppression requirements in areas without public water supply, which reinforces the value of having requirements in Section R322. The committee also objected to language regarding protection from floating debris, which is removed in this public comment. The original language in R322.3.7 is amended to provide that platforms may either be supported by foundations or be attached to buildings.

RB193-13

Final Action: AS AM AMPC____ D

RB198-13
R322.3.5.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

<u>**R322.3.5.1 Protection of building envelope.** An exterior door that meets the requirements of Section R612 shall be installed at the top of stairs that are enclosed with walls designed to break away in accordance with Section R322.3.4.</u>

Reason: Walls below elevated buildings in coastal high hazard areas (Zone V) are permitted if the area enclosed by walls is used for parking of vehicles, building access or storage. If the enclosed area is used for building access, then a stairway provides access to the elevated building. R322.3.4 requires the walls to be designed and constructed to break away under flood loads. Post-disaster investigations have identified increased damage to the interior of elevated buildings because wave splash, wave run-up, and wind-driven rain can enter buildings through the unprotected doorway at the top of the stairs.

Cost Impact: The added cost of an exterior door is offset by reduced damage caused by wave splash, wave run-up, and wind-driven rain, some of which is not covered by NFIP flood insurance.

R322.3.5.1 (NEW)-RB-QUINN-WILSON

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proposed section requires a door at the top of the stair and makes no provisions for conditions where the stair leads to a deck. It is a good concept but it needs work. In hurricane prone areas, the doors that are being discussed could be interior doors and this could create undue additional costs.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

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

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.3.5.1 Protection of building envelope. An exterior door that meets the requirements of Section R612 shall be installed at the top of stairs <u>that provide access to the building and</u> that are enclosed with walls designed to break away in accordance with Section R322.3.4.

Commenter's Reason: The committee action on this code change proposal was Disapproval because no provision was made for stairs that lead to decks. Although it would be unusual for stairs that lead to decks to be enclosed by walls, the proposal is modified to clarify that the requirement for an exterior door at the top of stairs applies to stairs that lead to the building and that are also enclosed by breakaway walls. This proposal adds to Section R322.3, which applies in coastal high hazard areas (Zone V) where wave height of greater than 3 feet are expected during the base flood. Walls are permitted to enclose areas below elevated buildings if the walls are designed to break away under flood loads and if the areas are used only for parking, storage and building access (see R322.3.4).

The proposal calls for an exterior door instead of an interior door because the walls enclosing the stairs are designed to break away, thus exposing the door to both wind and water.

RB198-13

Final Action: AS AM AMPC____ D

RB200-13
R324 (New), R325 (New), R326 (New), R327 (New), R328 (New)

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Add new text as follows:

R324 Structural Tests and Special Inspections. Where structural tests and special inspections are required due to the methods of construction, the tests and inspections shall be performed and documented as is required in Chapter 17 of the *International Building Code*.

R325 Swimming Pool Enclosures and Safety Devices. Swimming pools shall comply with the requirements of Sections 3109.2 through 3109.5 and other applicable sections of the *International Building Code*.

R326 Encroachments Into The Public Right-Of- Way. Encroachments into the Public Right-of-Way shall comply with the standards in Chapter 32 of the *International Building Code*.

R327 Safeguards During Construction Provisions for safety during construction and the protection of adjacent public and private properties shall be governed by the requirements of Chapter 33 of the *International Building Code*.

R328 Sound Transmission. Wall and floor-ceiling assemblies separating dwelling units from each other shall provide airborne sound insulation for walls, and both airborne and impact sound insulation for floor-ceiling assemblies as required in Chapter 12 of the *International Building Code*.

Reason: The IRC is developed as a standalone code however it does not address certain issues regulated by the International Building Code. This code change provides a cross reference to the IBC in lieu of adopting IBC regulations by transcription. The IRC allows multi-unit dwellings and townhouses but does not address sound transmission control between dwelling units and townhouses. Additionally the IRC does not seem to regulate swimming pools, encroachments into the public right of way or safety during construction.

Section R324 is necessary since special inspections and tests may be required by product evaluation reports or due to non-conforming construction that was approved to comply with the IRC may need to be qualified by testing.

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

R324 (NEW)-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it includes multiple references to the International Building Code. This is contrary to the intent of the International Residential Code, which is to be a stand-alone code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

R301.1.4 Structural Tests and Special Inspections. Where structural tests and special inspections are required due to the methods of construction pursuant to a product evaluation report or when required by the Building Official, the tests and inspections shall be performed and documented in accordance with Chapter 17 of the *International Building Code*.

Add new Appendix R as follows:

APPENDIX R
ENCROACHMENTS INTO THE PUBLIC RIGHT-OF- WAY

GENERAL
SECTION AR101

AR101.1 Scope. The provisions of this Appendix chapter shall govern the encroachment of structures into the public right-of-way.

AR101.2 Measurement. The projection of any structure or portion thereof shall be the distance measured horizontally from the lot line to the outermost point of the projection.

AR101.3 Other laws. The provisions of this chapter shall not be construed to permit the violation of other laws or ordinances regulating the use and occupancy of public property.

AR101.4 Drainage. Drainage water collected from a roof, awning, canopy or marquee, and condensate from mechanical equipment shall not flow over a public walking surface.

SECTION AR102
ENCROACHMENTS

AR102.1 Encroachments below grade. Encroachments below grade shall comply with Sections AR102.1.1 through AR102.1.3.

AR102.1.1 Structural support. A part of a building erected below grade that is necessary for structural support of the building or structure shall not project beyond the lot lines, except that the footings of street walls or their supports which are located not less than 8 feet (2438 mm) below grade shall not project more than 12 inches (305 mm) beyond the street lot line.

AR102.1.2 Vaults and other enclosed spaces. The construction and utilization of vaults and other enclosed spaces below grade shall be subject to the terms and conditions of the applicable governing authority.

AR102.1.3 Areaways. Areaways shall be protected by grates, guards or other approved means.

AR102.2 Encroachments above grade and below 8 feet in height. Encroachments into the public right-of-way above grade and below 8 feet (2438 mm) in height shall be prohibited except as provided for in Sections AR102.2.1 through AR102.2.3. Doors and windows shall not open or project into the public right-of-way.

AR102.2.1 Steps. Steps shall not project more than 12inches (305 mm) and shall be guarded by approved devices not less than 3 feet (914 mm) in height, or shall be located between columns or pilasters.

AR102.2.2 Architectural features. Columns or pilasters, including bases and moldings shall not project more than12 inches (305 mm). Belt courses, lintels, sills, architraves, pediments and similar architectural features shall not project more than 4 inches (102 mm).

AR102.2.3 Awnings. The vertical clearance from the public right-of-way to the lowest part of any awning, including valances, shall be not less than 7 feet (2134 mm).

AR102.3 Encroachments 8 feet or more above grade. Encroachments 8 feet (2438 mm) or more above grade shall comply with Sections AR102.3.1 through AR102.3.4.

AR102.3.1 Awnings, canopies, marquees and signs. Awnings, canopies, marquees and signs shall be constructed so as to support applicable loads as specified in Chapter 3 or where applicable Chapter 16 of the International Building Code. Awnings, canopies, marquees and signs with less than 15 feet (4572 mm) clearance above the sidewalk shall not extend into or occupy more than two-thirds the width of the sidewalk measured from the building. Stanchions or columns that support awnings, canopies, marquees and signs shall be located not less than 2 feet (610 mm) in from the curb line.

AR102.3.2 Windows, balconies, architectural features and mechanical equipment. Where the vertical clearance above grade to projecting windows, balconies, architectural features or mechanical equipment is more than 8 feet (2438 mm), 1 inch (25 mm) of encroachment is permitted for each additional 1 inch (25 mm) of clearance above 8 feet (2438 mm), but the maximum encroachment shall be 4 feet (1219 mm).

AR102.3.3 Encroachments 15 feet or more above grade. Encroachments 15 feet (4572 mm) or more above grade shall not be limited.

AR102.3.4 Pedestrian walkways. The installation of a pedestrian walkway over a public right-of-way shall be subject to the approval of the applicable governing authority. The vertical clearance from the public right-of-way to the lowest part of a pedestrian walkway shall be not less than 15 feet (4572 mm).

AR102.4 Temporary encroachments. Where allowed by the applicable governing authority, vestibules and storm enclosures shall not be erected for a period of time exceeding seven months in any one year and shall not encroach more than 3 feet (914 mm) nor more than one-fourth of the width of the sidewalk beyond the street lot line. Temporary entrance awnings shall be erected with a clearance of not less than 7 feet (2134 mm) to the lowest portion of the hood or awning where supported on removable steel or other approved noncombustible support.

Add new Appendix S as follows:

APPENDIX S
SAFEGUARDS DURING CONSTRUCTION

SECTION AS101
GENERAL

AS101.1 Scope. The provisions of this Appendix chapter shall govern safety during construction and the protection of adjacent public and private properties.

AS101.2 Storage and placement. Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or adjoining property for the duration of the construction project.

SECTION AS102
CONSTRUCTION SAFEGUARDS

AS102.1 Alterations, repairs and additions. Required exits, existing structural elements, fire protection devices and sanitary safeguards shall be maintained at all times during alterations, repairs or additions to any building or structure.

Exceptions:

1. Where such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. Maintenance of such elements and devices is not required when the existing building is not occupied.

AS102.2 Manner of removal. Waste materials shall be removed in a manner which prevents injury or damage to persons, adjoining properties and public rights-of-way.

AS102.3 Fire safety during construction. Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the International Fire Code.

SECTION AS103
DEMOLITION

AS103.1 Construction documents. Construction documents and a schedule for demolition shall be submitted where required by the building official. Where such information is required, no work shall be done until such construction documents or schedule, or both, are approved.

AS103.2 Pedestrian protection. The work of demolishing any building shall not be commenced until pedestrian protection is in place as required by this chapter.

AS103.3 Means of egress. A horizontal exit shall not be destroyed unless and until a substitute means of egress has been provided and approved.

AS103.4 Vacant lot. Where a structure has been demolished or removed, the vacant lot shall be filled and maintained to the existing grade or in accordance with the ordinances of the jurisdiction having authority.

AS103.5 Water accumulation. Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

AS103.6 Utility connections. Service utility connections shall be discontinued and capped in accordance with the approved rules and the requirements of the applicable governing authority.

AS103.7 Fire safety during demolition. Fire safety during demolition shall comply with the applicable requirements of this code and the applicable provisions of Chapter 56 of the International Fire Code.

SECTION AS104
SITE WORK

AS104.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Stumps and roots shall be removed from the soil to a depth of not less than 12 inches (305 mm) below the surface of the ground in the area to be occupied by the building. Wood forms which have been used in placing concrete, if within the ground or between foundation sills and the ground, shall be removed before a building is occupied or used for any purpose. Before completion, loose or casual wood shall be removed from direct contact with the ground under the building.

AS104.1.1 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soil investigation report acceptable to the building official.

AS104.1.2 Surcharge. No fill or other surcharge loads shall be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge. Existing footings or foundations that can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against later movement.

AS104.1.3 Footings on adjacent slopes. For footings on adjacent slopes, see Chapter 4.

SECTION AS105
PROTECTION OF PEDESTRIANS

AS105.1 Protection required. Pedestrians shall be protected during construction, remodeling and demolition activities as required by this chapter and Table AS105. Signs shall be provided to direct pedestrian traffic.

AS105.2 Walkways. A walkway shall be provided for pedestrian travel in front of every construction and demolition site unless the applicable governing authority authorizes the sidewalk to be fenced or closed. Walkways shall be of sufficient width to accommodate the pedestrian traffic, but in no case shall they be less than 4 feet (1219 mm) in width. Walkways shall be provided with a durable walking surface. Walkways shall be accessible in accordance with Chapter 11 of the International Building Code and shall be designed to support all imposed loads and in no case shall the design live load be less than 150 pounds per square foot (psf) (7.2 kN/m2).

AS105.3 Directional barricades. Pedestrian traffic shall be protected by a directional barricade where the walkway extends into the street. The directional barricade shall be of sufficient size and construction to direct vehicular traffic away from the pedestrian path.

AS105.4 Construction railings. Construction railings shall be not less than 42 inches (1067 mm) in height and shall be sufficient to direct pedestrians around construction areas.

AS105.5 Barriers. Barriers shall be not less than 8 feet (2438 mm) in height and shall be placed on the side of the walkway nearest the construction. Barriers shall extend the entire length of the construction site. Openings in such barriers shall be protected by doors that are normally kept closed.

AS105.6 Barrier design. Barriers shall be designed to resist loads required in Chapter 16 unless constructed as follows:

1. Barriers shall be provided with 2-inch by 4-inch (51mm by 102 mm) top and bottom plates.
2. The barrier material shall be boards not less than 3/4-inch (19.1 mm) thick or wood structural panels not less than 1/4-inch (6.4 mm) thick.
3. Wood structural use panels shall be bonded with an adhesive identical to that for exterior wood structural use panels.
4. Wood structural use panels 1/4 inch (6.4 mm) or 5/16 inch (23.8 mm) in thickness shall have studs spaced not more than 2 feet (610 mm) on center (o.c.).
5. Wood structural use panels 3/8 inch (9.5 mm) or 1/2 inch (12.7 mm) in thickness shall have studs spaced not more than 4 feet (1219 mm) on center provided a 2- inch by 4-inch (51 mm by 102 mm) stiffener is placed horizontally at mid height where the stud spacing is greater than 2 feet (610 mm) on center.
6. Wood structural use panels 5/8 inch (15.9 mm) or thicker shall not span over 8 feet (2438 mm).

AS105.7 Covered walkways. Covered walkways shall have a clear height of not less than 8 feet (2438 mm) as measured from the floor surface to the canopy overhead. Adequate lighting shall be provided at all times. Covered walkways shall be designed to support all imposed loads. In no case shall the design live load be less than 150 psf (7.2 kN/m2) for the entire structure.

Exception: Roofs and supporting structures of covered walkways for new, light-frame construction not exceeding two stories above grade plane shall be designed for a live load of 75 psf (3.6kN/m2) or the loads imposed on them, whichever is greater. In lieu of such designs, the roof and supporting structure of a covered walkway shall be constructed as follows:

1. Footings shall be continuous 2-inch by 6-inch (51 mm by 152 mm) members.
2. Posts not less than 4 inches by 6 inches (102 mm by 152 mm) shall be provided on both sides of the roof and spaced not more than 12 feet (3658 mm) on center.
3. Stringers not less than 4 inches by 12 inches (102 mm by 305 mm) shall be placed on edge upon the posts.
4. Joists resting on the stringers shall be not less than 2 inches by 8 inches (51 mm by 203 mm) and shall be spaced not more than 2 feet (610 mm) on center.
5. The deck shall be planks not less than 2 inches (51 mm) thick or wood structural panels with an exterior exposure durability classification not less than 23/32 inch (18.3 mm) thick nailed to the joists.

TABLE AS105
PROTECTION OF PEDESTRIANS

HEIGHT OF CONSTRUCTION	DISTANCE FROM CONSTRUCTION TO LOT LINE	TYPE OF PROTECTION REQUIRED
8 feet or less	Less than 5 feet Construction railings	Less than 5 feet Construction railings
	5 feet or more None	5 feet or more None
More than 8 feet	Less than 5 feet Barrier and covered walkway	Less than 5 feet Barrier and covered walkway
	5 feet or more, but not more than one-fourth the height of construction Barrier and covered walkway	5 feet or more, but not more than one-fourth the height of construction Barrier and covered walkway
	5 feet or more, but between one-fourth and one-half the height of construction Barrier	5 feet or more, but between one-fourth and one-half the height of construction Barrier
	5 feet or more, but exceeding one-half the height of construction None	5 feet or more, but exceeding one-half the height of construction None

For SI: 1 foot = 304.8 mm.

AS105.8 Repair, maintenance and removal. Pedestrian protection required by this appendix shall be maintained in place and kept in good order for the entire length of time pedestrians are subject to being endangered. The owner or the owner's agent, upon the completion of the construction activity, shall immediately remove walkways, debris and other obstructions and leave such public property in as good a condition as it was before such work was commenced.

AS105.9 Adjacent to excavations. Every excavation on a site located 5 feet (1524 mm) or less from the street lot line shall be enclosed with a barrier not less than 6 feet (1829 mm) in height. Where located more than 5 feet (1524 mm) from the street lot line, a barrier shall be erected where required by the building official . Barriers shall be of adequate strength to resist wind pressure as specified in Chapter 3.

SECTION AS106
PROTECTION OF ADJOINING PROPERTY

AS106.1 Protection required. Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities. The person making or causing an excavation to be made shall provide written notice to the owners of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.

SECTION AS107
TEMPORARY USE OF STREETS, ALLEYS AND PUBLIC PROPERTY

AS107.1 Storage and handling of materials. The temporary use of streets or public property for the storage or handling of materials or of equipment required for construction or demolition, and the protection provided to the public shall comply with the provisions of the applicable governing authority and this chapter.

AS107.1.1 Obstructions. Construction materials and equipment shall not be placed or stored so as to obstruct access to fire hydrants, standpipes, fire or police alarm boxes, catch basins or manholes, nor shall such material or equipment be located within 20 feet (6096 mm) of a street intersection, or placed so as to obstruct normal observations of traffic signals or to hinder the use of public transit loading platforms.

AS107.2 Utility fixtures. Building materials, fences, sheds or any obstruction of any kind shall not be placed so as to obstruct free approach to any fire hydrant, fire department connection, utility pole, manhole, fire alarm box or catch basin, or so as to interfere with the passage of water in the gutter. Protection against damage shall be provided to such utility fixtures during the progress of the work, but sight of them shall not be obstructed.

SECTION AS108
FIRE EXTINGUISHERS

AS108.1 Where required. All structures under construction, alteration or demolition shall be provided with not less than one approved portable fire extinguisher in accordance with Section 906 of the *International Building Code* and sized for not less than ordinary hazard as follows:

1. At each stairway on all floor levels where combustible materials have accumulated.
2. In every storage and construction shed.
3. Additional portable fire extinguishers shall be provided where special hazards exist, such as the storage and use of flammable and combustible liquids.

AS108.2 Fire hazards. The provisions of this appendix and where applicable the *International Fire Code* shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

SECTION AS109
MEANS OF EGRESS

AS109.1 Maintenance of means of egress. Required means of egress shall be maintained at all times during construction, demolition, remodeling or alterations and additions to any building.

> **Exception:** Existing means of egress need not be maintained where approved temporary means of egress systems and facilities are provided.

SECTION AS110
AUTOMATIC SPRINKLER SYSTEM

AS110.1 Completion before occupancy. In buildings where an automatic sprinkler system is required by this code, it shall be unlawful to occupy any portion of a building or structure until the automatic sprinkler system installation has been tested and approved, except as provided in Section 111.3 of the *International Building Code*.

SECTION AS111
WATER SUPPLY FOR FIRE PROTECTION

AS111.1 Where required. An approved water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material arrives on the site.

Commenter's Reason: The original proposal is being resubmitted with modifications after a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change.

Section R324 as proposed has been relocated to the scoping portion of Chapter 3 that serves as a sort of road map to IRC technical requirements. Proposed Section R325 and R328 were not included since Appendix G and K address the topics in the proposed section.

Section R326 and R327 were deleted however Appendices R and S were transcribed from IBC chapter 32 and 33 respectively with format modifications to fit the IRC. Additionally, requirements are not applicable to dwellings and townhouses. While reference s made to the IFC and the IBC where necessary, proponents would like to remind the membership that the International family of cods is advertised as a coordinated set of codes designed to work together. So it is very unlikely that the IFC or a fire code is adopted by a jurisdiction using the IRC or IBC.

While the IRC is developed as a standalone code, it does not address certain issues regulated by the International Building Code. This code change provides the IBC regulations by transcription.

Section R301.1.3 is necessary since special inspections and tests may be required by product evaluation reports or due to non-conforming construction that was approved to comply with the IRC and may need to be qualified by testing. For example the use of post installed adhesive or mechanical anchors require special inspections that need to be performed in accordance with the IBC.

Public Comment 2:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R301.1.4 Structural Tests and Special Inspections. Where structural tests and special inspections are required due to the methods of construction pursuant to a product evaluation report or when required by the Building Official, the tests and inspections shall be performed and documented as is required in Chapter 17 of the *International Building Code*.

R324 Encroachments Into The Public Right-Of- Way. Encroachments into the Public Right-of-Way shall comply with the standards in Chapter 32 of the *International Building Code*.

R325 Safeguards During Construction. Provisions for safety during construction and the protection of adjacent public and private properties shall be governed by the requirements of Chapter 33 of the *International Building Code*.

Commenter's Reason: The original proposal is being replaced after a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change. We offer this as an option in lieu of transcribing IBC text into the IRC.

Section R324 as proposed has been relocated to scoping portion of Chapter 3 that serves as a sort of road map to IRC technical requirements. Proposed Section R325 and R328 were not included since Appendix G and K address the topics in the proposed section.

Section R324 and R325 were retained in lieu of transcribing IBC chapter 32 and 33 respectively with format modifications to fit the IRC. While this is contrary to the intent of the IRC to function as a standalone code, adoption of the IRC throughout the United States is varying in some cases only the building portions in chapters 1 through 10 are being adopted. Urban jurisdictions enforce the IBC and IFC so when a situation arises it should not be overly difficult to apply the standards of the IBC as applicable when referenced in the IRC. By addressing inadvertent omissions ensures that IRC enforcers who like the IBC more will not tend to consider less restrictive IRC requirements as errors and omissions.

While references are made to the IBC where necessary, proponents would like to remind the membership that the International family of cods is advertised as a coordinated set of codes designed to work together. So it is very unlikely that the IFC or IBC are not adopted by a jurisdiction using the IRC.

RB200-13

Final Action: AS AM AMPC____ D

RB201-13
R324 (New), R202, Chapter 44

Proposed Change as Submitted

Proponent: David P. Kapturowski representing the American Association of Radon Scientist & Technologists

Add new text as follows:

SECTION R324
RADON REDUCTION

R324.1 General. This Section applies to radon control methods for buildings and structures within EPA Radon Zones 1 & 2, as defined in Section R324.42. *Rough-Ins* or complete *Active Soil Depressurization* (ASD) systems shall be installed as necessary to reduce soil gas entry and vapor intrusion so as to establish indoor radon levels below the *National Radon Action Level* (NRAL).

R324.2 Mitigation system required. A *mitigation system Rough-In* shall be installed in *dwellings* located in *radon* potential zones 1 and 2 in accordance with Section R324.8. The *radon* potential zones shall be determined in accordance with Section R324.42.

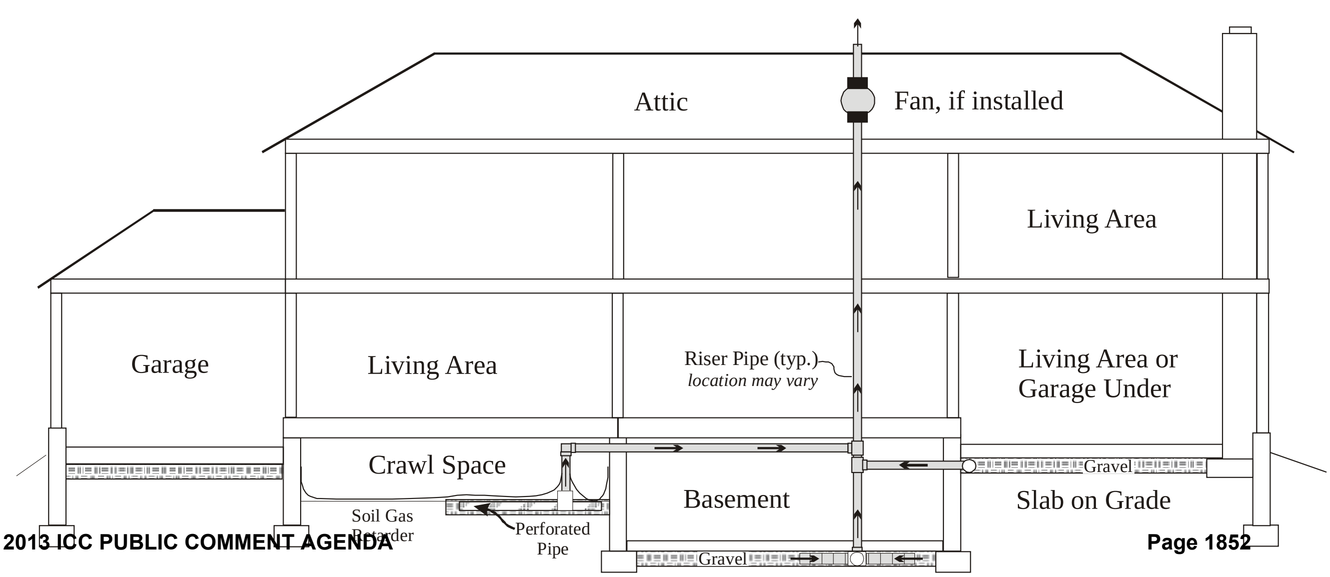
> **Exception:** Where the foundation system does not have any enclosed area of soil contact and where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Action Level* (*NAL*).

R324.3 Design. The design of *radon mitigation systems* shall comply with Section R324 and, for buildings having a total foundation area of greater than 2500 square feet [232 sq. m], shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems. Designs of *radon mitigation systems* for foundation types other than those specified herein shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems.

R324.4 Foundation area. The foundation area shall be calculated from the inside perimeter dimensions of the foundation walls.

R324.5 Mitigation system rough-in required. The *Rough-In* installation of a *mitigation system* shall be required for all foundations and *combination foundations* types, including *crawl space*, basement, slab-on-grade and slab-on-grade garage located below a living area. The installation shall be in accordance with Sections R324.6 through R324.28. Figure R324.5 illustrates the four foundation types.

FIGURE R324.5
FOUNDATION TYPES



R324.6 Soil gas collection plenums. Foundation areas shall be constructed so as to create sealed *soil gas collection plenums* in accordance with Sections R324.7 through R324.9.6.

R324.7 Submembrane soil gas collection plenums in crawl spaces with earthen floors. For each *suction point*, a *soil gas collector* shall be installed in accordance with Sections R324.7.1 through R324.7.7 and Section R324.9.

R324.7.1 Soil gas collector. One *soil gas collector* for each *suction point* in accordance with Section R324.7.1.1 shall be installed in accordance with Section R324.7.1.1, R324.7.1.2 or R324.7.1.3.

R324.7.1.1 Pipe soil gas collector. The *soil gas collector* shall consist of a perforated pipe with a nominal diameter of not less than 4 inches [102 mm]. The pipe shall be not less than 10 feet [3048 mm] in length. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1.1 such that the pipe is completely surrounded by not less than 4 inches [102 mm] of aggregate.

R324.7.1.1.2 Geotextile soil gas collector. The *soil gas collector* shall consist of a strip of geotextile drain matting not less than 10 feet [3048 mm] in length and having a cross sectional area of not less than 12 square inches [7742 sq. mm]. The strip of matting shall be placed on top of the soil or in a trench.

R324.7.1.1.3 Gravel soil gas collector. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.7.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. *Suction points* shall be installed in accordance with Section R324.7.2.1, R324.7.2.2 or R324.7.2.3, as applicable for the type of plenum installed.

R324.7.2.1 Suction point for pipe soil gas collector. The *suction point* for a pipe *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The perforated pipe plenum shall be inserted into both of the horizontal openings of the pipe fitting or device. One opening of the fitting or device shall be oriented in a vertical “up” position. Alternatively, the sub-membrane area and the other foundation types shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.1.3 and served by one or more *suction points*.

R324.7.2.2 Suction point for geotextile soil gas collector. The *suction point* for a geotextile *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be connected to the matting in a manner to facilitate airflow from the collector. One opening of the fitting or device shall be oriented in a vertical “up” position.

R324.7.2.3 Suction point for gravel soil gas collector. The *suction point* for a *gravel soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be provided with not less than 5 feet [1524 mm] of perforated pipe extending from each opening of the fitting or device into the *gravel* layer. Such perforated pipe shall provide not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe.

R324.7.3 Suction points not permitted. *Suction points* are not permitted on sump lids

R324.7.4 Fasten suction points. *Suction point* fittings and devices shall be fixed in place to prevent dislocation.

R324.7.5 Seal top of the soil gas collection plenum. A *soil gas retarder* shall cover the top of the *soil gas collection plenum* and all exposed soil. The installation of the *soil gas retarder* shall be in accordance with Sections R324.7.5.1 through R324.7.5.4.

R324.7.5.1 Sheeting. The *soil gas retarder* membrane shall meet ASTM E1745 Class A, B or C.

R324.7.5.2 Seams. The seams between adjacent membrane sheets shall be overlapped not less than 12 inches [305 mm] and shall be sealed by one of the following methods:

1. A tape recommended by the membrane manufacturer.
2. Caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.3 Repairs. Tears or punctures in the membrane shall be sealed by one or more of the following methods:

1. A tape recommended by the membrane manufacturer.
2. An additional sheet of the membrane material that covers and overlaps the tear or puncture not less than 12 inches [305 mm] on all sides and that is sealed with a caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.4 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural supports or similar penetrations shall be sealed.

R324.7.6 Seal sides of the soil gas collection plenum. The *soil gas retarder* membrane shall turn up onto foundation walls not less than 6 inches [152 mm] and shall be continuously sealed to the wall along the full perimeter with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.7.7 Membrane label required. *Soil gas retarder* membranes shall be marked in a conspicuous place with a label to identify that the membrane is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.8 Subslab soil gas collection plenums for concrete floors. The floors of basement, concrete crawlspace and slab-on-grade foundation systems shall be provided with a *soil gas collection plenum* installed in accordance with Sections R324.8.1 through R324.9.6.

R324.8.1 Soil gas collector. A *soil gas collector* shall be installed in accordance with Section R324.8.1.1, R324.8.1.2 or R324.8.1.3.

R324.8.1.1 Gravel. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.8.1.2 Geotextile. A layer of geotextile drainage matting shall be placed over a uniform layer of either soil or sand. The geotextile drainage matting shall be designed to allow the lateral flow of *soil gases* to the system's *suction point* fitting. The *geotextile matting* shall have a cross-sectional area of not less than 12 square inches [7742 sq. mm] and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the foundation wall to the edge of the drainage matting. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.1.3 Pipe loop. A loop of not less than 4 inch [102 mm] diameter perforated pipe shall be placed along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the centerline of the pipe to the foundation walls. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1 and surrounding the pipe on at least 2 sides. The cross-sectional area of the aggregate and pipe *soil gas collector* shall be not less than 50 square inches [32,258 sq. mm]. The piping shall form a continuous loop and pipe sections shall be joined with a connector device or method recommended by the manufacturer. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. Not less than one *suction point* shall be provided for each foundation type. Alternatively, each *soil gas collector* shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.3 and served by one or more *suction points*. *Suction points* shall be installed in accordance with Sections R324.8.2.1, R324.8.2.2 or R324.8.2.3 as applicable for the type of *soil gas collector* installed.

R324.8.2.1 Gravel layer soil gas collector. A *suction point* for a *gravel* type *soil gas collector* shall consist of a pipe fitting or other device having not less than two openings oriented so as to create multiple horizontal intake openings within the *gravel* layer. The horizontal openings shall be provided with not less than 5 feet [1534 mm] of perforated pipe extending from each opening of the fitting or device into the *gravel* layer. Said perforated pipe shall provide a not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.2 Geotextile layer soil gas collector. A *suction point* for a geotextile type *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two oriented so as to create multiple horizontal intake openings connected to the geotextile mat in a manner to maintain airflow capacity from the plenum. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.3 Pipe loop soil gas collector. A *suction point* for a *pipe loop* type collector shall consist of a pipe tee fitting or pipe saddle device installed in the loop piping. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.3 Multiple soil gas collection plenums. Where interior footings divide a *soil gas collector* into two or more areas, each such area shall be provided with the required *suction points* and joined with *mitigation system* piping in accordance with Section R324.10. Alternatively, each area so created by the interior footings shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.3 and served by one or more *suction points*.

R324.8.4 Suction points not permitted. *Suction points* are not permitted on sump lids.

R324.8.5 Fasten suction points. *Suction point* fittings and piping shall be fastened in place to prevent dislocation during placement of the gas permeable layer, *soil gas retarder* and concrete.

R324.8.6 Seal top of the soil gas plenum. The *soil gas collector* and all exposed soil shall be covered with a *soil gas retarder* installed in accordance with Section R324.8.6.1.

R324.8.6.1 Sheeting. Polyethylene sheeting of not less than 6 *mils* [0.152 mm] in thickness, or cross-laminated polyethylene sheeting of not less than 3 *mils* [0.076 mm] in thickness shall be installed on top of the *soil gas collector* and shall completely cover the area under the concrete floor and shall be sealed in accordance with Sections R324.8.6.1.1 through R324.8.6.1.3. Where sheet foam board insulation is installed on top of the *soil gas collector*, the polyethylene sheeting shall be installed below the foam board insulation.

R324.11.8.1.1 Seams. Seams between adjacent polyethylene sheets shall be overlapped not less than 12 inches [305 mm] and sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.11.8.1.2 Repairs. Tears or punctures in the polyethylene sheeting shall be sealed or an additional sheet of polyethylene shall cover the tear or puncture with an overlap of not less than 12 inches [305 mm] on all sides. Such additional sheet shall be sealed and fixed in place to prevent displacement during slab casting.

R324.11.8.1.3 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural posts and similar penetrations shall be sealed.

R324.8.7 Concrete floors. The concrete floor shall be cast directly upon the *soil gas retarder* or upon the sheet foam board insulation where it is installed on top of the *soil gas retarder*.

R324.8.8 Penetrations. Penetrations through the concrete slab and *soil gas retarder* shall be sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.8.9 Block-outs. Where openings are cast or constructed in the concrete slab under plumbing fixtures, the openings shall be filled with expanding foam or a non-shrink grout or an approved equivalent method. Exposed openings shall be sealed with non-shrink grout or an approved equivalent method.

R324.8.10 Seal sides of the soil gas collection plenum. The intersection of floors and foundation walls shall be sealed with a caulk complying with ASTM C920 class 25 or higher or an approved equivalent method. Sealing shall be performed in accordance with Section R324.8.10.1, R324.8.10.2 or R324.8.10.3.

R324.8.10.1 Seal floor to wall. The intersection of floors and foundation walls shall be sealed.

R324.8.10.2 Seal soil gas retarder to footing or wall. Where foundation walls are solid concrete, the *soil gas retarder* shall be sealed to the footing or to the foundation wall.

R324.8.10.3 Seal soil gas retarder to wall. Where foundation walls are masonry block, the *soil gas retarder* shall be sealed to the foundation wall.

R324.9 General sealing of soil gas collection plenums. Sealing of potential *soil gas* pathways shall be in accordance with Sections R324.9.1 through R324.9.6.

R324.9.1 Sumps in floors. Sumps in interior floors shall have a rigid lid and the lid shall be sealed with a gasket or silicone caulk and mechanically fastened in a manner to facilitate removal for maintenance. Pipe and wiring penetrations through the lid shall be sealed. The intersection of the floor and sump basin shall be sealed with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.9.2 Hollow masonry unit walls. The top course of hollow block masonry walls shall be made of solid masonry units or the top course shall be fully grouted. The top course under the full width of door and window openings shall be made of solid masonry units or the hollow masonry units shall be fully grouted. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be made of solid masonry units or the top course shall be fully grouted**.** Other penetrations through foundation walls shall be sealed**.**

R324.9.3 Floor drains. Floor drains and condensate drains shall not allow *soil gas* entry.

R324.9.4 Air ducts. Air ducts located below concrete slabs shall be sealed to prevent *radon* entry and constructed in accordance with Chapter 16.

R324.9.5 Foundation drains. Gravity foundation drainage systems shall include a *check valve* or other mechanical means to isolate the *soil gas collection plenum* from any exterior drain piping. Access shall be provided for maintenance.

R324.9.6 Access openings. Access openings in the floor provided for drain maintenance shall not allow *soil gas* entry.

R324.10 Mitigation system piping. The *mitigation system* piping that extends from the *soil gas* plenum to the point of discharge shall be rigid, non-perforated pipe in accordance with Sections R324.11 through R324.19.

R324.11 Pipe size. *Mitigation system* pipe shall be not less than 3 inch [76 mm] nominal inside diameter.

R324.12 ABS piping. ABS pipe shall comply with ASTM D2661, F628 or F1488. The pipe wall thickness shall be Schedule 40.

R324.13 PVC piping. PVC pipe shall comply with ASTM D2665, F891, or F1488. The pipe wall thickness shall be Schedule 40.

> **Exception:** Rigid, non-perforated PVC pipe meeting ASTM D2949 shall be an alternative to the material specified herein, where installed vertically within enclosed wall cavities.

R324.14 Slope. Above ground piping shall have a slope of not less than 1/8 inch [3.2 mm] per foot [305 mm]. Piping shall slope downwards towards the *suction point*. Piping arrangements that could allow water to collect are prohibited.

R324.15 Joints. Plastic pipe joints shall be solvent welded in accordance with Sections R324.15.1 and R324.15.2. Where disassembly of piping is required such as for removal of a fan, the joints shall be made with flexible couplings complying with ASTM D5926 or ASTM C1173 or an approved equivalent method.

R324.15.1 ABS plastic pipe joints. ABS plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2235.

R324.15.2 PVC plastic pipe joints. The joint surfaces for PVC plastic pipe and fittings to be solvent welded shall be prepared with a primer conforming to ASTM F 656. PVC plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2564.

R324.16 Support. Above ground piping shall be supported by the structure of the building using hangers or strapping designed for piping support. Supports for horizontal piping shall be installed at intervals of not more than 4 feet [1219 mm] and supports for vertical piping shall be installed at intervals of not more than 10 feet [3048 mm].

R324.17 Protection against physical damage. Where pipes penetrate top or bottom plates of stud walls and the nearest edge of the hole is within 1 ½ inches [38 mm] of the face of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inches [1.463 mm] (No. 16 gage). Such plates shall cover the area of the pipe where the plate is bored, and shall extend not less than 2 inches [51 mm] above bottom plates and not less than 2 inches [51 mm] below top plates.

R324.18 Insulation required. In spaces where *mitigation system* piping is subject to freezing temperatures and in spaces where the exterior of *mitigation system* piping is subject to the formation of condensation, such piping shall be provided with insulation having an external vapor barrier and an R-value of not less than 1.8.

R324.19 Labels required (piping). *Mitigation system* piping shall be marked prior to the closing of wall cavities with not less than one label at each floor level and at intervals not more than 10 feet [3048 mm] along the developed length of the piping. The label shall identify that the item is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.20 Mitigation system termination. The discharge point of a *mitigation system* shall be to the outdoors and shall be directed vertically upward.

R324.21 Elevation and vertical walls. The point of discharge of a *mitigation system* shall comply with all of the following:

1. It shall be not less than 1 foot [305 mm] above the roof at the point penetrated.
2. It shall be not less than 10 feet [3048 mm] above grade nearest the point of discharge.
3. It shall be not less than 10 feet [3048 mm] horizontally from a vertical wall that extends above the roof penetrated.

R324.22 Windows and doors. The discharge point of a *mitigation system* shall be not less than 2 feet [610 mm] above or not less than 10 feet [3048 mm] from windows, doors or other gravity intake openings into the structure or an adjacent structure excluding attic ventilation openings. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.23 Equipment air intake. The discharge point of a *mitigation system* shall be not less than 3 feet [914 mm] above or 10 feet [3048 mm] away from mechanical air intake openings such as those for evaporative coolers, make-up air, and heat energy recovery ventilators. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.24 Provision for Active Soil Depressurization (ASD) fan. A space having a vertical height of not less than 48 inches [1219 mm] and a diameter of not less than 21 inches [533 mm] shall be provided in the area where the *ASD fan* will be installed if required. The space provided for the *ASD fan* shall be located according to Section 901.8. The *ASD* pipe shall be centered in this space.

R324.25 Electrical. A receptacle outlet supplied by branch circuit conductors shall be located within 6 feet [1.8 m] of an interior *ASD fan* location

R324.25.1 Label. The over-current device for the branch circuit supplying the *ASD fan* shall be labeled to indicate that it supplies the *radon* fan.

R324.25.2 Disconnect required. Where the fan is not cord and plug connected, a means of electrical disconnect shall be provided for and in sight of the *ASD fan*. The electrical disconnect shall be labeled as to its purpose.

R324.26 Fan access. Limited *access* shall be provided for each *ASD fan* location to allow installation of *ASD fans* and replacement of same. *Access* entry shall be located not more than 20 feet [6096 mm] from the *ASD fan* location.

R324.27 Radon test kit required. A minimum of one long term *radon*-in-air test kit from a *certified* and/or *licensed* laboratory shall be provided for the occupants of each *dwelling* unit.

R324.28 Completion of ASD system. Prior to occupancy, the *ASD* system shall be completed and activated in accordance with Sections R324.30 through R324.41.

> **Exception:** Where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Action Level* (*NAL*) and the *Rough-In* piping is labeled in accordance with Section R324.29.

R324.29 Labels required, system Rough-in. *Mitigation system* piping shall be marked with not less than one label in a conspicuous location. An additional label shall be placed on or within 12 inches [305 mm] of the electrical service panel. The labels shall state the following: **"**This radon system is nonfunctional because the system has NOT been activated with a radon fan. The building should be tested for radon at least every 2 years or as recommended by the state or USEPA." The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color that is in contrast to the color of the background on which the lettering is applied.

R324.30 Fan selection. Fans installed in the *ASD* system shall be recommended by the manufacturer for *radon* mitigation. Such fans shall be designed and sealed by the manufacturer to minimize leakage of water or *soil gas* from the fan housing and shall be sized in accordance with Table R324.33 or as specified by a *certified* or *licensed radon mitigator*.

TABLE R324.30
FAN SIZING

PIPE SIZE Nominal (I.D.)	**TOTAL FOUNDATION AREA**		
	Less Than 1600 sq. feet	**1600 to 2500 sq. feet**	**Greater than 2500 sq. feet**
	Less Than 149 sq. meters	**149 to 232 sq. meters**	**Greater than 232 sq. meters**
(3 inch) [76 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 *cfm* @ 0.5 *in. WC* [85m^3/*hr* @ 125 *Pa*]	Use Radon Fan Type: **RF2** RF2 Minimum rating:[a] 75 *cfm* @ 1.0 *in. WC* [127m^3/*hr* @ 250 *Pa*]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*
(4 inch) [102 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 *cfm* @ 0.5 *in. WC* [85m^3/*hr* @ 125 *Pa*]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 *cfm* @ 0.5 *in. WC* [85m^3/*hr* @ 125 *Pa*]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*

a. Radon Fan Types RF1 & RF2 minimum flow and pressure ratings are manufacturer specifications.

R324.31 Orientation. *ASD* inline fans shall be installed only on vertical *ASD* piping.

R324.32 Installation. *ASD fans* shall be installed in accordance with the manufacturer's instructions.

R324.33 Flexible connectors required. *ASD fans* shall be connected to the *ASD* piping using flexible unshielded couplings complying with ASTM D5926 or ASTM C1173 or an equivalent method. Connections shall be air and water-tight.

R324.34 Fan start-up. *ASD fans* shall be electrically energized upon installation on the *ASD* system piping.

R324.35 Fan location. *ASD fans* shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. *ASD fans* shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in a basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. *ASD fans* shall not be mounted in a location where pipe that is positively pressurized by the fan is located inside of conditioned or occupiable space.

R324.36 System monitor required. Each *ASD* system shall be provided with a system negative pressure monitor, such as, but not limited to, manometer type pressure gauges, to indicate system operation. The system monitor shall be located indoors in an area where the monitor is readily observable by the occupants.

R324.37 Startup marking. *ASD* system monitors shall be clearly marked to indicate the pressure that existed when the system was initially activated. The monitor device shall have a durable label on or in close proximity to it that describes how to interpret the monitor and what to do if the monitor indicates that system performance has degraded.

R324.38 Automatic reset. Pressure activated electrical *ASD* system monitors, whether visual or audible, shall be supplied by un-switched electrical branch circuits and shall be designed to reset automatically when power is restored after power supply failure. Battery operated monitoring devices shall not be used except where they are equipped with a low power warning feature.

R324.39 Labels required (system and sump). System description labels made of durable material shall be placed on or within 12 inches [30 cm] of the electric service panel and also on the *ASD* system or other prominent location. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied. The label shall state the following: "Radon Reduction System;" the installer's name, phone number, and applicable certification identification; date of installation, an advisory stating that the building should be tested for *radon* at least every 2 years or as required or recommended by state or federal agencies. and shall include notice of additional *radon* resources at www.epa.gov/radon and the *radon* hotline 1-800-SOS-RADON (767-7236).

R324.39.1 Label sump basins. Sump basin covers shall be identified with a durable label that reads as follows: "Component of a Radon Reduction System. Do not tamper with or disconnect." or approved equivalent wording. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.40 Documentation package. The occupants of the *dwelling* shall be provided with a documentation package that includes the following:

1. A description of system operation, such as shown in Exhibit 1 "Understanding a Radon Reduction System".
2. All *radon* test data for the property.
3. The annual energy consumption of the installed *ASD fan*(s), whether estimated or actual, and the projected monetary cost of such energy.

R324.41 Radon testing prior to occupancy. A *radon* test shall be performed prior to occupancy and shall be performed by a *certified* or *licensed* measurement professional. Testing shall be performed in accordance with applicable state protocols or requirements; or if there are no state protocols or requirements, with accepted Federal protocols or "Protocols for Radon Measurements in Homes", AARST Consortium on National Radon Standards. Where testing results are greater than the *NAL*, a *certified* and/or *licensed mitigator* shall be required to perform *diagnostic tests* and remediation action. Further *radon* testing shall be required until *radon* concentrations below the *NAL* are achieved.

R324.42 EPA established zones. The *radon* potential of a building site shall be estimated from Figure R324.42 or from Table R324.42. Where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure R324.42 and Table R324.42.

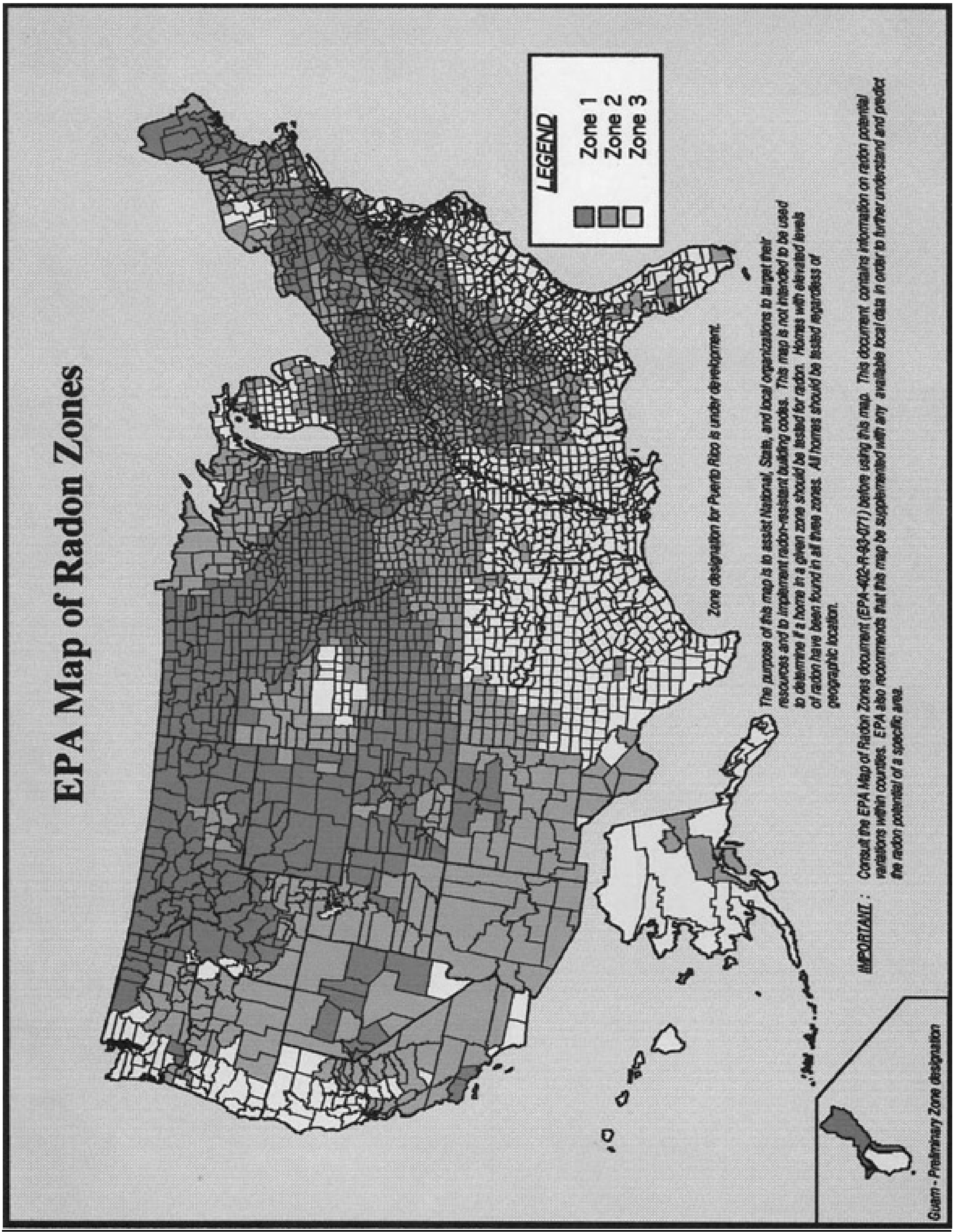


FIGURE R324.42
RADON POTENTIAL ZONES MAP
TABLE R324.42 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage
Municipality
Dillingham
Census Area
Fairbanks
North Star
Borough
Kenai
Peninsula
Borough
Matanuska-
Susitna
Borough
Southeast
Fairbanks
Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independenc
e
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa
Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra
Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San
Bernardino
San
Francisco
San Luis
Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London
Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None----
-

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary

Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattami
e
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington

Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry

Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorenc
y
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault
Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow
Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the
Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape
Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste
Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and
Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder
River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden
Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon

Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York

Zone 2

Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1

Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2

Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1

Carroll

Zone 2

Belknap
Cheshire
Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1

Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2

Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1

Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2

Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union
Valencia

New York

Zone 1

Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2

Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1

Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga

Zone 2

Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1

Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden
Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1

Adams
Allen
Ashland
Auglaize

Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2
Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry

Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe

Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince
Edward
Prince
William
Rappahanno
ck
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield

Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealea
u
Vilas
Washburn
Waushara
Winnebago

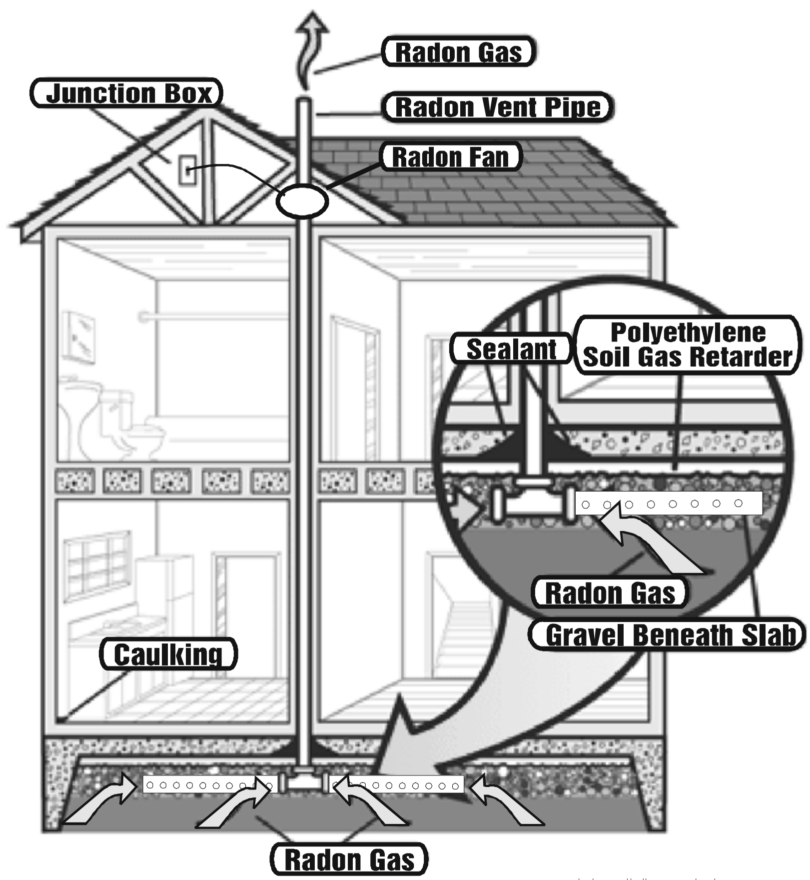
Wyoming

Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

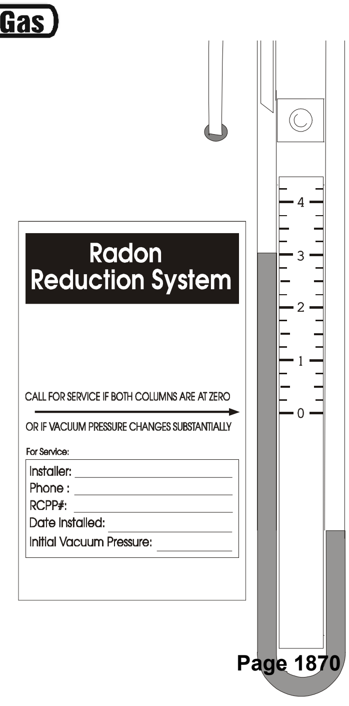
R324.46
Exhibit 1 - Understanding a Radon Reduction System (Occupants)

General: *Radon* is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock and water and gets into the air you breathe. The *radon* potential of any specific building lot is dependent on whether there is sufficient *radon* source material in the ground below the home and sufficient upward air movement for the *radon* to be near your home's foundation. *Radon* typically moves up through the ground to the air above and into your home through gaps and other holes in the foundation. The primary health concern associated with *radon* is lung cancer. The Environmental Protection Agency (EPA) estimates that 21,000 people die in the US each year from *radon*-induced lung cancer.



Radon Reduction System: Your new home was constructed with an *Active Subslab Depressurization* (*ASD*) System to protect your family's health. The *ASD* system is designed to limit *radon* entry into your home by keeping the soil under your home at a lower pressure than the air in your home. In doing so, *radon* and other *soil gases* from below your home are exhausted above your roof through a specially designed *radon* fan. An *ASD* system is recognized by the EPA as the Best Available Technology for *radon* control because it keeps much of the *radon* from entering your home. The system is designed to run 24 hours a day, 7 days a week. The electrical power required to run the fan, which is the only active component in the system, will typically cost 5 to 25 cents per day depending upon the type of fan and your electrical utility rates. Cost to operate this fan would be less than operating a normal light bulb.

System Maintenance: Your *ASD* System is designed to provide many years of service under normal conditions without significant maintenance. As the occupant of this home, you need to routinely check the system pressure gauge or other system monitor to verify that the fan is operating correctly. There are various labeled components of your *radon* system such as pipe, crawlspace membrane, fan, system pressure monitor and sump basin. DO NOT ALTER OR DISCONNECT any of these components. If the sump basin is opened for required maintenance or repair, restore to the original condition immediately after completing work. You also need to be aware that foundation settling, renovations or additions to your home can change your indoor *radon* concentrations. A *certified/licensed radon mitigator* can provide guidance when changes are to be made to the *dwelling* or provide a routine check-up on the operation of the system.



Understanding the System Pressure Gauge: The pressure gauge shown on the right is typical of a gauge used to monitor the pressure developed in the piping system by the *radon* fan. Your fan pressure should be checked regularly to ensure the fan system continues to operate properly. This gauge measures pressure in Inches Water Column (*in. WC*). This gauge does NOT measure *radon*.

Call for service if the measure changes substantially (20% or more) or if the gauge reads zero pressure (both columns equal).

Your *ASD* system may have an audible alarm to alert you to call for service in the event of a problem.

Radon Testing: Your builder left behind a long term test kit for you to use to test your home after you move in. The way you and your family live in your new home, how you set heating and cooling controls or use your clothes dryer and other exhaust fans can affect indoor *radon* levels. It is recommended that you test for a minimum of 3 months or preferably longer to determine your actual *radon* exposure in the home. Be sure to check the warranty your builder provides to make certain you complete your testing before the end of the new home warranty period.
Follow the instructions provided by the test laboratory to open, activate and place the test kit to test your *radon* levels.

The USEPA recommends that you retest your home at least every 2 years or if major renovations or additions are made to the *dwelling*.

Other sources of radon: *Radon* can also be found in the water from private wells. Testing can determine if your well contains significant amounts of *radon*.

More Info: For more information on *radon*, *radon* testing or *radon* removal: **www.epa.gov/radon**

NOTE: Exhibit 1 may be reprinted without license.

Add definitions as follows:

R202
DEFINITIONS

ACCESS (limited). For the purposes of Section R324, the point of entry to fan location that allows service personnel to reach an *ASD fan* or intended fan location for the purpose of installing or replacing an *ASD fan*. Such access does not require walkways, service platforms, level working spaces, receptacle and lighting outlets or clear and unobstructed passageways with continuous solid flooring such as are typically required for appliances that require periodic maintenance, servicing and inspection.

ACTIVE SOIL DEPRESSURIZATION (ASD). A family of *radon mitigation systems* involving fan-powered soil depressurization, including but not limited to *sub-slab depressurization* and *sub-membrane depressurization*.

ASD FAN. A particular type of fan that is designed and rated by the manufacturer for continuous duty and for use in an *ASD* system.

CERTIFIED. For the purposes of Section R324, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals are those of the National Radon Proficiency Program (NRPP) and the National Radon Safety Board (NRSB). Also see LICENSED.

CHECK VALVE. A mechanical device that will allow water to flow in one direction while preventing airflow in the opposite direction.

DEPRESSURIZATION. A negative pressure induced in one area relative to another.

DIAGNOSTIC TESTS. For the purposes of Section R324, procedures, including Communication Tests and other tests, used to identify or characterize conditions under, beside and within buildings that could contribute to *radon* entry or elevated *radon* levels or that could provide information regarding the performance of a *radon mitigation system*.

GEOTEXTILE MATTING. A product suitable for soil contact, that provides a void space laterally through the material to allow air movement. The void space is created through a matrix of woven mesh, "egg crate" support of a fabric enclosure or similar means. Also referred to as "Vent Strip".

LICENSED. For the purposes of Section R324, a designation applied to individuals and/or companies that are qualified and specifically authorized as *radon* laboratories, measurement and/or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

MITIGATOR. For the purposes of Section R324, a *certified/licensed* individual who designs, installs or directly supervises the installation of the *radon ASD mitigation systems*.

MITIGATION SYSTEM. For the purposes of Section R324, any system or steps designed to reduce *radon* concentrations in the indoor air of a building.

NATIONAL RADON ACTION LEVEL (NRAL). The indoor *radon* concentration at which mitigation is recommended. The *NAL* is defined as the US Environmental Protection Agency's Action Level of 4 *pCi/L* [148 Bq/m^3].

PIPE LOOP. A continuous length of perforated pipe extending around the inside perimeter of the foundation.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

ROUGH-IN. For the purposes of Section R324, the installation of all parts and materials of an *ASD* system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials are gas permeable layers, *soil gas retarders*, plenums, membranes, piping, *suction points*, discharge points and wiring.

SOIL GAS. The gas mixture present in soil, which could contain *radon* and water vapor.

SOIL GAS COLLECTION PLENUM. A constructed enclosure for collecting *radon* and other *soil gases* from under a foundation.

SOIL GAS COLLECTOR. A gas permeable conduit constructed of *gravel*, perforated pipe or *geotextile matting* for collecting *radon* and other *soil gases* from within a *soil gas collection plenum* and connecting the plenum to the *ASD* pipe system.

SOIL GAS RETARDER. A continuous membrane or other comparable material laid over a *soil gas* plenum or earthen floor area that is used to retard the flow of *soil gases* into a building.

SUB-MEMBRANE DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure in the space under a *soil gas retarder* membrane than above it by use of an *ASD fan* drawing air from beneath the membrane.

SUB-SLAB DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure under a floor slab than above it. An *ASD fan* is installed in the *radon* system piping that draws air from below the floor slab.

SUCTION POINT. For the purposes of Section R324, the location where the *soil gas collector* is connected to the *ASD* system piping.

Add standards to Chapter 44 as follows:

ASTM

D5926-11 "Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems "

E1745-11 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

Reason: 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1 & 2. Application of the methods contained in this proposed code change will ensure all new homes built in radon zones 1 & 2 will be tested to be below the EPA Action Level of 4 pCi/L prior to occupancy.

The code change proposal presented herein was developed as an ANSI consensus standard by the AARST Radon Standards Consortium. This standard, AARST/ANSI #CCAH *"Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses,"* was produced by a committee of (27) representing radon professionals, home inspectors, home builders, architects, code officials, consumer advocates and state and federal government.

There is no requirement in the Residential Code to apply radon reduction methods to new construction and thereby prevent elevated radon concentrations in newly built homes. Appendix F of the IRC (Radon Control Methods) is inadequate, 20 years old and not a mandatory part of the building code unless voluntarily adopted by a local jurisdiction.

This proposal adds requirements to homes in the high risk radon counties. Like snow and wind load, seismic and flood-resistance provisions, this proposal targets requirements to the areas with the greatest likelihood of exposure. The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code that address this important life/safety issue.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9
NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

Cost Impact: This change proposal will slightly increase the cost of construction. Most homes can be built with only a mitigation system rough-in. If the home tests high for elevated radon then the system can be upgraded with a fan to reduce the indoor radon levels.

Cost of mitigation system rough-in (passive) =$296*

Cost of fan driven mitigation system = $707* (total cost, not in addition to $296)

Source: Annual Builder Practices Report 2011, NAHB Research Center, Inc.

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

Analysis: A review of the standards proposed for inclusion in the code, [ASTM D5926-11 and ASTM E1745-11] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R324 (NEW)-RB-KAPTUROWSKI

Committee Action Hearing Results

For staff analysis of the content of ASTM D5926 and ASTM E1745 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that information related to radon gas should remain in the appendix, and because what may sometimes be needed should not always be required. This can be done independently at the local level. There are other ways to mitigate radon. An educational brochure seems to be included in the proposal, which is not appropriate for the code. It is not clear why a certified third party is required. The proposal requires a performance standard on top of prescriptive requirements with no guarantee that the performance requirements will be met. This committee and building and building code professionals are not industrial hygienists and should not be expected to enforce health related requirements.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

David Kapturowski, Spruce Environmental Technologies, Inc, representing American Association of Radon Scientists and Technologists (AARST), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION R324
RADON REDUCTION

R324.1 General. This Section applies to *radon* control methods for buildings and structures within EPA *radon* zones 1 & 2, as defined in Section R324.42. *Rough-Ins* or complete *Active Soil Depressurization (ASD)* systems shall be installed as necessary to reduce soil gas entry and vapor intrusion so as to establish indoor *radon* levels below the *National Radon Action Level (NRAL*).

R324.2 Mitigation system required. A *mitigation system Rough-In* shall be installed in dwellings located in *radon* potential zones 1 and 2 in accordance with Section R324.5. The *radon* potential zones shall be determined in accordance with Section R324.42.

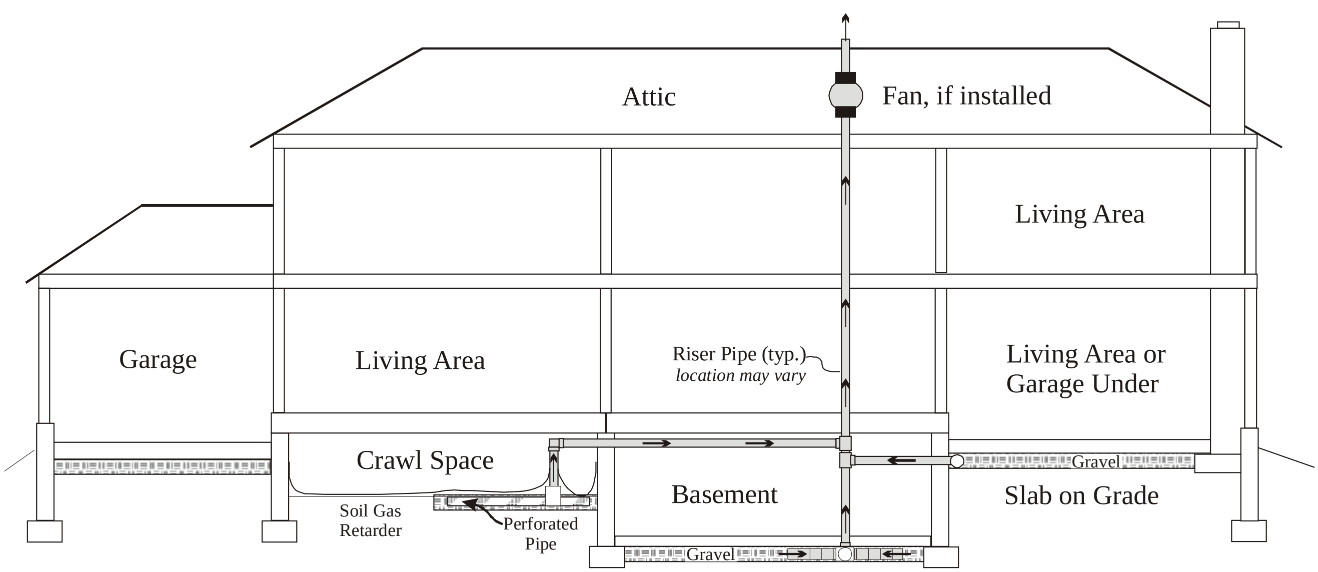
> **Exception:** Where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*).

R324.3 Design. The design of *radon mitigation systems* shall comply with Section R324 and for buildings having a total foundation area of greater than 2500 square feet [232 sq. m], shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems. Designs of *radon mitigation systems* for foundation types other than those specified herein shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems.

R324.4 Foundation area. The foundation area shall be calculated from the inside perimeter dimensions of the foundation walls.

R324.5 Mitigation system rough-in required. The *Rough-In* installation of a *mitigation system* shall be required for all foundations and combination foundations types, including crawl space, basement, slab-on-grade and slab-on-grade garage located below a living area. The installation shall be in accordance with Sections R324.6 through R324.28. Figure R324.5 illustrates the four foundation types.

FIGURE R324.5
FOUNDATION TYPES



R324.6 Soil gas collection plenums. Foundation areas shall be constructed so as to create sealed *soil gas collection plenums* in accordance with Sections R324.7 through R324.9.6.

R324.7 Submembrane soil gas collection plenums in crawl spaces with earthen floors. For each *suction point*, a *soil gas collector* shall be installed in accordance with Sections R324.7.1 through R324.7.7 and Section R324.9.

R324.7.1 Soil gas collector. One *soil gas collector* for each *suction point* (R324.7.2) shall be installed in accordance with Section R324.7.1.1, R324.7.1.2 or R324.7.1.3.

R324.7.1.1 Pipe soil gas collector. The *soil gas collector* shall consist of a perforated pipe with a nominal diameter of not less than 4 inches [102 mm]. The pipe shall be not less than 10 feet [3048 mm] in length. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1.1 such that the pipe is completely surrounded by not less than 4 inches [102 mm] of aggregate.

R324.7.1.1.2 Geotextile soil gas collector. The *soil gas collector* shall consist of a strip of geotextile drain matting not less than 10 feet [3048 mm] in length and having a cross sectional area of not less than 12 square inches [7742 sq. mm]. The strip of matting shall be placed on top of the soil or in a trench.

R324.7.1.1.3 Gravel soil gas collector. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.7.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. *Suction points* shall be installed in accordance with Section R324.7.2.1, R324.7.2.2 or R324.7.2.3, as applicable for the type of plenum installed.

R324.7.2.1 Suction point for pipe soil gas collector. The *suction point* for a pipe *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The perforated pipe plenum shall be inserted into both of the horizontal openings of the pipe fitting or device. One opening of the fitting or device shall be oriented in a vertical “up” position. Alternatively, the sub-membrane area and the other foundation types shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.1.3 and served by one or more *suction points*.

R324.7.2.2 Suction point for geotextile soil gas collector. The *suction point* for a geotextile *soil gas collector* shall consist of a pipe fitting or other device having not less three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be connected to the matting in a manner that facilitates airflow from the collector. One opening of the fitting or device shall be oriented in a vertical “up” position.

R324.7.2.3 Suction point for gravel soil gas collector. The *suction point* for a gravel *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be provided with not less than 5 feet [1524 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Such perforated pipe shall provide not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe.

R324.7.3 Suction points not permitted. *Suction points* shall not be permitted on sump lids

R324.7.4 Fasten suction points. *Suction point* fittings and devices shall be fixed in place to prevent dislocation.

R324.7.5 Seal top of the soil gas collection plenum. A *soil gas retarder* shall cover the top of the *soil gas collection plenum* and all exposed soil. The installation of the *soil gas retarder* shall be in accordance with Sections R324.7.5.1 through R324.7.5.4.

R324.7.5.1 Sheeting. The *soil gas retarder* membrane shall comply with ASTM E1745 Class A, B or C.

R324.7.5.2 Seams. The seams between adjacent membrane sheets shall be overlapped not less than 12 inches [305 mm] and shall be sealed by one of the following methods:

1. A tape recommended by the membrane manufacturer.
2. Caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.3 Repairs. Tears or punctures in the membrane shall be sealed by one or more of the following methods:

1. A tape recommended by the membrane manufacturer.
2. An additional sheet of the membrane material that covers and overlaps the tear or puncture not less than 12 inches [305 mm] on all sides and that is sealed with a caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.4 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural supports or similar penetrations shall be sealed.

R324.7.6 Seal sides of the soil gas collection plenum. The *soil gas retarder* membrane shall turn up onto foundation walls not less than 6 inches [152 mm] and shall be continuously sealed to the wall along the full perimeter with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.7.7 Label required (membranes). *Soil gas retarder* membranes shall be marked in a conspicuous place with a label to identify that the membrane is a component of a *radon* reduction system. The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.8.1 Subslab soil gas collection plenums for concrete floors. The floors of basement, concrete crawlspace and slab-on-grade foundation systems shall be provided with a *soil gas collection plenum* installed in accordance with Sections R324.8.1.1 through R324.9.6.

R324.8.1.1 Soil gas collector. A *soil gas collector* shall be installed in accordance with Section R324.8.1.1.1, R324.8.1.1.2 or R324.8.1.1.3.

R324.8.1.1.1 Gravel. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.8.1.1.2 Geotextile. A layer of geotextile drainage matting shall be placed over a uniform layer of either soil or sand. The geotextile drainage matting shall be designed to allow the lateral flow of *soil gases* to the system's *suction point* fitting. The *geotextile matting* shall have a cross-sectional area of not less than 12 square inches [7742 sq. mm] and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the foundation wall to the edge of the drainage matting. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.1.1.3 Pipe loop. A loop of not less than 4 inch [102 mm] diameter perforated pipe shall be placed along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the centerline of the pipe to the foundation walls. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1.1 and surrounding the pipe on at least 2 sides. The cross-sectional area of the aggregate and pipe *soil gas collector* shall be at least 50 square inches [32,258 sq. mm]. The piping shall form a continuous loop and pipe sections shall be joined with a connector device or method recommended by the manufacturer. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. Not less than one *suction point* shall be provided for each foundation type. Alternatively, each *soil gas collector* shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.3 and served by one or more *suction points*. *Suction points* shall be installed in accordance with Sections R324.8.2.1, R324.8.2.2 or R324.8.2.3 as applicable for the type of *soil gas collector* installed.

R324.8.2.1 Gravel layer soil gas collector. A *suction point* for a *gravel* type *soil gas collector* shall consist of a pipe fitting or other device having not less than two openings oriented so as to create multiple horizontal intake openings within the gravel layer. The horizontal openings shall be provided with not less than 5 feet [1534 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Said perforated pipe shall provide a minimum of 1 square inch [645 sq. mm] of open perforation area in each lineal foot of pipe. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.2 Geotextile layer soil gas collector. A *suction point* for a geotextile type *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two oriented so as to create multiple horizontal intake openings connected to the geotextile mat in a manner that maintains airflow capacity from the plenum. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.3 Pipe loop soil gas collector. A *suction point* for a *pipe loop* type collector shall consist of a pipe tee fitting or pipe saddle device installed in the loop piping. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.3 Multiple soil gas collection plenums. Where interior footings divide a *soil gas collector* into two or more areas, each such area shall be provided with the required *suction points* and joined with *mitigation system* piping in accordance with Section R324.10. Alternatively, each area so created by the interior footings shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.1.3 and served by one or more *suction points*.

R324.8.4 Suction points not permitted. *Suction points* shall not be permitted on sump lids.

R324.8.5 Fasten suction points. *Suction point* fittings and piping shall be fastened in place to prevent dislocation during placement of the gas permeable layer, *soil gas retarder* and concrete.

R324.8.6 Seal top of the soil gas plenum. The *soil gas collector* and all exposed soil shall be covered with a *soil gas retarder* that is installed in accordance with Section R324.8.6.1.

R324.8.6.1 Sheeting. Polyethylene sheeting of not less than 6 *mils* [0.152 mm] in thickness, or cross-laminated polyethylene sheeting of not less than 3 *mils* [0.076 mm] in thickness shall be installed on top of the *soil gas collector* and shall completely cover the area under the concrete floor and shall be sealed in accordance with Sections R324.8.6.1.1 through R324.8.6.1.3. Where sheet foam board insulation is installed on top of the *soil gas collector*, the polyethylene sheeting shall be installed below the foam board insulation.

R324.8.6.1.1 Seams. Seams between adjacent polyethylene sheets shall be overlapped not less than 12 inches [305 mm] and sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.8.6.1.2 Repairs. Tears or punctures in the polyethylene sheeting shall be sealed or an additional sheet of polyethylene shall cover the tear or puncture with an overlap of not less than 12 inches [305 mm] on all sides. Such additional sheet shall be sealed and fixed in place to prevent displacement during slab casting.

R324.8.6.1.3 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural posts and similar penetrations shall be sealed.

R324.8.7 Concrete floors. The concrete floor shall be cast directly upon the *soil gas retarder* or upon the sheet foam board insulation where it is installed on top of the *soil gas retarder*.

R324.8.8 Penetrations. Penetrations through the concrete slab and *soil gas retarder* shall be sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.8.9 Block-outs. Where openings are cast or constructed in the concrete slab under plumbing fixtures, the openings shall be filled with expanding foam or a non-shrink grout or an approved equivalent method. Exposed openings shall be sealed with non-shrink grout or an approved equivalent method.

R324.8.10 Seal sides of the soil gas collection plenum. The intersection of floors and foundation walls shall be sealed with a caulk complying with ASTM C920 class 25 or higher or an approved equivalent method. Sealing shall be performed in accordance with Section R324.8.10.1, R324.8.10.2 or R324.8.10.3.

R324.8.10.1 Seal floor to wall. The intersection of floors and foundation walls shall be sealed.

R324.8.10.2 Seal soil gas retarder to footing or wall. Where foundation walls are solid concrete, the *soil gas retarder* shall be sealed to the footing or to the foundation wall.

R324.8.10.3 Seal soil gas retarder to wall. Where foundation walls are masonry block, the *soil gas retarder* shall be sealed to the foundation wall.

R324.9 General sealing of soil gas collection plenums. Sealing of potential *soil gas* pathways shall be in accordance with Sections R324.9.1 through R324.9.6.

R324.9.1 Sumps in floors. Sumps in interior floors shall have a rigid lid and the lid shall be sealed with a gasket or silicone caulk and mechanically fastened in a manner that facilitates removal for maintenance. Pipe and wiring penetrations through the lid shall be sealed. The intersection of the floor and sump basin shall be sealed with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.9.2 Hollow masonry unit walls. The top course of hollow block masonry walls shall be made of solid masonry units or shall be fully grouted. The top course under the full width of door and window openings shall be made of solid masonry units or the hollow masonry units shall be fully grouted. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be made of solid masonry units or the top course shall be fully grouted**.** Other penetrations through foundation walls shall be sealed**.**

R324.9.3 Floor drains. Floor drains and condensate drains shall not allow *soil gas* entry.

R324.9.4 Air ducts. Air ducts located below concrete slabs shall be sealed to prevent *radon* entry and constructed in accordance with Chapter 16.

R324.9.5 Foundation drains. Gravity foundation drainage systems shall include a *check valve* or other mechanical means to isolate the *soil gas collection plenum* from any exterior drain piping. Access shall be provided for maintenance.

R324.9.6 Access openings. Access openings in the floor provided for drain maintenance shall not allow *soil gas* entry.

R324.10 Mitigation system piping. The *mitigation system* piping that extends from the *soil gas* plenum to the point of discharge shall be rigid, non-perforated pipe in accordance with Sections R324.11 through R324.19.

R324.11 Pipe size. *Mitigation system* pipe shall be not less than 3 inch [76 mm] nominal inside diameter.

R324.12 ABS piping. ABS pipe shall comply with ASTM D2661, F628 or F1488. The pipe wall thickness shall be Schedule 40.

R324.13 PVC piping. PVC pipe shall comply with ASTM D2665, F891, or F1488. The pipe wall thickness shall be Schedule 40.

Exception: Rigid, non-perforated PVC pipe complying with ASTM D2949 shall be an alternative to the material specified herein, where installed vertically within enclosed wall cavities.

R324.14 Slope. Above ground piping shall have a slope of not less than 1/8 inch [3.2 mm] per foot [305 mm]. Piping shall slope downwards towards the *suction point*. Piping arrangements that allow water to collect shall be prohibited.

R324.15 Joints. Plastic pipe joints shall be solvent welded in accordance with Sections R324.15.1 and R324.15.2. Where disassembly of piping is required such as for removal of a fan, the joints shall be made with flexible couplings complying with ASTM D5926 or ASTM C1173 or an approved equivalent method.

R324.15.1 ABS plastic pipe joints. ABS plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2235.

R324.15.2 PVC plastic pipe joints. The joint surfaces for PVC plastic pipe and fittings to be solvent welded shall be prepared with a primer conforming to ASTM F 656. PVC plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2564.

R324.16 Support. Above ground piping shall be supported by the structure of the building using hangers or strapping designed for piping support. Supports for horizontal piping shall be installed at intervals not exceeding 4 feet [1219 mm] and supports for vertical piping shall be installed at intervals not exceeding 10 feet [3048 mm].

R324.17 Protection against physical damage. Where pipes penetrate top or bottom plates of stud walls and the nearest edge of the hole is within 1 ½ inches [38 mm] of the face of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inches [1.463 mm] (No. 16 gage). Such plates shall cover the area of the pipe where the plate is bored, and shall extend not less than 2 inches [51 mm] above bottom plates and not less than 2 inches [51 mm] below top plates.

R324.18 Insulation required. In spaces where *mitigation system* piping is subject to freezing temperatures and in spaces where the exterior of *mitigation system* piping is subject to the formation of condensation, such piping shall be provided with insulation having an external vapor barrier and an R-value of not less than 1.8.

R324.19 Piping labels required. *Mitigation system* piping shall be marked prior to the closing of wall cavities with not less than one label at each floor level and at intervals not greater than 10 feet [3048 mm] along the developed length of the piping. The label shall identify that the item is a component of a *radon* reduction system. The label lettering height shall be not less than 1/4 inch [6.35 mm] and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.20 Mitigation system termination. The discharge point of a *mitigation system* shall be to the outdoors and shall be directed vertically upward.

R324.21 Elevation and vertical walls. The point of discharge of a *mitigation system* shall comply with all of the following:

1. It shall be not less than 1 foot [305 mm] above the roof at the point penetrated.
2. It shall be not less than 10 feet [3048 mm] above grade nearest the point of discharge.
3. It shall be not less than 10 feet [3048 mm] horizontally from a vertical wall that extends above the roof penetrated.

R324.22 Windows and doors. The discharge point of a *mitigation system* shall be not less than 2 feet [610 mm] above or not less than 10 feet [3048 mm] from windows, doors or other gravity intake openings into the structure or an adjacent structure excluding attic ventilation openings. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.23 Equipment air intake. The discharge point of a *mitigation system* shall be not less than 3 feet [914 mm] above or 10 feet [3048 mm] away from mechanical air intake openings such as those for evaporative coolers, make-up air, and heat energy recovery ventilators. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.24 Provision for Active Soil Depressurization (ASD) fan. A space having a vertical height of not less than 48 inches [1219 mm] and a diameter of not less than 21 inches [533 mm] shall be provided in the area where a required *ASD fan* is installed. The space provided for the *ASD fan* shall be located in accordance with Section R324.35. The *ASD* pipe shall be centered in this space.

R324.25 Electrical. A receptacle outlet supplied by branch circuit conductors shall be located within 6 feet [1.8 m] of an interior *ASD fan* location

R324.25.1 Label. The over-current device for the branch circuit supplying the *ASD fan* shall be labeled to indicate that it supplies the *radon* fan.

R324.25.2 Disconnect required. Where the fan is not cord and plug connected, a means of electrical disconnect shall be provided for and in sight of the *ASD fan*. The electrical disconnect shall be labeled to indicate its purpose.

R324.26 Fan access. Limited *access* shall be provided for each *ASD fan* location to allow installation and replacement of *the fan*. *Access* entry shall be located not greater than 20 feet [6096 mm] from the *ASD fan* location.

R324.27 Radon test kit required. A minimum of one long term *radon*-in-air test kit from a *certified* or *licensed* laboratory shall be provided for the occupants of each dwelling unit.

R324.28 Completion of ASD system. Prior to occupancy, the *ASD* system shall be completed by a *certified* or *licensed radon mitigator* and activated in accordance with Sections R324.30 through R324.40.

> **Exception:** Where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*) and the *Rough-In* piping is labeled in accordance with Section R324.29.

R324.29 Labels required, system *Rough-In*. *Mitigation system* piping shall be marked with not less than one label in a conspicuous location. An additional label shall be placed on or within 12 inches [305 mm] of the electrical service panel. The labels shall state the following: **"**This radon system is nonfunctional because the system has NOT been activated with a radon fan. The building should be tested for radon at least every 2 years or as recommended by the state or USEPA." The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color that is in contrast to the color of the background on which the lettering is applied.

R324.30 Fan selection. Fans installed in the *ASD* system shall be recommended by the manufacturer for *radon* mitigation. Such fans shall be designed and sealed by the manufacturer to minimize leakage of water or *soil gas* from the fan housing and shall be sized in accordance with Table R324.33 or as specified by a *certified* or *licensed radon mitigator*.

TABLE R324.30
FAN SIZING

PIPE SIZE Nominal (I.D.)	**TOTAL FOUNDATION AREA**		
	Less Than 1600 sq. feet	**1600 to 2500 sq. feet**	**Greater than 2500 sq. feet**
	Less Than 149 sq. meters	**149 to 232 sq. meters**	**Greater than 232 sq. meters**
(3 inch) [76 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF2** RF2 Minimum rating:[a] 75 cfm @ 1.0 in. WC [127m^3/hr @ 250 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*
(4 inch) [102 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*

a. Radon Fan Types RF1 & RF2 minimum flow and pressure ratings are manufacturer specifications.

R324.31 Orientation. *ASD* inline fans shall be installed only on vertical *ASD* piping.

R324.32 Installation. *ASD fans* shall be installed in accordance with the manufacturer's instructions.

R324.33 Flexible connectors required. *ASD fans* shall be connected to the *ASD* piping using flexible unshielded couplings complying with ASTM D5926 or ASTM C1173 or an equivalent method. Connections shall be air and water-tight.

R324.34 Fan start-up. *ASD fans* shall be electrically energized upon installation on the *ASD* system piping.

R324.35 Fan location. *ASD fans* shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. *ASD fans* shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in any basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. *ASD fans* shall not be mounted in any location where pipe that is positively pressurized by the fan is located inside of conditioned or occupiable space.

R324.36 System monitor required. Each *ASD* system shall be provided with a system negative pressure monitor such as, but not limited to, a manometer type pressure gauge to indicate system operation. The system monitor shall be located indoors in an area where the monitor is readily observable by the occupants.

R324.37 Startup marking. *ASD* system monitors shall be clearly marked to indicate the pressure that existed when the system was initially activated. The monitor device shall have a durable label on or in close proximity to it that describes how to interpret the monitor and what to do if the monitor indicates that system performance has degraded.

R324.38 Automatic reset. Pressure activated electrical *ASD* system monitors, whether visual or audible, shall be supplied by un-switched electrical branch circuits and shall be designed to reset automatically when power is restored after power supply failure. Battery operated monitoring devices shall not be used except where they are equipped with a low power warning feature.

R324.39 Labels required (system and sump). System description labels made of durable material shall be placed on or within 12 inches [30 cm] of the electric service panel and also on the *ASD* system or other prominent location. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that is in contrast with the color of the background on which the lettering is applied. The label shall state the following: "Radon Reduction System;" the installer's name, phone number, and applicable certification identification; date of installation, an advisory stating that the building should be tested for *radon* at least every 2 years or as required or recommended by state or federal agencies. and shall include notice of additional *radon* resources at www.epa.gov/radon and the *radon* hotline 1-800-SOS-RADON (767-7236).

R324.39.1 Label sump basins. Sump basin covers shall be identified with a durable label that reads as follows: "Component of a Radon Reduction System. Do not tamper with or disconnect." or equivalent wording. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that is in contrast with the color of the background on which the lettering is applied.

R324.40 Documentation package. The occupants of the dwelling shall be provided with a documentation package that includes the following:

1. A description of system operation.
2. All *radon* test data for the property performed by a *licensed or certified* measurement professional.
3. The annual energy consumption of the installed *ASD fan*(s), whether estimated or actual, and the projected monetary cost of such energy.

R324.41 Radon testing prior to occupancy. A *radon* test shall be performed prior to occupancy and shall be performed by a *certified* or *licensed* measurement professional. Testing shall be performed in accordance with applicable state protocols or requirements; or if there are no state protocols or requirements, with accepted Federal protocols or "Protocols for Radon Measurements in Homes", AARST Consortium on National Radon Standards. Where testing results are greater than the *NRAL*, a *certified* and/or *licensed mitigator* shall be required to perform *diagnostic tests* and remediation action. Further *radon* testing shall be required until *radon* concentrations below the *NRAL* are achieved.

R324.42 EPA established zones. The *radon* potential of a building site shall be estimated from Figure R324.42 or from Table R324.42 except that, where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure R324.42 and Table R324.42.

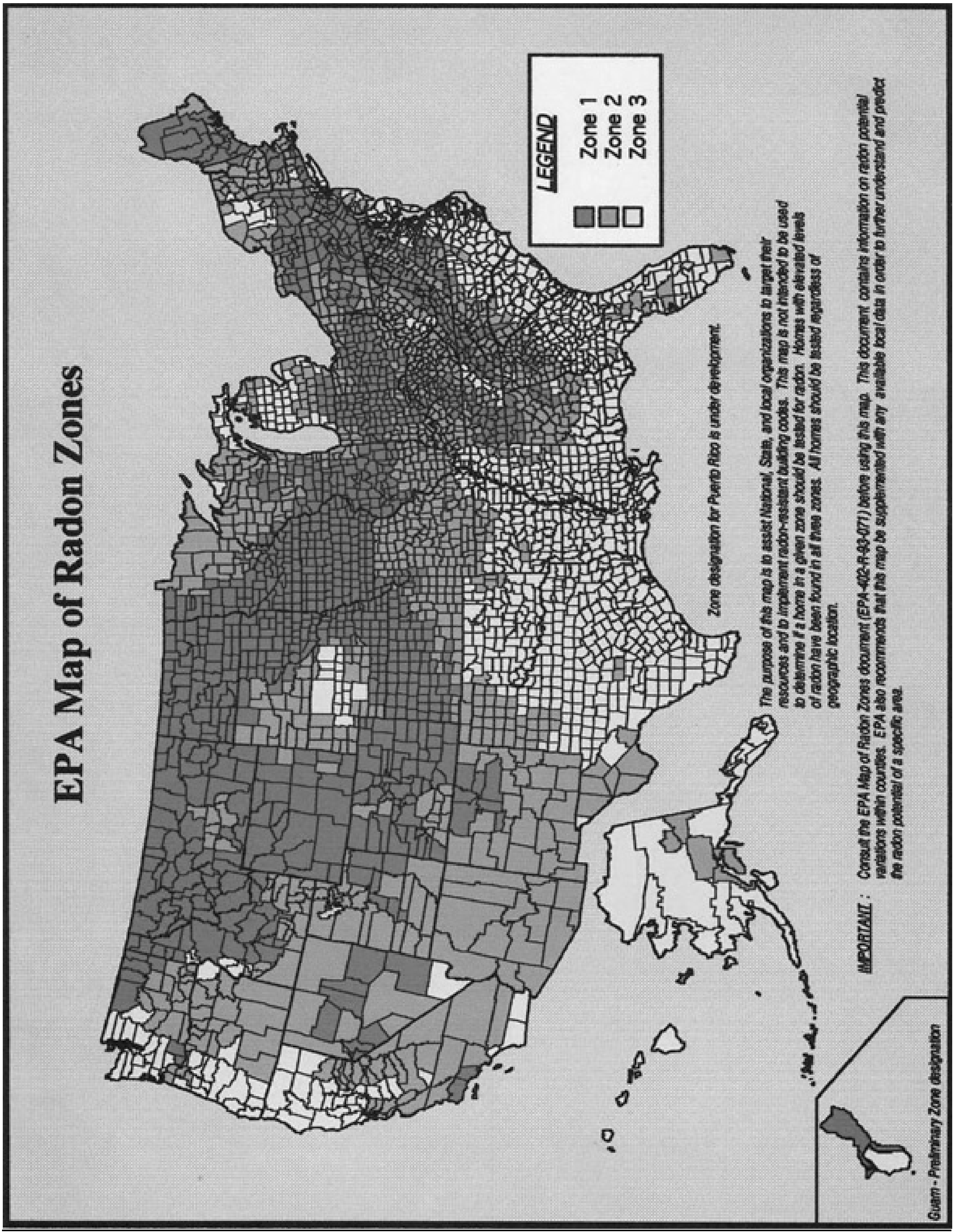


FIGURE R324.42
RADON POTENTIAL ZONES MAP

TABLE R324.42 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage Municipality
Dillingham Census Area
Fairbanks North Star Borough
Kenai Peninsula Borough
Matanuska-Susitna Borough
Southeast Fairbanks Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independence
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San Bernardino
San Francisco
San Luis Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London

Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None-----

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary
Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattamie
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington
Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry
Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorency
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon
Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York

Zone 2
Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2
Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1
Carroll

Zone 2
Belknap
Cheshire

Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1
Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2
Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2
Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union
Valencia

New York

Zone 1
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2
Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga

Zone 2
Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1
Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1
Adams
Allen
Ashland
Auglaize
Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2

Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry
Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe
Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince Edward
Prince William
Rappahannock
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield
Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealeau
Vilas
Washburn
Waushara
Winnebago

Wyoming

Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

Add to Chapter 3 Bibliography

ASTM D5926-11 – "Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems "

ASTM E1745-11 – "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

Add new definitions as follows:

ACCESS (limited). For the purposes of Section R324, the point of entry to a fan location that allows service personnel to reach an *ASD fan* or intended fan location for the purpose of installing or replacing an *ASD fan*. Such access does not require walkways, service platforms, level working spaces, receptacle and lighting outlets or clear and unobstructed passageways with continuous solid flooring such as are typically required for appliances that require periodic maintenance, servicing and inspection.

ACTIVE SOIL DEPRESSURIZATION (ASD). A family of *radon mitigation systems* involving fan-powered soil depressurization, including but not limited to *sub-slab depressurization* and *sub-membrane depressurization*.

ASD FAN. A particular type of fan that is designed and rated by the manufacturer for continuous duty and for use in an *ASD* system.

CERTIFIED. For the purposes of Section R324, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals shall be those of the National Radon Proficiency Program (NRPP) and the National Radon Safety Board (NRSB). Also see LICENSED.

CHECK VALVE. For the purposes of Section R324, a mechanical device that will allow water to flow in one direction while preventing airflow in the opposite direction.

DEPRESSURIZATION. A negative pressure induced in one area relative to another.

DIAGNOSTIC TESTS. For the purposes of Section R324, procedures, including Communication Tests and other tests, used to identify or characterize conditions under, beside and within buildings that could contribute to *radon* entry or elevated *radon* levels or that could provide information regarding the performance of a *radon mitigation system*.

GEOTEXTILE MATTING. A product suitable for soil contact, that provides a void space laterally through the material to allow air movement. The void space is created through a matrix of woven mesh, "egg crate" support of a fabric enclosure or similar means. Also referred to as "Vent Strip".

LICENSED. For the purposes of Section R324, a designation applied to individuals and/or companies that are qualified and specifically authorized as *radon* laboratories, measurement and/or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

MITIGATOR. For the purposes of Section R324, a *certified/licensed* individual who designs, installs or directly supervises the installation of the *radon ASD mitigation systems*.

MITIGATION SYSTEM. For the purposes of Section R324, any system or steps designed to reduce *radon* concentrations in the indoor air of a building.

NATIONAL RADON ACTION LEVEL (NRAL). The indoor *radon* concentration at which mitigation is recommended. The *NRAL* is defined as the US Environmental Protection Agency's Action Level of 4 *pCi/L* [148 Bq/m^3].

PIPE LOOP. For the purposes of Section R324, a continuous length of perforated pipe extending around the inside perimeter of the foundation.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

ROUGH-IN. For the purposes of Section R324, the installation of all parts and materials of an *ASD* system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials are gas permeable layers, *soil gas retarders*, plenums, membranes, piping, *suction points*, discharge points and wiring.

SOIL GAS. The gas mixture present in soil, which could contain *radon* and water vapor.

SOIL GAS COLLECTION PLENUM. A constructed enclosure for collecting *radon* and other *soil gases* from under a foundation.

SOIL GAS COLLECTOR. A gas permeable conduit constructed of *gravel*, perforated pipe or *geotextile matting* for collecting *radon* and other *soil gases* from within a *soil gas collection plenum* and connecting the plenum to the *ASD* pipe system.

SOIL GAS RETARDER. A continuous membrane or other comparable material laid over a *soil gas* plenum or earthen floor area that is used to retard the flow of *soil gases* into a building.

SUB-MEMBRANE DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure in the space under a *soil gas retarder* membrane than above it by use of an *ASD fan* drawing air from beneath the membrane.

SUB-SLAB DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure under a floor slab than above it. An *ASD fan* is installed in the *radon* system piping that draws air from below the floor slab.

SUCTION POINT. For the purposes of Section R324, the location where the *soil gas collector* is connected to the *ASD* system piping.

Commenter's Reason: Exhibit 1 was deleted from the original proposal because the committee felt it was not appropriate for code. The Exception in R324.2 was modified to allow for alternate radon mitigation techniques and provides a performance only path. The Exception in R324.2 also provides the opportunity to not require a system where local conditions determine it is not necessary. In the prescriptive path where a complete Active Soil Depressurization system is installed the builder will not be required to test prior to occupancy.

This proposed section on radon reduction is consistent with the stated goals of the IRC as stated in **R103.1 Intent: "***The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare…………".* The prescriptive requirements of this proposed section and the requirements for certified/licensed radon professionals relieves the building official from a need for detailed knowledge on testing and remediating this Class "A" carcinogen from the built environment and so they need not be an industrial hygienist or an expert on radon.

Radon is a Life/Safety issue which exists in residential construction because of the way homes are constructed and the soil underlying a dwelling's foundation. 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1 and 2. If the radon system is not needed it does not need to be roughed-in or completed.

There is currently no requirement in the Residential Code to apply radon reduction methods to new construction and thereby prevent elevated radon concentrations in newly built homes unless voluntarily adopted by a local jurisdiction. Because of the lack of code requirement we have added 2.5 million new homes with elevated indoor radon to the country's housing inventory in the past 25 years.

The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code that address this important life/safety issue.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9
NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

This change proposal will slightly increase the cost of construction. Most homes can be built with only a mitigation system Rough-In. If the home tests high for elevated radon then the system can be upgraded with a fan to reduce the indoor radon levels.

Cost of mitigation system Rough-In (passive) =$296*

Cost of fan driven mitigation system = $707* (total cost, not in addition to $296)

Source: Annual Builder Practices Report 2011, NAHB Research Center, Inc.

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

Public Comment 2:

Mathew Koch, Southern Radon Reduction, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

SECTION R324
RADON

R324.1 *Radon* Testing. Where a building site indicates a potential for elevated indoor *radon* concentrations, as shown by the United States Environmental Protection Agency Zones 1 and 2 in Figure 324.1 or from the United States Environmental Protection Agency *radon* potential by county listing in Table 324.2, the *building official* shall determine whether to require a *radon* test be performed by a *licensed or certified radon* measurement professional prior to occupancy. Where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure 324.1 and Table 324.2.

Add new definitions as follows:

CERTIFIED. For the purposes of Section R324, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals are those of the National Radon Proficiency Program and the National Radon Safety Board. Also see LICENSED.

LICENSED. For the purposes of Section R324, a designation applied to individuals and/or companies that are qualified and specifically authorized as *radon* laboratories, measurement or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

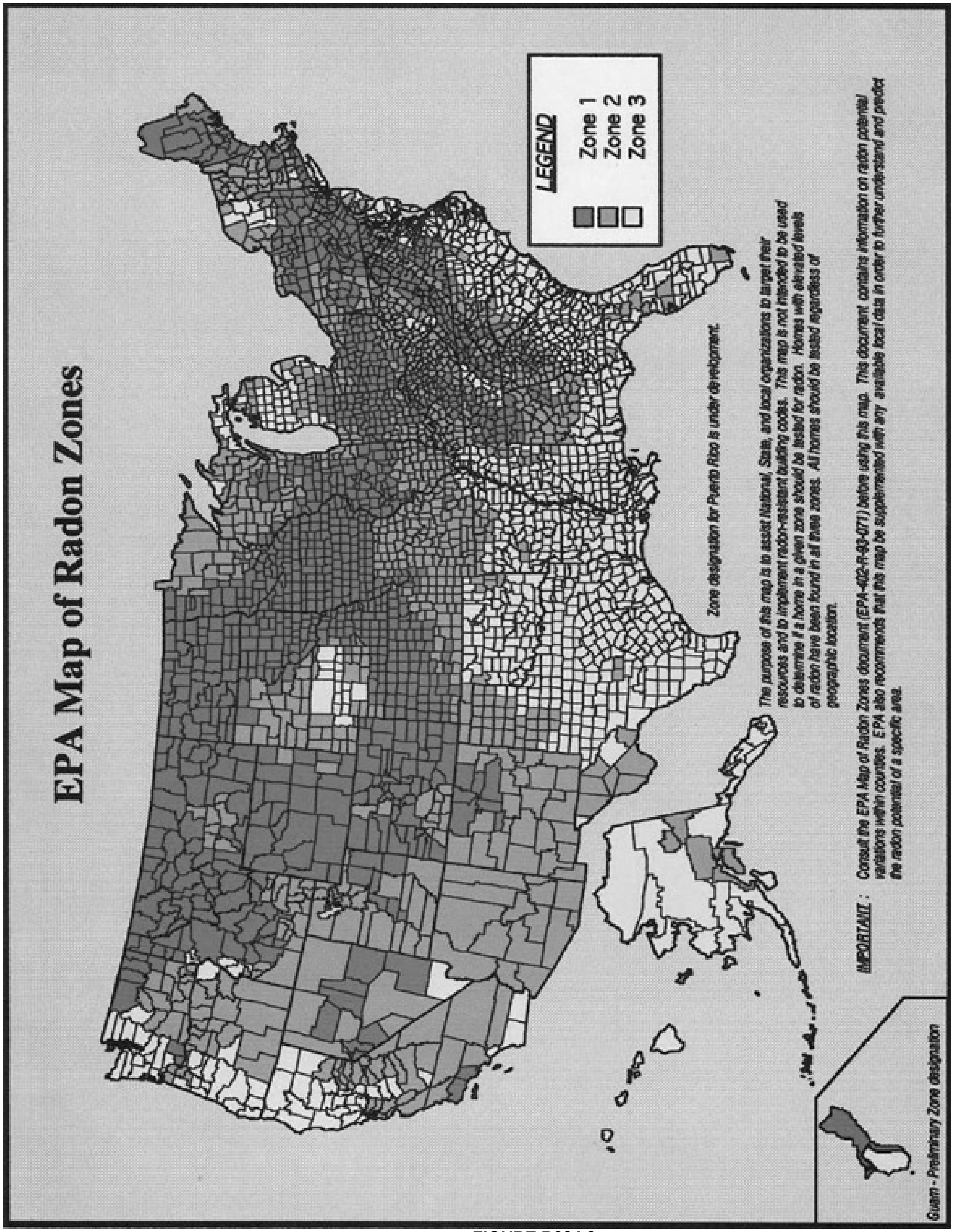


FIGURE R324.2
RADON POTENTIAL ZONES MAP

TABLE R324.2 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage Municipality
Dillingham Census Area
Fairbanks North Star Borough
Kenai Peninsula Borough
Matanuska-Susitna Borough
Southeast Fairbanks Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independence
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San Bernardino
San Francisco
San Luis Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London
Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None-----

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary
Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattamie
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington
Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry
Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorency
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the
Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon
Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York

Zone 2
Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2
Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1
Carroll

Zone 2
Belknap
Cheshire

Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1
Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2
Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2
Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union
Valencia

New York

Zone 1
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2
Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga

Zone 2
Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1
Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1
Adams
Allen
Ashland
Auglaize
Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2

Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry
Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe

Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince Edward
Prince William
Rappahannock
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield
Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealeau
Vilas
Washburn
Waushara
Winnebago

Wyoming

Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

--------*end*-------

Commenter's Reason: The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code to identify homes with excessive levels of this Class "A" carcinogen.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9
NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

Cost Impact: This change proposal will slightly increase the cost of construction by adding a radon test if required by the building official.

Cost of radon test =$125

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

RB201-13

Final Action: AS AM AMPC____ D

RB203-13
R202, R301.2.2.3.1, R324 (New)

Proposed Change as Submitted

Proponent: Maureen Traxler/City of Seattle/Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

SECTION R202
DEFINITIONS

MEZZANINE~~, LOFT~~. An intermediate level or levels between the floor and ceiling of any *story* ~~with an aggregate floor area of not more than one-third of the area of the room or space in which the level or levels are located~~.

Revise as follows:

R301.2.2.3.1 Height limitations. Wood-framed buildings shall be limited to three stories above *grade* plane or the limits given in Table R602.10.3(3). Cold-formed, steel-framed buildings shall be limited to less than or equal to three stories above *grade* plane in accordance with AISI S230. Mezzanines as defined in Section R202 that comply with Section R324 shall not be considered as stories. Structural insulated panel buildings shall be limited to two stories above *grade* plane.

SECTION R324
MEZZANINES

R324.1 General. *Mezzanines* shall comply with Section R324.

R324.2 Mezzanines. The clear height above and below *mezzanine* floor construction shall be not less than 7 feet (2134 mm).

R324.3 Area limitation. The aggregate area of a *mezzanine or mezzanines* shall be not greater than one-third of the floor area of the room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located.

R324.4 Means of egress. The *means of egress* for *mezzanines* shall comply with the applicable provisions of Section R311.

R324.5 Openness. *Mezzanines* shall be open and unobstructed to the room in which they *are* located except for walls not more than 42 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are no more than two *stories* above *grade plane* and equipped throughout with an *automatic sprinkler system* in accordance with NFPA 13R, NFPA 13D or Appendix S, a *mezzanine* having two or more *means of egress* shall not be required to be open to the room in which the *mezzanine* is located.

Reason: The IRC provisions for mezzanines are incomplete. The code provides a definition of “mezzanine, loft” but doesn’t include any other provisions to clarify the allowable size or extent of mezzanines. This proposal copies relevant portions of IBC Section 505.2 into the IRC.

Mezzanines are allowed to be considered not to be stories because they are limited in size and because they are subject to provisions that provide protection from fire hazards. Mezzanines are required to be open to the room in which they are located, which provides early warning to occupants should a fire occur in either the mezzanine or in the room. The IBC provisions also include more specific provisions for determining the portion of the room that can be included in the allowable area of the mezzanine.

There is also reason to limit the size of mezzanines. Section R301.2.2.3.1 states that mezzanines are not considered stories in the context of height limitations for buildings in higher seismic design categories. Mezzanines that are large in relation to the size of the story will act more like a story in response to seismic forces and should be treated as stories.

In addition, we are proposing to delete the word “loft” from the definition of mezzanine. The word is not used anywhere in the code, so it is not necessary to define it.

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

R324 (NEW)-RB-TRAXLER

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify proposal as follows:

R324.5 Openness. *Mezzanines* shall be open and unobstructed to the room in which they *are* located except for walls not more than ~~42~~ 36 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are no more than two *stories* above *grade plane* and equipped throughout with an *automatic sprinkler system* in accordance with ~~NFPA 13R, NFPA 13D or Appendix S~~ Section R313, a *mezzanine* ~~having two or more *means of egress*~~ shall not be required to be open to the room in which the *mezzanine* is located.

(Portions of proposal not shown to remain as originally proposed.)

Committee Reason: The committee approved this code change proposal because they felt that it appropriately removes requirement s that should be in the body of the code from the definitions section of the code. The term “loft” does not add anything. The modification adds clarity.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R324.5 Openness. *Mezzanines* shall be open and unobstructed to the room in which they *are* located except for walls not more than ~~42~~ 36 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are no more than two stories above grade plane and equipped throughout with an automatic sprinkler system in accordance with NFPA 13R, NFPA 13D or Appendix S Section R313, a mezzanine having two or more means of egress shall not be required to be open to the room in which the mezzanine is located.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The committee voted to modify the original proposal. We agree with the original proposal and the modifications made by the committee with the one exception of the allowable wall height. The wall height was modified from 42 inch to 36 inch maximum height by the committee. The current code and original proposal permits up to a 42-inch high wall enclosure to qualify as open for purposes of establishing a mezzanine. The modification from 42 to 36 inch was probably done to correlate with the guard height requirements. The 36-inch is a minimum height for guards. One should not be penalized for installing a guard taller than the minimum...and arguably, safer.

RB203-13

Final Action: AS AM AMPC____ D

RB206-13
R401.5 (New)

<u>Proposed Change as Submitted</u>

Proponent: Jonathan Siu, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov)

Add new text as follows:

<u>**R401.5 Protection of adjoining property.** Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights, roofs and other building elements. Provisions shall be made to control water runoff and erosion during construction or demolition activities.</u>

Reason: Currently, the IRC contains no provisions requiring adjacent property be protected from construction activities. This proposal brings text from IBC Section 3307 (Protection of Adjoining Property) into the IRC, bringing the codes into closer alignment. One difference between this proposal and the IBC text is the addition of "and other building elements" in the second sentence. The WABO TCD Committee feels it is just as important to protect elements such as bay or garden windows with roof-like components from hazards as it is to protect roofs and skylights.

It is to be noted that there is a requirement in the IBC text to notify owners of adjoining buildings at least 10 days prior to the start of excavation. The WABO TCD Committee considers this to be unenforceable language, and therefore has not included it in this proposal. However, if the committee feels led to do so, the following text (verbatim from IBC Section 3307.1) can be added to the proposal as a committee modification, in order to get complete consistency between the codes:

"<u>The person making or causing an excavation to be made shall provide written notice to the *owners* of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.</u>"

Cost Impact: Potential increase in initial cost of construction since this is not currently specifically regulated in the code, but may reduce potential for lawsuits where precautions are not already being taken.

R401.5 (NEW) #1-RB-SIU.doc

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The building department is not involved with encroachment on adjacent property. There are local, state and federal laws that address this issue. This is consistent with the committees action on RB205-13.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

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

Public Comment:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R401.5 Protection of adjoining property. Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights, roofs and other building elements. ~~Provisions shall be made to control water runoff and erosion during construction or demolition activities.~~

Commenter's Reason: This proposal simply aligns the IRC more closely with the IBC. The recent tragedy in Philadelphia demonstrates the need for this type of regulation. The modification is being proposed in response to the comments received at the Committee Action Hearings stating drainage issues are not handled by the Building Official, although it is notable that the identical text appears in the IBC, as stated below. In further response to the published and unpublished comments received at the hearings:

1. The first published reason for the Committee's action is that the building department is not involved with encroachment on adjacent property. However, the proposed text is contained in Section 3307.1 of the 2012 IBC (reproduced below for reference), including the text regarding the control of water runoff and erosion. There were no proposals in Group A to change that section, so the identical text will appear in the 2015 IBC. Therefore, we would contend the building department is already involved in these types of issues.
2. One commenter said this is handled by local ordinances, a statement that is echoed in the published reason for the Committee's disapproval. However, not all jurisdictions pass local ordinances to deal with this type of issue, and some jurisdictions are prohibited from amending the IRC. The I-codes form a family of <u>model</u> codes. As such, this text provides model code language that jurisdictions can adopt to protect neighboring properties. These may be especially helpful to those jurisdictions who are restricted from adopting amendments to the model code. For those jurisdictions who have already adopted local ordinances, this text can serve either to refine their current regulations, or eliminate the need to adopt a separate local ordinance.
3. One commenter said these provisions were "best practice," not minimum code. Similar to the first response above, since similar text appears in the IBC, it does not appear to be a "best-practice," but was considered to be minimum code for other types of buildings, and should be applicable to IRC-scope buildings as well.

2012 IBC Section 3307.1, with text extracted for the original proposal underlined:

3307.1 Protection required. <u>Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities.</u> The person making or causing an excavation to be made shall provide written notice to the *owners* of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.

RB206-13

Final Action: AS AM AMPC____ D

RB207-13
R401.5 (New), R403.1, Chapter 44

Proposed Change as Submitted

Proponent: Jonathan Siu, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov)

Revise as follows:

R401.5 Site work. Site work shall be performed in accordance with Sections R401.5.1 through R401.5.4.

R401.5.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Excavation, fill, or shoring, whether temporary or permanent, shall not extend onto adjacent property. Existing footings or foundations that can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement.

R401.5.2 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the submittal of a geotechnical report acceptable to the *building official*.

R401.5.3 Surcharge. No fill or other surcharge loads shall be placed adjacent to any building or structure, or caused to be imposed on them, unless such building or structure is designed to resist the additional loads caused by the fill or surcharge.

R401.5.4 Soil supporting foundations. Footings and foundations shall be supported on undisturbed natural soils or engineered fill. Fill to be used to support the footings or foundations of any building or structure shall comply with the provisions of a geotechnical report acceptable to the *building official*. The compaction shall be verified by a *registered design professional*.

> **Exception:** Compacted fill material 12 inches (305 mm) in depth or less need not comply with a geotechnical report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557, and the compaction is verified by a *registered design professional*.

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. ~~Footings shall be supported on undisturbed natural soils or engineered fill.~~ Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

Add new standard to Chapter 44 as follows:

ASTM

D 1557-07 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lb/ft3 (2,700 KN m/m3)]

Reason: This proposal adds provisions to the IRC to protect adjacent structures and property from the effects of site work. Currently, there are no regulations in the IRC that would prevent an excavation for a foundation or footing from endangering adjacent buildings or property, nor is guidance given for fill material properties. An extreme example of where this was a problem was the collapse of the Lotus Riverside apartment building in Shanghai in 2009. There, the contractor stockpiled up to 10 meters of soil on one side of the building, while excavating on the other, leading to the building tipping over (see http://www.chinadaily.com.cn/china/2009-07/03/content_8376126.htm). For IRC-type buildings, the failures would not be as dramatic, but can still become a headache for the building official. This proposal is based on text found in IBC Section 3304, which would bring the two codes into closer alignment. Specifically:

R401.5.1 – Requires excavations or fill not endanger (undercut or overhang) adjacent buildings or property. It also clearly states that all site work (temporary or permanent) has to stay within the property lines—a principle that is understood by most people, but not stated anywhere in the I-codes. This does not preclude other approved alternates, such as a temporary easement, from being employed to allow work to extend onto the adjacent property, since those can be approved under Section R104.11. Finally, this section states that any footings or foundations that are undercut by an adjacent excavation must be underpinned or supported by other means. If the affected foundation is on the adjacent property, the shoring or permanent foundation wall being constructed must be designed for the appropriate surcharge to support the adjacent foundation. (See also proposed Section R401.5.3.)

R401.5.2 – Sets some practical limits on permanent cut or fill slopes. A geotechnical report (usually by a geotechnical engineer) can set different parameters, but the text gives the building official the opportunity to review the report to see if the recommendations are based on an appropriate investigation.

R401.5.3 – Requires structures supporting surcharge loads to be designed for those loads. Examples of sources of surcharge loads might be: a steep slope being supported by a retaining wall; vehicular loads from an adjacent right-of-way; foundation/footing loads from adjacent buildings; or fill placed next to an existing structure. All these and other sources can impose additional loads on foundation or retaining walls (or even temporary shoring walls) that must be accounted for in a design.

R401.5.4 – Replaces a general requirement in IRC Section 403.1, and gives more guidance. Requires structures be supported by natural soils or structural fill. Structural fill properties must be determined in a geotechnical report. Since special inspections are not included in the IRC but compaction must be verified, a registered design professional (again, usually a geotechnical engineer) is required to conduct the verification. The exception gives an alternative to the full geotechnical report, allowing field verification of 90% compaction in accordance with the ASTM standard if the compaction is again verified by a registered design professional.

Chapter 44 – The standard has already been adopted into the IBC, so the addition in Chapter 44 just brings it into the IRC in order to provide appropriate guidance for the purposes of the exception.

Cost Impact: The code change proposal will not increase the cost of construction, if site development is being done in accordance with IBC requirements as a matter of course, it may increase the cost of construction if not.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D1557 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R401.5 (NEW) #2-RB-SIU.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM D1557-07 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: This committee feels this is outside the scope of the IRC and should be handled by ordinance at the local jurisdiction.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. ~~Footings shall be supported on undisturbed natural soils or engineered fill.~~ Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

R403.1.7 Soil supporting foundations. Footings and foundations shall be supported on undisturbed natural soils or engineered fill. Where fill is used to support the footings or foundations of a building or structure this fill shall comply with the provisions of a geotechnical report acceptable to the *building official*. The compaction shall be verified by a *registered design professional*.

> **Exception:** Compacted fill material 12 inches (305 mm) in depth or less need not comply with a geotechnical report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557, and the compaction is verified by a *registered design professional*.

(Renumber subsequent subsections.)

Add new standard to Chapter 44 as follows:

ASTM

D 1557-12 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lb/ft3 (2,700 KN m/m3)]

Commenter's Reason: This proposal simply brings the IRC and the IBC into closer alignment on how to adequately support foundations.

Because the original proposal addressed two separate issues in a single proposal, we have divided them in two Public Comments. This Public Comment addresses soil supporting building foundations. A separate Public Comment will address the other site work requirements. It is notable there were no technical objections raised to this part of the proposal by the Committee or other speakers at the Committee Action Hearings.

This public comment only adopts the regulations regarding how foundations are supported. This will replace the more general statement in Section 403.1 with clearer, more specific requirements as to what constitutes acceptable fill materials for foundation support. The proposed text is based on Section 3304.1.4 and 1804.5 of the 2012 IBC, which are reproduced below for reference. No proposals were made to change these sections in the Group A development process, so they should remain as shown in the 2015 IBC.

As a modification to the original proposal which placed the requirements in the more general Section R401.5, this Public Comment places the added text before the other subsections dealing with soils issues (R403.1.7, footings on or adjacent to slopes, and R403.1.8, foundations on expansive soils). While it may seem to be important enough that the requirement should appear as the first subsection under R403.1, it seemed logical to the WABO committee that it should be grouped with the other soils issues.

A second modification has been made to the original proposal, updating the edition of ASTM D 1557 to the 2012 version, as approved by the Administrative Provisions Committee for the IBC in item ADM62-13.

> 2012 IBC Section 3304.1.4 and 1804.5:
>
> **3304.1.4 Fill supporting foundations.** Fill to be used to support the foundations of any building or structure shall comply with Section 1804.5. *Special inspections* of compacted fill shall be in accordance with Section 1704.7.
>
> **1804.5 Compacted fill material.** Where shallow foundations will bear on compacted fill material, the compacted fill shall comply with the provisions of an *approved* geotechnical report, as set forth in Section 1803.
>
> > **Exception:** Compacted fill material 12 inches (305 mm) in depth or less need not comply with an *approved* report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557. The compaction shall be verified by *special inspection* in accordance with Section 1705.6.

Public Comment 2:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R401.5 Site work. Site work shall be performed in accordance with Sections R401.5.1 through R401.5.3.

R401.5.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Excavation, fill, or shoring, whether temporary or permanent, shall not extend onto adjacent property. Existing footings or foundations that can be affected by an excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement.

R401.5.2 Slope limits. Slopes for permanent fill shall be not more than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not more than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the submittal of a geotechnical report acceptable to the *building official*.

R401.5.3 Surcharge. No fill or other surcharge loads shall be placed adjacent to a building or structure, or caused to be imposed on them, unless such building or structure is designed to resist the additional loads caused by the fill or surcharge.

> **Exception:** Minor surcharge loads from grading for landscaping purposes shall be permitted where approved by the building official, or where:
>
> 1. The grading is done with walk-behind equipment, AND
> 2. The grade is not increased more than one foot from original design grade.

Commenter's Reason: This proposal simply brings the IRC and the IBC into closer alignment on protection of adjacent property. Our experience has been that when the work being performed damages adjacent property (or is perceived to be the cause of damage), it creates a problem for everyone involved—owners, contractors, designers, and code officials—regardless of whether or not it is addressed in the code. The WABO Technical Code Development Committee believes this is an area of regulation that is missing in the current IRC, especially when compared to the IBC. Putting these regulations in place will likely reduce the hassles for everyone.

However, because it can be viewed as two separate issues are being addressed by the original code change proposal, we have divided them in two Public Comments. This Public Comment addresses the site development aspects of the code change proposal. A separate Public Comment will address the support for foundations.

This public comment adopts regulations regarding site work. As stated in the reason statement for the original proposal, this clearly states whoever is doing the work is responsible to keep the effects of construction on the subject property. Without this text, it can be easily construed to be the adjacent property owner who is responsible to protect his/her own property from the effects of construction—something they are not causing. In addition, under the general code principle "if something is not prohibited, it's allowed," the current code allows cuts or fills to be extend onto adjacent property. We do not believe this is what the code intends, and this Public Comment clarifies the issue. The proposed text is based on Section 3304.1 of the 2012 IBC (which is reproduced below for reference), but adds a new exception based on a change to 2015 IBC Section 1808.3.2 to allow minor surcharges from landscaping activities (Item S184-12). No proposals were made to change IBC Section 3304.1 in the Group A development process, so the 2015 IBC section will be the same as 2012.

The Committee's published reason for disapproval states this is outside the scope of the IRC and should be handled by ordinance at the local jurisdiction. In response:

1. There is nothing in the Scope or Intent sections in the IRC (R101.2 and R101.3) that confine the regulations to the actual building. In fact, Section R101.3 specifically refers to establishing minimum requirements to safeguard the public through "safety to life *and property* [emphasis ours]".
2. Other regulations in the code are in place to protect adjacent property from the effects of the new construction (e.g., the requirements in Section R302 for protecting openings near the property line). This proposal is no different, as it also seeks to protect the adjacent property from the effects of the new construction.
3. As stated above, the proposed text is based on text already found in the IBC. For the issue of protecting adjacent property, there is nothing unique about a dwelling built in accordance with the IRC versus one built in accordance with the IBC provisions for R-3 occupancies. That is, protection of adjacent property is an issue for any construction. It therefore follows that if the IBC regulates this issue, there is no reason why the IRC shouldn't.
4. Not all jurisdictions pass local ordinances to deal with this type of issue, and some jurisdictions are prohibited from amending the IRC. The fact that many jurisdictions adopt ordinances regulating this demonstrates there is a need for them in the code. The I-codes form a family of model codes. As such, this text provides model code language that jurisdictions can adopt to protect neighboring properties. This may be especially helpful to those jurisdictions who are restricted from adopting amendments to the model code. For those jurisdictions who have already adopted local ordinances, this text can serve either to refine their current regulations, or eliminate the need to adopt a separate local ordinance.

2012 IBC Section 3304.1, with text extracted for the original proposal underlined:

> **3304.1 Excavation and fill.** Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Stumps and roots shall be removed from the soil to a depth of not less than 12 inches (305 mm) below the surface of the ground in the area to be occupied by the building. Wood forms which have been used in placing concrete, if within the ground or between foundation sills and the ground, shall be removed before a building is occupied or used for any purpose. Before completion, loose or casual wood shall be removed from direct contact with the ground under the building.
>
> **3304.1.1 Slope limits.** Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soil investigation report acceptable to the *building official*.
>
> **3304.1.2 Surcharge.** No fill or other surcharge loads shall be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge. Existing footings or foundations which can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against later movement.

RB207-13

Final Action: AS AM AMPC____ D

RB210-13
R403.1, Figure R403.3(1) (NEW)

<u>Proposed Change as Submitted</u>

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

<u>At transitions between footings located at different elevations, precast concrete lintels complying with Figure R403.1(1) shall be permitted in Seismic Design Categories A, B, and C.</u>

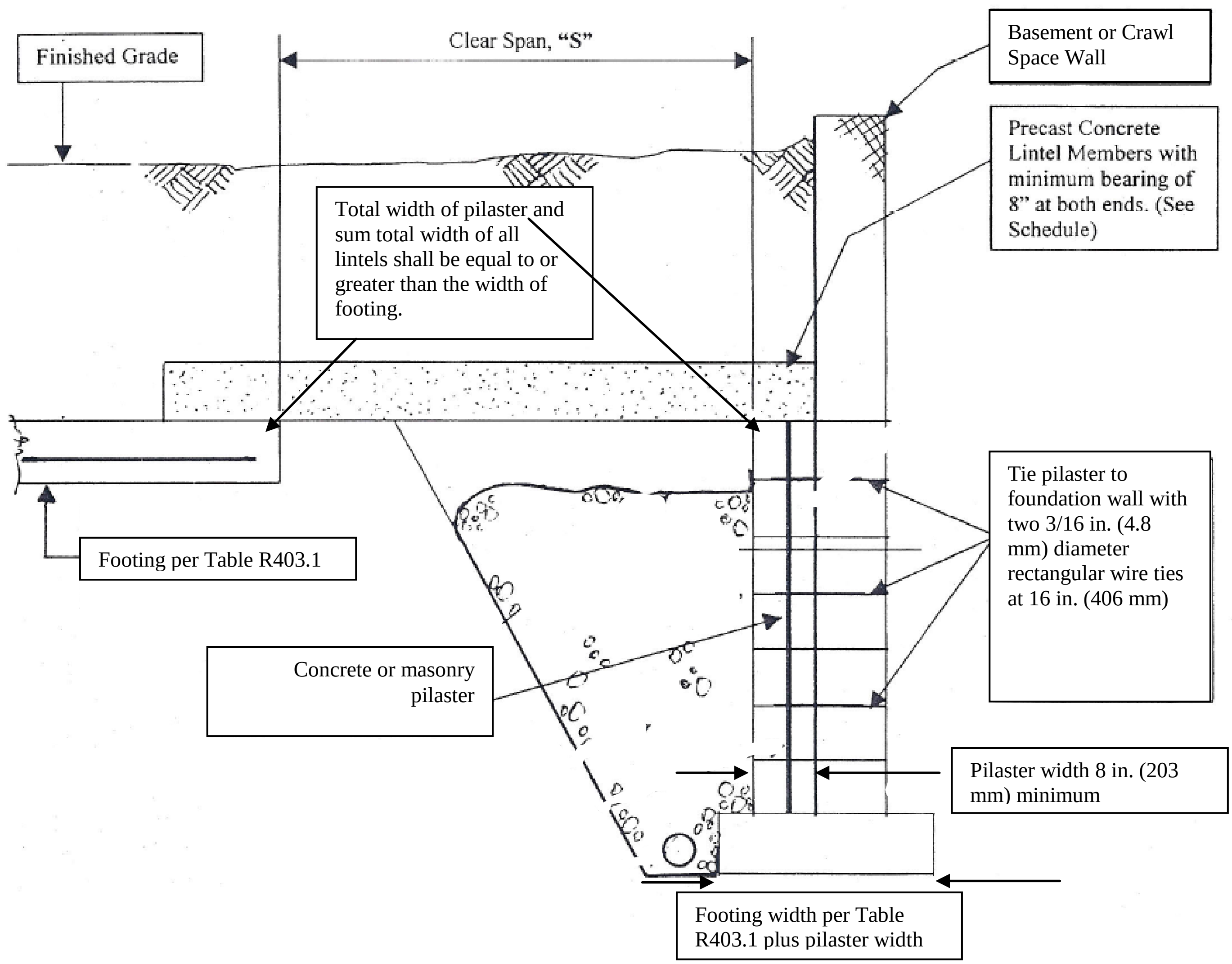


FIGURE 403.1(1) DISCONTINUOUS FOOTERS

Required Reinforcement for Each 4 in. by 8 in. Lintel			Required Reinforcement for Each 6 in. by 8 in. Lintel		
Clear Span, S	Top Bar Size	Bottom Bar Size	Clear Span, S	Top Bar Size	Bottom Bar Size
4'-0"	No. 3	No. 3	4'-0"	No. 3	No. 3
4'-8"	No. 3	No. 3	4'-8"	No. 3	No. 3
5'-4"	No. 3	No. 3	5'-4"	No. 3	No. 3
6'-0"	No. 3	No. 3	6'-0"	No. 3	No. 3
6'-8"	No. 3	No. 3	6'-8"	No. 3	No. 4
7'-4"	No. 3	No. 4	7'-4"	No. 3	No. 5
8'-0"	No. 3	No. 5	8'-0"	No. 3	No. 5

1. All reinforcing bars shall comply with ASTM A615, Grade 60.
2. Minimum 28 day compressive strength of the lintel shall be 3,000 psi.

Reason: Situations often arise in the field whereby it is not practical to have a continuous footing around the perimeter of a residence, such as at the transition between a basement wall and a stem wall below a garage, which is further complicated due to excavating around the basement. A common solution to this situation is to span between the stem wall footer and basement wall footer using a precast lintel to support surcharge loads applied from above.

This change proposes to introduce an alternative design and construction option to allow discontinuous footers when complying with the requirements of the proposed new Figure 403.1(1). Similar detailing has been used successfully for years in various regions of the country.

The detailing options presented here are applicable only to structures assigned to SDC A, B, and C. For higher seismic design categories, the provisions of Section R403.1.3 are still applicable.

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

R403.1-RB-THOMPSON.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee feels this has merit but the figure is confusing. The proponent should work with the structural engineers and clarify the details and bring this back later.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards, requests Approval as Modified by this Public Comment.

Modify the proposal as follows (delete proposed Figure 403.1(1) and replacing with new Figure 403.1(1)

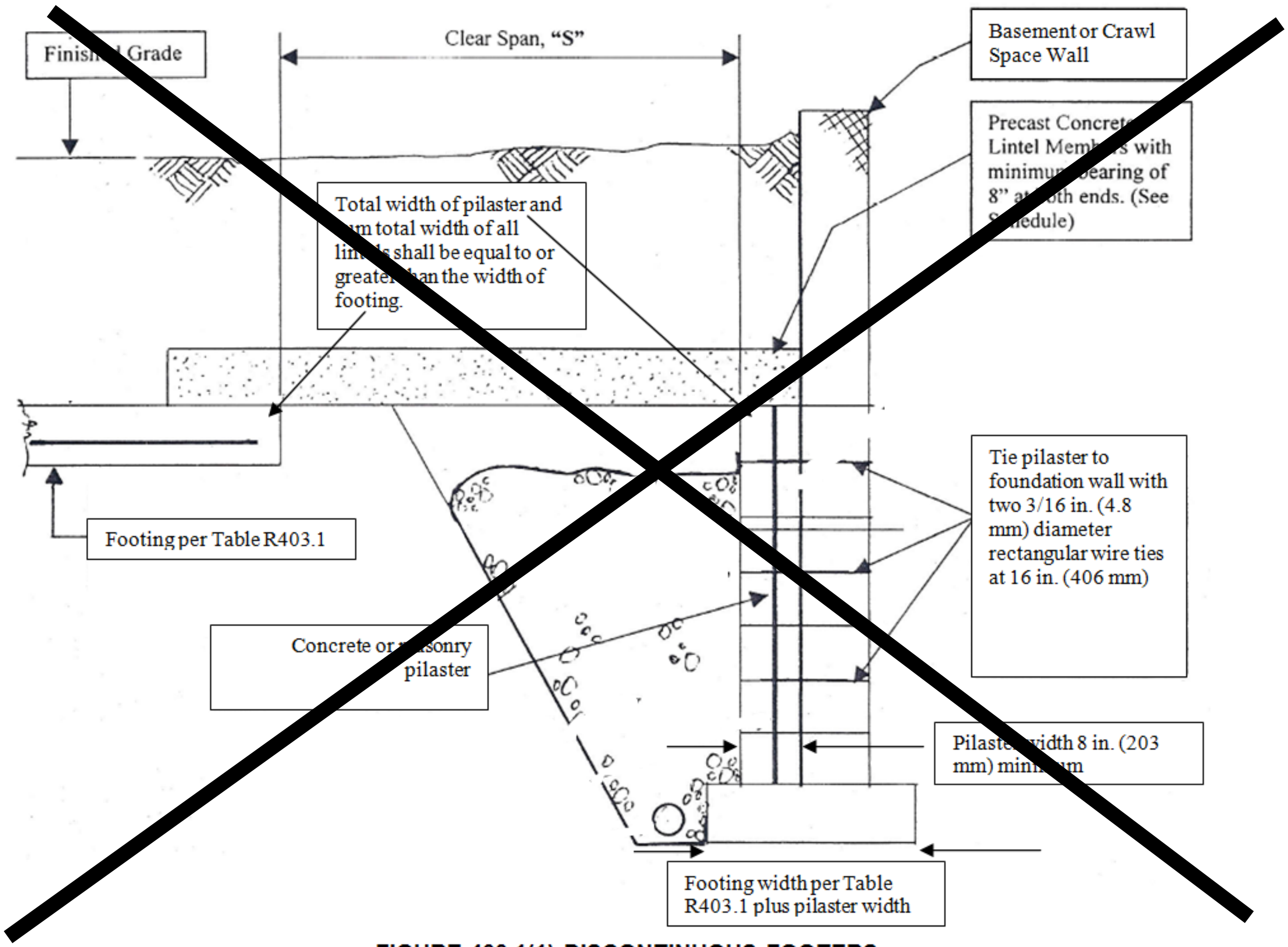
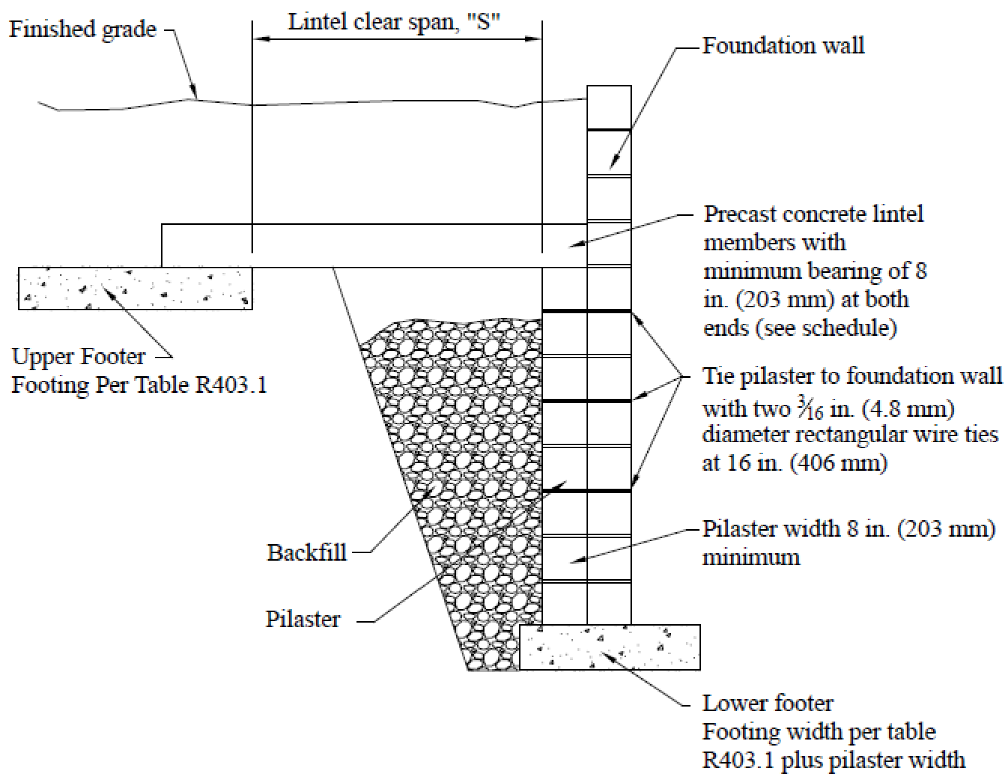


FIGURE 403.1(1) DISCONTINUOUS FOOTERS

Elevation



Finished grade
Lintel clear span, "S"
Foundation wall
Precast concrete lintel members with minimum bearing of 8 in. (203 mm) at both ends (see schedule)
Upper Footer
Footing Per Table R403.1
Tie pilaster to foundation wall with two 3/16 in. (4.8 mm) diameter rectangular wire ties at 16 in. (406 mm)
Backfill
Pilaster width 8 in. (203 mm) minimum
Pilaster
Lower footer
Footing width per table R403.1 plus pilaster width

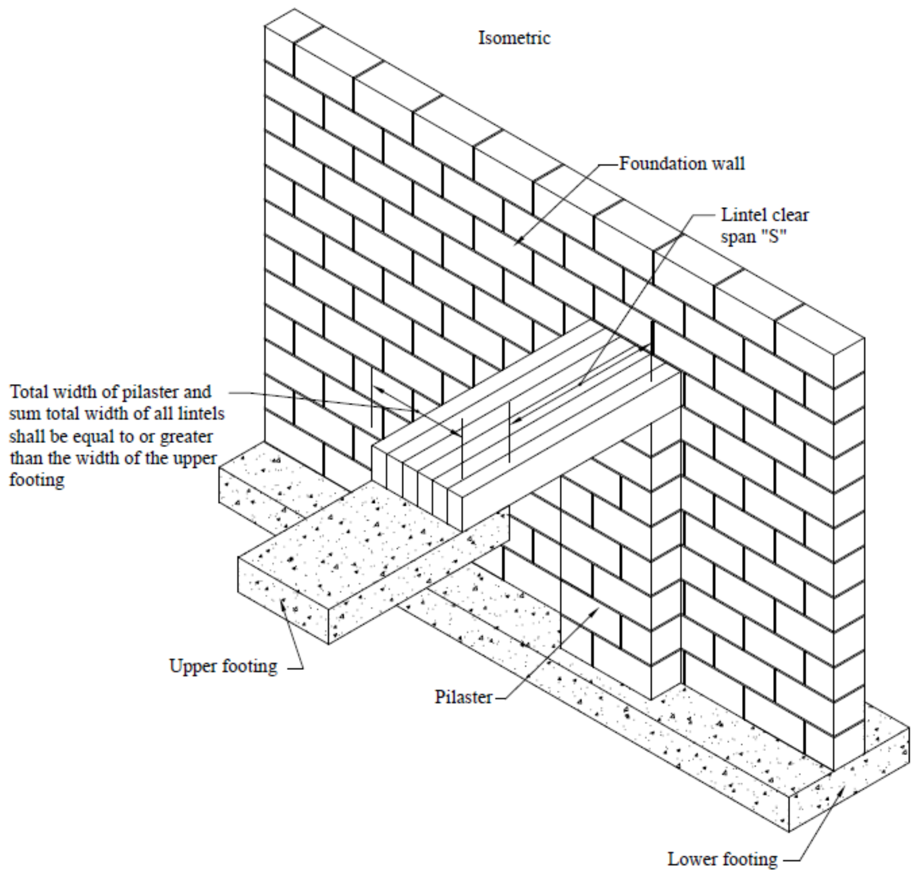


FIGURE 403.1(1) DISCONTINUOUS FOOTERS

Commenter's Reason: At the committee hearings earlier this year several commented that the original figure proposed with RB210-13 could be misinterpreted. The modifications proposed by this public comment incorporate a revised detail shown in both elevation and isometric to illustrate the concept of spanning between footings located at different elevations. These proposed modifications only improve clarity and do not propose any technical changes to the original code change proposal.

RB210-13

Final Action: AS AM AMPC____ D

RB211-13

R403.1.1, Table R403.1(1), Table 403.1(2) (New), Table R403.1(3) (NEW)

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association, (BajnaiC@chesterfield.gov), James R. Baty II, Technical Director of Concrete Foundations Association, and Matthew R. Senecal, Senior Engineer, American Concrete Institute

Revise as follows:

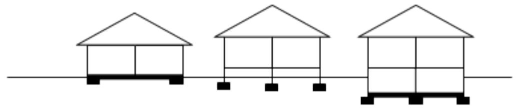
R403.1.1 Minimum size. The minimum ~~sizes~~ width, W, and thickness, T, for concrete ~~and masonry~~ footings shall be ~~as set forth~~ in accordance with Table R403.1(1) through R403.1(3) and Figure R403.1(1). The footing width~~, W,~~ shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. ~~Spread footings shall be at least 6 inches (152 mm) in thickness, T.~~ Footing projections, P, shall be at least 2 inches (51 mm) and shall not exceed the thickness of the footing. Footing thickness and projection for fireplaces shall be in accordance with Section R1001.2. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).

~~TABLE R403.1~~
~~MINIMUM WIDTH OF CONCRETE PRECAST OR MASONRY FOOTINGS (inches)~~[a]

TABLE R403.1(1)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT FRAME CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with Light Frame	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
30 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	23 x 6	17 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
50 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	25 x 7	19 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	22 x 6	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	28 x 9	21 x 6	17 x 6	14 x 6	12 x 6	12 x 6
70 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	27 x 9	20 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



Slab on grade Crawl space Basement

TABLE R403.1(2)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR CONCRETE FOOTINGS FOR LIGHT FRAME CONSTRUCTION WITH BRICK VENEER

Snow load or Roof Live Load	Story and Type of Structure with Brick Veneer	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story - slab on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story - plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
30 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	27 x 9	21 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story - slab on grade	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	27 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story - plus basement	33 x 11	24 x 7	20 x 6	16 x 6	14 x 6	12 x 6
50 psf	1 story - slab on grade	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	29 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story - slab on grade	24 x 7	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	3 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
70 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - slab on grade	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story - with crawl space	31 x 11	23 x 7	19 x 6	16 x 6	13 x 6	12 x 6
	3 story - plus basement	37 x 13	28 x 9	22 x 6	18 x 6	16 x 6	14 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

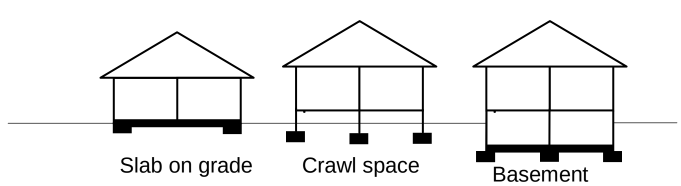
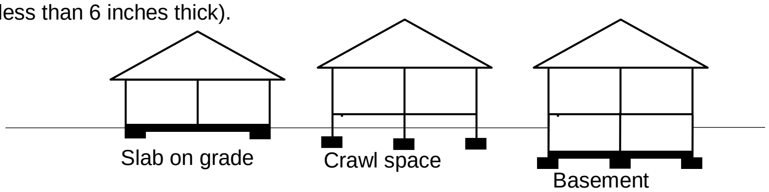


TABLE R403.1(3)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS WITH CAST-IN-PLACE CONCRETE OR FULL MASONRY WALL CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with CMU	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	3 story - slab on grade	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - with crawl space	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - plus basement	43 x 17	33 x 11	26 x 8	22 x 6	19 x 6	16 x 6
30 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	24 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	30 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - plus basement	36 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story - slab on grade	33 x 12	25 x 7	20 x 6	17 x 6	14 x 6	12 x 6
	3 story - with crawl space	39 x 14	29 x 9	23 x 7	19 x 6	17 x 6	14 x 6
	3 story - plus basement	44 x 17	33 x 12	27 x 8	22 x 6	19 x 6	17 x 6
50 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story - slab on grade	27 x 8	20 x 6	20 x 6	13 x 6	12 x 6	12 x 6
	3 story - with crawl space	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - plus basement	36 x 13	27 x 9	22 x 6	18 x 6	16 x 6	14 x 6
70 psf	1 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - slab on grade	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - with crawl space	34 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	2 story - plus basement	40 x 15	30 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story - slab on grade	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - with crawl space	43 x 16	32 x 11	26 x 8	21 x 6	18 x 6	16 x 6
	3 story - plus basement	49 x 19	37 x 13	29 x 10	24 x 7	21 x 6	18 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The existing table was based on:

- a snow load of 50 psf
- 20 feet of tributary roof area
- 16 feet of tributary floor area
- 10 feet first floor height
- 8 feet second and third floor heights

For some parts of the country, the table's assumptions may not "fit" well.

1. These new tables factor in four snow live load conditions that were not previously acknowledged: 20 psf (the minimum allowed per Table R301.6), 30 psf, 50 psf and 70 psf (the maximum to be designed prescriptively by R301.2.3). Between these increments, the table allows for interpolation.
2. The tables account for additional soil bearing conditions. They now provide sizing for 1500 psf, 2000 psf, 2500 psf, and 3000 psf, 3500 psf and 4000psf soil bearing locations.
3. The tables take into consideration the same three framing types as the current table:
    a. Conventional light framing,
    b. Conventional light framing with veneer, and
    c. Cast-in-place concrete or full masonry wall construction.
4. The new tables were expanded to cover more conditions. They now differentiate houses built:
    a. 1, 2 and 3 stories built slab on grade (without a first floor load),
    b. 1, 2 and 3 stories built over a crawl space (with a first floor load and foundation wall/footing),
    c. 1, 2 and 3 stories built with basement (with a first floor load and basement walls. Previously, the table was silent on how to handle the extra load from a masonry or concrete basement wall).
5. The tables also provide the width of the footing based on the loads and the minimum projection – whichever governs. 6" is the minimum thickness already required by Section R403.1.1.
6. The table are based on the loading case of: TL = DL + .75LL
7. General assumptions, formulas and example follow for peer review:

ASSUMPTIONS

House width	32	
Roof ground snow load	varies	psf
Roof dead load	10	psf
Rafter length of house	16	ft
Roof overhang	2	ft
Attic live load	15	psf
Attic dead load	10	psf
Attic tributary width	8	ft
Third floor wall height	8	ft
Third floor wall materials	15	#/ vert ft
Third floor with veneer	45	#/ vert ft
Third floor with cmu wall	100	#/ vert ft
Third floor live load	22.5	psf
Third floor dead load	15	psf
Third floor tributary length	8	ft
Second floor wall height	9	ft
Second floor wall materials	15	#/ vert ft
Second floor with veneer	45	#/ vert ft
Second floor with cmu wall	100	#/ vert ft
Second floor live load	22.5	psf
Second floor dead load	15	psf
Second floor tributary length	8	ft
First floor wall height	10	ft
First floor with light frame	15	#/ vert ft
First floor with veneer	45	#/ vert ft
First floor with cmu wall	100	#/ vert ft
First floor live load	30	psf
First floor dead load	15	psf
First floor tributary length	8	ft
Crawl wall height	3	ft
Basement wall height	10	ft
Wall thickness	10	in
Basement/crawl floor wall materials	125	pcf
Footing width (min)	12	in
Footing thickness (min)	6	in
Concrete weight	150	pcf
	0.0868	pci

SAMPLE CALCULATION WITH FORMULAS

CMU CONSTRUCTION BASED ON 50 psf SNOW LOAD

	DESIGN PARAMETERS (variables)	1 story slab on grade		1 story with crawl		1 story with basement		2 story slab on grade		2 story with crawl		2 story with basement		3 story slab on grade		3 story with crawl		3 story with basement	
Roof load	(Roofspan/2 + Overhangspan) * (Roof-DL + (.75*Roof-LL))	855		855		855		855		855		855		855		855		855	
Attic Floor load	Roofspan/4 * (Attic-DL + .75(Attic-LL)	200		200		200		200		200		200		200		200		200	
TF Wall load	TFht * Wwt													480		480		480	
TF Floor load	Roofspan/4 * (TF-DL + (.75(TF-LL))													300		300		300	
SF Wall load	SFht * Wwt							540		540		540		540		540		540	
SF Floor load	Roofspan/4 * (SF-DL + (.75(SF-LL))							300		300		300		300		300		300	
FF Wall load	FFht * Wwt	600		600		600		600		600		600		600		600		600	
FF Floor load	Rspan/4 * (FF-DL + (.75FF-LL))			360		360				360		360				360		360	
Crawl Wall load	Cht * Cth / 12 * Cwt			250						250						250			
Basement Wall load	Bth * Bthick / 12 * Bwt					833						833						833	
Footing	Footthick / 12 * Footwidth / 12 * Wtcond	75		75		75		75		75		75		75		75		75	
CALCULATED LOAD (plf)		1730		2340		2923		2570		3180		3763		3350		3960		4543	
	Footing width is the greater of: 6" minimum or (Footing width - wall thickness) / 2																		
Soil bearing capacity variances (psf)	1500	14	6	19	6	23	7	21	6	25	8	30	10	27	8	32	11	36	13
	2000	10	6	14	6	18	6	15	6	19	6	23	6	20	6	24	7	27	9
	2500	8	6	11	6	14	6	12	6	15	6	18	6	16	6	19	6	22	6
	3000	7	6	9	6	12	6	10	6	13	6	15	6	13	6	16	6	18	6
	3500	6	6	8	6	10	6	9	6	11	6	13	6	11	6	14	6	16	6
	4000	5	6	7	6	9	6	8	6	10	6	11	6	10	6	12	6	14	6

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

R403.1(1)-RB-BAJNAI-BATY-SENECAL-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee feels this provides useful tables and provides additional option for builders. This improves the prescribed minimum footing sizes.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R403.1 (3)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS with CAST-IN-PLACE CONCRETE or FULLY GROUTED MASONONRY WALL CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with CMU	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	3 story - slab on grade	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - with crawl space	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - plus basement	43 x 17	33 x 11	26 x 8	22 x 6	19 x 6	16 x 6
30 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	24 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	30 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - plus basement	36 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story - slab on grade	33 x 12	25 x 7	20 x 6	17 x 6	14 x 6	12 x 6
	3 story - with crawl space	39 x 14	29 x 9	23 x 7	19 x 6	17 x 6	14 x 6
	3 story - plus basement	44 x 17	33 x 12	27 x 8	22 x 6	19 x 6	17 x 6
50 psf	1 story - slab on grade	~~14 X 6~~ 17 x 6	~~12 X 6~~ 13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	~~19 X 6~~ 22 x 6	~~14 X 6~~ 17 x 6	~~12 X 6~~ 13 x 6	12 x 6	12 x 6	12 x 6

	1 story - plus basement	~~23 X 7~~ 28 x 9	~~18 X 6~~ 21 x 6	~~14 X 6~~ 17 x 6	~~12 X 6~~ 14 x 6	12 x 6	12 x 6
	2 story - slab on grade	~~21 X 6~~ 27 x 8	~~15 X 6~~ 20 x 6	~~12 X 6~~ 16 x 6	~~12 X 6~~ 13 x 6	12 x 6	12 x 6
	2 story - with crawl space	~~25 X 8~~ 32 x 11	~~19 X 6~~ 24 x 7	~~15 X 6~~ 19 x 6	~~13 X 6~~ 16 x 6	~~12 X 6~~ 14 x 6	12 x 6
	2 story - plus basement	~~30 X 10~~ 38 x 14	~~23 X 6~~ 28 x 9	~~18 X 6~~ 23 x 6	~~15 X 6~~ 19 x 6	~~13 X 6~~ 16 x 6	~~12 X 6~~ 14 x 6
	3 story - slab on grade	~~27 X 8~~ 35 x 13	~~20 X 6~~ 27 x 8	~~20 X 6~~ 21 x 6	~~13 X 6~~ 18 x 6	~~12 X 6~~ 15 x 6	~~12 X 6~~ 13 x 6
	3 story - with crawl space	~~32 X 11~~ 41 x 15	~~24 X 7~~ 31 x 10	~~19 X 6~~ 24 x 7	~~16 X 6~~ 20 x 6	~~14 X 6~~ 17 x 6	~~12 X 6~~ 15 x 6
	3 story - plus basement	~~36 X 13~~ 47 x 18	~~27 X 9~~ 35 x 12	~~22 X 6~~ 28 x 9	~~18 X 6~~ 23 x 7	~~16 X 6~~ 20 x 6	~~14 X 6~~ 17 x 6
70 psf	1 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - slab on grade	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - with crawl space	34 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	2 story - plus basement	40 x 15	30 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story - slab on grade	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - with crawl space	43 x 16	32 x 11	26 x 8	21 x 6	18 x 6	16 x 6
	3 story - plus basement	49 x 19	37 x 13	29 x 10	24 x 7	21 x 6	18 x 6

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address an inconsistency discovered by ICC staff following Dallas. The values were checked and an error was detected in the spreadsheet producing the footing sizes for the third table, which is corrected with this public comment.

Public Comment 2:

Stephen S. Szoke, Portland Cement Association and Masonry Alliance for Codes and Standards requests Disapproval.

Commenter's Reason: The committee action on the proposed code change should be overturned for the following eleven reasons. Code change proposal RB211-13 should be disapproved because it:

1) unintentionally or otherwise eliminates the use of masonry footings;
2) contains errors in the tables;
3) contains errors in the calculations based on the assumptions;
4) many of the assumptions are inaccurate and misleading;
5) results in overdesigned footings for many systems;
6) concrete and masonry walls are unfairly penalized as typical foundation systems will be required to have larger footings than necessary;
7) lacks the necessary guidance to the designer, builder and code official on the use and determination of the values provided in the tables;
8) does not eliminate the need the calculate dead and live loads to determine footing size;
9) does not provide sufficient technical information for evaluating code compliance;
10) creates confusion which increases the risk of structural failure; and
11) precludes wall constructions otherwise permitted by the code. Each of these reasons for overturn committee action is described below.

1) **Masonry Footers Eliminated**. Code change removes "and masonry" as a permissible footer system eliminating the use of masonry foundation systems previously permitted in the code although they have proven effective footing systems and especially useful in areas, primarily rural areas, too far from a ready-mixed concrete batch site or sites not readily accessible by ready-mixed concrete trucks. Approval of this code change modifying section R403.1.1 and related tables should be overturned so that the use of masonry footer systems can continue to be permitted.

2) **Errors in Tabular Values**. There are numerous errors in the tabular values. For example in Table R403.1(3) the minimum footer size for a one-story structure with a crawlspace where the snow load is 30 psf and soil bearing capacity is 2000 psf, is listed as a 15 x 6 footing. The minimum footing size for a one-story structure with a crawlspace where the snow load is 50 psf and the soil bearing capacity is 2000 psf, is 14 x 6. It is illogical that the footing size decreases when as the snow load increases and the only variation is snow load.

Excerpts from Table R403.1(3)

Snow Load or Roof Live Load	Story and Type of Structure with CMU	Load-Bearing Value of Soil (psf) 2000
30 psf	1 story – with crawl space	15 x 6
50 psf	1 story – with crawl space	14 x 6

3) **Errors in Assumptions and Sample Calculations.** The assumptions advise that the weight of a concrete masonry unit wall is 100 pounds per linear foot of height and the height of the third floor wall systems is 8 feet. These assumptions result in a weight per linear foot of 800 pounds [100 #/vert. ft. X 8 feet]. The sample calculations provided in the reasoning statement show the weight of the third floor portion of the wall as 480 pounds per linear foot of footing length.

Dead weight of CMU wall 100 lb per vert. ft x 8 ft = 800 lb per linear ft.
Dead weight shown in SAMPLE CALCULATION WITH FORMULAS: 480 lb per linear ft.

4) **Assumptions Are Inaccurate**. Masonry veneers are not only applied over the exterior wall surface, but also over the band joists of interim floors. Similarly, for concrete and concrete masonry walls, joists are typically fire cut into the wall assembly or hung with joist hangers. This results in additional weight for the concrete or concrete masonry wall height covering the band joists. Where floor construction consists of 2x10 joists and the walls are constructed of concrete masonry units which per the assumptions weighs 100 pounds per vertical foot the result is over 150 pounds per linear foot in a three story building on a slab-on-grade foundation that are not accounted for in determining the minimum footer thickness.
While this may be relatively insignificant for single-story structures, for three-story structures the additional load could be excessive. If the load for the masonry spanning band joists was accounted for in the wall weight, then the loads for single-story structures are conservative. However, if the loads were not accounted for, then the calculated loads are less than required to satisfy the bearing conditions and could lead to failures.

Deadweight of Concrete Masonry Wall

Stories	Foundation System	Without Considering Band Joists	Considering Band Joists
1	Slab on Ground	1000 lb	1000 lb
1	Basement	2000 lb	1083 lb
2	Slab on Ground	1900 lb	1983 lb
2	Basement	2900 lb	3067 lb
3	Slab on Ground	2700 lb	2867 lb
3	Basement	3700 lb	3950 lb

5) **Over Design**. Many of the assumptions result in the determination of conservative loads and thus conservative footing dimensions. The basement wall height is assumed to be 10 feet in height. For new homes where the basement wall height is only 8 feet, using the assumptions presented in the proposed code change, the difference in dead load on the footing would be over 200 pounds per linear foot.

6) **Mass Wall Unfairly Penalized**. In the proposed change, concrete and masonry walls are assumed to have a weight per linear foot of wall height of 100 lbs. This weight ranges from 18 to 60% heavier than most common 8" concrete and masonry wall systems unfairly penalizing these systems by increasing footing size and respective costs as compared to other wall systems. Since the footing sizes in the the proposed table are minimum footing sizes, for most applications the proposed change is requiring substantially larger footings than necessary to distribute loads to soil. This is especially true for concrete and masonry wall systems. The result is inefficient and less sustainably utilization of materials. For some commonly used basement and above grade concrete masonry walls the weight used in the assumptions is is 65% larger than the actual wall weight. Shown below are some weights of various concrete and concrete masonry wall systems.

Wall System	Material Density lb per cubic foot	Wall Thickness Nominal (Actual)	Wall Weight lb/ per vertical foot
8" Light weight CMU (52% solid)	120 unit concrete	8" (7.625")	35
8" Light weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	8" (7.625")	50
8" Light weight CMU (Fully grouted)	120 unit concrete 140 grout	8" (7.625")	77
10" Light weight CMU (48% solid)	120 unit concrete	10" (9.625")	40
10" Light weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	10" (9.625")	66
10" Light weight CMU (Fully grouted)	120 unit concrete 140 grout	10" (9.625")	99
8" Medium weight CMU (52% solid)	120 unit concrete	8" (7.625")	40
8" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	8" (7.625")	55
8" Medium weight CMU (Fully grouted)	120 unit concrete 140 grout	8" (7.625")	82
10" Medium weight CMU (48% solid)	120 unit concrete	10" (9.625")	46
10" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	10" (9.625")	72
10" Medium weight CMU (Fully grouted)	120 unit concrete 140 grout	10" (9.625")	105
8" Medium weight CMU (52% solid)	135 unit concrete	8" (7.625")	45
8" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	135 unit concrete 140 grout	8" (7.625")	60
8" Medium weight CMU (Fully grouted)	135 unit concrete 140 grout	8" (7.625")	87
10" Medium weight CMU (48% solid)	135 unit concrete	10" (9.625")	52
10" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	135 unit concrete 140 grout	10" (9.625")	78
10" Medium weight CMU (Fully grouted)	135 unit concrete 140 grout	10" (9.625")	110
8" Cast-in-Place Concrete	140 Concrete	8" (7.5")	88
6 Concrete Wall (Stay-in-Place Forms)	140 Concrete	6" (5.5")	64
4" Cast-in Place (Stay-in-Place Forms)	140 Concrete	4" (3.5")	41
8" Lightweight Precast (50% Solid)	140 Concrete	8" (7.5")	44

7) **Lack of Guidance**. All assumptions in calculated minimum footing should be included as footnotes to the proposed Table so that alternative designs may be appropriately determined to avoid excess and unnecessary costs and use of materials where weights of wall systems deviate from the assumptions.

8) **Calculations Still Required**. Calculations of actual dead and live loads are still required because the assumptions are unknown and table provides minimum thickness. Designer, builder and/or code official would still need to calculate the loads to determine if the minimum footing size needs to be increased.

9) **Insufficient Information for Code.** The information provided does not address the actual building systems. This information might be appropriate for commentary should all assumption be included and the values correctly calculated. Alternatively, direct design table could be generated for use in the code or provided in referenced standards.

10) **Confusion and Risk of Failure.** The increased complexity provided with the tables implies that this is the footing size provided is the size that should be used and does not appropriately or adequately communicate that these are still minimum footing sizes. Since calculations are still required to determine if minimum footing size the tables serve no significant benefit and suggest that for the conditions described, the minimum footing size is adequate. However, the code proposal does not include all assumptions which means the footing may be undersized and increase the potential for failures.

Exclusive to Select Wall Systems. The tables are inappropriate as they do not address many wall systems. For example, there are not provisions for log home and other alternative construction methods.

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Figure R403.1(1), Figure R403.1(2), Figure R403.1(3), R403.1.3.2, Figure R403.1.3.2

Proposed Change as Submitted

Revise as follows:

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

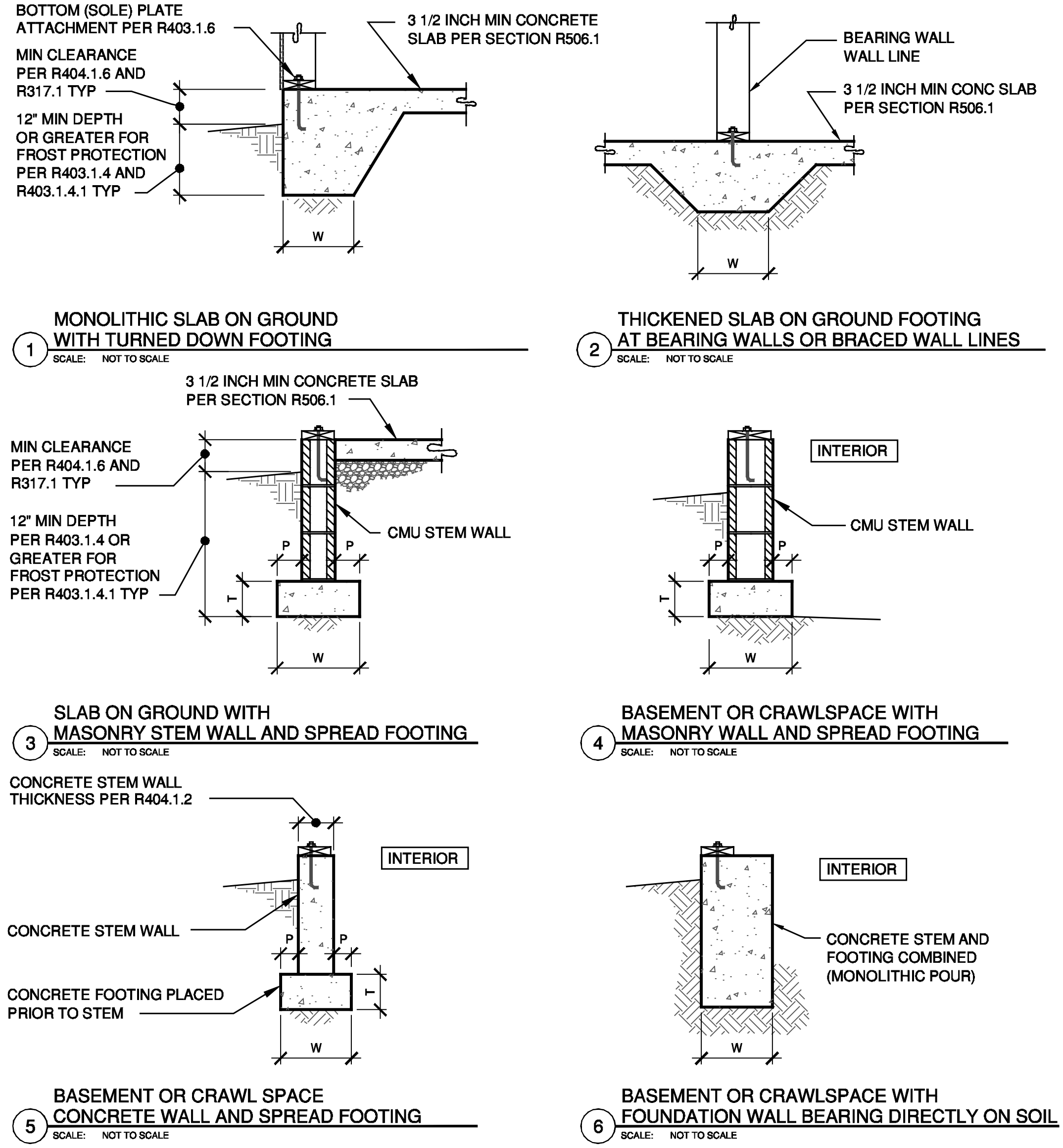


FIGURE R403.1(1)

PLAIN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC A, B AND C [a, b, c, d, e, f, g]

W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
e. SEE FIGURE R403.1(2) FOR ADDITIONAL FOOTING REQUIREMENTS FOR STRUCTURES IN SDC D0, D1 AND D2 AND TOWNHOUSES IN SDC C
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(1)

PLAN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS OM SDC Do, D_1 AND D_2 [a,b,c,d,e,f,g]

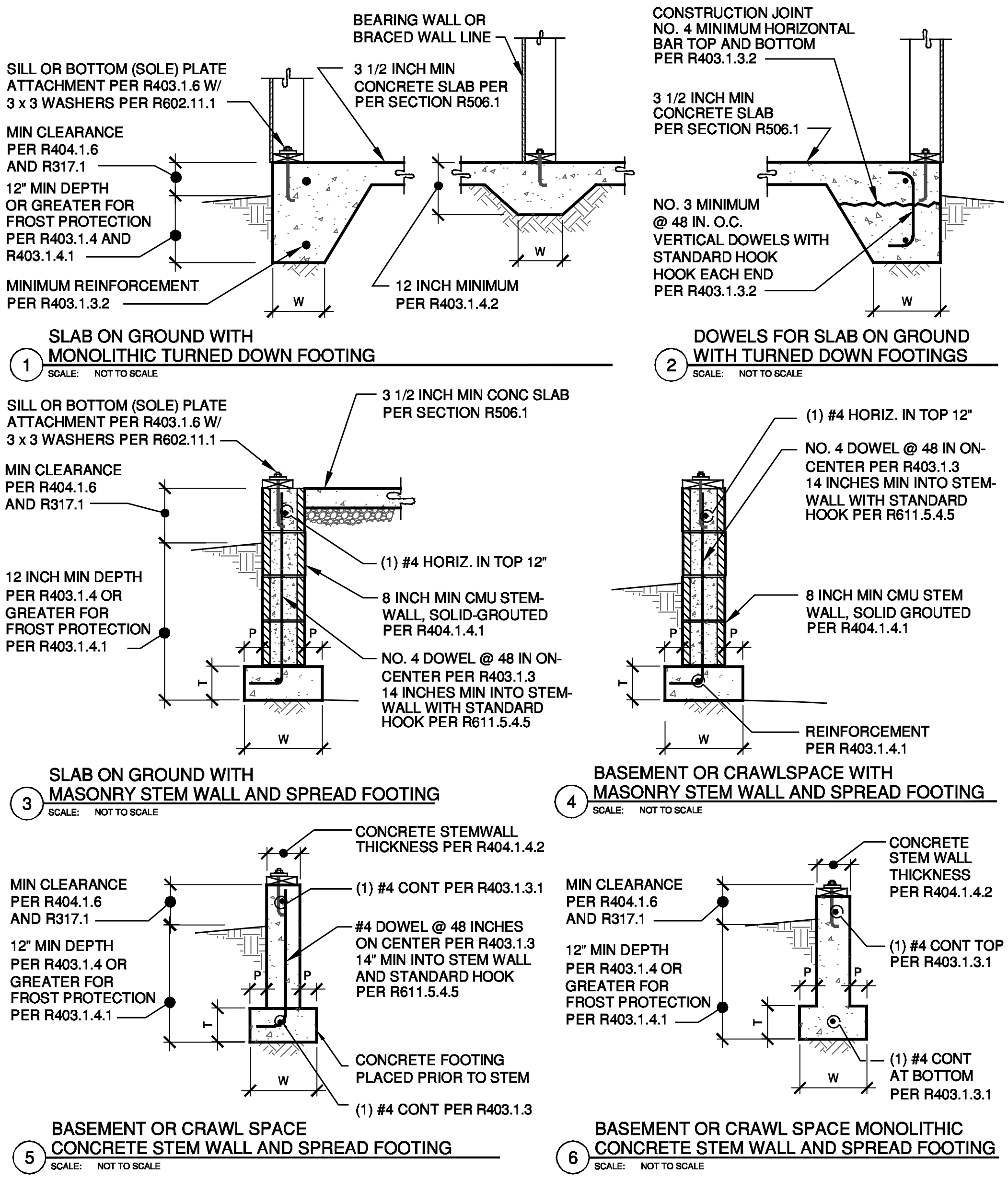


FIGURE R403.1(2)
REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D0, D1 AND D2 [a, b, c, d, e, f, g]

W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(2)
REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D_O, D_1 AND D_2 [a,b,c,d,e,f,g]

FIGURE ~~R403.1(2)~~ R403.1(3)
PERMANENT WOOD FOUNDATION BASEMENT WALL SECTION

FIGURE ~~R403.1(3)~~ R403.1(4)

PERMANENT WOOD FOUNDATION CRAWL SPACE SECTION

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

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

Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks on each end shall be provided in accordance with Figure ~~R403.1.3.2~~ R403.1(2), detail 2. Standard hooks shall comply with Section R611.5.4.5.

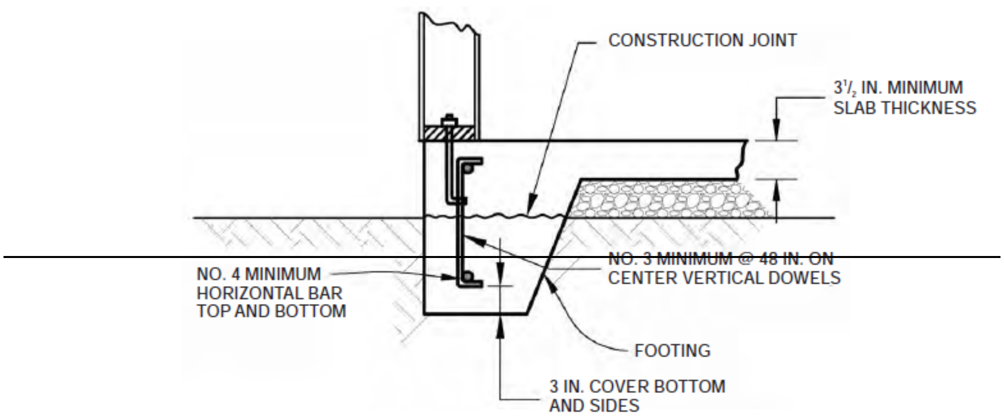


FIGURE R403.1.3.2
DOWELS FOR SLABS-ON-GROUND WITH TURNED-DOWN FOOTINGS

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

This proposal is to revise and update the existing footing figures in the code. The revised figures improve the graphic quality of the figures and add information that is helpful to the code user. In addition, the current figures do not show, describe or address the specific reinforcement requirements for Seismic Design Categories D0, D1 and D2. Initial attempts to incorporate the SDC reinforcement requirements into the set of figures resulted in overly complex details that would contain information not necessary to code users in lower SDC's. Therefore, the committee decided to generate a second set of figures specifically detailing the reinforcement requirements for the applicable SDC's.

This proposal also moves existing figure R403.1.3.2 to Figure R403.1(2) and changes the reference in section R403.1.3.2. The footnotes were also expanded to alert the code user to other applicable sections relating to foundations but were not necessarily helpful to add to the figures such as vapor barriers and ventilation.

This proposal does not change any requirements in the current code and are a great improvement to the code enabling the code user to visualize the code requirements.

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

R403.1(1)-F-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee likes the concept and it would add useful figures to the code. However, there are some inaccuracies in the figures related to reinforcing for high seismic. The proponent should rework this and bring it back.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

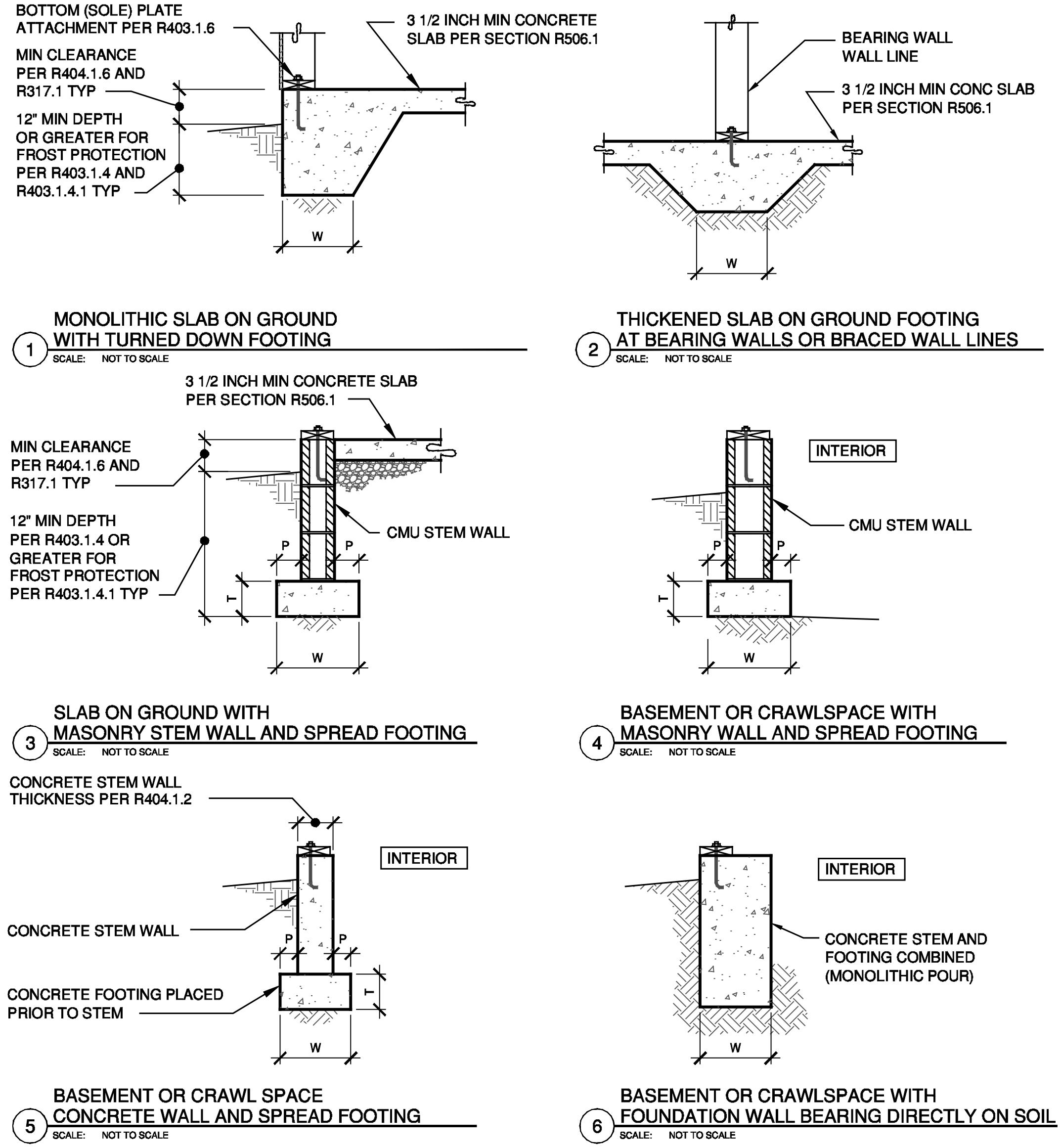
Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.1.1 Minimum size. Minimum sizes for concrete and masonry footings shall be as set forth in Table R403.1 and Figure R403.1(1) or Figure R403.1.3, as applicable. The footing width, W, shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Spread footings shall be at least 6 inches (152 mm) in thickness, T. Footing projections, P, shall be at least 2 inches (51 mm) and shall not exceed the thickness of the footing. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).

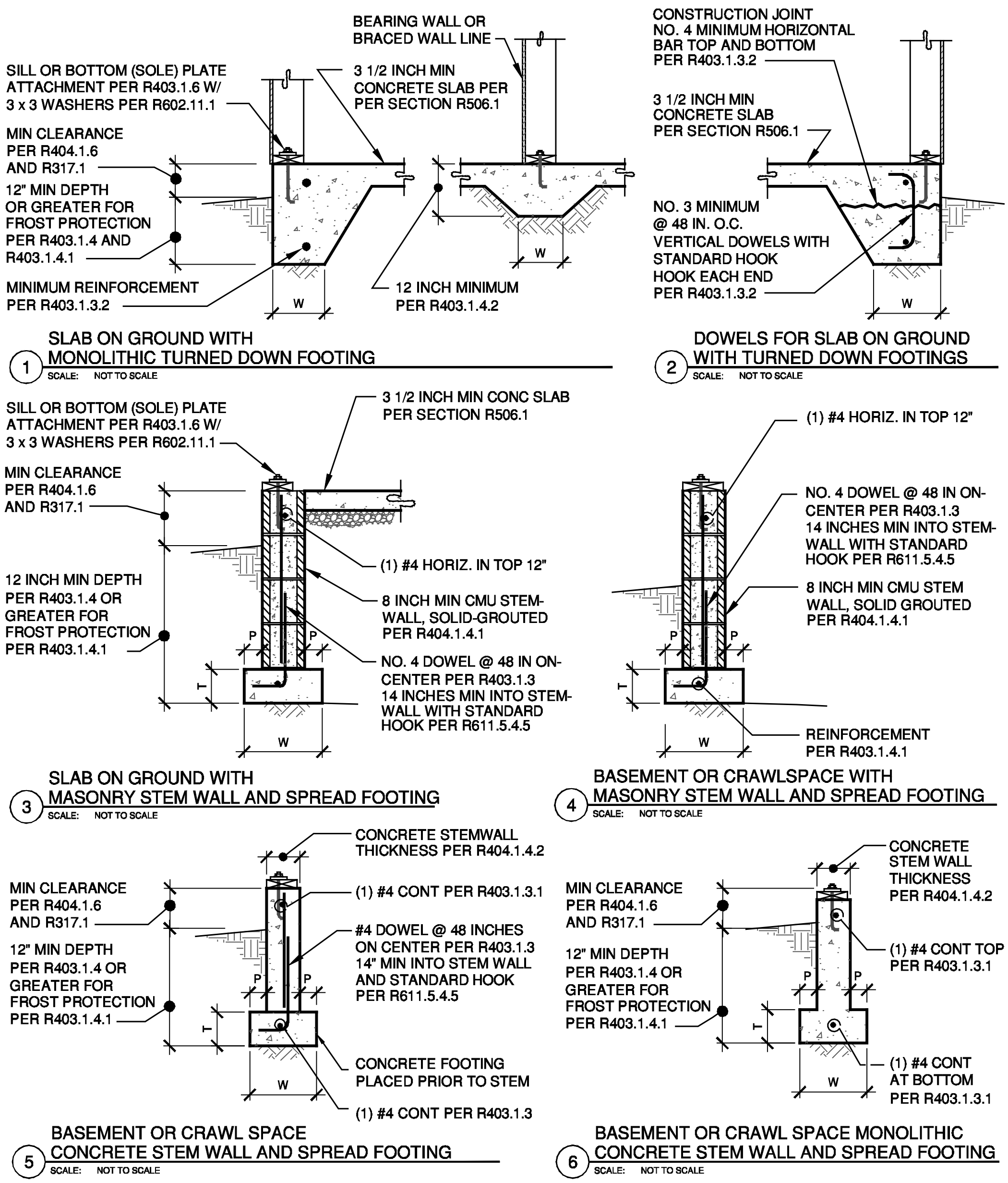
R403.1.3 Seismic reinforcing. Concrete footings located in Seismic Design Categories D0, D1 and D2, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this Section and Figure R403.1.3. Bottom reinforcement shall be located a minimum of 3 inches (76 mm) clear from the bottom of the footing. In Seismic Design Categories D0, D1 and D2 where a construction joint is created between a concrete footing and a stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing, have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. In Seismic Design Categories D0, D1 and D2 where a grouted masonry stem wall is supported on a concrete footing and stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing and have a standard hook. In Seismic Design Categories D0, D1 and D2 masonry stem walls without solid grout and vertical reinforcing are not permitted.

Replace Figure R403.1(1) as follows:



W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
e. SEE FIGURE R403.1(2) FOR ADDITIONAL FOOTING REQUIREMENTS FOR STRUCTURES IN SDC D0, D1 AND D2 AND TOWNHOUSES IN SDC C
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(1)
PLAIN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS ~~OM~~ IN SDC A, B AND C ~~D_0, D_1 AND D_2~~ [a,b,c,d,e,f,g]



W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1.3 ~~(2)~~
REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D_O, D_1 AND D_2 [a,b,c,d,e,f,g]

FIGURE R403.1(2) ~~R403.1(3)~~
PERMANENT WOOD FOUNDATION BASEMENT WALL SECTION

FIGURE R403.1(3) ~~R403.1(4)~~
PERMANENT WOOD FOUNDATION CRAWL SPACE SECTION

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

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

Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks on each end shall be provided in accordance with Figure R403.1.3 ~~(2)~~, detail 2. Standard hooks shall comply with Section R611.5.4.5.

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committee's concerns. The code development committee thought the details added a lot of understanding but found a few minor flaws:

1. The title of Figure R403.1(1) was corrected to reflect that the details apply to SDC A,B and C only.

2. The numbering in the second figure was changed to reflect that the details apply to Section R403.1.3 for SDC D_0, D_1 and D_2 .

3. The appropriate figure references have been provided in Section R403.1.1 and R403.1.3.

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R403.1.3, R403.1.3.1, R403.1.3.2, R403.1.3.5 (NEW), R403.1.3.5.1 (NEW), R403.1.3.5.2 (NEW), R403.1.3.5.3 (NEW), R403.1.3.5.4 (NEW), R403.1.3.6 (NEW), R403.1.4.2

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

R403.1.3 ~~Seismic reinforcing~~ Footing and stem wall reinforcing in Seismic Design Categories D_0, D_1 and D_2 . Concrete footings located in Seismic Design Categories D_0, D_1 and D_2, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this section. ~~Bottom r~~Reinforcement shall be ~~located~~ installed in accordance with Section R403.1.3.5. ~~a minimum of 3 inches (76 mm) clear from the bottom of the footing.~~

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

~~In Seismic Design Categories D_0, D_1 and D_2 where a grouted masonry stem wall is supported on a concrete footing and stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing and have a standard hook. In Seismic Design Categories D_0, D_1 and D_2 masonry stem walls without solid grout and vertical reinforcing are not permitted.~~

> ~~**Exception:** In detached one- and two-family *dwellings* which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.~~

~~**R403.1.3.1 Foundations with stemwalls.** Foundations with stem walls shall have installed a minimum of one No. 4 bar within 12 inches (305 mm) of the top of the wall and one No. 4 bar located 3 inches (76 mm) to 4 inches (102 mm) from the bottom of the footing.~~

R403.1.3.1 Concrete stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a construction joint is created between a concrete footing and a concrete stem wall, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to the bottom of the footing and shall have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the stem wall and one No. 4 horizontal bar shall be located three to four inches from the bottom of the footing.

R403.1.3.2 Masonry stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a masonry stem wall is supported on a concrete footing, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to the bottom of the footing and have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the wall and one No. 4 horizontal bar shall be located three to four inches from the bottom of the footing. Masonry stem walls shall be solid grouted.

~~R403.1.3.2~~ **R403.1.3.3 Slabs-on-ground with turned-down footings.** In Seismic Design Categories D_0, D_1 and D_2, Slabs on ground cast monolithically with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing or one No. 5 bar or two No. 4 bars in the middle third of the footing depth..

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

Where the slab is not cast monolithically with the footing~~,~~ one No. 3 or larger vertical dowels with standard hooks on each end shall be ~~provided~~ installed at not more than 4 feet (1219 mm) on center in accordance with Figure R403.1.3.2 . Standard hooks shall comply with Section R611.5.4.5.

~~**R403.1.4.2 Seismic conditions**~~ **R403.1.3.4 Interior bearing and braced wall panel footings in Seismic Design Categories D_0, D_1 and D_2.** In Seismic Design Categories D_0, D_1 and D_2, interior footings supporting bearing walls or *braced wall panels,* ~~bracing walls~~ and cast monolithically with a slab on *grade*~~,~~ shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

R403.1.3.5 Reinforcement. Footing and stem wall reinforcement shall comply with Sections R403.1.3.5.1 through R403.1.3.5.4.

R403.1.3.5.1 Steel reinforcement. Steel reinforcement shall comply with the requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from rail steel shall be Type R. In buildings assigned to Seismic Design Category A, B or C, the minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). In buildings assigned to Seismic Design Category D0, D1 or D2, reinforcing steel shall comply with the requirements of ASTM A 706 for low-alloy steel with a minimum yield strength of 60,000 psi (Grade 60) (414 MPa).

R403.1.3.5.2 Location of reinforcement in wall. The center of vertical reinforcement in stem walls shall be located at the centerline of the wall. Horizontal and vertical reinforcement shall be located in footings and stem walls to provide the minimum cover required by Section R403.1.3.5.3.

R403.1.3.5.3 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1-1/2 inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be 3/4 inch (19 mm). The minus tolerance for cover shall not exceed the smaller of one-third the required cover or 3/8 inch (10 mm).

R403.1.3.5.4 Lap splices. Vertical and horizontal reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table R611.5.4.(1) and Figure R611.5.4(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm). See Figure R611.5.4(1).

R403.1.3.6 Isolated concrete footings. In detached one- and two-family *dwellings* which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. This proposal specifically addresses conflicts and confusing language in the current sections of code that address reinforcement required for Seismic Design Categories D0, D1 and D2.

The title and language in section R403.1.3 is changed for clarity. Additionally, a note is added that references a new section, R403.1.3.4, that defines the installation requirements for the reinforcement.

The existing language describing concrete stem walls and masonry stem walls on concrete footings are separated into two sections, "Concrete stem walls" and "Masonry stem walls" respectively.

Section R403.1.3.1 describes the existing requirements for the horizontal reinforcement at the top of the stem wall and the bottom of the footing. This proposal deletes that section and incorporates the language into the two sections describing the requirements for the stem wall, R403.1.3.1 and R403.1.3.2 respectively.

The language in the existing section R403.1.3.2 for slabs on ground is changed to clarify that this section is addressing turned down footings cast monolithically with the slab since there are new provisions in the code to allow turned down footings that are not cast monolithically with the slab. Also, the existing exception for the reinforcement to be installed in the middle third of the footing have been moved into the section instead of being an exception.

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

R403.1.3-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal needs additional work and brought back. An inappropriate standard, ASTM A706 is referenced in R403.1.3.5.1. Sections R403.1.3.1 and R403.1.3.2 require vertical bars to extend to the bottom of the footing and no clearance is specified.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.1.3 Footing and stem wall reinforcing in Seismic Design Categories D_0, D_1 and D_2 . Concrete footings located in Seismic Design Categories D_0, D_1 and D_2, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this section. Reinforcement shall be installed <u>with support and cover</u> in accordance with Section R403.1.3.5.

R403.1.3.1 Concrete stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a construction joint is created between a concrete footing and a concrete stem wall, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall <u>have a standard hook and</u> extend to the bottom of the footing and shall <u>have support and cover as specified in Section R403.1.3.5.3.</u> ~~a standard hook~~ and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the stem wall and one No. 4 horizontal bar shall be located at the bottom of the footing.

R403.1.3.2 Masonry stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a masonry stem wall is supported on a concrete footing, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall <u>have a standard hook and</u> extend to the bottom of the footing <u>and shall have support and cover as specified in Section R403.1.3.5.3.</u>~~and have a standard hook.~~ and extend a minimum of 14 inches (357 mm) into the stem wall.

Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the wall and one No. 4 horizontal bar shall be at the bottom of the footing. Masonry stem walls shall be solid grouted.

R403.1.3.3 Slabs-on-ground with turned-down footings. In Seismic Design Categories D_0, D_1 and D_2, Slabs on ground cast monolithically with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing or one No. 5 bar or two No. 4 bars in the middle third of the footing depth.

Where the slab is not cast monolithically with the footing, one No. 3 or larger vertical dowels with standard hooks on each end shall be installed at not more than 4 feet (1219 mm) on center in accordance with Figure R403.1(1). Standard hooks shall comply with Section R611.5.4.5.

R403.1.3.4 Interior bearing and braced wall panel footings in Seismic Design Categories D_0, D_1 and D_2. In Seismic Design Categories D0, D1 and D2, interior footings supporting bearing walls or *braced wall panels* and cast monolithically with a slab on *grade* shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

R403.1.3.5 Reinforcement. Footing and stem wall reinforcement shall comply with Sections R403.1.3.5.1 through R403.1.3.5.4

R403.1.3.5.1 Steel reinforcement. Steel reinforcement shall comply with the requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from rail steel shall be Type R~~. In buildings assigned to Seismic Design Category A, B or C, t~~The minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). ~~In buildings assigned to Seismic Design Category D0, D1 or D2, reinforcing steel shall comply with the requirements of ASTM A 706 for low-alloy steel with a minimum yield strength of 60,000 psi (Grade 60) (414 MPa).~~

R403.1.3.5.2 Location of reinforcement in wall. The center of vertical reinforcement in stem walls shall be located at the centerline of the wall. Horizontal and vertical reinforcement shall be located in footings and stem walls to provide the minimum cover required by Section R403.1.3.5.3.

R403.1.3.5.3 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1-1/2 inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be 3/4 inch (19 mm). ~~The minus tolerance for cover shall not exceed the smaller of one-third the required cover or 3/8 inch (10 mm).~~

R403.1.3.5.4 Lap splices. Vertical and horizontal reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table R611.5.4(1) and Figure R611.5.4(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm). See Figure R611.5.4(1).

R403.1.3.5 Isolated concrete footings. In detached one- and two-family *dwellings* which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.

Commenter's Reason: The ICC Building Code Action Committee (BCAC) identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. The original proposal specifically addressed conflicts and confusing language in the current sections of code that address reinforcement required for Seismic Design Categories D0, D1 and D2. The items that were intended to be addressed are listed in the original reason statement.

There were some items about the original proposal that were brought up at the Committee Action Hearings and this public comment addresses those items.

1. There was an inaccurate reference to ASTM A706 standard in R403.1.3.5.1. This language is not new in the code. The new section (R403.1.3.5.1) in the proposal specifying the reinforcement materials was copied from the existing section R404.1.2.3.7. The portions of the section that are deleted from R403.1.3.5.1 in this public comment should not have been copied over.

2. The Report of Hearings also stated that in Sections R403.1.3.1 and R403.1.3.2 the proposed language merely specified that ***"…the vertical bars to extend to the bottom of the footing and no clearance is specified."*** This was intentional in the original proposal. The original language in this section specified that*, "The vertical bar shall extend to 3 inches (76mm) clear of the bottom of the footing…"* In section R403.1.3.1 it stated that footings shall have *"…one No. 4 bar located 3 inches (76mm) to 4 inches (102mm) from the bottom of the footing."* There were no other clearances specified such as to the formwork or where the concrete will not be exposed to earth or weather. These clearances are defined in ACI standards and also currently exist in R404.1.2.3.7.4. The original proposal removed the one specific clearance requirement and added a new section, copied from R404.1.2.3.7.4, to cover all clearances and support. This new section is referenced in the charging statement in R403.1.3 and applies to all the sections that follow.

RB216-13

Final Action: AS AM AMPC____ D

RB219-13
R403.1.6

Proposed Change as Submitted

Proponent: Hope Medina, Colorado Code Consulting, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. <u>The bolts shall be located a minimum 1 ¾" from the plate's edge or in the middle third of the plate's edge.</u> A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.
2. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall panels* shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).
3. Connection of walls 12 inches (305 mm) total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).

Reason: It has become a common occurrence to see an anchor bolt placed at the edge of the sole plate, and on many occasions the threads of the bolt are visible. The "practicing industry standard" is for the bolt to be located at least two bolt diameters from the plate's edge, but there is nothing in the IRC to govern this. We require two bolts per plate, within 12" of a break, and spaced no more than 6 feet apart, but nothing plainly referencing it's placement from the plates edge. Having a specified placement of the bolt in the bottom plate allows for proper enforcement while still giving some flexibility to the contractors.
Simpson Strong Tie has performed tests demonstrating that the bolt lost the expected anchoring capacity when placed closer than 1 ¾" from the plate's edge.

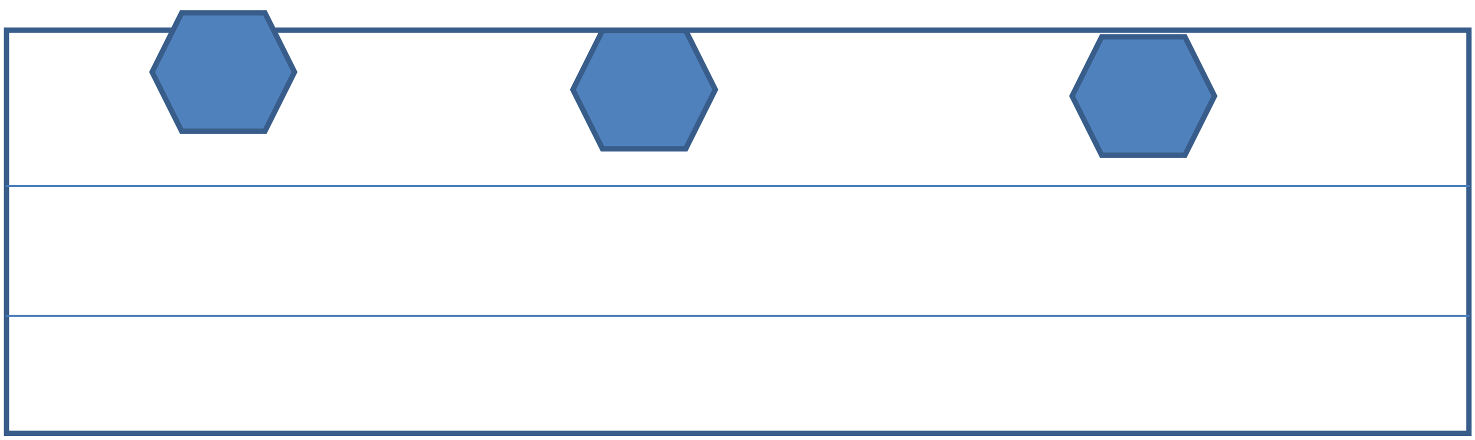
Both the Simpson Strong Tie Wood Construction Connectors 2011-2012 edition and the USP Structural Connectors state that their connectors must have a minimum placement of 1 ¾ inches from the edge.
The IRC reference the NDS for wood design for items not covered in the code like wood edge and end distances. The 2012 NDS has edge distance of ¾" for shear and 2" for wind loads (Table 11.5.1C). So if the edge distance is 1-1/8" you would need to reduce the anchor capacity with an 0.56 allowable load adjustment factor (1.125/2) when resisting wind loads. So you can space in the middle 1/3 of plate, but you may need to increase the number of bolts for wind.

In chapter 7 of the National Design Specifications for wood construction reference of anchor bolt placement.

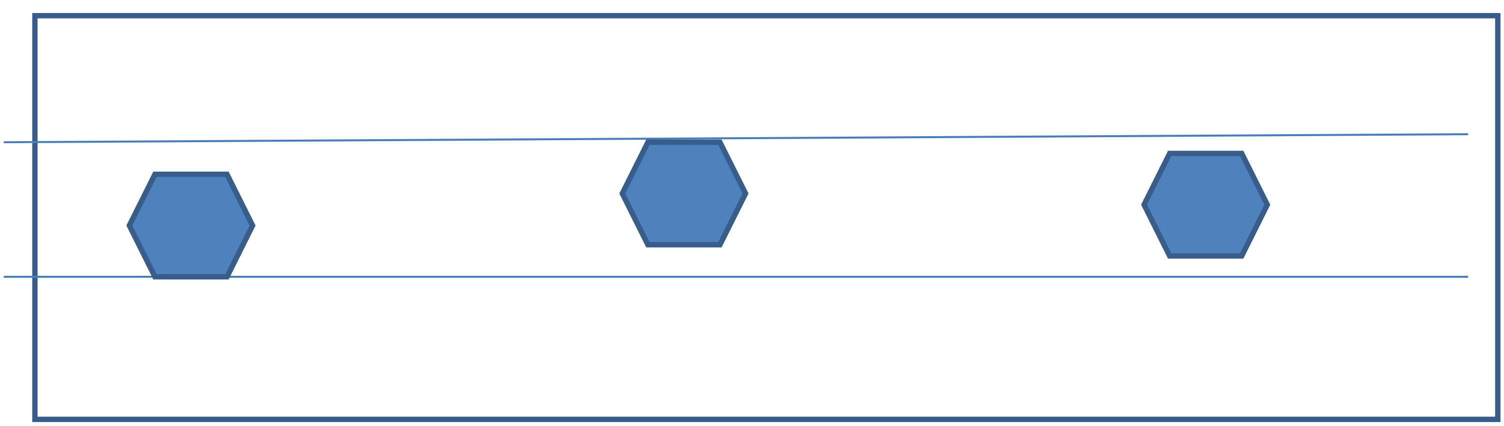
Spacing, Edge, and End Distance

The center-to-center distance along the grain should be at least four times the bolt diameter for parallel-to-grain loading. The minimum center-to-center spacing of bolts in the across-the-grain direction for loads acting through metal side plates and parallel to the grain need only be sufficient to permit the tightening of the nuts. For wood side plates, the spacing is controlled by the rules applying to loads acting parallel to grain if the design load approaches the bolt-bearing capacity of the side plates. When the design load is less than the bolt-bearing capacity of the side plates, the spacing may be reduced below that required to develop their maximum capacity.

COMMON PLACEMENT OF BOLTS IN THE FIELD



PROPER PLACEMENT OF BOLTS WITH CODE CHANGE



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

R403.1.6-RB-MEDINA.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. The bolts shall be located ~~a minimum 1 ¾" from the plate's edge or~~ in the middle third of the plate~~'s edge~~. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

(Portions of code change not shown remain unchanged)

Committee Reason: Approval was based upon the proponent's published reason. The modification clarifies the location of the anchor bolt relative to the middle third of the plate.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Hope Medina, Cherry Hills Village, representing Colorado Code Consulting, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. The bolts shall be located in the middle third of the width of the plate. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.
2. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall panels* shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).
3. Connection of walls 12 inches (305 mm) total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).

Commenter's Reason: The addition of the word width was added to circumvent any misunderstandings of where the middle third of the plate is located

RB21913

Final Action: AS AM AMPC____ D

RB224-13
202

Proposed Change as Submitted

Table R404.1.1(1)

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates, Inc., representing self (skerr@jwa-se.com)

Revise as follows:

TABLE R404.1.1(1)
PLAIN MASONRY FOUNDATION WALLS

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT[c] (feet)	PLAIN MASONRY[a] MINIMUM NOMINAL WALL THICKNESS (inches)		
		Soil classes[b]		
		GW, GP, SW and SP	GM, GC, SM, SM-SC and ML	SC, MH, ML-CL and inorganic CL
5	4	6 solid[d] or 8	6 solid[d] or 8	6 solid[d] or 8
	5	6 solid[d] or 8	8	8
6	4	6 solid[d] or 8	6 solid[d] or 8	6 solid[d] or 8
	5	6 solid[d] or 8	8	10
	6	8	10	12
7	4	6 solid[d] or 8	8	8
	5	6 solid[d] or 8	10	10
	6	10	12	10 solid[d]
	7	12	10 solid[d]	12 solid[d]
8	4	6 solid[d] or 8	6 solid[d] or 8	8
	5	6 solid[d] or 8	10	12
	6	10	12	12 solid[d]
	7	12	12 solid[d]	Footnote e
	8	10 ~~solid~~grout[d]	12 ~~solid~~ grout[d]	Footnote e
9	4	6 ~~solid~~grout[d] or 8 solid[d] or 12	6 ~~solid~~grout[d] or 8 solid[d]	8 grout[d] or 10 solid[d]
	5	~~8~~ 6 grout[d] or 10 solid[d]	~~10~~8 grout[d] or 12 solid[d]	~~12~~8 grout[d]
	6	~~10~~ 8 grout[d] or 12 solid[d]	~~12~~10 grout[d]	~~12 solid~~10 grout[d]
	7	~~12~~ 10 grout[d]	~~12 solid~~10 grout[d]	12 grout~~Footnote e~~
	8	~~12 solid~~10 grout[d]	12 grout~~Footnote e~~	Footnote e
	9	12 grout~~Footnote e~~	Footnote e	Footnote e

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 Pa.

a. Mortar shall be Type M or S and masonry shall be laid in running bond. Ungrouted hollow masonry units are permitted except where otherwise indicated.
b. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
c. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
d. Solid indicates solid masonry unit, grout indicates grouted hollow units~~ or solid masonry units~~.
e. Wall construction shall be in accordance with either Table R404.1.1(2), Table R404.1.1(3), Table 404.1.1(4), or a design shall be provided.

Reason: For plain masonry walls with a maximum height of 9 ft., all backfill depths, and 8ft. tall walls with 8ft. of backfill, the wall construction limitations of Table R404.1.1 (1) exceed the prescriptive requirements of TMS 402/ACI 530/ASCE 5 section 5.6.3 and

Table 5.6.3.1. For these specific walls, when analyzed in accordance with TMS 402/ACI 530/ASCE 5, using the allowable flexural tensile stresses in Table 2.2.3.2, the values shown in Table R404.1.1 (1) cannot be justified. The proposed change is to make the values shown in Table R404.1.1 (1) compliant with the prescriptive and analytical requirements of TMS 402/ACI 530/ASCE 5.

It should be noted that in Table R404.1.1 (1) footnote d currently lumps solid grouted hollow units with solid masonry units. However, in both TMS 402/ACI 530/ASCE 5 Tables 5.6.3.1 and 2.2.3.2 the limitations of solid units are less than those of solid grouted hollow units. Depending on the type of mortar, the capacity from Table 2.2.3.2 for solid units is either 62% or 40% the capacity of solid grouted hollow units.

With this proposal the IRC table for plain masonry wall will meet the requirements found in the referenced standard.

Cost Impact: The cost of construction for 8ft and 9ft tall plain masonry walls will slightly increase. The cost increase will primarily only impact the 8ft and 9ft walls where solid masonry units are currently specified.

R404.1.1(1)T-RB-KERR.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: There was no technical justification provided that there have been any wide spread failures of 8 ft or 9 ft hollow masonry walls.

Assembly Action: Approved as Submitted

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted.

RB228-13
R202, R404.1.3, R404.4

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when either of the following conditions exists:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top ~~or~~ <u>and</u> bottom.

R404.4 Retaining walls. Retaining walls that are not laterally supported at the top and that retain in excess of ~~24~~ <u>48</u> inches (610 mm) of unbalanced fill<u>, or retaining walls exceeding 24 inches in height that resist lateral loads in addition to soil,</u> shall be designed <u>in accordance with accepted engineering practice</u> to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning

Revise definition as follows:

WALL, RETAINING. A wall not laterally supported at the top, that resists <u>only</u> lateral ~~soil~~ load<u>.</u> ~~and other imposed loads.~~

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. This proposal specifically addresses conflicts and confusing language for when a design is required in Section R404.1.3 and retaining walls in Section R404.4.

Section R404.1.3 specifically requires that walls supporting more than 48 inches of unbalanced fill and not laterally supported require an engineered design. Section R404.4 addresses the same walls where they are not supported at the top but states that a design is required when the height of the unbalanced fill exceeds 24 inches. The two sections are in direct conflict. This proposal changes the trigger height in R404.4 to 48 inches to be consistent with other sections of the code.

In addition, this proposal clarifies, in R404.1.3 that the lateral support is required at the top **and** bottom. The definition of "WALL, RETAINING" is modified to be consistent with the intent of section R404.4. The type of wall addressed in R404.4 is a self-standing retaining wall that is not supported at the top and is laterally supported at the bottom against sliding and overturning by a factor of 1.5. This type of wall would typically be a site retaining wall where it is primarily resisting only lateral soil loads. The definition is modified to clarify that this type of wall is not intended to support structural loads. A similar wall that does support structural loads would be addressed by other sections.

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

R404.4-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: It is unclear whether the change would prohibit temporary bracing. There are inconsistencies within the text. The committee prefers the current definition of retaining wall.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R404.4 Retaining walls. Retaining walls that are not laterally supported at the top and that retain in excess of ~~24~~ 48 inches (610 mm) of unbalanced fill, or retaining walls exceeding 24 inches in height that resist lateral loads in addition to soil, shall be designed in accordance with accepted engineering practice to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning. This section shall not apply to foundation walls supporting buildings.

Commenter's Reason: The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. The original proposal specifically addressed conflicts and confusing language for when a design is required in Section R404.1.3 and retaining walls in Section R404.4.

Based on comments received, the proposed change to the language in section R404.1.3 may, in some cases, cause further confusion and misapplication. This public comment removes the proposed changes to that section and it will remain as it currently is in the 2012 code. This public comment replaces the original proposal and only modifies section R404.4 to be consistent with other provisions in the code that allow a concrete or masonry wall supporting not more than 48 inches of backfill to be constructed without an engineered design . If the wall resists lateral loads in addition to soil, such as vehicle surcharges and fences built on top of the wall that are subject to wind loads, the height of the unbalanced fill is then limited to 24 inches as currently stated in the code.

Also, in the original proposal there was a proposed modification to the definition of RETAINING WALL. This public comment removes the suggested change and leaves the definition as it currently exists.

At the Committee Action Hearings, there was a question raised about this proposal prohibiting temporary bracing. The concern is not germane to the proposed code revision. The code does not specify requirements or limitations on how structures are braced or supported during construction. Those specifications and requirement are specified and regulated by agencies or organizations whose specific purpose is for construction site and worker safety such as OSHA. Nothing is specified requiring or prohibiting temporary bracing or shoring during construction.

RB228-13

Final Action: AS AM AMPC____ D

RB236-13
R501.3

Proposed Change as Submitted

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies ~~located directly over a space~~ in dwellings protected throughout by an automatic sprinkler system in accordance with Section P2904~~,~~ or NFPA13D~~,~~. ~~or other approved equivalent sprinkler system.~~
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
    3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
    3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Reason: In several areas where the IRC is adopted, Section 501.3 Exception #1 "…or other approved equivalent sprinkler system." is interpreted to permit the dwelling unit to only have a partial residential sprinkler "system" installed in the unprotected ceiling space, i.e. only fire sprinklers in the basement ceiling. This was not the intent of the authors of this text in the previous code cycle.

A residential fire sprinkler system designed according to NFPA 13D and/or P2904 is considered "sprinklered throughout" and does not have criteria or rules for partial systems. When a partial system is installed, it would violate not only the standards for installation, but the very requirement that mandated the system in the first place, Exception #1 of Section 501.3.

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

R501.3-RB-HUGO.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that Section P2904 permits a partial system and other approved systems needs to be retained.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jeffrey M. Hugo, CBO representing National Fire Sprinkler Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies in dwellings protected throughout by an automatic sprinkler system in accordance with Section P2904, ~~or~~ NFPA13D, <u>or other approved equivalent sprinkler system</u>.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Commenter's Reason: Sprinkler systems installed according to NFPA 13D and P2904 are intended to be installed throughout the dwelling unit. Both NFPA 13D and P2904 have areas that are exempt from sprinklers, but neither of these standards have any provisions or rules for partially installed systems, including a partial system protecting a lightweight floor system.

It is contrary to draft code language that directs a user to a standard that does not have the provisions for which the code language is requiring. For this section to offer an exception for an incomplete system is not an exception and this puts the code official, the jurisdiction, and more importantly the occupants in the home at risk.

This public comment retains the committee's desire to keep the "other approved equivalent sprinkler system" language.

RB236-13

Final Action: AS AM AMPC____ D

RB237-13
R501.3

Proposed Change as Submitted

Proponent: Sean DeCrane, Cleveland Division of Fire, representing Cleveland Division of Fire/ International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistant rated, shall be provided with a ½-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of the floor assembly can be unprotected when complying with the following:
   3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story.
   3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, ~~or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: This author was the original proponent of the current language in the IRC and appreciates the assistance of the representatives from NAHB and the American Wood Council who worked hard to place this language in the code providing additional protection to the responding fire fighters and the residents occupying these occupancies.

Since passage of this language it has become apparent there is cause for concern in portions of the language. One serious concern that has been demonstrated through additional testing at Underwriters Laboratories involves the language in Exception 4 permitting the use of *other approved floor assemblies demonstrating equivalent fire performance*. While this language was placed in the body of the code its intent was to allow the equivalency for a protected floor assembly. The language in Exception 4 allows the equivalency to an unprotected floor assembly.

We also want to ask the question, demonstrating the equivalent performance by what Standard? If it is to the ASTM E 119 Standard the ICC-ES has already permitted a deviation from a true E 119 test. In recent hearings, despite testimony to the contrary and evidence that the decision was based on misrepresented numbers the ICC –ES permits the reduction of the applied load to 50% of the design load, submitted as AC 14. A proponent is also not required to test a full assembly; simply testing two joists would be permitted.

There is a great concern on the reduction of the applied load. Further testing completed at Underwriters Laboratories has demonstrated the importance the applied load and the misrepresentation of true performance under fire conditions. I have provided a link at the bottom where the UL Tests reports can be accessed in detail.

The results of the original UL furnace testing on the performance of lightweight floor systems was instrumental in demonstrating the concern on the lack of performance in fire conditions of specific engineered products. Just a short recap, with a modified load of 40 lb/ft² on two sides of the floor system and two 300 pound fire fighter mannequins' tests results demonstrated:

- Unprotected 2 x 10 Dimensional Lumber collapsed at 18:45.
- Unprotected 16" I-Joists collapsed at 6:03.
- The use of ½" gypsum wallboard as protection allowed the 2 x 10 Dimensional to collapse at 44:45.
- The use of ½" gypsum wallboard as protection allowed the 16" I-Joist to collapse at 26:45.

A substantial improvement was realized simply by adding the gypsum board.

Let us now review recent test results conducted in the ASTM E 119 Standard test furnace. This report was issued in 2011 prior to the ICC-ES hearing. In the follow up tests there was an attempt to replicate test results for consistency plus there had been discussions on how some of the floor systems were not tested to a true E 119 test standard of 100% design load. The question would be; how would the applied load impact the performance of the floor? As you can clearly realize below, the test load has a direct impact on time performance.

- A 16" I-Joist floor assembly unprotected with a full design load collapsed at 2:02, a full four minutes earlier than the previous test to a modified load;
- A 2 x 10 dimensional lumber floor assembly with a full design load collapsed at 7:00, a full eleven minute difference to a modified load;
- A potential "equivalent" floor protection system (Intumescent paint) was tested to a modified load (40 lb/ft² on two sides and fire fighters in the middle) collapsed at 8:40. We saw a reduction in performance with the full load applied to the 2 x 10 dimensional lumber. What is the true performance when subjected to a full load? We will not know as the equivalency requirements allow the reduce test parameters including small samplings. (Test report language and timeline are listed below).

"Experiment 5 examined an engineered I-joist floor assembly with a spray applied fire retardant coating and the modified loading configuration (Figure 61 and Figure 62). The floor assembly failed at 8:40 after ignition. Observations made during the experiment of the exposed and unexposed sides of the floor assembly are detailed in Table 17. The average furnace temperature during the experiment followed the standard curve closely until approximately 6 minutes when the floor system was involved in flames (Figure 63).

The furnace pressure and oxygen concentration measured in the furnace are presented in Figure 64 and Figure 65 respectively. The pressure remained between -0.3 in. w.c. and 0.6 in. w.c. but fluctuated around 0 for most of the experiment. The oxygen concentration fluctuated and then decreased to less than 5 % by 7 minutes and remained at or below that concentration until collapse." [1]See UL Report Fire Service Collapse Hazard Floor Furnace Experiments.

Exp. Time, Min:Sec	Surface Observations
1:15	Crackling could be heard and smoke was present at West edge.
2:00	More frequent crackling could be heard.
2:00	Too dark to seen in furnace.
3:10	Crackling and smoke ceased.
3:45	Crackling and smoke started again.
4:00	Material on joists began to lighten in color and started to crack.
4:15	More intense smoke and crackling was present.
4:45	Significant flaming could be seen from first two joist bays on the north end of the assembly.
5:10	Crackling continued.
6:00	Smoke from subfloor joints was present.
6:00	Joist orange in color and looked like charring wood.
6:45	Significant flaming over entire exposed surface.
7:00	Kneeling mannequin began to vibrate vertically.
7:30	Entire assembly began to deflect into the furnace.
7:30	Vision obscured by fall off material circulating throughout the furnace.
8:10	Larger vertical vibrations could be seen on both mannequins.
8:15	Noticeable deflection could be seen at the centerline of the assembly.
8:30	Joist webs started to burn through.
8:40	Structural failure.

In recent years the fire service has become concerned on the performance of "modern" lumber and the use of engineered trees to produce lumber in a shorter time frame. While the elimination of this code language does not address this concern it does require manufacturers to produce products that will be tested and compared to a protected floor assembly as opposed to an unprotected floor. There is currently a proposal to ICC-ES, at the time of this submission, AC 450, to consider the approval of the use of an intumescent product, eerily similar to the test parameters of Test #5. The previous approval of AC 14 now allows the reduced floor assembly and test load in the comparable.

As we have demonstrated the concern in allowing reduced test parameters to address equivalencies in structural floor systems. We believe we should be using equivalencies to meet protected floor systems. The other question we would like to present would be what is the expected equivalent performance? Is it the 2 x 10 dimensional lumber's performance to a 100% design load? We saw a test performance of seven minutes, very close to the performance time of lightweight systems in the original tests that moved the ICC membership to require the protection of these floor systems. This is a question yet to be truly answered by the current language and that is why the membership must remove the equivalency language in Exception 4.

Traditionally the International Residential Code has been a prescriptive code. While the intent of this code language was not to promote gypsum board specifically we must ensure any substitute for a known consistent protection feature be held to a comparative Standard of performance to ensure consistency and safety.
http://www.ul.com/global/documents/offerings/industries/buildingmaterials/fireservice/basementfires/2009%20NIST%20ARRA%20Appendix%20B%20-%20Fire%20Service%20Collapse%20Hazard%20Floor%20Furnace%20Experiments.pdf

[1.] Underwriters Laboratories,
http://www.ul.com/global/eng/pages/offerings/industries/buildingmaterials/fire/fireservice/smokeparticulates/

Cost Impact: This proposal may or may not increase costs depending on cost of equivalent product.

R501.3-RB-DECRANE.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels it is important to keep the requirement that permits approved assemblies with equivalency to 2x10 lumber.

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 Division of Fire, representing International Association of Fire Fighters, requests Approval as Submitted.

Commenter's Reason: We are requesting this proposal to be Approved As Submitted. Since this section was approved in the Residential Code there has been some question as to the equivalency that is required. We require the protection of the lightweight assemblies that have been demonstrated to fail early in fire conditions due to the dangers to the occupants of these homes and also the responding fire fighters.

The code requires the installation of gypsum board to protect the floor assemblies, not because of industry influence but rather it is a proven product that has demonstrated its performance in many tests and real conditions. We encourage other industries to develop products that can meet the equivalency performance. Additional products are coming to the marketplace as we speak. The challenge to the AHJ is to identify which products meet the equivalency performance requirements. By placing this language in Exception 4 it has caused some confusion for officials. Currently manufacturers can meet the equivalency performance by going through Chapter 1. This requires manufacturers to take the proper steps of going through a recognized Evaluation Service to have their product reviewed, judged and properly evaluated for performance.

Some may say this is common sense but there are individuals who have proposed products that can meet ASTM E 84 flame spread performances and advocate this E 84 performance as the equivalency of a load bearing test such as the ASTM E119/UL 263 test. There are also individuals who have proposed Engineering Evaluations advocating Metal Plated Connected Wood Truss performs the equal to dimensional lumber. This despite the poor performance of a 3 minute 58 second collapse time, from ignition, in a full scale test at UL and NIST sponsored test.

By removing the equivalency from Exception 4 and requiring manufacturers to achieve their equivalency through the performance requirements in Chapter 1 we can provide the proper guidance to local AHJ's who are looking for assistance in determining products that have truly been evaluated properly for performance claims and can be installed in the field.

Public Comment 2:

J. William Degnan, President, National Association of State Fire Marshals, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistant rated, shall be provided with a ½-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of the floor assembly can be unprotected when complying with the following:
   3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story.
   3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension.
5. <u>Other approved floor assemblies demonstrating equivalent fire performance.</u>

Commenter's Reason: The committee disapproved the proposal because the committee felt "it is important to keep the requirement that permits approved assemblies with equivalency to 2X10 lumber".

The proponent pointed out to the committee that while the language had intended to allow an equivalency for a protected floor assembly, the exception in its present form allows the equivalency to an unprotected floor assembly. The proponent went further by pointing out the defects of the current language based on UL conducted tests but in spite of these tests, the committee felt that it was important to keep the requirement. If so, then this modification would correctly format the exception to cause the approval to be based on or compared to the charging section and not exception #4. Furthermore, as asked by the proponent, to what standard is the equivalency to 2X10 lumber to be determined?

RB237-13

Final Action: AS AM AMPC____ D

RB240-13
R501.3

Proposed Change as Submitted

Proponent: Thomas Peterson, Box Elder County, representing Utah Chapter of ICC (tpeterson@boxeldercounty.org)

Delete without substitution as follows:

~~**R501.3 Fire protection of floors.** Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a $^{1}/_{2}$-inch (12.7 mm) gypsum wallboard membrane, $^{5}/_{8}$-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.~~

~~**Exceptions:**~~

1. ~~Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.~~
2. ~~Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.~~
3. ~~Portions of floor assemblies can be unprotected when complying with the following:~~
   - ~~3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story~~
   - ~~3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.~~
4. ~~Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: The code reference is not needed as one of the exceptions of requiring the fire protection of floors is that an NFPA 13D system be installed. NFPA 13D systems are required by Section R313 of this code in all structures. Section R501.3 is not applicable and should be removed from the code to prevent confusion of what is required.

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

R501.3-RB-PETERSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this section should be retained. This section is needed where jurisdictions amend out the sprinkler requirements.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Thomas Peterson, Box Elder County, UT, representing self, requests Approval as Submitted.

Commenter's Reason: The committee's reason for disapproving this code change was because a jurisdiction "may" amend out the requirement for fire suppression systems. This code should not be written to require things that may cover what some jurisdictions may or may not amend out. We are opening Pandora's Box by allowing the code to have requirements "just in case" certain jurisdictions amend out a code requirement. If that many jurisdictions are amending out the requirement for fire suppression then maybe that needs to be removed instead. If that were the case then this section would make perfect sense.

RB240-13

Final Action: AS AM AMPC____ D

RB241-13
R502.1 (NEW), R502.1.1, R502.1.1.1, R502.1.2, R502.2.2 (NEW)

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R502.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

~~**R502.1**~~ **R502.1.1** ~~**Identification**~~**. Sawn Lumber.** ~~Load-bearing dimension~~ Sawn lumber ~~for joists, beams and girders~~ shall be identified by a grade *mark* of ~~a~~ an accredited lumber grading or inspection agency ~~that has been *approved* by~~ and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade *mark*, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

~~**R502.1.1**~~ **R502.1.1.1 Preservative-treated lumber.** Preservative treated dimension lumber shall also be identified as required by Section R317.2.

~~**R502.1.2 Blocking and subflooring.** Blocking shall be a minimum of utility grade lumber. Subflooring may be a minimum of utility grade lumber or No. 4 common grade boards.~~

R502.2.2 Blocking and subflooring. Blocking for fastening panel edges or fixures shall be a minimum of utility grade lumber. Subflooring shall be a minimum of utility grade lumber or No. 4 common grade boards. Fireblocking shall be of any grade lumber.

Reason: The change is intended to clarify the process by which lumber design values are certified and recognized in the code. The current process, which has been used since 1970, relies on the internationally recognized U.S. Department of Commerce Voluntary Product Standard PS20. Because the current format of the section can be incorrectly interpreted to place a number of wood products under the identification requirements of PS20, a new format is proposed that clearly states this standard is only for sawn lumber. The format proposed is nearly identical to what is used in Section 2302 of the International Building Code. Wood products other than sawn lumber have unique manufacturing standards, design value development, and quality control criteria. This new format clarifies that these other wood products must comply with specific product standards.

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

R502.1 (NEW)-RB-PITTS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that proposed Section R502.2.2 would prohibit WSP for subflooring.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R502
WOOD FLOOR FRAMING

R502.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

R502.1.1 Sawn Lumber. Sawn lumber shall be identified by a grade *mark* of an accredited lumber grading or inspection agency and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade *mark*, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

R502.1.1.1 Preservative-treated lumber. Preservative treated dimension lumber shall also be identified as required by Section R317.2.

~~R502.1.3~~ R502.1.1.2 End-jointed lumber. *Approved* end-jointed lumber identified by a grade *mark* conforming to Section R502.1 may be used interchangeably with solid-sawn members of the same species and grade. End-jointed lumber used in an assembly required elsewhere in this code to have a fire-resistance rating shall have the designation “Heat Resistant Adhesive” or “HRA” included in its grade mark.

~~R502.1.4~~ R502.1.2 Prefabricated wood I-joists. Structural capacities and design provisions for prefabricated wood I-joists shall be established and monitored in accordance with ASTM D 5055.

~~R502.1.5~~ R502.1.3 Structural glued laminated timbers. Glued laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1 and ASTM D 3737.

~~R502.1.6~~ R502.1.4 Structural log members. Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade *mark* of an *approved* lumber grading or inspection agency. In lieu of a grade *mark* on the material, a certificate of inspection as to species and grade issued by a lumber-grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.

~~R502.1.7~~ R502.1.5 Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D 5456.

RELOCATE THE FOLLOWING SECTION:

R502.2.2 Blocking and subflooring. Blocking for fastening panel edges or fixtures shall be a minimum of utility grade lumber. Subflooring shall be a minimum of utility grade lumber, ~~or~~ No. 4 common grade boards, or wood structural panels as specified in Section R503.2. Fireblocking shall be of any grade lumber.

Commenter’s Reason: RB241-13 was one of three proposals intended to be format changes to clarify the application of DOC PS20, and there was no intent to make technical changes in any of them. The other two proposals – RB269-13 and RB393-13 – were recommended for approval as submitted. However, the IRC Committee felt that the relocated Sec. R502.2.2 in RB241 ignored the use of wood structural panels for subflooring and recommended disapproval for that reason. The use of wood structural panels in subflooring is addressed in Sec. R503.2, and the text being relocated in our original proposal exists in the code today. However, to address the committee’s concern and to avoid possible conflict, this public comment adds a reference to R503.2. It also corrects a typo in the word “fixtures.”

RB241-13
Final Action: AS AM AMPC____ D

RB250-13

Table R502.5(1), Table R502.5(2), Table R802.4(1), Table R802.4(2), Table R802.5.1(1) through R802.5.1(8)

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

TABLE R502.5(1)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR EXTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir~~[b]~~ and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.
a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine 2x4s. Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

TABLE R502.5(2)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR INTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir~~[b]~~ and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine 2x4s. Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

Revise as follows:

TABLE R802.4(1)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2x4	2x6	2x8	2x10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	#2	~~12-5~~ 11-10	19-6	25-8	Note a
	Southern pine	#3	~~11-6~~ 9-8	17-0	21-8	25-7
16	Southern pine	#2	~~11-3~~ 10-9	17-8	23-4	Note a

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2x4	2x6	2x8	2x10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Southern pine	#3	~~10-0~~ 8-5	14-9	18-9	22-2
19.2	Southern pine	#2	~~10-7~~ 10-2	16-8	21-11	Note a
	Southern pine	#3	~~9-1~~ 7-8	13-6	17-2	20-3
24	Southern pine	#2	~~9-10~~ 9-1	15-6	20-1	23-11
	Southern pine	#3	~~8-2~~ 6-10	12-0	15-4	18-1

(Portions of Table not shown remain unchanged)

TABLE R802.4(2)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2x4	2x6	2x8	2x10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	#2	~~9-10~~ 9-1	15-6	20-1	23-11
	Southern pine	#3	~~8-2~~ 6-10	12-0	15-4	18-1
16	Southern pine	#2	~~8-11~~ 7-10	13-6	17-5	20-9
	Southern pine	#3	~~7-1~~ 5-11	10-5	13-3	15-8
19.2	Southern pine	#2	~~8-5~~ 7-2	12-3	15-10	18-11
	Southern pine	#3	~~6-5~~ 5-5	9-6	12-1	14-4
24	Southern pine	#2	~~7-8~~ 6-5	11-0	14-2	16-11
	Southern pine	#3	~~5-9~~ 4-10	8-6	10-10	12-10

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	~~10-10~~ 10-2	17-0	22-5	Note b	Note b	~~10-6~~ 8-9	15-1	19-5	23-2	Note b

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Southern Pine	#3	~~9-1~~ 7-8	13-6	17-2	20-3	24-1	~~7-11~~ 6-8	11-8	14-10	17-6	20-11
16	Southern Pine	#2	~~9-10~~ 8-9	15-1	19-5	23-2	Note b	~~9-1~~ 7-7	13-0	16-10	20-1	23-7
	Southern Pine	#3	~~7-11~~ 6-8	11-8	14-10	17-6	20-11	~~6-10~~ 5-9	10-1	12-10	15-2	18-1
19.2	Southern Pine	#2	~~9-3~~ 8-0	13-9	17-9	21-2	24-10	~~8-4~~ 6-11	11-11	15-4	18-4	21-6
	Southern Pine	#3	~~7-3~~ 6-1	10-8	13-7	16-0	19-1	~~6-3~~ 5-3	9-3	11-9	13-10	16-6
24	Southern Pine	#2	~~8-7~~ 7-2	12-3	15-10	18-11	22-2	~~7-5~~ 6-2	10-8	13-9	16-5	19-3
	Southern Pine	#3	~~6-5~~ 5-5	9-6	12-1	14-4	17-1	~~5-7~~ 4-8	8-3	10-6	12-5	14-9

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(2)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load = 20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	~~9-10~~ 9-5	15-6	20-5	Note b	Note b	~~9-10~~ 8-9	15-1	19-5	23-2	Note b
	Southern Pine	#3	~~9-1~~ 7-8	13-6	17-2	20-3	24-1	~~7-11~~ 6-8	11-8	14-10	17-6	20-11
16	Southern Pine	#2	~~8-11~~ 8-7	14-1	18-6	23-2	Note b	~~8-11~~ 7-7	13-0	16-10	20-1	23-7
	Southern Pine	#3	~~7-11~~ 6-8	11-8	14-10	17-6	20-11	~~6-10~~ 5-9	10-1	12-10	15-2	18-1
19.2	Southern Pine	#2	~~8-5~~ 8-0	13-3	17-5	21-2	24-10	~~8-4~~ 6-11	11-11	15-14	18-4	21-6
	Southern Pine	#3	~~7-3~~ 6-1	10-8	13-7	16-0	19-1	~~6-3~~ 5-3	9-3	11-9	13-10	16-6
24	Southern Pine	#2	~~7-10~~ 7-2	12-3	15-10	18-11	22-2	~~7-5~~ 6-2	10-8	13-9	16-5	19-3
	Southern Pine	#3	~~6-5~~ 5-5	9-6	12-1	14-4	17-1	~~5-7~~ 4-8	8-3	10-6	12-5	14-9

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(3)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 30 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)

12	Southern Pine #2	~~9-6~~ 8-5	14-5	18-8	22-3	Note b	~~9-0~~ 7-6	12-11	16-8	19-11	23-4
	Southern Pine #3	~~7-7~~ 6-4	11-2	14-3	16-10	20-0	~~6-9~~ 5-8	10-0	12-9	15-1	17-11
16	Southern Pine #2	~~8-7~~ 7-3	12-6	16-2	19-3	22-7	~~7-10~~ 6-6	11-2	14-5	17-3	20-2
	Southern Pine #3	~~6-7~~ 5-6	9-8	12-4	14-7	17-4	~~5-10~~ 4-11	8-8	11-0	13-0	15-6
19.2	Southern Pine #2	~~7-11~~ 6-8	11-5	14-9	17-7	20-7	~~7-1~~ 6-0	10-2	13-2	15-9	18-5
	Southern Pine #3	~~6-0~~ 5-0	8-10	11-3	13-4	15-10	~~5-4~~ 4-6	7-11	10-1	11-11	14-2
24	Southern Pine #2	~~7-1~~ 6-0	10-2	13-2	15-9	18-5	~~6-4~~ 5-4	9-2	11-9	14-1	16-6
	Southern Pine #3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-9~~ 4-0	7-1	9-0	10-8	12-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(4)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 50 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	~~8-0~~ 6-10	11-9	15-3	18-2	21-3	~~7-7~~ 6-4	10-11	14-1	16-10	19-9
	Southern Pine #3	~~6-2~~ 5-2	9-2	11-8	13-9	16-4	~~5-9~~ 4-10	8-5	10-9	12-9	15-2
16	Southern Pine #2	~~7-1~~ 6-0	10-2	13-2	15-9	18-5	~~6-7~~ 5-6	9-5	12-2	14-7	17-1
	Southern Pine #3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-11~~ 4-2	7-4	9-4	11-0	13-1
19.2	Southern Pine #2	~~6-6~~ 5-5	9-4	12-0	14-4	16-10	~~6-0~~ 5-0	8-8	11-2	13-4	15-7
	Southern Pine #3	~~4-11~~ 4-1	7-3	9-2	10-10	12-11	~~4-6~~ 3-10	6-8	8-6	10-1	12-0
24	Southern Pine #2	~~5-10~~ 4-10	8-4	10-9	12-10	15-1	~~5-5~~ 4-6	7-9	10-0	11-11	13-11
	Southern Pine #3	~~4-4~~ 3-8	6-5	8-3	9-9	11-7	~~4-1~~ 3-5	6-0	7-7	9-0	10-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(5)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 30 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	~~8-7~~ 8-3	13-6	17-10	22-3	Note b	~~8-7~~ 7-6	12-11	16-8	19-11	23-4
	Southern Pine #3	~~7-7~~ 6-4	11-2	14-3	16-10	20-0	~~6-9~~ 5-8	10-0	12-9	15-1	17-11

16	Southern Pine	#2	~~7-10~~ 7-3	12-3	16-2	19-3	22-7	~~7-10~~ 6-6	11-2	14-5	17-3	20-2
	Southern Pine	#3	~~6-7~~ 5-6	9-8	12-4	14-7	17-4	~~5-10~~ 4-11	8-8	11-0	13-0	15-6
19.2	Southern Pine	#2	~~7-4~~ 6-8	11-5	14-9	17-7	20-7	~~7-1~~ 6-0	10-2	13-2	15-9	18-5
	Southern Pine	#3	~~6-0~~ 5-0	8-10	11-3	13-4	15-10	~~5-4~~ 4-6	7-11	10-1	11-11	14-2
24	Southern Pine	#2	~~6-10~~ 6-0	10-2	13-2	15-9	18-5	~~6-4~~ 5-4	9-2	11-9	14-1	16-6
	Southern Pine	#3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-9~~ 4-0	7-1	9-0	10-8	12-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(6)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 50 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	~~7-3~~ 6-10	11-5	15-0	18-2	21-3	~~7-3~~ 6-4	10-11	14-1	16-10	19-9
	Southern Pine	#3	~~6-2~~ 5-2	9-2	11-8	13-9	16-4	~~5-9~~ 4-10	8-5	10-9	12-9	15-2
16	Southern Pine	#2	~~6-7~~ 6-0	10-2	13-2	15-9	18-5	~~6-7~~ 5-6	9-5	12-2	14-7	17-1
	Southern Pine	#3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-11~~ 4-2	7-4	9-4	11-0	13-1
19.2	Southern Pine	#2	~~6-2~~ 5-5	9-4	12-0	14-4	16-10	~~6-0~~ 5-0	8-8	11-2	13-4	15-7
	Southern Pine	#3	~~4-11~~ 4-1	7-3	9-2	10-10	12-11	~~4-6~~ 3-10	6-8	8-6	10-1	12-0
24	Southern Pine	#2	~~5-9~~ 4-10	8-4	10-9	12-10	15-1	~~5-5~~ 4-6	7-9	10-0	11-11	13-11
	Southern Pine	#3	~~4-4~~ 3-8	6-5	8-3	9-9	11-7	~~4-1~~ 3-5	6-0	7-7	9-0	10-18

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(7)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	~~7-1~~ 6-0	10-2	13-2	15-9	18-5	~~6-8~~ 5-7	9-7	12-5	14-10	17-5
	Southern Pine	#3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~5-1~~ 4-3	7-5	9-6	11-3	13-4
16	Southern Pine	#2	~~6-2~~ 5-2	8-10	11-5	13-7	16-0	~~5-10~~ 4-10	8-4	10-9	12-10	15-1

	Southern Pine #3	~~4-8~~ 3-11	6-10	8-9	10-4	12-3	~~4-4~~ 3-8	6-5	8-3	9-9	11-7
19.2	Southern Pine #2	~~5-7~~ 4-8	8-1	10-5	12-5	14-7	~~5-4~~ 4-5	7-7	9-10	11-9	13-9
	Southern Pine #3	~~4-3~~ 3-7	6-3	8-0	9-5	11-2	~~4-0~~ 3-4	5-11	7-6	8-10	10-7
24	Southern Pine #2	~~5-0~~ 4-3	7-3	9-4	11-1	13-0	~~4-9~~ 4-0	6-10	8-9	10-6	12-4
	Southern Pine #3	~~3-9~~ 3-2	5-7	7-1	8-5	10-0	~~3-7~~ 3-0	5-3	6-9	7-11	9-5

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(8)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	~~6-6~~ 6-0	10-2	13-2	15-9	18-5	~~6-6~~ 5-7	9-7	12-5	14-10	17-5
	Southern Pine #3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~5-1~~ 4-3	7-5	9-6	11-3	13-4
16	Southern Pine #2	~~5-11~~ 5-2	8-10	11-5	13-7	16-0	~~5-10~~	8-4	10-9	12-10	15-1
	Southern Pine #3	~~4-8~~ 3-11	6-10	8-9	10-4	12-3	~~4-4~~	6-5	8-3	9-9	11-7
19.2	Southern Pine #2	~~5-6~~ 4-8	8-1	10-5	12-5	14-7	~~5-4~~ 4-5	7-7	9-10	11-9	13-9
	Southern Pine #3	~~4-3~~ 3-7	6-3	8-0	9-5	11-2	~~4-0~~ 3-4	5-11	7-6	8-10	10-7
24	Southern Pine #2	~~5-0~~ 4-3	7-3	9-4	11-1	13-0	~~4-9~~ 4-0	6-10	8-9	10-6	12-4
	Southern Pine #3	~~3-9~~ 3-2	5-7	7-1	8-5	10-0	~~3-7~~ 3-0	5-3	6-9	7-11	9-5

(Portions of Table not shown remain unchanged)

Reason: New design values for 2x4 Southern Pine #2 and all lower grades (i.e. #3, Stud, Construction, Standard, and Utility) were certified by the American Lumber Standards Committee Board of Review (BOR) on January 11, 2012, and became effective on June 1, 2012. This proposed change to multiple tables of the IRC reflects lower spans resulting from the newly certified design values. It is anticipated the Board of Review will certify new design values for other widths and grades of southern pine in early 2013. The use of the phrase “no change” is intended to mean that, as of the January 3, 2013 code change deadline, there are no revisions to these table entries. Further, it is likely there will be changes affecting these entries during the time period of the Group B development cycle. If new design values are certified and there is time prior to the IRC Committee hearings, AWC will prepare a floor modification to amend all the affected spans. Alternatively, the revised span tables will be developed for consideration during the Final Action Hearings. Regardless, approval of these spans by the Committee will allow the greatest degree of flexibility to further modify the spans at the Final Action Hearings.

In October 2012, the ICC membership approved code changes S281-12 and S283-12. These changes established a link between changes made to span tables in the IRC to identical IBC span tables. Since design values for wider width southern pine lumber were not available for the IBC Group A development cycle, S281-12 and S283-12 instruct ICC staff to extract the appropriate tables from the 2015 IRC. This will ensure that the 2015 IBC and 2015 IRC have identical state-of-the-art spans for southern pine.

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

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

TABLE R502.5(1)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR EXTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine ~~2x4s~~. Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

TABLE R502.5(2)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR INTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir and required number of jack studs)

(Portions of Table not shown remain unchanged)

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

a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine ~~2x4s.~~ Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

Add the tables as follows:

TABLE R502.3.1(1)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
(Residential sleeping areas, live load = 30 psf, L/Δ= 360)[a]

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)
12	Southern pine	#1	~~12-0~~ 11-10	~~15-10~~ 15-7	~~20-3~~ 19-10	~~24-8~~ 24-2	~~12-0~~ 11-10	~~15-10~~ 15-7	~~20-3~~ 18-7	~~24-8~~ 22-0
	Southern pine	#2	~~11-10~~ 11-3	~~15-7~~ 14-11	~~19-10~~ 18-1	~~24-2~~ 21-4	~~11-10~~ 10-9	~~15-7~~ 13-8	~~18-7~~ 16-2	~~21-9~~ 19-1
	Southern pine	#3	~~10-5~~ 9-2	~~13-3~~ 11-6	15-8 14-0	~~18-8~~ 16-6	~~9-4~~ 8-2	~~11-11~~ 10-3	~~14-0~~ 12-6	~~16-8~~ 14-9
16	Southern pine	#1	~~10-11~~ 10-9	~~14-5~~ 14-2	~~18-5~~ 18-0	~~22-5~~ 21-4	~~10-11~~ 10-9	~~14-5~~ 13-9	~~17-11~~ 16-1	~~21-4~~ 19-1
	Southern pine	#2	~~10-9~~ 10-3	~~14-2~~ 13-3	~~18-0~~ 15-8	~~21-1~~ 18-6	~~10-5~~ 9-4	~~13-6~~ 11-10	~~16-1~~ 14-0	~~18-10~~ 16-6
	Southern pine	#3	~~9-0~~ 7-11	~~11-6~~ 10-10	~~13-7~~ 12-1	~~16-2~~ 14-4	~~8-1~~ 7-1	~~10-3~~ 8-11	~~12-2~~ 10-10	~~14-6~~ 12-10
19.2	Southern pine	#1	~~10-4~~ 10-1	~~13-7~~ 13-4	~~17-4~~ 16-5	~~21-1~~ 19-6	~~10-4~~ 9-11	~~13-7~~ 12-7	~~16-4~~ 14-8	~~19-6~~ 17-5
	Southern pine	#2	~~10-1~~ 9-6	~~13-4~~ 12-1	~~16-5~~ 14-4	~~19-3~~ 16-10	~~9-6~~ 8-6	~~12-4~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1
	Southern pine	#3	~~8-3~~ 7-3	~~10-6~~ 9-1	~~12-5~~ 11-0	~~14-9~~ 13-1	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8
24	Southern pine	SS	9-9	12-10	16-5	19-11	9-9	12-10	16-5	~~19-11~~ 19-8
	Southern pine	#1	~~9-7~~ 9-4	~~12-7~~ 12-4	~~16-1~~ 14-8	~~19-6~~ 17-5	~~9-7~~ 8-10	~~12-4~~ 11-3	~~14-7~~ 13-1	~~17-5~~ 15-7
	Southern pine	#2	~~9-4~~ 8-6	~~12-4~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1	~~8-6~~ 7-7	~~11-0~~ 9-8	~~13-1~~ 11-5	~~15-5~~ 13-6
	Southern pine	#3	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8	~~6-7~~ 5-9	~~8-5~~ 7-3	~~9-11~~ 8-10	~~11-10~~ 10-5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

Note: Check sources for availability of lumber in lengths greater than 20 feet.

a. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D_0, D_1 and D_2 shall be determined in accordance with Section R301.2.2.2.1.

(Portions of table not shown remain unchanged)

TABLE R502.3.1(2)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
(Residential living areas, live load = 40 psf, L/Δ = 360)[b]

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)
12	Southern pine	#1	~~10-11~~ 10-9	~~14-5~~ 14-2	~~18-5~~ 18-0	~~22-5~~ 21-11	~~10-11~~ 10-9	~~14-5~~ 14-2	~~18-5~~ 16-11	~~22-5~~ 20-1
	Southern pine	#2	~~10-9~~ 10-3	~~14-2~~ 13-6	~~18-0~~ 16-2	~~21-9~~ 19-1	~~10-9~~ 9-10	~~14-2~~ 12-6	~~16-11~~ 14-9	~~19-10~~ 17-5
	Southern pine	#3	~~9-4~~ 8-2	~~11-11~~ 10-3	~~14-0~~ 12-6	~~16-8~~ 14-9	~~8-6~~ 7-5	~~10-10~~ 9-5	~~12-10~~ 11-5	~~15-3~~ 13-6
16	Southern pine	#1	~~9-11~~ 9-9	~~13-1~~ 12-10	~~16-9~~ 16-1	~~20-4~~ 19-1	~~9-11~~ 9-9	~~13-1~~ 12-7	~~16-4~~ 14-8	~~19-6~~ 17-5
	Southern pine	#2	~~9-9~~ 9-4	~~12-10~~ 11-10	~~16-1~~ 14-0	~~18-10~~ 16-6	~~9-6~~ 8-6	~~12-4~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1
	Southern pine	#3	~~8-1~~ 7-1	~~10-3~~ 8-11	~~12-2~~ 10-10	~~14-6~~ 12-10	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8
19.2	Southern pine	#1	~~9-4~~ 9-2	~~12-4~~ 12-1	~~15-9~~ 14-8	~~19-2~~ 17-5	~~9-4~~ 9-0	~~12-4~~ 11-5	~~14-11~~ 13-5	~~17-9~~ 15-11
	Southern pine	#2	~~9-2~~ 8-6	~~12-1~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1	~~8-8~~ 7-9	~~11-3~~ 9-10	~~13-5~~ 11-8	~~15-8~~ 13-9
	Southern pine	#3	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8	~~6-9~~ 5-11	~~8-7~~ 7-5	~~10-1~~ 9-0	~~12-1~~ 10-8
24	Southern pine	SS	8-10	11-8	14-11	18-1	8-10	11-8	14-11	~~18-1~~ 18-0
	Southern pine	#1	~~8-8~~ 8-6	~~11-5~~ 11-3	~~14-7~~ 13-1	~~17-5~~ 15-7	~~8-8~~ 8-1	~~11-3~~ 10-3	~~13-4~~ 12-0	~~15-11~~ 14-3
	Southern pine	#2	~~8-6~~ 7-7	~~11-0~~ 9-8	~~13-1~~ 11-5	~~15-5~~ 13-6	~~7-9~~ 7-0	~~10-0~~ 8-10	~~12-0~~ 10-5	~~14-0~~ 12-4
	Southern pine	#3	~~6-7~~ 5-9	~~8-5~~ 7-3	~~9-11~~ 8-10	~~11-10~~ 10-5	~~6-0~~ 5-3	~~7-8~~ 6-8	~~9-1~~ 8-1	~~10-9~~ 9-6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

Note: Check sources for availability of lumber in lengths greater than 20 feet.

a. End bearing length shall be increased to 2 inches.

b. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D_0, D_1, and D_2 shall be determined in accordance with Section R301.2.2.2.1.

(Portions of table not shown remain unchanged)

Revise the tables as follows:

TABLE R802.4(1)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~12-8~~ 12-5	~~19-11~~ 19-6	~~Note a~~ 25-8	Note a
	Southern pine	#2	~~12-5~~ 11-10	~~19-6~~ 18-8	~~25-8~~ 24-7	Note a
	Southern pine	#3	~~11-6~~ 10-1	~~17-0~~ 14-11	~~21-8~~ 18-9	~~25-7~~ 22-9
16	Southern pine	#1	~~11-6~~ 11-3	~~18-1~~ 17-8	~~23-10~~ 23-4	Note a
	Southern pine	#2	~~11-3~~ 10-9	~~17-8~~ 16-11	~~23-4~~ 21-7	~~Note a~~ 25-7
	Southern pine	#3	~~10-0~~ 8-9	~~14-9~~ 12-11	~~18-9~~ 16-3	~~22-2~~ 19-9
19.2	Southern pine	#1	~~10-10~~ 10-7	~~17-0~~ 16-8	~~22-5~~ 22-0	Note a

	Southern pine	#2	~~10-7~~ 10-2	~~16-8~~ 15-7	~~21-11~~ 19-8	~~Note a~~ 23-5
	Southern pine	#3	~~9-1~~ 8-0	~~13-6~~ 11-9	~~17-2~~ 14-10	~~20-3~~ 18-0
24	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 20-5	~~Note a~~ 24-0
	Southern pine	#2	~~9-10~~ 9-3	~~15-6~~ 13-11	~~20-1~~ 17-7	~~23-11~~ 20-11
	Southern pine	#3	~~8-2~~ 7-2	~~12-0~~ 10-6	~~15-4~~ 13-3	~~18-1~~ 16-1

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.

a. Span exceeds 26 feet in length.

(Portions of table not shown remain unchanged)

TABLE R802.4(2)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics with limited storage, live load = 20 psf, L/∆ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 20-5	~~Note a~~ 24-0
	Southern pine	#2	~~9-10~~ 9-3	~~15-6~~ 13-11	~~20-1~~ 17-7	~~23-11~~ 20-11
	Southern pine	#3	~~8-2~~ 7-2	~~12-0~~ 10-6	~~15-4~~ 13-3	~~18-1~~ 16-1
16	Southern pine	#1	~~9-1~~ 8-11	~~14-4~~ 14-0	~~18-11~~ 17-9	~~23-1~~ 20-9
	Southern pine	#2	~~8-11~~ 8-0	~~13-6~~ 12-0	~~17-5~~ 15-3	~~20-9~~ 18-1
	Southern pine	#3	~~7-1~~ 6-2	~~10-5~~ 9-2	~~13-3~~ 11-6	~~15-8~~ 14-0
19.2	Southern pine	SS	8-9	13-9	~~18-1~~ 18-2	23-1
	Southern pine	#1	~~8-7~~ 8-5	~~13-6~~ 12-9	~~17-9~~ 16-2	~~21-1~~ 18-11
	Southern pine	#2	~~8-5~~ 7-4	~~12-3~~ 11-0	~~15-10~~ 13-11	~~18-11~~ 16-6
	Southern pine	#3	~~6-5~~ 5-8	~~9-6~~ 8-4	~~12-1~~ 10-6	~~14-4~~ 12-9
24	Southern pine	#1	~~8-0~~ 7-8	~~12-6~~ 11-5	~~15-10~~ 14-6	~~18-10~~ 16-11
	Southern pine	#2	~~7-8~~ 6-7	~~11-0~~ 9-10	~~14-2~~ 12-6	~~16-11~~ 14-9
	Southern pine	#3	~~5-9~~ 5-1	~~8-6~~ 7-5	~~10-10~~ 9-5	~~12-10~~ 11-5

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.

a. Span exceeds 26 feet in length.

(Portions of table not shown remain unchanged)

TABLE R802.5.1(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load=20 psf, ceiling not attached to rafters, L/∆ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~11-1~~ 10-10	~~17-4~~ 17-0	~~22-11~~ 22-5	Note b	Note b	~~11-1~~ 10-6	~~17-3~~ 15-8	~~21-9~~ 19-10	~~25-10~~ 23-2	Note b
	Southern pine	#2	~~10-10~~ 10-4	~~17-0~~ 15-7	~~22-5~~ 19-8	~~Note b~~ 23-5	Note b	~~10-6~~ 9-0	~~15-1~~ 13-6	~~19-5~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10
	Southern pine	#3	~~9-1~~ 8-0	~~13-6~~ 11-9	~~17-2~~ 14-10	~~20-3~~ 18-0	~~24-1~~ 21-4	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6
16	Southern pine	SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	~~Note b~~ 25-7	Note b
	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 19-10	~~25-10~~ 23-2	Note b	~~10-0~~ 9-1	~~15-0~~ 13-7	~~18-10~~ 17-2	~~22-4~~ 20-1	~~Note b~~ 23-10

	Southern pine	#2	~~9-10~~ 9-0	~~15-1~~ 13-6	~~19-5~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10	~~9-1~~ 7-9	~~13-0~~ 11-8	~~16-10~~ 14-9	~~20-1~~ 17-6	~~23-7~~ 20-8
	Southern pine	#3	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6	~~6-10~~ 6-0	~~10-1~~ 8-10	~~12-10~~ 11-2	~~15-2~~ 13-6	~~18-1~~ 16-0
19.2	Southern pine	SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	~~19-11~~ 19-7	~~25-5~~ 23-4	Note b
	Southern pine	#1	~~9-5~~ 9-3	~~14-10~~ 14-3	~~19-7~~ 18-1	~~23-7~~ 21-2	~~Note b~~ 25-2	~~9-3~~ 8-4	~~13-8~~ 12-4	~~17-2~~ 15-8	~~20-5~~ 18-4	~~24-4~~ 21-9
	Southern pine	#2	~~9-3~~ 8-2	~~13-9~~ 12-3	~~17-9~~ 15-7	~~21-2~~ 18-6	~~24-10~~ 21-9	~~8-4~~ 7-1	~~11-11~~ 10-8	~~15-4~~ 13-6	~~18-4~~ 16-0	~~21-6~~ 18-10
	Southern pine	#3	~~7-3~~ 6-4	~~10-8~~ 9-4	~~13-7~~ 11-9	~~16-0~~ 14-3	~~19-1~~ 16-10	~~6-3~~ 5-6	~~9-3~~ 8-1	~~11-9~~ 10-2	~~13-10~~ 12-4	~~16-6~~ 14-7
24	Southern pine	SS	8-11	14-1	18-6	23-8	Note b	8-11	~~14-1~~ 13-10	~~18-6~~ 17-6	~~22-11~~ 20-10	~~Note b~~ 24-8
	Southern pine	#1	~~8-9~~ 8-7	~~13-9~~ 12-9	~~17-9~~ 16-2	~~21-1~~ 18-11	~~25-2~~ 22-6	~~8-3~~ 7-5	~~12-3~~ 11-1	~~15-4~~ 14-0	~~18-3~~ 16-5	~~21-9~~ 19-6
	Southern pine	#2	~~8-7~~ 7-4	~~12-3~~ 11-0	~~15-10~~ 13-11	~~18-11~~ 16-6	~~22-2~~ 19-6	~~7-5~~ 6-4	~~10-8~~ 9-6	~~13-9~~ 12-1	~~16-5~~ 14-4	~~19-3~~ 16-10
	Southern pine	#3	~~6-5~~ 5-8	~~9-6~~ 8-4	~~12-1~~ 10-6	~~14-4~~ 12-9	~~17-1~~ 15-1	~~5-7~~ 4-11	~~8-3~~ 7-3	~~10-6~~ 9-1	~~12-5~~ 11-0	~~14-9~~ 13-1

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

TABLE R802.5.1(2)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load=20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 20-5	Note b	Note b	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 19-10	~~25-10~~ 23-2	Note b
	Southern pine	#2	~~9-10~~ 9-5	~~15-6~~ 14-9	~~20-5~~ 19-6	~~Note b~~ 23-5	Note b	~~9-10~~ 9-0	~~15-1~~ 13-6	~~19-5~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10
	Southern pine	#3	~~9-1~~ 8-0	~~13-6~~ 11-9	~~17-2~~ 14-10	~~20-3~~ 18-0	~~24-1~~ 21-4	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6
16	Southern pine	#1	~~9-1~~ 8-11	~~14-4~~ 14-1	~~18-11~~ 18-6	~~24-1~~ 23-2	Note b	~~9-1~~ 8-11	~~14-4~~ 13-7	~~18-10~~ 17-2	~~22-4~~ 20-1	~~Note b~~ 23-10
	Southern pine	#2	~~8-11~~ 8-7	~~14-1~~ 13-5	~~18-6~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10	~~8-11~~ 7-9	~~13-0~~ 11-8	~~16-10~~ 14-9	~~20-1~~ 17-6	~~23-7~~ 20-8
	Southern pine	#3	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6	~~6-10~~ 6-0	~~10-1~~ 8-10	~~12-10~~ 11-2	~~15-2~~ 13-6	~~18-1~~ 16-0
19.2	Southern pine	SS	8-9	13-9	~~18-1~~ 18-2	23-1	Note b	8-9	13-9	~~18-1~~ 18-2	23-1	Note b
	Southern pine	#1	~~8-7~~ 8-5	~~13-6~~ 13-3	~~17-9~~ 17-5	~~22-8~~ 21-2	~~Note b~~ 25-2	~~8-7~~ 8-4	~~13-6~~ 12-4	~~17-2~~ 15-8	~~20-5~~ 18-4	~~24-4~~ 21-9
	Southern pine	#2	~~8-5~~ 8-1	~~13-3~~ 12-3	~~17-5~~ 15-7	~~21-2~~ 18-6	~~24-10~~ 21-9	~~8-4~~ 7-1	~~11-11~~ 10-8	~~15-4~~ 13-6	~~18-4~~ 16-0	~~21-6~~ 18-10
	Southern pine	#3	~~7-3~~ 6-4	~~10-8~~ 9-4	~~13-7~~ 11-9	~~16-0~~ 14-3	~~19-1~~ 16-10	~~6-3~~ 5-6	~~9-3~~ 8-1	~~11-9~~ 10-2	~~13-10~~ 12-4	~~16-6~~ 14-7
24	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	~~21-6~~ 20-10	~~Note b~~ 24-8

	Southern pine	#1	~~8-0~~ 7-10	~~12-6~~ 12-3	~~16-6~~ 16-2	~~21-1~~ 18-11	~~25-2~~ 22-6	~~8-0~~ 7-5	~~12-3~~ 11-1	~~15-4~~ 14-0	~~18-3~~ 16-5	~~21-9~~ 19-6
	Southern pine	#2	~~7-10~~ 7-4	~~12-3~~ 11-0	~~15-10~~ 13-11	~~18-11~~ 16-6	~~22-2~~ 19-6	~~7-5~~ 6-4	~~10-8~~ 9-6	~~13-9~~ 12-1	~~16-5~~ 14-4	~~19-3~~ 16-10
	Southern pine	#3	~~6-5~~ 5-8	~~9-6~~ 8-4	~~12-1~~ 10-6	~~14-4~~ 12-9	~~17-1~~ 15-1	~~5-7~~ 4-11	~~8-3~~ 7-3	~~10-6~~ 9-1	~~12-5~~ 11-0	~~14-9~~ 13-1

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:

H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.

H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

b. Span exceeds 26 feet in length.

TABLE R802.5.1(3)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=30 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	20-5	~~Note b~~ 25-4	Note b
	Southern pine	#1	~~9-8~~ 9-6	~~15-2~~ 14-10	~~20-0~~ 19-0	~~24-9~~ 22-3	Note b	~~9-8~~ 9-0	~~14-10~~ 13-5	~~18-8~~ 17-0	~~22-2~~ 19-11	~~Note b~~ 23-7
	Southern pine	#2	~~9-6~~ 8-7	~~14-5~~ 12-11	~~18-8~~ 16-4	~~22-3~~ 19-5	~~Note b~~ 22-10	~~9-0~~ 7-8	~~12-11~~ 11-7	~~16-8~~ 14-8	~~19-11~~ 17-4	~~23-4~~ 20-5
	Southern pine	#3	~~7-7~~ 6-7	~~11-2~~ 9-9	~~14-3~~ 12-4	~~16-10~~ 15-0	~~20-0~~ 17-9	~~6-9~~ 5-11	~~10-0~~ 8-9	~~12-9~~ 11-0	~~15-1~~ 13-5	~~17-11~~ 15-10
16	Southern pine	SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	~~18-6~~ 18-5	~~23-8~~ 21-11	~~Note b~~ 25-11
	Southern pine	#1	~~8-9~~ 8-7	~~13-9~~ 13-0	~~18-1~~ 16-6	~~21-5~~ 19-3	~~25-7~~ 22-10	~~8-8~~ 7-10	~~12-10~~ 11-7	~~16-2~~ 14-9	~~19-2~~ 17-3	~~22-10~~ 20-5
	Southern pine	#2	~~8-7~~ 7-6	~~12-6~~ 11-2	~~16-2~~ 14-2	~~19-3~~ 16-10	~~22-7~~ 19-10	~~7-10~~ 6-8	~~11-2~~ 10-0	~~14-5~~ 12-8	~~17-3~~ 15-1	~~20-2~~ 17-9
	Southern pine	#3	~~6-7~~ 5-9	~~9-8~~ 8-6	~~12-4~~ 10-8	~~14-7~~ 13-0	~~17-4~~ 15-4	~~5-10~~ 5-2	~~8-8~~ 7-7	~~11-0~~ 9-7	~~13-0~~ 11-7	~~15-6~~ 13-9
19.2	Southern pine	SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	~~17-5~~ 16-10	~~22-0~~ 20-0	~~25-9~~ 23-7
	Southern pine	#1	~~8-3~~ 8-0	~~13-0~~ 11-10	~~16-6~~ 15-1	~~19-7~~ 17-7	~~23-4~~ 20-11	~~7-11~~ 7-1	~~11-9~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8
	Southern pine	#2	~~7-11~~ 6-10	~~11-5~~ 10-2	~~14-9~~ 12-11	~~17-7~~ 15-4	~~20-7~~ 18-1	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2
	Southern pine	#3	~~6-0~~ 5-3	~~8-10~~ 7-9	~~11-3~~ 9-9	~~13-4~~ 11-10	~~15-10~~ 14-0	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6
24	Southern pine	SS	7-10	12-3	16-2	~~20-8~~ 20-0	~~25-1~~ 23-7	7-10	~~12-3~~ 11-10	~~16-2~~ 15-0	~~19-8~~ 17-11	~~23-0~~ 21-2
	Southern pine	#1	~~7-8~~ 7-1	~~11-9~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-1~~ 6-4	~~10-6~~ 9-6	~~13-2~~ 12-0	~~15-8~~ 14-1	~~18-8~~ 16-8
	Southern pine	#2	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-4~~ 5-5	~~9-2~~ 8-2	~~11-9~~ 10-4	~~14-1~~ 12-3	~~16-6~~ 14-6
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-9~~ 4-2	~~7-1~~ 6-2	~~9-0~~ 7-10	~~10-8~~ 9-6	~~12-8~~ 11-2

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

TABLE R802.5.1(4)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=50 psf, ceiling not attached to rafters, L/∆ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	SS	8-4	~~13-0~~ 13-1	17-2	21-11	Note b	8-4	~~13-0~~ 13-1	17-2	~~21-11~~ 21-5	~~Note b~~ 25-3
	Southern pine	#1	~~8-2~~ 8-0	~~12-10~~ 12-3	~~16-10~~ 15-6	~~20-3~~ 18-2	~~24-1~~ 21-7	~~8-2~~ 7-7	~~12-6~~ 11-4	~~15-9~~ 14-5	~~18-9~~ 16-10	~~22-4~~ 20-0
	Southern pine	#2	~~8-0~~ 7-0	~~11-9~~ 10-6	~~15-3~~ 13-4	~~18-2~~ 15-10	~~21-3~~ 18-8	~~7-7~~ 6-6	~~10-11~~ 9-9	~~14-1~~ 12-4	~~16-10~~ 14-8	~~19-9~~ 17-3
	Southern pine	#3	~~6-2~~ 5-5	~~9-2~~ 8-0	~~11-8~~ 10-1	~~13-9~~ 12-3	~~16-4~~ 14-6	~~5-9~~ 5-0	~~8-5~~ 7-5	~~10-9~~ 9-4	~~12-9~~ 11-4	~~15-2~~ 13-5
16	Southern pine	SS	7-6	11-10	15-7	19-11	~~24-3~~ 23-7	7-6	11-10	15-7	~~19-11~~ 18-6	~~23-10~~ 21-10
	Southern pine	#1	~~7-5~~ 7-1	~~11-7~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-4~~ 6-7	~~10-10~~ 9-10	~~13-8~~ 12-5	~~16-2~~ 14-7	~~19-4~~ 17-3
	Southern pine	#2	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-7~~ 5-8	~~9-5~~ 8-5	~~12-2~~ 10-9	~~14-7~~ 12-9	~~17-1~~ 15-0
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-11~~ 4-4	~~7-4~~ 6-5	~~9-4~~ 8-1	~~11-0~~ 9-10	~~13-1~~ 11-7
19.2	Southern pine	SS	7-1	11-2	14-8	~~18-9~~ 18-3	~~22-10~~ 21-7	7-1	11-2	~~14-8~~ 14-2	~~18 7~~ 16-11	~~21-9~~ 20-0
	Southern pine	#1	~~7-0~~ 6-6	~~10-8~~ 9-8	~~13-5~~ 12-3	~~16-0~~ 14-4	~~19-1~~ 17-1	~~6-8~~ 6-0	~~9-11~~ 9-0	~~12-5~~ 11-4	~~14-10~~ 13-4	~~17-8~~ 15-9
	Southern pine	#2	~~6-6~~ 5-7	~~9-4~~ 8-4	~~12-0~~ 10-7	~~14-4~~ 12-6	~~16-10~~ 14-9	~~6-0~~ 5-2	~~8-8~~ 7-9	~~11-2~~ 9-9	~~13-4~~ 11-7	~~15-7~~ 13-8
	Southern pine	#3	~~4-11~~ 4-3	~~7-3~~ 6-4	~~9-2~~ 8-0	~~10-10~~ 9-8	~~12-11~~ 11-5	~~4-6~~ 4-0	~~6-8~~ 5-10	~~8-6~~ 7-4	~~10-1~~ 8-11	~~12-0~~ 10-7
24	Southern pine	SS	6-7	10-4	13-8	~~17-5~~ 16-4	~~21-0~~ 19-3	6-7	~~10-4~~ 10-0	~~13-8~~ 12-8	~~16-7~~ 15-2	~~19-5~~ 17-10
	Southern pine	#1	~~6-5~~ 5-10	~~9-7~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3	~~6-0~~ 5-5	~~8-10~~ 8-0	~~11-2~~ 10-2	~~13-3~~ 11-11	~~15-9~~ 14-1
	Southern pine	#2	~~5-10~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2	~~5-5~~ 4-7	~~7-9~~ 6-11	~~10-0~~ 8-9	~~11-11~~ 10-5	~~13-11~~ 12-3
	Southern pine	#3	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3	~~4-1~~ 3-6	~~6-0~~ 5-3	~~7-7~~ 6-7	~~9-0~~ 8-0	~~10-8~~ 9-6

Check sources for availability of lumber in lengths greater than 20 feet.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa
a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67

1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

TABLE R802.5.1(5)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=30 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~8-9~~ 8-7	~~13-9~~ 13-6	~~18-2~~ 17-10	~~23-2~~ 22-3	Note b	~~8-9~~ 8-7	~~13-9~~ 13-5	~~18-2~~ 17-0	~~22-2~~ 19-11	~~Note b~~ 23-7
	Southern pine	#2	~~8-7~~ 8-3	~~13-6~~ 12-11	~~17-10~~ 16-4	~~22-3~~ 19-5	~~Note b~~ 22-10	~~8-7~~ 7-8	~~12-11~~ 11-7	~~16-8~~ 14-8	~~19-11~~ 17-4	~~23-4~~ 20-5
	Southern pine	#3	~~7-7~~ 6-7	~~11-2~~ 9-9	~~14-3~~ 12-4	~~16-10~~ 15-0	~~20-0~~ 17-9	~~6-9~~ 5-11	~~10-0~~ 8-9	~~12-9~~ 11-0	~~15-1~~ 13-5	~~17-11~~ 15-10
16	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	21-6	~~Note b~~ 25-11
	Southern pine	#1	~~8-0~~ 7-10	~~12-6~~ 12-3	~~16-6~~ 16-2	~~21-1~~ 19-3	~~25-7~~ 22-10	~~8-0~~ 7-10	~~12-6~~ 11-7	~~16-2~~ 14-9	~~19-2~~ 17-3	~~22-10~~ 20-5
	Southern pine	#2	~~7-10~~ 7-6	~~12-3~~ 11-2	~~16-2~~ 14-2	19-3 16-10	~~22-7~~ 19-10	~~7-10~~ 6-8	~~11-2~~ 10-0	~~14-5~~ 12-8	~~17-3~~ 15-1	~~20-2~~ 17-9
	Southern pine	#3	~~6-7~~ 5-9	~~9-8~~ 8-6	~~12-4~~ 10-8	~~14-7~~ 13-0	~~17-4~~ 15-4	~~5-10~~ 5-2	~~8-8~~ 7-7	~~11-0~~ 9-7	~~13-0~~ 11-7	~~15-6~~ 13-9
19.2	Southern pine	SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-10	~~20-2~~ 20-0	~~24-7~~ 23-7
	Southern pine	#1	~~7-6~~ 7-4	~~11-9~~ 11-7	~~15-6~~ 15-1	~~19-7~~ 17-7	~~23-4~~ 20-11	~~7-6~~ 7-1	~~11-9~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8
	Southern pine	#2	~~7-4~~ 6-10	~~11-5~~ 10-2	~~14-9~~ 12-11	~~17-7~~ 15-4	~~20-7~~ 18-1	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2
	Southern pine	#3	~~6-0~~ 5-3	~~8-10~~ 7-9	~~11-3~~ 9-9	~~13-4~~ 11-10	~~15-10~~ 14-0	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6
24	Southern pine	SS	7-1	11-2	14-8	18-9	22-10	7-1	11-2	14-8	~~18-9~~ 17-11	~~22-10~~ 21-2
	Southern pine	#1	~~7-0~~ 6-10	~~10-11~~ 10-7	~~14-5~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-0~~ 6-4	~~10-6~~ 9-6	~~13-2~~ 12-0	~~15-8~~ 14-1	~~18-8~~ 16-8
	Southern pine	#2	~~6-10~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-4~~ 5-5	~~9-2~~ 8-2	~~11-9~~ 10-4	~~14-1~~ 12-3	~~16-6~~ 14-6
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-9~~ 4-2	~~7-1~~ 6-2	~~9-0~~ 7-10	~~10-8~~ 9-6	~~12-8~~ 11-2

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:

H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

TABLE R802.5.1(6)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=50 psf, ceiling attached to rafters, L/∆ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	#1	~~7-5~~ 7-3	~~11-7~~ 11-5	~~15-4~~ 15-0	~~19-7~~ 18-2	~~23-9~~ 21-7	~~7-5~~ 7-3	~~11-7~~ 11-4	~~15-4~~ 14-5	~~18-9~~ 16-10	~~22-4~~ 20-0
	Southern pine	#2	~~7-3~~ 6-11	~~11-5~~ 10-6	~~15-0~~ 13-4	~~18-2~~ 15-10	~~21-3~~ 18-8	~~7-3~~ 6-6	~~10-11~~ 9-9	~~14-1~~ 12-4	~~16-10~~ 14-8	~~19-9~~ 17-3
	Southern pine	#3	~~6-2~~ 5-5	~~9-2~~ 8-0	~~11-8~~ 10-1	~~13-9~~ 12-3	~~16-4~~ 14-6	~~5-9~~ 5-0	~~8-5~~ 7-5	~~10-9~~ 9-4	~~12-9~~ 11-4	~~15-2~~ 13-5
16	Southern pine	SS	6-10	10-9	14-2	18-1	22-0	6-10	10-9	14-2	18-1	~~22-0~~ 21-10
	Southern pine	#1	~~6-9~~ 6-7	~~10-7~~ 10-4	~~13-11~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~6-9~~ 6-7	~~10-7~~ 9-10	~~13-8~~ 12-5	~~16-2~~ 14-7	~~19-4~~ 17-3
	Southern pine	#2	~~6-7~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-7~~ 5-8	~~9-5~~ 8-5	~~12-2~~ 10-9	~~14-7~~ 12-9	~~17-1~~ 15-0
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-11~~ 4-4	~~7-4~~ 6-5	~~9-4~~ 8-1	~~11-0~~ 9-10	~~13-1~~ 11-7
19.2	Southern pine	SS	6-5	10-2	13-4	17-0	20-9	6-5	10-2	13-4	~~17-0~~ 16-11	~~20-9~~ 20-0
	Southern pine	#1	~~6-4~~ 6-2	~~9-11~~ 9-8	~~13-1~~ 12-3	~~16-0~~ 14-4	~~19-1~~ 17-1	~~6-4~~ 6-0	~~9-11~~ 9-0	~~12-5~~ 11-4	~~14-10~~ 13-4	~~17-8~~ 15-9
	Southern pine	#2	~~6-2~~ 5-7	~~9-4~~ 8-4	~~12-0~~ 10-7	~~14-4~~ 12-6	~~16-10~~ 14-9	~~6-0~~ 5-2	~~8-8~~ 7-9	~~11-2~~ 9-9	~~13-4~~ 11-7	~~15-7~~ 13-8
	Southern pine	#3	~~4-11~~ 4-3	~~7-3~~ 6-4	~~9-2~~ 8-0	~~10-10~~ 9-8	~~12-11~~ 11-5	~~4-6~~ 4-0	~~6-8~~ 5-10	~~8-6~~ 7-4	~~10-1~~ 8-11	~~12-0~~ 10-7
24	Southern pine	SS	6-0	9-5	12-5	15-10	19-3	6-0	9-5	12-5	~~15-10~~ 15-2	~~19-3~~ 17-10
	Southern pine	#1	~~5-10~~ 5-9	~~9-3~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3	~~5-10~~ 5-5	~~8-10~~ 8-0	~~11-2~~ 10-2	~~13-3~~ 11-11	~~15-9~~ 14-1
	Southern pine	#2	~~5-9~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2	~~5-5~~ 4-7	~~7-9~~ 6-11	~~10-0~~ 8-9	~~11-11~~ 10-5	~~13-11~~ 12-3
	Southern pine	#3	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3	~~4-1~~ 3-6	~~6-0~~ 5-3	~~7-7~~ 6-7	~~9-0~~ 8-0	~~10-8~~ 9-6

Check sources for availability of lumber in lengths greater than 20 feet.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.
a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

TABLE R802.5.1(7)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum Rafter Spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	SS	7-5	11-8	15-4	19-7	~~23-10~~ 23-7	7-5	11-8	15-4	~~19-7~~ 18-10	~~23-10~~ 22-3
	Southern pine	#1	~~7-3~~ 7-1	~~11-5~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-3~~ 6-9	~~11-1~~ 10-0	~~13-11~~ 12-8	~~16-6~~ 14-10	~~19-8~~ 17-7
	Southern pine	#2	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-8~~ 5-9	~~9-7~~ 8-7	~~12-5~~ 10-11	~~14-10~~ 12-11	~~17-5~~ 15-3
	Southern pine	#3	~~5-~~4 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~5-1~~ 4-5	~~7-5~~ 6-6	~~9-6~~ 8-3	~~11-3~~ 10-0	~~13-4~~ 11-10
16	Southern pine	SS	6-9	10-7	14-0	~~17-10~~ 17-4	~~21-8~~ 20-5	6-9	10-7	~~14-0~~ 13-9	~~17-10~~ 16-4	~~21-0~~ 19-3
	Southern pine	#1	~~6-7~~ 6-2	~~10-2~~ 9-2	~~12-9~~ 11-8	~~15-2~~ 13-8	~~18-1~~ 16-2	~~6-5~~ 5-10	~~9-7~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3
	Southern pine	#2	~~6-2~~ 5-3	~~8-10~~ 7-11	~~11-5~~ 10-0	~~13-7~~ 11-11	~~16-0~~ 14-0	~~5-10~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2
	Southern pine	#3	~~4-8~~ 4-1	~~6-10~~ 6-0	~~8-9~~ 7-7	~~10-4~~ 9-2	~~12-3~~ 10-10	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3
19.2	Southern pine	SS	6-4	10-0	13-2	~~16-9~~ 15-10	~~20-4~~ 18-8	6-4	~~10-0~~ 9-10	~~13-2~~ 12-6	~~16-5~~ 14-11	~~19-2~~ 17-7
	Southern pine	#1	~~6-3~~ 5-8	~~9-3~~ 8-5	~~11-8~~ 10-8	~~13-10~~ 12-5	~~16-6~~ 14-9	~~5-11~~ 5-4	~~8-9~~ 7-11	~~11-0~~ 10-0	~~13-1~~ 11-9	~~15-7~~ 13-11
	Southern pine	#2	~~5-7~~ 4-10	~~8-1~~ 7-3	~~10-5~~ 9-2	~~12-5~~ 10-10	~~14-7~~ 12-9	~~5-4~~ 4-6	~~7-7~~ 6-10	~~9-10~~ 8-8	~~11-~~9 10-3	~~13-9~~ 12-1
	Southern pine	#3	~~4-3~~ 3-8	~~6-3~~ 5-6	~~8-0~~ 6-11	~~9-5~~ 8-4	~~11-2~~ 9-11	~~4-~~0 3-6	~~5-11~~ 5-2	~~7-6~~ 6-6	~~8-10~~ 7-11	~~10-7~~ 9-4
24	Southern pine	SS	5-11	9-3	~~12-2~~ 11-11	~~15-7~~ 14-2	~~18-2~~ 16-8	5-11	~~9-3~~ 8-10	~~12-2~~ 11-2	~~14-8~~ 13-4	~~17-2~~ 15-9
	Southern pine	#1	~~5-7~~ 5-0	~~8-3~~ 7-6	~~10-5~~ 9-6	~~12-5~~ 11-1	~~14-9~~ 13-2	~~5-3~~ 4-9	~~7-10~~ 7-1	~~9-10~~ 9-0	~~11-8~~ 10-6	~~13-11~~ 12-5
	Southern pine	#2	~~5-0~~ 4-4	~~7-3~~ 6-5	~~9-4~~ 8-2	~~11-1~~ 9-9	~~13-0~~ 11-5	~~4-9~~ 4-1	~~6-10~~ 6-1	~~8-9~~ 7-9	~~10-6~~ 9-2	~~12-4~~ 10-9
	Southern pine	#3	~~3-9~~ 3-4	~~5-7~~ 4-11	~~7-1~~ 6-2	~~8-5~~ 7-6	~~10-0~~ 8-10	~~3-7~~ 3-1	~~5-3~~ 4-7	~~6-9~~ 5-10	~~7-11~~ 7-1	~~9-5~~ 8-4

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

TABLE R802.5.1(8)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
		Maximum rafter spans[a]									

			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~6-7~~ 6-6	~~10-5~~ 10-2	~~13-8~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~6-7~~ 6-6	~~10-5~~ 10-0	~~13-8~~ 12-8	~~16-6~~ 14-10	~~19-8~~ 17-7
	Southern pine	#2	~~6-6~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-6~~ 5-9	~~9-7~~ 8-7	~~12-5~~ 10-11	~~14-10~~ 12-11	~~17-5~~ 15-3
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~5-1~~ 4-5	~~7-5~~ 6-6	~~9-6~~ 8-3	~~11-3~~ 10-0	~~13-4~~ 11-10
16	Southern pine	SS	6-1	9-7	12-8	16-2	19-8	6-1	9-7	12-8	16-2	~~19-8~~ 19-3
	Southern pine	#1	~~6-0~~ 5-11	~~9-5~~ 9-2	~~12-5~~ 11-8	~~15-2~~ 13-8	~~18-1~~ 16-2	~~6-0~~ 5-10	~~9-5~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3
	Southern pine	#2	~~5-11~~ 5-3	~~8-10~~ 7-11	~~11-5~~ 10-0	~~13-7~~ 11-11	~~16-0~~ 14-0	~~5-10~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2
	Southern pine	#3	~~4-8~~ 4-1	~~6-10~~ 6-0	~~8-9~~ 7-7	~~10-4~~ 9-2	~~12-3~~ 10-10	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3
19.2	Southern pine	SS	5-9	9-1	11-11	15-3	18-6	5-9	9-1	11-11	~~15-3~~ 14-11	~~18-6~~ 17-7
	Southern pine	#1	~~5-8~~ 5-6	~~8-11~~ 8-5	~~11-8~~ 10-8	~~13-10~~ 12-5	~~16-6~~ 14-9	~~5-8~~ 5-4	~~8-9~~ 7-11	~~11-0~~ 10-0	~~13-1~~ 11-9	~~15-7~~ 13-11
	Southern pine	#2	~~5-6~~ 4-10	~~8-1~~ 7-3	~~10-5~~ 9-2	~~12-5~~ 10-10	~~14-7~~ 12-9	~~5-4~~ 4-6	~~7-7~~ 6-10	~~9-10~~ 8-8	~~11-9~~ 10-3	~~13-9~~ 12-1
	Southern pine	#3	~~4-3~~ 3-8	~~6-3~~ 5-6	~~8-0~~ 6-11	~~9-5~~ 8-4	~~11-2~~ 9-11	~~4-0~~ 3-6	~~5-11~~ 5-2	~~7-6~~ 6-6	~~8-10~~ 7-11	~~10-7~~ 9-4
24	Southern pine	SS	5-4	8-5	11-1	14-2	~~17-2~~ 16-8	5-4	8-5	11-1	~~14-2~~ 13-4	~~17-2~~ 15-9
	Southern pine	#1	~~5-3~~ 5-0	~~8-3~~ 7-6	~~10-5~~ 9-6	~~12-5~~ 11-1	~~14-9~~ 13-2	~~5-3~~ 4-9	~~7-10~~ 7-1	~~9-10~~ 9-0	~~11-8~~ 10-6	~~13-11~~ 12-5
	Southern pine	#2	~~5-0~~ 4-4	~~7-3~~ 6-5	~~9-4~~ 8-2	~~11-1~~ 9-9	~~13-0~~ 11-5	~~4-9~~ 4-1	~~6-10~~ 6-1	~~8-9~~ 7-9	~~10-6~~ 9-2	~~12-4~~ 10-9
	Southern pine	#3	~~3-9~~ 3-4	~~5-7~~ 4-11	~~7-1~~ 6-2	~~8-5~~ 7-6	~~10-0~~ 8-10	~~3-7~~ 3-1	~~5-3~~ 4-7	~~6-9~~ 5-10	~~7-11~~ 7-1	~~9-5~~ 8-4

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/10 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

Committee Reason: Approval was based upon the proponent's published reason. The modifications updated the span tables for southern pine based on the current design values certified by the American Lumber Standards Committee Board of Review.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

TABLE R502.3.1(1)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
(Residential sleeping areas, live load = 30 psf, L/Δ = 360)[a]

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10psf 2 x 8 Maximum floor joist spans (ft – in)
16	Southern pine	#3	~~10-10~~ 10-0

(Portions of Table not shown remain unchanged)

Commenter's Reason: This public comment corrects a typo in our original proposal.

RB250-13
Final Action: AS AM AMPC____ D

RB262-13
R507.2.3, Figure R507.2.3(2) (NEW)

Proposed Change as Submitted

Proponent: Hoyt Jeter, Eagle Eye Consulting Engineers, representing Washington Association of Building Officials Technical Code Development Committee (hoytjeter@centurytel.net)

Revise as follows:

R507.2.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figures R507.2.3(1) or R507.2.3(2). Where the lateral load connection is provided in accordance with Figure 507.2.3(1), hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N). Where the lateral load connections is provided in accordance with Figure R507.2.3(2), the hold-down tension devices shall be installed in not less than 4 locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

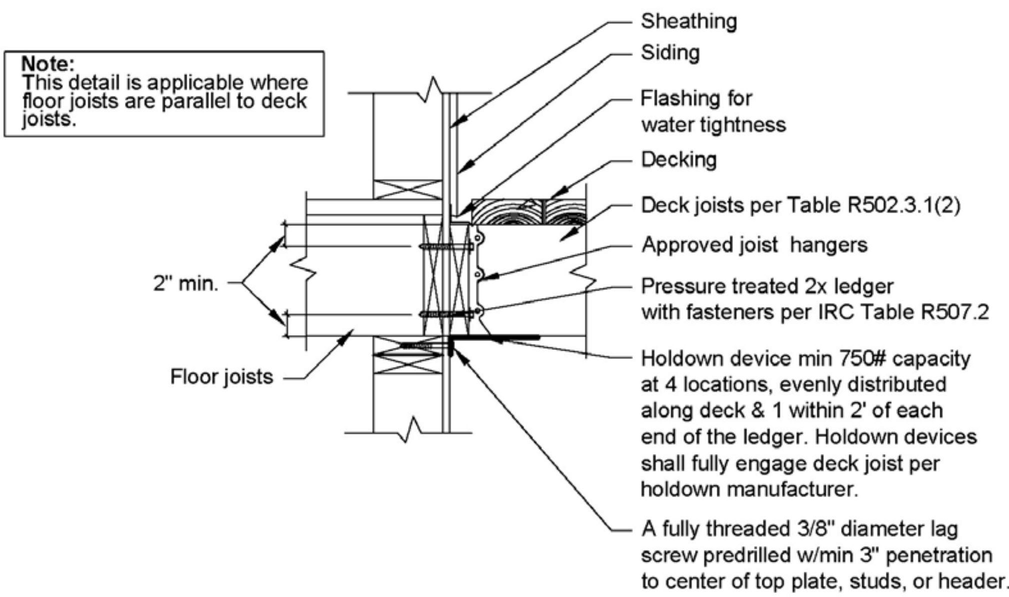


FIGURE R507.2.3(2)

Reason: This proposal provides an alternative prescriptive method to achieve an acceptable lateral load connection for residential decks. For new or replacement decks on existing homes, builders or homeowners must often remove interior sheet rock on ceilings in order to install hold-down tension devices as required by Figure 507.2.3. This proposal achieves an acceptable lateral load connection between the deck and primary structure by permitting the installation of surface mounted hold-down connection devices spread out along the length of the ledger and precludes the need to make expensive and unnecessary ceiling repairs.

Typical deck failures occur because joists separate from the joist-hangers which are fastened to the ledger. This is due to the lack of an adequate tension connection between the joist and the hanger at this joint. This proposal provides a better connection between at least 4 joists and the primary structure thereby reducing the potential failure of the joist to joist-hanger connection and better support form complete collapse of the deck and will reduce the chance of injury.

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

R507.2.3 #3-JETER.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Lee J. Kranz, City of Bellevue, Development Services, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

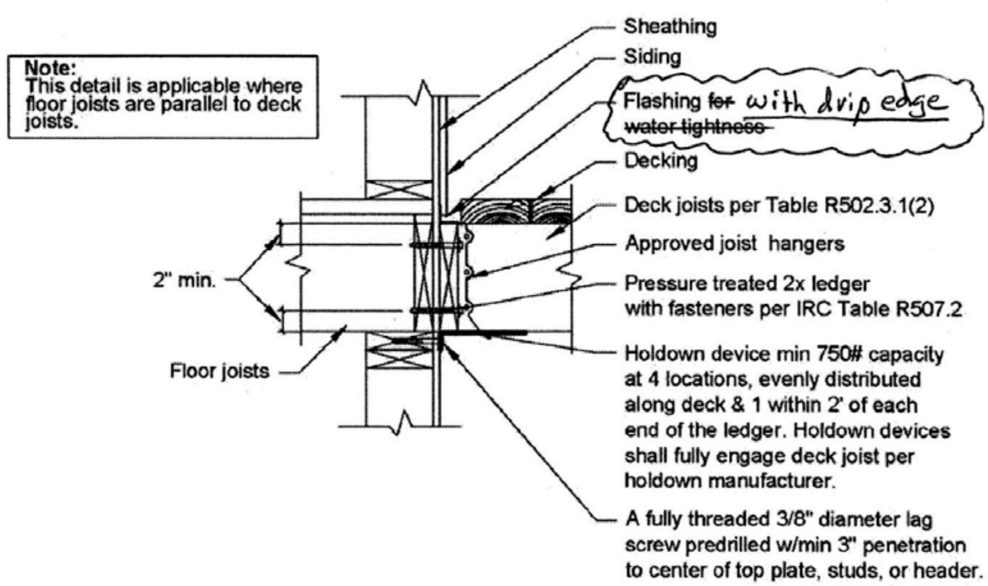


FIGURE R507.2.3(2)

(Portions of Code Change Proposal not shown remain unchanged)

Commenter's Reason: The attached modification was discussed in Dallas by the IRC Building Committee as part of the testimony related to the RB-262 code change proposal and received favorable responses from members of the Committee. After hearing testimony on the floor modification and the original proposal the Committee voted to endorse RB262 and it was approved as submitted. Subsequent to the final vote it was noted that the modification should have been included in the motion but was not. The Committee Chair suggested that a public comment be submitted to have it added to the original proposal.

The modification changes the original proposal slightly to require that the deck ledger flashing to have a drip edge to divert moisture away from the ledger.

Public Comment 2:

Glenn Mathewson, MCP, City of Westminster, CO, representing North American Deck and Railing Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.2.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figures R507.2.3(1) or R507.2.3(2). Where the lateral load connection is provided in accordance with Figure 507.2.3(1), hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N). Where the lateral load connections is provided in accordance with Figure R507.2.3(2), the hold-down tension devices shall be installed in not less than 4 locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

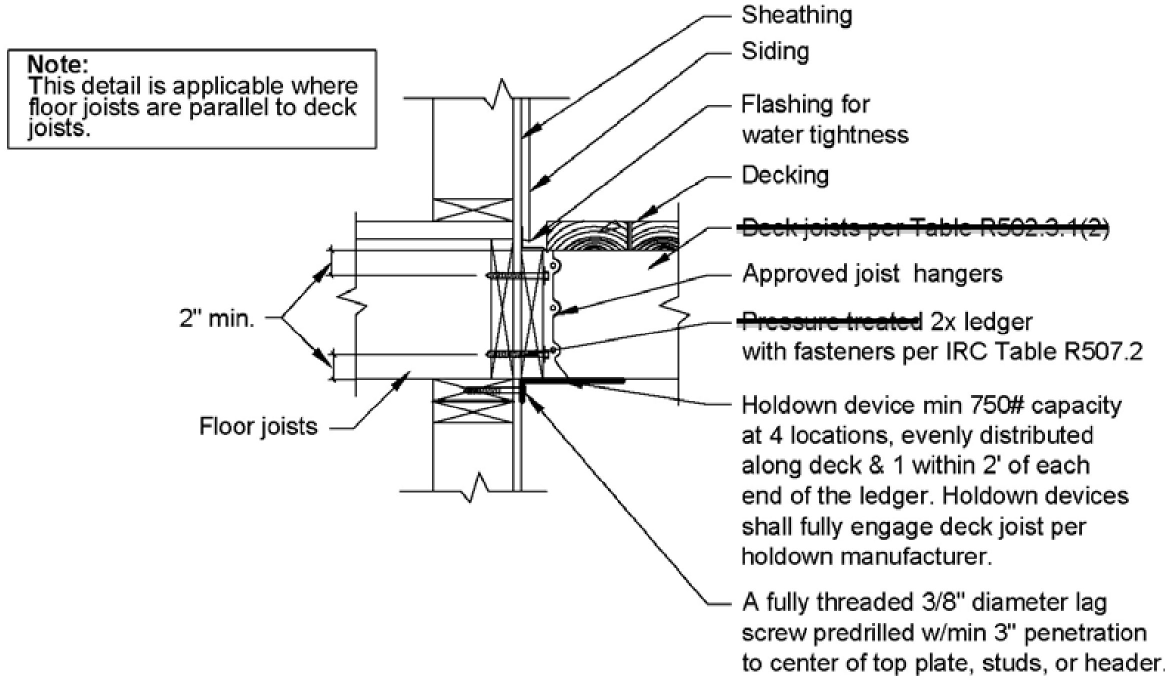


FIGURE R507.2.3(2)

RB262-13
Final Action: AS AM AMPC____ D

RB263-13
R507.1, R507.2.3, Figure R507.2.3

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R507.1 Decks. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads.

> **Exception:** Design for lateral loads, and connectors in accordance with Section R507.3, shall not be required for decks that do not require guards in accordance with Section R312.1.1, provided that the deck ledger is connected to the band joist in accordance with Section R507.2.

Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

~~R507.2.3~~ R507.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.~~2.~~3. Where the lateral load connection is provided in accordance with figure 507.~~2.~~3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

FIGURE ~~507.2.3~~ 507.3
DECK ATTACHMENT FOR LATERAL LOADS

(Figure remains unchanged)

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The provisions for deck design and attachment to the house have evolved in recent years. The IRC is now very strong on appropriate attachment to the main structure, as it should be. However, the specific provision in R507.1 that requires design for lateral loads, and the prescriptive hold-down tension connector alternative of R507.2.3, seem overly conservative for decks that are at grade, when these decks do not even require guardrails. For at-grade decks, the lag screw/bolt connections from deck ledger to band joist required by R507.2 are adequate. Elevated decks would still be required to be designed for lateral loads in accordance with R507.1 or the prescriptive hold-down tension devices specified in R507.2.3 (figure included below for convenience).

The renumbering of current Section R507.2.3 to R507.3 is necessary because current Section R507.2.3 serves as a prescriptive alternative to the requirement for design for lateral loads in R507.1. The purpose of the exception is to retain the requirement for ledger-to-band joist lags or bolts in current R507.2, R507.2.1, and R507.2.2, but exempt low decks from the prescriptive hold-down tension devices (or design for lateral load) in current section R507.2.3. Moving current R507.2.3 to its own section allows easier reference to the lag/screw connection requirements.

Cost Impact: The code change proposal could reduce the cost of construction. It could reduce the cost of construction.

R507.1-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a needed exception for decks without guards. This allows decks without guards to be attached without the lateral hold downs.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Glenn Mathewson, MCP, City of Westminster, CO, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.1 ~~Decks~~ General. Decks shall be designed in accordance with this section and accepted engineering practice to resist both vertical and lateral loads as required by Section R301.1. Ledger connections to exterior walls shall not be made to any wall cladding or veneers and shall be made to the primary structure. ~~Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads.~~

> ~~**Exception:** Design for lateral loads, and connectors in accordance with Section R507.3, shall not be required for decks that do not require guards in accordance with Section R312.1.1, provided that the deck ledger is connected to the band joist in accordance with Section R507.2.~~

Such ~~attachment~~ connection shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

~~**R507.3 Deck lateral load connection.** The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.3. Where the lateral load connection is provided in accordance with figure 507.2.3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).~~

~~**Figure R507.2.3**~~
~~**Deck attachment for lateral loads.**~~

Commenter's Reason: As you consider this public comment modification, please review the additional information at the end that provides a better undesrstanding of the history and implications of the IRC lateral load provisions on the construction industry. Rather than only exempting low-level decks from lateral load connections as RB263 proposes, this public comments provides evidence that it's not required on most if not all decks.

In the summer of 2013, a month before this public comment was due, the Forest Products Society published an edition of Wood Design Focus containing research articles providing results from Washington State University and Virginia Tech regarding testing of decks for lateral loads. Seven years after the lateral load provisions were put in the IRC, only NOW we finally have real information. The following results of these tests provide the validated information the decking and code industry has been waiting for. While more research is necessary for a complete prescriptive lateral load design method in the IRC, the research to date is sufficient enough to prove that what has been in the IRC is a fallacy and must be removed. Quality structural provisions based on real data will be more appropriately developed for the 2018 with a clean slate. There is no justification and has never been any justification for building code, products or alternatives based on what is in the 2012 IRC for deck lateral loads.
The following quotes from this document are provided below under "fair use" permitted by the publisher, the Forest Products Society.

Wind Analysis from Washington State University.
To determine the effects of wind on typical deck construction, load calculations for a 12 x 12 deck 10 ft. above grade were performed. The following text is from this research report.

> "From the assumptions in the example, the largest ASD wind load was 1,299 lb using ASCE 7-10 methodology and data. The resulting hold-down force for a 12 ft by 12 ft deck would be approximately 650 lb. This load is smaller than the 1,500 lb hold-down requirement in the 2009 IRC, Section 502.2.2.3. From this analysis, the 1,500 lb minimum design capacity is conservatively high for wind lateral loads. An allowable design capacity of 650 lb would be sufficient to resist the wind lateral loads based on the assumptions and calculations given in this paper. Unless you are in a hurricane or special wind

region, the hold-down forces will be significantly smaller. Based on the above assumptions, the hold down forces would be approximately 266 lb."

According to the study of this deck, in a hurricane or special wind region, the lateral load developed at the connection device would be 650 lb. However, more common wind zones (i.e. the minimum standard) would only require a 266 lb design resistance. This is well below the 1500 lb currently in the IRC.

Seismic Analysis from Washington State University.
To determine the effects of seismic activity on typical deck construction, load calculations for a 12 x 12 deck 10 ft above grade were performed. The calculations and the resulting loads are based on seismic design category D. The following text is from this research report.

> "Based on our seismic analyses with the stated assumptions, and using the equivalent lateral load provisions in ASCE 7-10, hold-down requirements significantly lower than 1,500 lb can be justified when seismic loads govern. From our analyses, a maximum ASD-factored seismic load of 1,250 lb would be reasonable, resulting in hold-down requirements of approximately 625 lb. <u>This can be achieved through a variety of hardware solutions.</u>"

Again, we will compare these values at the end of this report. To summarize, in a very high seismic region (D), only 625 lb. of load would require resistance. It is safe to assume it will be less for lower seismic regions. This is well below the 1500 lb currently in the IRC.

Lateral Load from Occupants Testing from Washington State University.
To determine the magnitude of lateral load that could be generated by the movement of occupants on a deck, tests were conducted on a full-scale deck with human subjects. The following text is from this research report.

> "The highest lateral load observed in all tests was 12.1 psf shown in Table 2. In this case, deck boards were oriented parallel to the deck ledger, resulting in a very flexible deck that swayed back and forth approximately 7 inches each way at a frequency of approximately 1 Hz. These large displacements caused significant inertial forces from the mass of the deck and also allowed the occupants to "feel" the deck movement, making it easier for them to synchronize their movements. As displacement of the deck reached <u>maximum values of approximately 7 inches</u>, the occupants started pivoting their hips (like downhill skiers) with the deck while leaving their upper body nearly motionless. At this point, it could be argued that the majority of the force generated is coming from deck inertial forces rather than from the occupants. <u>This would imply that if lateral sway/acceleration of a deck is adequately restrained, these inertial forces could be reduced or eliminated.</u> For example, <u>when the cyclic motion was perpendicular to the deck ledger (the stiffest orientation), the maximum traction load was 4.5 psf. In summary it could be argued for the design that 12 psf would provide a reasonable upper estimate of lateral loads from occupants for flexible decks."</u>

Let's look at some key parts of this information.

1) The test revealed that a 12 x12 deck loaded to 40psf with moving occupants, would experience approximately 7 inches maximum of displacement. This deflection is measured from the outer corner of the deck, at 12 ft from the ledger side of the deck. This is with perpendicular decking installed.
2) At the above described maximum expected deflection, the maximum load expected to be generated by the occupants is conservatively 12 psf.
3) It is important to note that this load is based on a deck built that allows sway up to 7 inches. Had the deck been designed appropriately, to resist such deformation, the researcher states the loads would be reduced.

Ledger Connection Testing by Virginia State.
The same researcher that conducted the ledger connection tests that were the basis of the ledger fastening table in the 2009 IRC performed this research. Two 12 x 12 decks were constructed identically with perpendicular decking. One deck had lateral hold down anchors installed, the other did not. The decks were fastened with a strut along the center of the 12 ft. joists spans to simulate the resultant location of a uniformly loaded deck. The decks were pulled laterally at this midpoint to a displacement of 17 inches, far greater than anything the occupants in the previously described test could generate. The following text from the research report describes the damage observed by these large loads.

> "In both tests, splitting of the top edges of the deck joists was the main source of damage, and was caused by the couple from the deck screws that induced stresses perpendicular to the grain. Splitting propagated along the longitudinal axis of the wood. Each deck joist completely split, to the depth of screw penetration, from the load drag strut to the ledger board. Significant yielding and fracture of deck board screws was also observed in this region. Minimal joist splitting and screw yielding was seen in the region from the load drag strut to the outer deck beam. <u>In both tests, no damage was observed in the deck ledger to house rim board connection</u>. A maximum separation of 0.1 inches when hold-downs were used and 0.15 inches when hold-downs were not used was recorded between the deck ledger and diaphragm rim board at the tension chord of the deck. <u>No damage was observed in the simulated house diaphragm."</u>

It is critical at this time to remember the original motivation for including the lateral load provisions in the 2009 IRC was the connection of the band joists to the house, as shown in the clip below:

Reason: Researchers at Virginia Tech University and Washington University have tested simulated deck-ledger to house-band-joist connections in their respective laboratories. A practical range of pressure-preservative-treated (PPT) deck ledger lumber (incised Hem-fir and Southern Pine) was attached to a simulated Spruce-Pine-Fir band joist by ½-inch lag screws or bolts with washers. The deck ledger was separated from the house band joist by placing a piece of 15/32" wall sheathing in the connection, and in another test case for bolts only, a ½-inch stack of washers was inserted into the connection to produce a drainage plane. The specimens were tested to failure and the average test results ware divided by a factor of 3.0, intended to provide an adequate in-service safety factor, and further divided by 1.6 to convert from a "test duration" to a "normal duration" of ten years recognized by the NDS and IBC as the proper duration for occupancy live load.

The proposed on-center spacing is the closest spacing for the two cases of deck ledger lumber studied. Due to the limited investigation into the performance of composite type house rimboards (only DFL was evaluated) and the possibility of rimboards entering the market being a lower quality than what was tested at Washington State University, engineered rimboards are not included in the scope of the proposed fastener spacing table. Instead, footnote 6 is proposed to refer the contractor and official to the manufacturer of the rimboard product. The two papers cited in the Bibliography gives the testing procedure and results for the cases included in the caption to the proposed table.

Bibliography:

1. Carradine, D. M., D. A. Bender, J. R. Loferski, and F. E. Woeste. 2005. Wood Bits: Residential deck ledger design. Building Safety Journal (6): 4-7. www.iccsafe.org/news/bsj/1205_Woodbits.pdf

2. Loferski, J., F. Woeste, R. Caudill, T. Platt, and Q. Smith. 2004. Load-tested deck ledger connections. Journal of Light Construction 22(6): 71-78

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

Committee Action: **Approved as Submitted**

Committee Reason: This is a much needed addition to the code and it brings in a new table that is a good starting point for the attachment of the deck ledger to the band joist. The committee urges additional study of the attachment of the band joist to the framing.

Assembly Action: **None**

2007 ICC FINAL ACTION AGENDA **445**

The committee reason in the clip above, approving the ledger fastening table, is provided below:

> "Committee Reason: This is a much needed addition to the and brings in a new table that is a good starting point of the attachment of the ledger to a band joist. The committee urges additional study of the attachment of the band joist to the framing."

The test above, by the original researcher of the ledger connection, reveals that no damage occurred to the simulated house diaphragm, even under the most maximum loads in the test and a 17 inch horizontal deflection that split the tops of the joists. The band joist attachment to the framing did not require any additional connection. Seven years later, the study has been provided.

Many have questioned, "Doesn't a ledger connected with lag screws resist at least some lateral load?" The following text is from the research report.

> "The two outermost lag screws in tension resisted most of the chord force and the sum of the forces in all the lag screws located in the tension region of the deck agree well with the calculated overturning tension force (Figure 6). Furthermore, even though the two outermost lag screws carried most of the force, these lag screws did not show any visible signs of withdrawal at a maximum load of approximately 7,000 lbs (Figure 5)"

According to the graph below from the research, the deck experienced a horizontal deflection at approximately 17 inches at a load just shy of 3500 lbs. However, when loading continued upwards of 7,000 lbs, "the lag screws did not show any visible signs of withdrawal". I think the answer is that lag screws do withstand lateral loads, and band joists don't get pulled from homes.

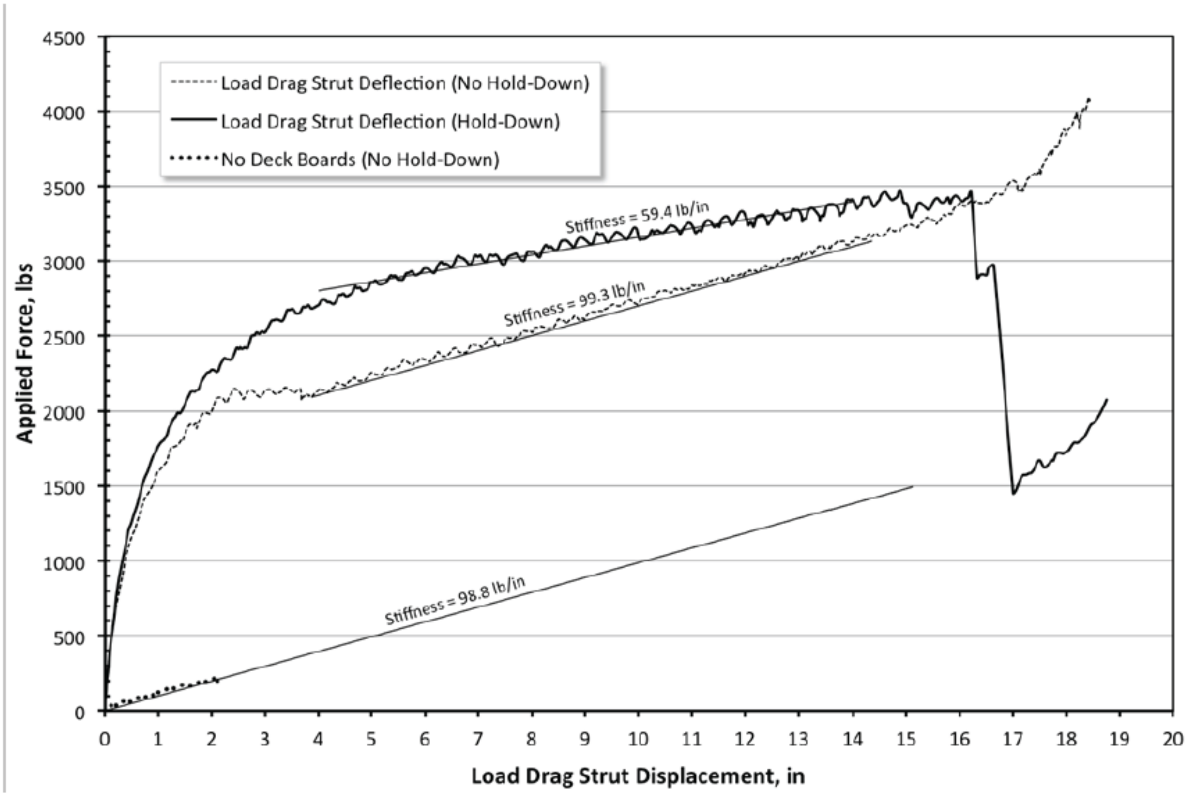


Figure 4. Load-Displacement Curves for Deck With and Without Hold-downs

There is still more to be said about the lateral load anchors and the ledger connection in this test. The following text is from this research report.

> *"Hold-down behavior and geometric effects.*--If the deck behaved as a rigid body, the tension chord forces can be calculated using simple statics as given in Equation 4.3-7 of the 2008 *Special Design Provisions for Wind and Seismic* (AF&PA, 2008), and are shown in Figure 7. However, due to the flexibility of the deck, the measured forces in the hold-down connectors were dramatically different than expected. The hold-down expected to resist overturning tension forces actually diminished to zero as the deck deformed."

The lateral load detail provided in the IRC with no structural basis, indeed…has no structural basis. It doesn't even work as intended and clearly doesn't belong in the IRC. The following text is from this research report.

> "Ledger attachment -- Deck ledgers were attached with 0.5-inch diameter lag screws in a staggered pattern as specified in IRC Table R502.2.2.1. The research basis for the IRC provisions was Carradine et al. (2007;; 2008). The deck ledger-to-house attachment appeared to be adequate for the conditions studied. When no tension hold-down connectors were used, the outer two lag screws carried most of the withdrawal load with no visible signs of failure (Figure 6). Testing was terminated before an ultimate strength was achieved at a load of approximately 7,000 lb for both decks. The two lag screws nearest the deck tension chord experienced the largest forces, yet did not fail in withdrawal. These results point to the effectiveness of 0.5-in diameter lag screws when selected and installed per the IRC deck ledger connection provisions in Table R502.2.2.1 (ICC 2009b). The results obtained in this study should generally apply to decks with an aspect ratio of 1:1 and less, where aspect ratio is defined as the deck dimension perpendicular to the house divided by the dimension parallel to the house. The study results should not be applied to decks having an aspect ratio greater than 1:1 as the failure modes and deck behavior may substantially change."

7,000 lb. of lateral load placed at the centroid of the deck and the lag screws "did not fail in withdrawal" and the band joist experienced no visible sign of anything.

The summary of all this is simple. Wind and seismic don't produce lateral loads on standard decks with sufficient magnitude to justify a special lateral connection across all zones.
Occupants can only produce about 12 psf of lateral force uniformly across a deck. A 12 x 12 deck attached per the IRC ledger-fastening table and WITHOUT lateral anchors was able to resist a resultant lateral force of 7,000 lb. The joists split and failed while there was only a fraction of an inch of movement in the ledger and no visible sign of any change to the rim joist. The equivalent load

that could be produced by occupants is 1728 lb. 1/4th of a 7,000 lb test that still did not separate the ledger or band joist from the home.

Based on 12 psf of lateral load design, it would take 583 square feet to generate 7,000 lb. With the longest common framing material available being 18 ft. long, a 583 sf deck would be 18 ft. x 32 ft. This reduces the aspect ratio from 1:1 for the 12 x 12 deck to 1:1.77. This reduction in aspect ratio reduces the resultant force at the ledger ends. It also increases the length of the lag-screwed ledger from 12 ft. to 32 ft, meaning more fasteners to resist the additional load. With this consideration and extrapolating the test results, a deck constructed of common dimensional lumber can be built of any size without exceeding the values found in these tests, provided the deck aspect ratio is no greater than 1:1.

Occupants' movement will not disconnect a ledger attached per the IRC fastening table. Lateral devices are just not even close to necessary.

In summary, the request of the committee from the 2009 code development to have further testing of the band joist connection has been satisfied. The real data from research clearly disproves the necessity of the lateral load anchor details "permitted" in the IRC

The current lateral load provisions first came to the code as late as possible, as a public comment. It's no wonder they are now found to be flawed. With an approval as modified of this public comment, lateral load provisions can be developed as they should be. With a clean start and a lot learned, provisions can be based on real research, vetted by professionals nationwide, and introduced at the beginning of the code development process.

ADDITIONAL INFORMATION

How did Figure R507.2.3 get in the IRC?

During the development of the 2009 IRC, (supplement cycle), a new proposal was submitted at the start of the modification process. This proposal provided a much needed ledger connection table for the fastening of a deck ledger to a band joist. Extensive testing conducted by Dr. Frank Woste and peers conducted at Virginia Tech was the basis of this critical addition to the IRC.

During the committee hearings, the committee approved the ledger connection table. They did provide a comment, however, stating that this provided a great connection between the ledger and the band joist, but they would like to see more research regarding the connection of the band joist to the remaining framing.

To address this committee comment regarding the sufficiency of the band joist connection to the structure, the lateral load detail and provisions were submitted as a modification to the ledger connection table. During the final hearings, the voting membership in attendance approved the modification. Without being fully vetted through the entire code modification process, the lateral load provisions were printed in the 2009 IRC. They were approved for the IRC after only being alive in the process for 46 days. This created the following implications:

1) A prescriptive structural provision was included in the code without any scientific or statistic basis what-so-ever. The 1500 lb value is a mere guess.
2) It requires fastening of floor sheathing greater than that required by perscriptive code for floor construction.
3) It is described as a connection that "shall be permitted". This phrase is used as a clarifier in the IRC for when an installation would be otherwise prohibited. This language created confusion in code administration leading to it being considered a "requirement".
4) A proprietary based fastening solution, complete with artwork, as the sole remedy.

The origin for the lateral load detail in the IRC is from a FEMA document for earthquake resistant design. Though not tied to any siesmic zone, the IRC detail is MORE RESTRICTIVE than the FEMA detail in that it requires additional fastening of the floor sheathing to the joist with the hold down.

How have the IRC lateral load provisions affected the construction industry.

The domino effect of including an unfounded structural value for an unothodox "permissable" connection utilizing proprietary products in the IRC has been dramatic. To the decking industry, it has un-necesarrily driven up the cost of construction. Most alarming is that the added expense and inconvenience without foundation has served as motivation to homeowners to have their deck built without permit. Installation of the hold-down detail requires invasive remodeling that most homeowners will not accept.

Another impact is the code insutry itself, where it has devalued the legitimacy of the IRC provisions with unfounded structural designs and supports a demand for proprietary products. As a code administrator, I am appauled, as are many of my colleagues. Many of the following graphics are intended to show how the lateral load provisions have caused unwarranted delimna.

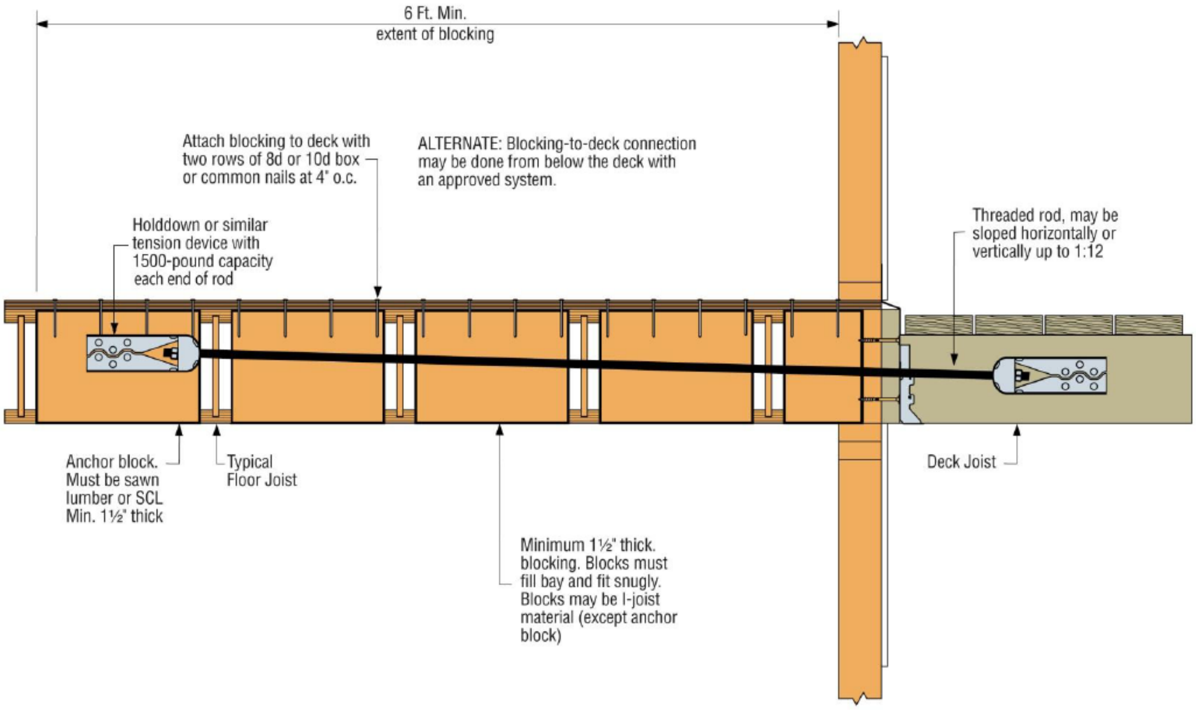
Wood I-joist Manufacturers Association.

I-joist manufacturers, fielding inquiries regarding how to connect a 1500 lb load device to their floor systems, had to respond. The Wood I-joist Manufacturers Assocation did just that with the publication of a technical report. With no choice but to use the 1500 lb figure published in the IRC, they were forced to create details such as those below.

Take a moment and look at the details and some of the potential ramifications.

- Removal of floor finish
- Removal of ceiling finish
- Threaded rod extending at least 6 feet into the floor system with blocking in every bay.
- Floor sheathing that must be fastened to he blocking at 4 inches on center.

This is to satisfy an IRC load that is not proven and not even required.



As mentioned previously, the lateral load detail and provisions is unusually included in the code as a "permitted" method to resist lateral loads…that are undefined and undetermined. Being unorthodox language for the IRC, it is promoted as if it is required by many organizations, manufacturers and professionals. The text shown below is copied from the WIJMA details and appears to promote a "requirement" for this connection that is merely "permitted".

Deck Lateral Load Connection to Prefabricated Wood I-Joist Floor System

The International Residential Code (IRC) includes provisions for resisting lateral forces of an exterior deck that is attached to a structure. Specifically, 2009 IRC R502.2.2.3 and 2012 IRC R507.2.3 require connections at two locations that resist a minimum lateral load of 1500 lbs per connection.

ICC-ES Acceptance Criteria Development
In December of 2010 ICC Evaluation Services began development of an acceptance criteria, AC430, for "Deck harness devices". The purpose of these criteria was to test alternative methods of lateral load connection other than the hold-down/threaded rod method provided in the 2009 IRC. Interestingly, here is a statement by ICC-ES staff regarding this subject.

TO: **PARTIES INTERESTED IN DECK HARNESS DEVICES AND ASSEMBLIES FOR RESIDENTIAL DECKS**

SUBJECT: Proposed Acceptance Criteria for Deck Harness Devices and Assemblies for Residential Decks, Subject AC430-0211-R1 (MO/JS)

> The ICC-ES staff is of the opinion that the devices specified in IRC Section R502.2.2.3 are prescriptive requirements, in lieu of engineered connections to the primary structure. Regardless of whether the hold-down tension devices specified in IRC Section R502.2.2.3 are to be considered components within the primary structural support system, or as safety devices within a backup system, the devices clearly serve a structural purpose, as indicated by the minimum required ASD capacity of 1500 pounds (6672 N).

Though the lateral load detail was approved for the 2009 IRC as merely a "permitted detail" and not outright required, it became the easy answer. Note that the justification for this connection, according to ICC-ES, is that "…the devices clearly serve a structural purpose, as indicated by the minimum required ASD capacity of 1500 pounds." At this point, the reason why the lateral load provisions were originally included in the IRC are starting to be lost. ICC-ES doesn't know if it is part of the primary design or a backup safety device. The answer is that it is out of concern of the band joist (rim joist) detaching from the structure.

RB263-13

Final Action: AS AM AMPC____ D

RB264-13

R507.1, R507.4 (NEW), R507.5 (NEW), Figure R507.5 (NEW), Table R507.5 (NEW), R507.5.1, R507.6, Figure R507.6 (NEW), Table R507.6 (NEW), R507.7 (NEW), R507.8 (NEW), R507.8.1 (NEW), Figure R507.8.1 (NEW), R507.8.2 (NEW), Figure R507.8.2 (NEW)

Proposed Change as Submitted

Proponent: Brian Foley, P.E. Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov), Glenn Mathewson, M.C.P., North American Deck and Railing Association, Randy Shackleford, P.E., Simpson Strong-Tie

Revise as follows:

R507.1 Decks. Wood decks shall be in accordance with this section. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. The use of other grades, species, loading, materials and conditions not described herein shall be permitted be in accordance with Section R301.

R507.4 Decking. Wood decking shall be at least a nominal 2-inch (51 mm) in thickness and placed at an angle between 45 and 90 degrees to deck joists spaced a maximum of 24-inches (610 mm) on-center. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.

Exceptions:

1. Wood decking with a minimum nominal thickness of 1 $^{1}/_{4}$ inches (32 mm) shall be permitted to be installed at 90 degrees to deck joists spaced a maximum of 24 inches (610 mm) on center and not less than 45 degrees to deck joists spaced a maximum of 16 inches (406 mm) on center.
2. Wood/plastic composite decking in accordance with Section R507.3.

R507.5 Allowable deck joist spans. Spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joist shall be permitted to cantilever a maximum of one-fourth of the joist span.

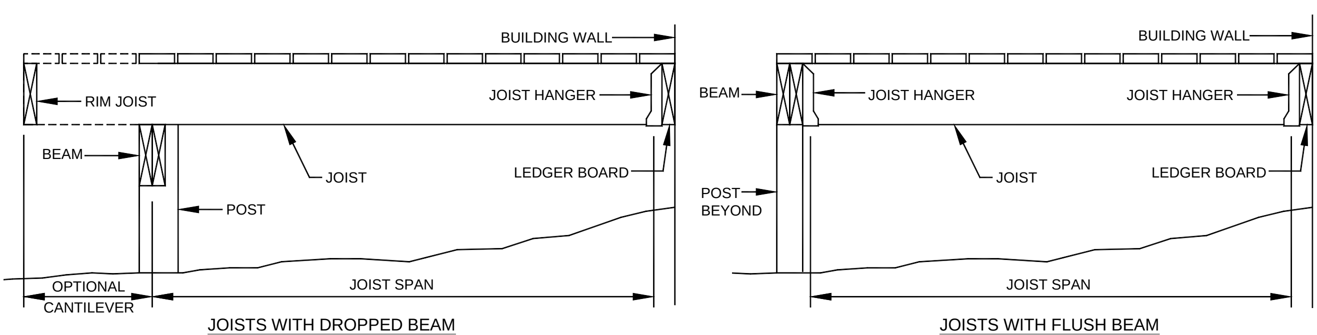


FIGURE R507.5
TYPICAL DECK JOIST SPANS

TABLE R507.5
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b] (in.)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	10-4	9-5	7-10	7-1	7-1	7-1
	2 x 8	13-8	12–5	10–2	10-9	10-9	10-2
	2 x 10	17-5	15–10	13–1	15-6	15-6	13-1
	2 x 12	18-0	18–0	15-5	18-0	18-0	15-5
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

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

a. No. 2 grade with wet service factor.
b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor

R507.5.1 Lateral restraint at supports. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3)10d threaded nails or (3)#10x3 inch (76 mm) long wood screws.

R507.6 Deck Beams. Spans for deck beams, as shown in Figure R507.6, shall be in accordance with Table R507.6. Beam plies shall be fastened with two rows of 10d threaded nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the beam span. Splices of multi-span beams shall be located at interior post locations.

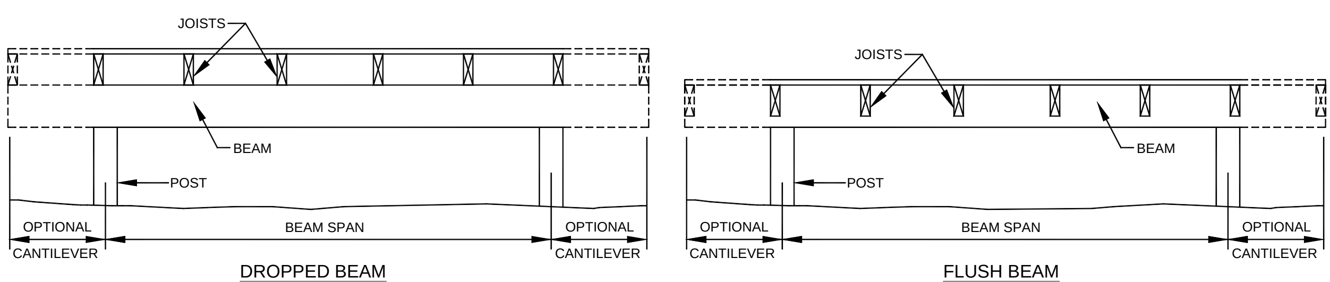


FIGURE R507.6
TYPICAL DECK BEAM SPANS

TABLE R507.6
DECK BEAM SPAN LENGTHS (ft.-in.)[a, b]

SPECIES[c]	SIZE[d]	DECK JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	7-1	6-2	5-6	5-0	4-8	4-4	4-1
	2-2x8	9-2	7-11	7-1	6-6	6-0	5-7	5-3
	2-2x10	11-10	10-3	9-2	8-5	7-9	7-3	6-10
	2-2x12	13-11	12-0	10-9	9-10	9-1	8-6	8-0
	3-2x6	8-7	7-8	6-11	6-3	5-10	5-5	5-2
	3-2x8	11-4	9-11	8-11	8-1	7-6	7-0	6-7
	3-2x10	14-5	12-10	11-6	10-6	9-9	9-1	8-7
	3-2x12	17-5	15-1	13-6	12-4	11-5	10-8	10-1
Douglas fir-larch[e],	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9

hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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

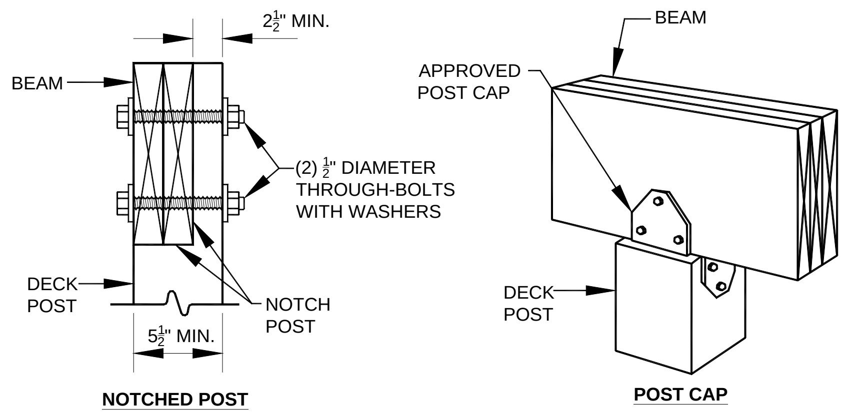
a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied at the end.
b. Beams supporting deck joists from one side only.
c. No 2 grade, wet service factor.
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
e. Includes incising factor.
f. Northern species with no incising factor.

R507.7 Deck joist and deck beam bearing. The ends of each joist and beam shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Beam bearing at deck posts shall be in accordance with Section R507.8.1.

R507.8 Deck posts. For single level wood decks with beams sized in accordance with Table R507.6, posts shall be a minimum nominal 6x6 with a maximum height of 14 feet (5486 mm) measured to the underside of the beam.

Exception: Nominal 4x4 or 4x6 posts shall be permitted with a maximum height of 8 feet (2438 mm).

R507.8.1 Deck post to deck beam. Deck beams shall be attached to deck posts in accordance with Figure R507.8.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm

FIGURE R507.8.1
DECK BEAM TO DECK POST

R507.8.2 Deck post to deck footing. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.2.

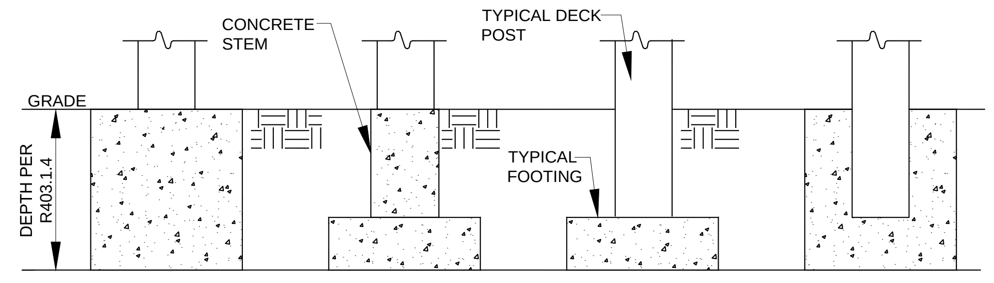


FIGURE R507.8.2
TYPICAL DECK POSTS TO DECK FOOTINGS

Reason: Wood decks are the most prolific structure to be constructed to a residential dwelling, yet there is very little guidance in the IRC regarding the structural capacity of the joists, beams and posts. The existing span tables in Chapter 5 do not address wood decks due to the differences in their design considerations. Some builders and code officials often rely on span tables developed by AHJs or the DCA6 published by the American Wood Council, while others have nothing to refer to.

With the permission of the American Wood Council, we have provided in this proposal their span tables for typical joists and beams and height requirements for typical posts based on the most common wood species and grade used throughout the country. Attachment and bearing requirements are also provided to give the user guidance on how these elements connect. With the existing provisions already in Section 507, the IRC user would be able to design and construct a safe wood deck.

Careful attention was given to ensure these new provisions did not and could not deter the construction of decks composed of other materials and in different configurations and conditions.

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

R507.1-RB-FOLEY.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt this proposal needs reworking and brought back. There is no criteria for the threaded nails. Language is unclear. There is no provision for the deck post to footing to be raised above grade for moisture protection.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Brian Foley, Fairfax County, VA, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.1 Decks. Wood-framed decks shall be in accordance with this section or Section R301 for materials and conditions not prescribed herein. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. ~~The use of other grades, species, loading, materials and conditions not described herein shall be permitted be in accordance with Section R301.~~

~~**R507.4 Decking.** Wood decking shall be at least a nominal 2-inch (51 mm) in thickness and placed at an angle between 45 and 90 degrees to deck joists spaced a maximum of 24-inches (610 mm) on-center. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.~~

~~**Exceptions:**~~

~~3.~~ ~~Wood decking with a minimum nominal thickness of $^5/_4$ inches (32 mm) shall be permitted to be installed at 90 degrees to deck joists spaced a maximum of 24 inches (610 mm) on center and not less than 45 degrees to deck joists spaced a maximum of 16 inches (406 mm) on center.~~

~~4.~~ ~~Wood/plastic composite decking in accordance with Section R507.3.~~

R507.~~5~~4 Allowable deck joist spans. Spans for wood deck joists, as shown in Figure R507.~~5~~4, shall be in accordance with Table R507.~~5~~4. Deck joists shall be permitted to cantilever a maximum of one-fourth of the actual joist span.

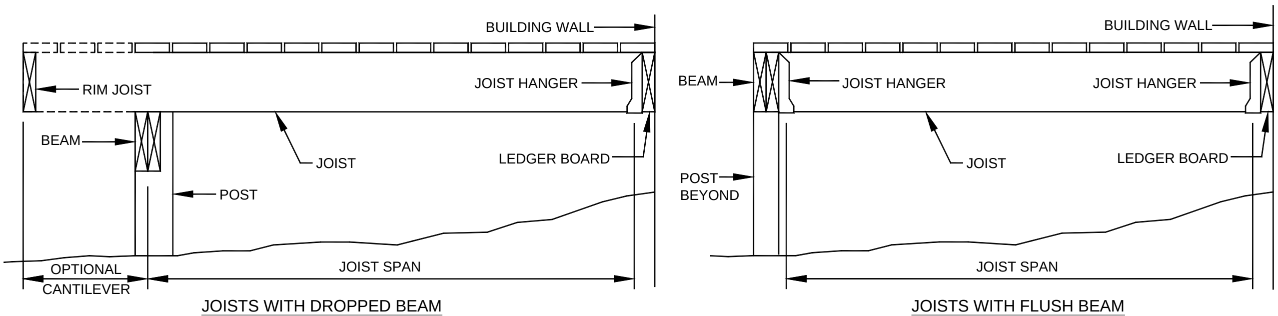


FIGURE R507.~~5~~4
TYPICAL DECK JOIST SPANS

TABLE R507.~~5~~4
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b,f] (in.)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	~~10-4~~ 9-11	~~9-5~~ 9-0	~~7-10~~ 7-7	~~7-1~~ 6-8	~~7-1~~ 6-8	~~7-1~~ 6-8
	2 x 8	~~13-8~~ 13-1	~~12–5~~ 11-10	~~10–2~~ 9-8	~~10-9~~ 10-1	~~10-9~~ 10-1	~~10-2~~ 9-8
	2 x 10	~~17-5~~ 16-2	~~15–10~~ 14-0	~~13–1~~ 11-5	~~15-6~~ 14-6	~~15-6~~ 14-0	~~13-1~~ 11-5
	2 x 12	18-0	~~18–0~~ 16-6	~~15-5~~ 13-6	18-0	~~18-0~~ 16-6	~~15-5~~ 13-6
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

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

f. No. 2 grade with wet service factor.
g. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
h. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
i. Includes incising factor.
j. Northern species with no incising factor
k. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

~~**R507.5.1 Lateral restraint at supports.** Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3) 10d (3" x 0.128") threaded nails or (3) #10x3 inch (76 mm) long wood screws.~~

R507.~~6~~5 Deck Beams. Spans for deck beams, as shown in Figure R507.~~6~~5, shall be in accordance with Table R507.~~6~~5. Beam plies shall be fastened in accordance with Table R602.3(1). ~~with two rows of 10d (3" 0.128") threaded nails minimum at 16 inches (406 mm) on center along each edge.~~ Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. ~~Splices of multi-span beams shall be located at interior post locations.~~

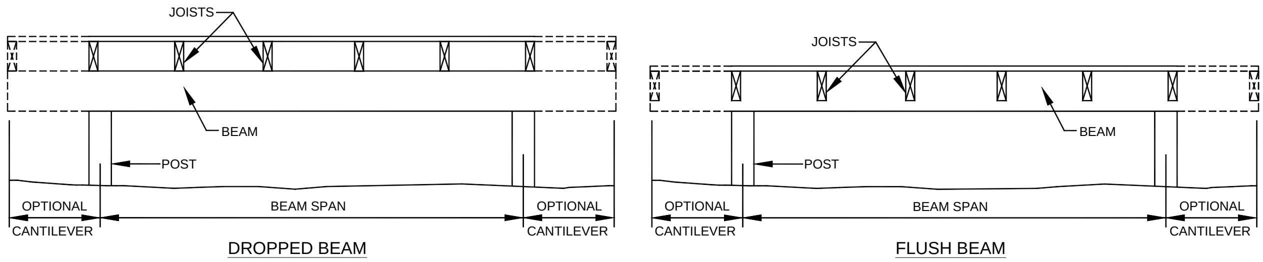


FIGURE R507.~~6~~5
TYPICAL DECK BEAM SPANS

TABLE R507.~~6~~5
DECK BEAM SPAN LENGTHS (ft.-in.)[a, b]

SPECIES[c]	SIZE[d]	DECK JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	~~7-1~~ 6-11	~~6-2~~ 5-11	~~5-6~~ 5-4	~~5-0~~ 4-10	~~4-8~~ 4-6	~~4-4~~ 4-3	~~4-1~~ 4-0
	2-2x8	~~9-2~~ 8-9	~~7-11~~ 7-7	~~7-1~~ 6-9	~~6-6~~ 6-2	~~6-0~~ 5-9	~~5-7~~ 5-4	~~5-3~~ 5-0
	2-2x10	~~11-10~~ 10-4	~~10-3~~ 9-0	~~9-2~~ 8-0	~~8-5~~ 7-4	~~7-9~~ 6-9	~~7-3~~ 6-4	~~6-10~~ 6-0
	2-2x12	~~13-11~~ 12-2	~~12-0~~ 10-7	~~10-9~~ 9-5	~~9-10~~ 8-7	~~9-1~~ 8-0	~~8-6~~ 7-6	~~8-0~~ 7-0
	3-2x6	~~8-7~~ 8-2	~~7-8~~ 7-5	~~6-11~~ 6-8	~~6-3~~ 6-1	~~5-10~~ 5-8	~~5-5~~ 5-3	~~5-2~~ 5-0
	3-2x8	~~11-4~~ 10-10	~~9-11~~ 9-6	~~8-11~~ 8-6	~~8-1~~ 7-9	~~7-6~~ 7-2	~~7-0~~ 6-8	~~6-7~~ 6-4
	3-2x10	~~14-5~~ 13-0	~~12-10~~ 11-3	~~11-6~~ 10-0	~~10-6~~ 9-2	~~9-9~~ 8-6	~~9-1~~ 7-11	~~8-7~~ 7-6
	3-2x12	~~17-5~~ 15-3	~~15-1~~ 13-3	~~13-6~~ 11-10	~~12-4~~ 10-9	~~11-5~~ 10-0	~~10-8~~ 9-4	~~10-1~~ 8-10
Douglas fir-larch[e], hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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

g. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied at the end.
h. Beams supporting deck joists from one side only.
i. No 2 grade, wet service factor.
j. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
k. Includes incising factor.
l. Northern species with no incising factor.

~~**R507.7 Deck joist and deck beam bearing.** The ends of each joist and beam shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Beam bearing at deck posts shall be in accordance with Section R507.8.1.~~

R507.~~8~~6 Deck posts. For single level wood-framed decks with beams sized in accordance with Table R507.~~6~~5, posts shall be in accordance with Table R507.6. ~~a minimum nominal 6x6 with a maximum height of 14 feet (5486 mm), measured to the underside of the beam.~~

~~**Exception:** Nominal 4x4 or 4x6 posts shall be permitted with a maximum height of 8 feet (2438 mm).~~

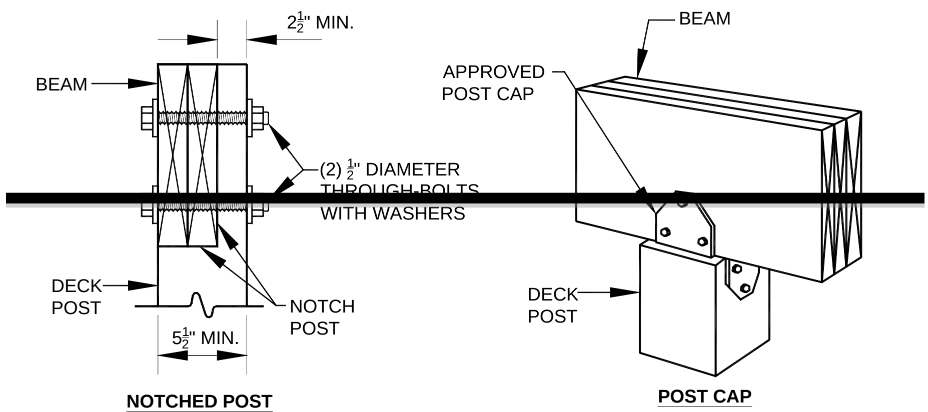
TABLE R507.6

DECK POST HEIGHT

DECK POST SIZE	MAXIMUM HEIGHT [a]
4x4	8’
4x6	8’
6x6	14’

For SI: 1 foot = 304.8 mm.
[a] Measured to the underside of the beam.

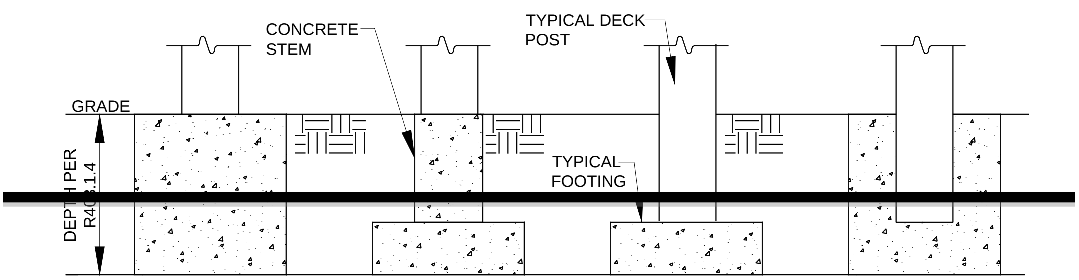
~~**R507.8.1 Deck post to deck beam.** Deck beams shall be attached to deck posts in accordance with Figure R507.8.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.~~



For SI: 1 inch = 25.4 mm

~~**FIGURE R507.8.1**~~
~~**DECK BEAM TO DECK POST**~~

~~**R507.8.2 Deck post to deck footing.** Posts shall bear on footings in accordance with Section R403 and Figure R507.8.2.~~



~~**FIGURE R507.8.2**~~
~~**TYPICAL DECK POSTS TO DECK FOOTINGS**~~

Commenter’s Reason: There are no provisions for building a wood-framed, exterior deck under the prescriptive provisions of the existing IRC. Decks have notoriously never been address comprehensively in any building standard in our country, and therefore there are a great variety of construction methods that have long been in practice. An informal and open group of professionals and organizations have been working together to recognize this variety and develop well-rounded provisions suitable for the IRC. The provisions proposed in the original RB264-13 represented what could generally be agreed upon by the majority, however, testimony during the hearings on this and other deck-related proposals drew doubt from the committee that industry-wide agreement had been met.

This group continues to work together and will likely do so toward 2018 IRC proposals. Until then, the nation is left without clear guidance for joist and beams spans intended specifically for conventionally framed decks in wet-use environments. The joist span tables currently in the IRC are not suitable for exterior, treated or incised lumber and there is no method for sizing beams appropriately. RB264-13, in this public comment, has been edited to include joist, beam and post sizing only such that the most basic of deck structural elements can be recognized in the code. Tens of thousands of decks will be built every year and permitted by building officials. With this proposed change, the IRC will address them better.

Public Comment 2:

Glenn Mathewson, Westminster, CO, representing North American Deck and Railing Association (NADRA) requests Approval as Modified by this Public Comment.

Modify the proposal as follows

R507.1 Decks. Wood-framed decks shall be in accordance with this section or Section R301 for materials and conditions not prescribed herein. . Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. ~~The use of other grades, species, loading, materials and conditions not described herein shall be permitted be in accordance with Section R301.~~

R507.4 Decking. Maximum allowable spacing for joists supporting ~~wood~~ decking shall be in accordance with Table R507.4. ~~at least a nominal 2-inch (51 mm) in thickness and placed at an angle between 45 and 90 degrees to deck joists spaced a maximum of 24-inches (610 mm) on-center.~~ Wood decking shall be attached to each supporting member with a minimum of (2)8d nails or (2)#8 wood screws.

~~**Exceptions:**~~

~~5. Wood decking with a minimum nominal thickness of $^{5}/_{4}$ inches (32 mm) shall be permitted to be installed at 90 degrees to deck joists spaced a maximum of 24 inches (610 mm) on center and not less than 45 degrees to deck joists spaced a maximum of 16 inches (406 mm) on center.~~

~~6. Wood/plastic composite decking in accordance with Section R507.3.~~

Table R507.4
Maximum joist spacing

Material type and nominal size	Maximum on-center joist spacing	
	Perpendicular to joist	Diagonal to joist[a]
5/4-inch thick wood	16 inches	12 inches
2-inch thick wood	24 inches	16 inches
Plastic composite	Per R507.3	Per R507.3

For SI: 1 inch = 25.4 mm
a. Maximum angle of 45 degrees from perpendicular for wood deck boards

R507.5 ~~Allowable~~ Deck joists ~~spans~~. Maximum allowable spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joist shall be permitted to cantilever a maximum of one-fourth of the actual, adjacent joist span.

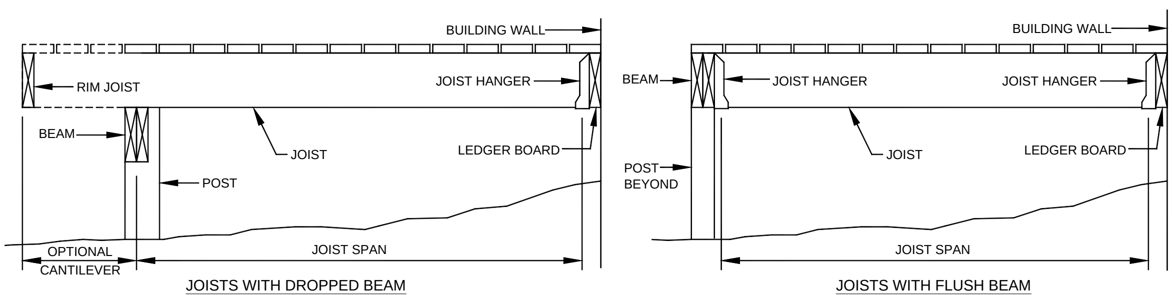


FIGURE R507.5
TYPICAL DECK JOIST SPANS

TABLE R507.5
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b, f] (in.)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	~~10-4~~ 9-11	~~9-5~~ 9-0	~~7-10~~ 7-7	~~7-1~~ 6-8	~~7-1~~ 6-8	~~7-1~~ 6-8
	2 x 8	~~13-8~~ 13-1	~~12–5~~ 11-10	~~10–2~~ 9-8	~~10-9~~ 10-1	~~10-9~~ 10-1	~~10-2~~ 9-8
	2 x 10	~~17-5~~ 16-2	~~15–10~~ 14-0	~~13–1~~ 11-5	~~15-6~~ 14-6	~~15-6~~ 14-0	~~13-1~~ 11-5
	2 x 12	18-0	~~18–0~~ 16-6	~~15-5~~ 13-6	18-0	~~18-0~~ 16-6	~~15-5~~ 13-6
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars,	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6

ponderosa pine[e], red pine[e]	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

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

l. No. 2 grade with wet service factor.
m. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
n. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
o. Includes incising factor.
p. Northern species with no incising factor
q. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

R507.5.1 Lateral restraint at supports. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3) 10d (3" x 0.128") ~~threaded~~ nails or (3) #10x3 inch (76 mm) long wood screws.

R507.6 Deck Beams. Maximum allowable spans for wood deck beams, as shown in Figure R507.6, shall be in accordance with Table R507.6. Beam plies shall be fastened with two rows of 10d (3" 0.128") ~~threaded~~ nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Splices of multi-span beams shall be located at interior post locations.

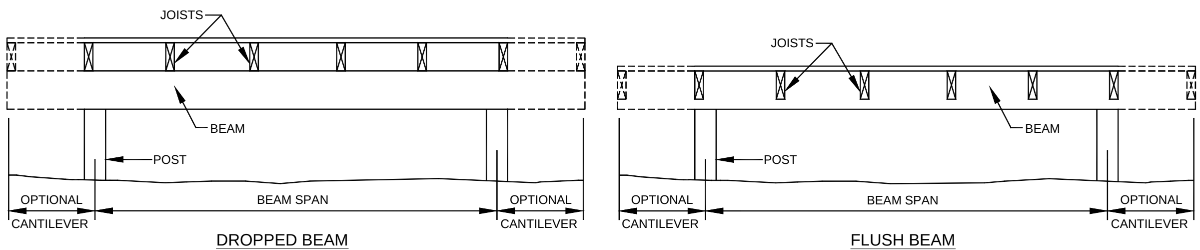


FIGURE R507.6
TYPICAL DECK BEAM SPANS

TABLE R507.6
DECK BEAM SPAN LENGTHS (ft.-in.)[a, b]

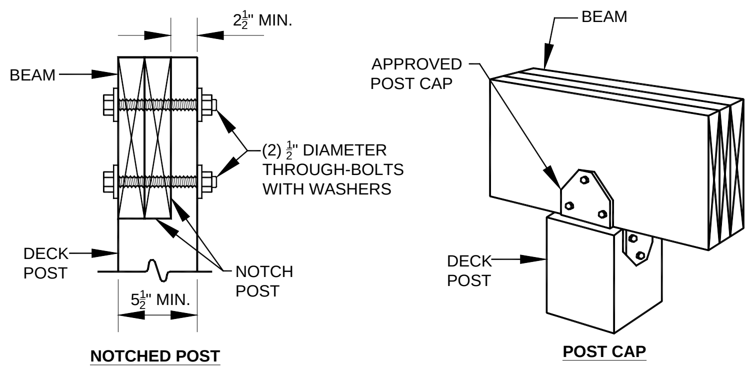
SPECIES[c]	SIZE[d]	DECK JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	~~7-1~~ 6-11	~~6-2~~ 5-11	~~5-6~~ 5-4	~~5-0~~ 4-10	~~4-8~~ 4-6	~~4-4~~ 4-3	~~4-1~~ 4-0
	2-2x8	~~9-2~~ 8-9	~~7-11~~ 7-7	~~7-1~~ 6-9	~~6-6~~ 6-2	~~6-0~~ 5-9	~~5-7~~ 5-4	~~5-3~~ 5-0
	2-2x10	~~11-10~~ 10-4	~~10-3~~ 9-0	~~9-2~~ 8-0	~~8-5~~ 7-4	~~7-9~~ 6-9	~~7-3~~ 6-4	~~6-10~~ 6-0
	2-2x12	~~13-11~~ 12-2	~~12-0~~ 10-7	~~10-9~~ 9-5	~~9-10~~ 8-7	~~9-1~~ 8-0	~~8-6~~ 7-6	~~8-0~~ 7-0
	3-2x6	~~8-7~~ 8-2	~~7-8~~ 7-5	~~6-11~~ 6-8	~~6-3~~ 6-1	~~5-10~~ 5-8	~~5-5~~ 5-3	~~5-2~~ 5-0
	3-2x8	~~11-4~~ 10-10	~~9-11~~ 9-6	~~8-11~~ 8-6	~~8-1~~ 7-9	~~7-6~~ 7-2	~~7-0~~ 6-8	~~6-7~~ 6-4
	3-2x10	~~14-5~~ 13-0	~~12-10~~ 11-3	~~11-6~~ 10-0	~~10-6~~ 9-2	~~9-9~~ 8-6	~~9-1~~ 7-11	~~8-7~~ 7-6
	3-2x12	~~17-5~~ 15-3	~~15-1~~ 13-3	~~13-6~~ 11-10	~~12-4~~ 10-9	~~11-5~~ 10-0	~~10-8~~ 9-4	~~10-1~~ 8-10
Douglas fir-larch[e], hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
m. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied at the end.
n. Beams supporting deck joists from one side only.
o. No 2 grade, wet service factor.
p. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
q. Includes incising factor.
r. Northern species with no incising factor.

R507.7 Deck joist and deck beam bearing. The ends of each joist and beam shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Joists bearing on a beam shall be connected to the beam to resist lateral displacement. ~~Beam bearing at deck posts shall be in accordance with Section R507.8.1.~~

R507.~~8~~ 7.1 Deck post to deck beam. Deck beams shall be attached to deck posts in accordance with Figure R507.8.1 or by other equivalent means capable ~~Post to beam connections shall be constructed~~ to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

Exception: Where deck beams bear directly on footings in accordance with Section R507.8.2



For SI: 1 inch = 25.4 mm

FIGURE R507.8.1
DECK BEAM TO DECK POST

R507.8 Deck posts. For single level wood-framed decks with beams sized in accordance with Table R507.6, deck post size shall be ~~a minimum nominal 6x6 with a maximum height of 14 feet (5486 mm) measured to the underside of the beam.~~ in accordance with Table R507.8.

~~**Exception:** Nominal 4x4 or 4x6 posts shall be permitted with a maximum height of 8 feet (2438 mm).~~

Table R507.8
Deck Post Height

Deck Post Size	Maximum Height
4x4	8’
4x6	8’
6x6	14’

a. Measured to the underside of the beam.

R507.8.2 Deck post to deck footing. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.2. Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers’ installation instructions or a minimum post embedment of 12-inches in surrounding soils or concrete piers.

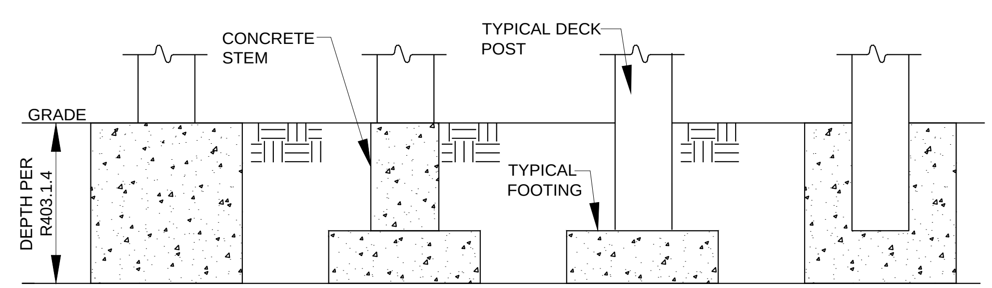


FIGURE R507.8.2
TYPICAL DECK POSTS TO DECK FOOTINGS

R317.1.4 Wood columns. Wood columns shall be approved wood of natural decay resistance or approved pressure-preservative-treated wood.

Exceptions:

1. Columns exposed to the weather or in basements when supported by concrete piers or metal pedestals projecting 1 inch (25.4 m) above a concrete floor or 6 inches above exposed earth and the earth is covered by an approved impervious moisture barrier.
2. Columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building when supported by a concrete pier or metal pedestal at a height more than 8 inches from exposed earth and the earth is covered by an impervious moisture barrier.
3. <u>Deck posts supported by concrete piers or metal pedestals projecting a minimum of 1 inch above a concrete floor or 6 inches above exposed earth.</u>

Commenter's Reason: There is no method in which any typical, wood-framed, exterior deck can be built under the prescriptive provisions of the IRC. Decks have notoriously never been address comprehensively in any building standard in our country, and therefore there are a great variety of construction methods that have long been in practice. An informal and open group of professionals and organizations have been working together to recognize this variety and develop well-rounded provisions suitable for the IRC. It hasn't and won't be easy or quick. The provisions proposed in the original RB264-13 represented what could generally be agreed upon by the majority, however, testimony during the hearings on this and other deck-related proposals drew doubt from the committee that industry-wide agreement had been met.

RB264-13, in this public comment, has been expanded and re-written to recognize further consensus from the discussion group, to better present code provisions, and to address opposition testimony from the committee hearings.

The decking provisions have been rewritten to better describe the angled vs. perpendicular conditions. The new table proposed, R507.4, mirrors the organization and language of another long-standing IRC table for lumber floor sheathing, R503.1.

The post-sizing provisions have also been presented in table form for better presentation of the information.

Concerns regarding Figure R507.8.2 and the lack of a projection of the foundations above grade level were brought up during the hearing and were recognized in this public comment. It was agreed by the proponents of this comment that foundation details are not the appropriate location for provisions regarding the decay resistance of wood members. To better clarify the relationship between the height of footing and the decay resistance of the posts, a third exception specifically addressing decks was added to the current provisions for post (column) decay resistance, R317.1.4, "Wood columns"

Span tables were updated to the new design values for southern pine, and other minor clarifications were made throughout the proposal.

RB264-13

Final Action: AS AM AMPC____ D

RB265-13
R507.2, Table 507.2, R507.2.1, R507.2.2, R507.2.3 (NEW)

Proposed Change as Submitted

Proponent: Glenn Mathewson, North American Deck and Railing Association, representing The Colorado Chapter of the International Code Council, (GlennMathewson@nadra.org)

Revise as follows:

R507.2 Deck leger connection to band joist. ~~For decks supporting a total design load of 50 pounds per square foot (2394 Pa) [40 pounds per square foot (1915 Pa) live load plus 10 pounds per square foot (479 Pa) dead load], the connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir, or *approved* decay-resistant species, and a 2-inch (51mm) nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with ½-inch (12.7 mm) lag screws or bolts with washers in accordance with Table R507.2. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel.~~ Deck ledger connections to band joists shall be in accordance with this section and Table R507.2, Table R507.2.1, Figure R507.2.1(1) and Figure R507.2.1(2). For other grades, species, connection details, and loading conditions, decks shall be designed in accordance with section R301.

~~**R507.2.1 Placement of lag screws or bolts in deck ledgers and band joists.** The lag screws or bolts in deck ledgers and band joists shall be placed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1 (2).~~

R507.2.1 Ledger details. Deck ledgers installed in accordance with section R507.2 shall be a minimum 2 x 8 nominal, pressure-preservative-treated or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

~~**R507.2.2 Alternate deck ledger connections.** Deck ledger connections not conforming to Table R507.2 shall be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer.~~

R507.2.2 Band joist details. Band joists attached by a ledger in accordance with section R507.2 shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir lumber or a minimum 1 x 9.5 dimensional, Douglas fir, laminated veneer lumber. Band joists attached by a ledger in accordance with section R507.2 shall be fully supported by a wall or sill plate below.

R707.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 and Figure R507.2.1(1) and Figure R507.2.1(2).

TABLE R507.2
~~FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND A 2-INCH-NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST~~~~[c, f, g]~~
DECK LEDGER CONNECTION TO BAND JOIST[c, d, e]
(Deck live load = 40 psf, deck dead load = 10 psf, snow load <= 40 psf)

	JOIST SPAN						
~~JOIST SPAN~~	6' and less	6'1" to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
Connection details	On-center spacing of fasteners~~[d, e]~~						

½ inch diameter lag screw with $^{15}/_{32}$ inch maximum sheathing[a]	30	23	18	15	13	11	10
½ inch diameter bolt with $^{15}/_{32}$ inch maximum sheathing	36	36	34	29	24	21	19
½ inch diameter bolt with ~~$^{15}/_{32}$~~ 1 inch maximum sheathing ~~and ½ inch washers~~[~~b, h~~ b]	36	36	29	24	21	18	16

For SI: 1 inch =n 25.4 mm, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kPa.

a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

~~b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½ inch.~~

b. Up to ½-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable sheathing thickness.

c. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.

~~d. Lag screws and bolts shall be staggered in accordance with Section R507.2.1~~

~~e. Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.~~

~~f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1-inch-thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.~~

~~g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist~~

~~h~~ d. Wood structural panel ~~sheathing~~, gypsum board ~~sheathing~~, fiberboard, lumber, or foam sheathing ~~not exceeding 1 inch in thickness~~ shall be permitted. ~~The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.~~

e. Snow load shall not be assumed to act concurrently with live load.

Reason: The prescriptive ledger bolting provisions are very specific, yet difficult to understand and somewhat contradictory between the language in Section R507.2 and that of Table R507.2. Overall, this code modification proposal does not intend to change the application of the current provisions.

--Footnote “h” is the only place where the description of the type of sheathing permitted is provided. However, footnote “h” is only referenced in one of the three connection methods in the table. This has been corrected to reflect that the various sheathing types are allowed under all methods by placing the footnote reference in the main title of the table.

--Fiberboard (“black celotex®” or “thermoply® for example) and lumber sheathing (diagonal wood sheathing) is likely to be encountered in deck construction on existing homes. The current provision provides a blanket approval of “foam sheathing” which includes varying compositions and performance levels without regard. Under that consideration, fiberboard and lumber should certainly be acceptable up to the same maximum thickness.

--Footnote "b" and "h" are discussing the same topic but with different points of references. This is confusing, and has been corrected.

--Why list various engineered wood products in footnote f and reference what we already know about engineered alternatives. This is unnecessary text. They are alternatives and need to be approved under R104.11 or R301.

--In the current language, the description of allowable species for ledger material is not consistent between the section language, table title and table footnotes. The Section refers to decay resistant properties of PPT pine or hem-fir, and then continues with an ambiguous reference to “approved decay-resistant species” leaving it to the building official to decide. The Table heading, however, refers only to the pine and hem-fir and not the use of decay-resistant species. It is further confused with the references in the table footnotes for use of any PPT, No 2 grade lumber species or engineering. There is no consistency and it is not user friendly. The proposed language makes use of the IRC-defined term “naturally durable lumber” as opposed to “decay-resistant” and clearly explains the materials allowed under this connection method in the body of the code as opposed to footnotes in a table.

--“Rim Board" is a registered trademark of APA. The use of the term "rimboard" in discussions unique to engineered wood products used as band joists infers that said engineered band joist must be one rated by APA. The IRC does not require engineered lumber band joists to be APA rated "Rim Board”. It is simply too similar to a proprietary trademark to be appropriate terminology for the IRC, when the industry- and IRC-wide term “band joist” is available for use.

--The description of the allowable materials for the home’s band joist are described in the Section, the Table title and then again in the footnotes. As with the ledger material, this is now described only in the body of the code section.

--The current language would prohibit the connection of a deck ledger to a band joist that was larger in it's narrow cross-section than 2-inches, thus the term "minimum" has been moved in front of this size description.

Prohibition to supporting beams/girders on ledgers and band joist after the sentence about “engineering practice” and under the heading of “alternate deck ledger connections” is misleading. A design professional should not be prohibited from making such design. The intent has been presented more clearly in this proposal, that simply the fastening schedule does not anticipate concentrated loads from beams.

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

R507.2-RB-MATHEWSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent's reason is very confusing. The deck provisions are evolving and once these changes are proven the proposal should be reworked and brought back.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Glenn Mathewson, MCP, City of Westminster, CO, representing North American Deck and Railing Association and the Colorado Chapter of ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.2 Deck leger connection to band joist. Deck ledger connections to band joists shall be in accordance with this section and Table R507.2, Table R507.2.1, Figure R507.2.1(1) and Figure R507.2.1(2). For other grades, species, connection details, and loading conditions, ~~decks~~ ledger connections shall be designed in accordance with section R301.

R507.2.1 Ledger details. Deck ledgers installed in accordance with section R507.2 shall be a minimum 2 x 8 nominal, pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

R507.2.2 Band joist details. Band joists attached by a ledger in accordance with section R507.2 shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir lumber or a minimum 1 x 9.5 dimensional, Douglas fir, laminated veneer lumber. Band joists attached by a ledger in accordance with section R507.2 shall be fully supported by a wall or sill plate below.

R507.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 and Figure R507.2.1(1) and Figure R507.2.1(2).

TABLE R507.2
DECK LEDGER CONNECTION TO BAND JOIST[c, d, e]
(Deck live load = 40 psf, deck dead load = 10 psf, snow load <= 40 psf)

	Joist span						
	6' and less	**6'1" to 8'**	**8'1" to 10'**	**10'1" to 12'**	**12'1" to 14'**	**14'1" to 16'**	**16'1" to 18'**
Connection details	**On-center spacing of fasteners**						
1/2 inch diameter lag screw with ~~15/32~~ 1/2 inch maximum sheathing[a]	30	23	18	15	13	11	10
1/2 inch diameter bolt with ~~15/32~~ 1/2 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 1 inch maximum sheathing[b]	36	36	29	24	21	18	16

For SI: 1 inch =n 25.4 mm, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kPa.
a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
b. Up to ½-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable wood structural panel or lumber sheathing thickness.
c. Ledgers shall be flashed in accordance with section R703.8.
d. Wood structural panel, gypsum board, fiberboard, lumber, or foam sheathing shall be permitted.
e. Snow load shall not be assumed to act concurrently with live load.

Commenter's Reason: During the hearings, the committee expressed concern that the species Southern Pine had been removed from the code language. Though the original proposal did not preclude this species from use, it has been retained from the current 2012 language in this public comment, along with Hem-Fir.

Floor modifications were presented by both the original proponent and opposition in regard to sheathing types, and may have complicated the proposal. Both of the complications that arose during the committee hearing are explained below.

1) Tightening washers over foam sheathing is not sensible and was not tested.

In the original ledger testing that lead to these provisions in the 2009 IRC, only 15/32-inch thick wood structural panels were tested with a stack of ½ inch washers. The current language in the 2012 IRC allows washers over foam sheathing. Retaining this allowance in the proposed modification drew opposition. With that consideration, and some empirical experience, this public comment modification provides limitations to what sheathing may be used with washers. Stacked washers should only be used with wood structural panel or lumber sheathing. The photo below shows how easily a washer can be pressed into foam sheathing with my hand, a result that would be expected from tightening washers over foam and loading the deck.

2) The fastening schedule for the first two rows (lag screws or bolts with 1/2 inch sheathing) currently provides no guidance for what sheathing is allowed.

Opposition to the original proposal did not believe that ledgers should be placed over any 1/2-inch sheathing other than wood structural panels. This was not based on evidence of failure for such conditions, rather that such condition has not been specifically laboratory tested. This is indeed true; the only known laboratory tests on such connection are with wood structural panel. However……shall we throw away decades of real world experience simply from the absence of a specific laboratory facsimile? Decks have been constructed for generations being attached over siding, stucco, brick veneers and whatever else could not be bothered for removal at the time. They used nails in the ledgers, lacked hangers, were attached to cantilevered floors and were often without any flashing. None of this was good, but decks got little attention…until recently. Now we are finding the worst of the worst construction collapsing under load, those old, forgotten decks that have never been maintained beyond a "sand and stain". Rightfully so, the sins of the past are haunting the deck industry. However, we must look at why these decks are failing. I have. It's not properly flashed and lag screwed decks attached to fully supported band joists that are failing…even when attached over siding as they have been (incorrectly) for years. There is no need to take the decking industry from a free-for-all to overbearing regulation. We must find some balance between both; neither one more important than the other. The balance this public comment is asking for is simple. Will a properly flashed ledger attached to a fully supported band joist with lag screws structurally fail because of 1/2 inch of foam in between? We don't see evidence or history to support that it will. As a plan's analyst, I don't want to have to ask what sheathing is hiding behind my customers' homes as I try to verify their proposed lag screw connection and get their permit issued. For this reason, I am maintaining the allowance of any sheathing to be used in any of the connection methods…likely how code administrators are already interpreting it.

Further modifications have also been prompted since the committee action hearings.

The sheathing thickness of 15/32 inch has been changed to ½ inch to accommodate the thickness of common foam sheathing. This is only a 1/32-inch (6.5%) increase in allowable thickness.

Under section R507.2 the reference to "deck" design has been changed to "deck ledger connections". The subject of this section is the ledger connection, not the entire deck.

It is the intention of this commenter to collect and conduct further research on this matter and make it available at www.decktesting.com.

Public Comment 2:

Randall Shackelford, P.E., Simpson Strong-Tie Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R507.2
DECK LEDGER CONNECTION TO BAND JOIST[~~c, d, e~~ a, b]
(Deck live load = 40 psf, deck dead load = 10 psf, snow load <= 40 psf)

	JOIST SPAN						
	6' and less	**6'1" to 8'**	**8'1" to 10'**	**10'1" to 12'**	**12'1" to 14'**	**14'1" to 16'**	**16'1" to 18'**
Connection details	**On-center spacing of fasteners**						
½ in diameter lag screw with 15/32 inch maximum sheathing[~~a~~ c , d]	30	23	18	15	13	11	10
½ inch diameter bolt with 15/32 inch maximum sheathing[d]	36	36	34	29	24	21	19
½ inch diameter bolt with 1 inch maximum sheathing[~~b~~ e]	36	36	29	24	21	18	16

a. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.
b. Snow load shall not be assumed to act concurrently with live load.
~~a~~ c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
d. Sheathing shall be wood structural panel or solid sawn lumber.
~~b~~ e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber, or foam sheathing. Up to ½-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable sheathing thickness when combined with wood structural panel or lumber sheathing.
~~c. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.~~
~~d. Wood structural panel, gypsum board, fiberboard, lumber, or foam sheathing shall be permitted.~~
~~e. Snow load shall not be assumed to act concurrently with live load.~~

Commenter's Reason: We think Mr. Matthewson and NADRA did a good job of re-organizing the requirements for deck ledger to band joist connection. The deck ledger to band joist connection is the most important connection on a deck and deserves the attention to make sure it is done in a safe manner. With one notable exception, we agree that the proposal simply improves the section without making technical changes. The one area where it appears that a technical change was made is the application of the proposed footnote d, which would allow any type of sheathing between the band joist and the deck ledger. Placement of footnote d at the title of the table applies that note to all three situations.
We went back and reviewed the testing that was performed to develop the existing table in the IRC. There were only three configurations tested: ½" lag screw with 15/32" OSB between the ledger and the band; ½" bolt with 15/32" OSB between the ledger and the band, and ½" bolt with ½" stack of washers and 15/32" OSB between the ledger and the band.
These three cases correspond to the three rows in the ledger table. Based on the testing, the additional gap can only be permitted in the third row of the table. The first two rows must have the ledger directly against wood structural panel sheathing or the band joist.
So we have revised the footnotes to do several things:

1. Re-arrange footnotes c and e so that they are footnotes a and b and they apply to the table title.
2. Add new footnote d that applies to the first two lines so that only wood structural panel or lumber sheathing is permitted between the ledger board and the band joist
3. Combine footnotes b and d from the original proposal into new footnote e, and change the reference so that it only applies to the last line in the table. Additional clarification was added that stacked washers can only be used with wood structural panel or lumber sheathing.

An article published in the December 2005 Building Safety Journal is included showing the basis for the existing table.

- Bibliography: "Wood Bits: Residential Deck Ledger Design". By David M. Carradine, Ph.D.; Donald A. Ph.D., P.E.,; Joseph R. Loferski, Ph.D.; and Frank E. Woeste, Ph.D., P.E.

RB265-13
Final Action: AS AM AMPC____ D

RB268-13
R507 (NEW)

Proposed Change as Submitted

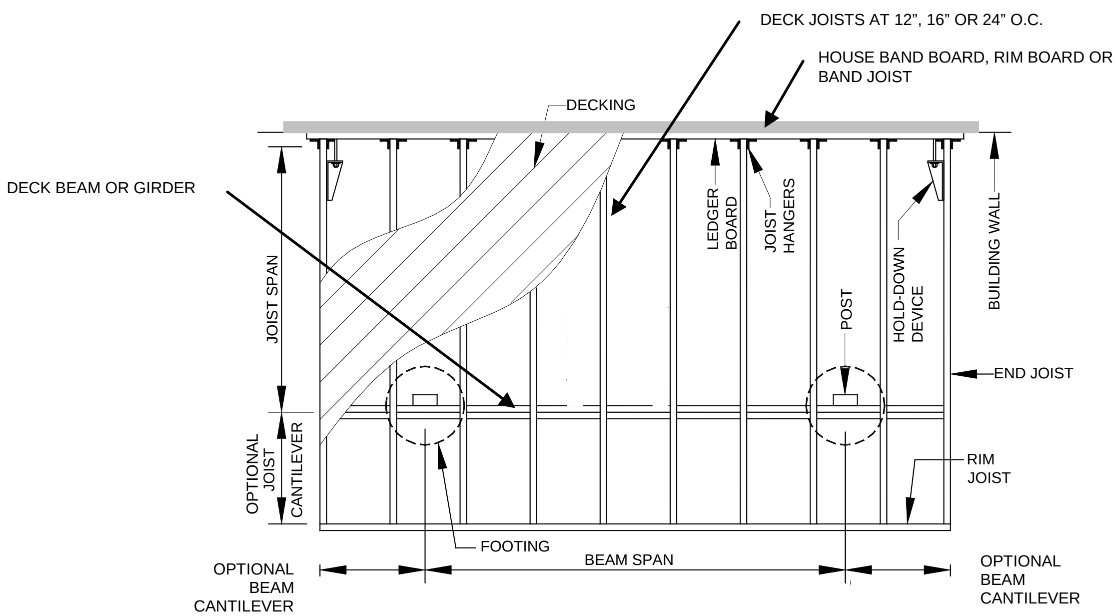
Proponent: Charles S. Bajnai, Chesterfield County, VA, representing self (bajnaic@chesterfield.gov), Randy Shackelford, Simpson Strong Tie (rshackelford@strongtie.com)

Add new text as follows:

SECTION R507
DECKS

R507.1 Wood decks. Typical wood decks shall be designed and constructed in accordance with this section. Other grades, species, loading, materials and conditions not described herein shall be permitted in accordance with Section 301. Loading for large concentrated loads, such as hot tubs, is beyond the scope of this section.

R507.2 Requirements. Deck construction shall be capable of accommodating applied loads and transmitting them to the supporting structural elements. Figure R507.2 is intended for purposes of identifying typical parts, and not to limit the design.



For SI: 1 inch = 25.4 mm

FIGURE R507.2
DECK CONSTRUCTION

R507.3 Materials. Materials used in the construction of a deck shall comply with the provisions of this section.

R507.3.1 Preservative-treated lumber. All lumber for decks shall be either naturally durable, minimum No.2 grade dimension lumber and identified in accordance with Section R502.1 or, preservative-treated in accordance with Section R317. All lumber in contact with the ground shall be identified as suitable for ground contact.

R507.3.2 Wood Decking. Wood decking shall comply with any of the following materials:

1. Wood decking with a minimum nominal thickness of 1 $^{1}/_{4}$ inches (32 mm) shall be installed at 90 degrees to deck joists that are spaced at a maximum of 16 inches (406 mm) on center and up to 45 degrees when spaced at a maximum of 12 inches (305 mm) on center.
2. Wood decking with a nominal 2 inch (51 mm) thickness shall be installed at an angle between 45 and 90 degrees to deck joists that are spaced at a maximum of 24 inches (610 mm) on center.
3. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.

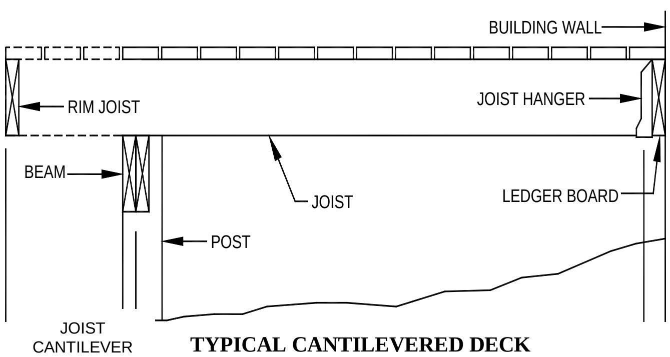
R507.3.3 Wood/plastic composites. Wood/plastic composites used as exterior deck boards, stair treads, handrails and guardrail systems shall be permitted in accordance with manufacturer's instructions.

R507.3.4 Metal guardrail systems. Metal guardrail and handrail systems shall be permitted in accordance with the manufacturer's instructions.

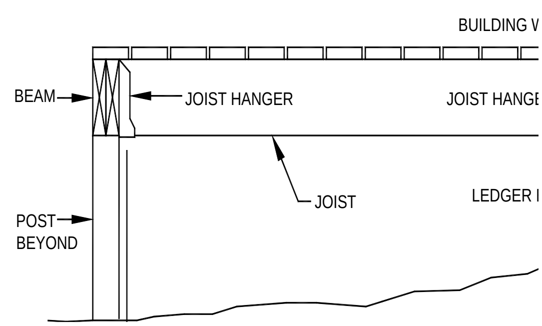
R507.3.5 Fasteners and connectors. Nails, bolts with nuts and washers, screws and connectors shall be coated in accordance with Section R317.3. Proprietary fasteners shall be permitted provided they are compatible with the pressure-preservative-treated lumber being used. Fasteners and connectors within 300 feet of salt water shoreline shall be stainless steel.

R507.3.6 Flashing. Flashing shall be corrosion-resistant metal of minimum nominal 0.019 inch (0.5 mm) thickness or approved non-metallic material.

R507.4 Deck joists. Spans for typical wood deck joist configurations, as shown in Figure R507.4, shall be in accordance with Table R507.4. Deck joists shall be permitted to cantilever a maximum of one-fourth of the joist span.

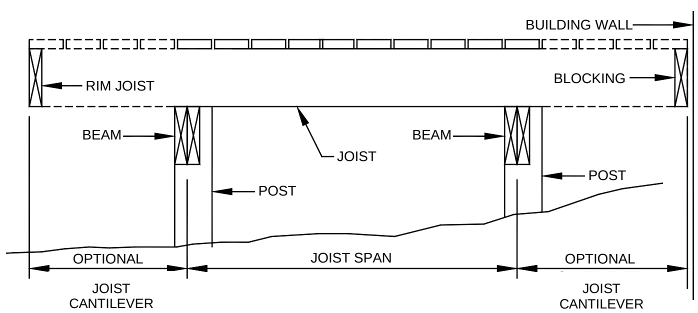


TYPICAL CANTILEVERED DECK



TYPICAL FLUSH DECK

FIGURE R507.4
TYPICAL DECK JOIST SPANS



TYPICAL FREE STANDING DECK

TABLE R507.4
MAXIMUM DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES [a]	SIZE	MAXIMUM SPACING OF DECK JOISTS WITH NO CANTILEVER [b] (in.)			MAXIMUM SPACING OF DECK JOISTS WITH CANTILEVERS [c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	10-4	9-5	7-10	7-1	7-1	7-1
	2 x 8	13-8	12–5	10–2	10-9	10-9	10-2
	2 x 10	17-5	15–10	13–1	15-6	15-6	13-1
	2 x 12	18-0	18–0	15-5	18-0	18-0	15-5
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

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

a. No. 2 grade with wet service factor.

b. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360.

c. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.

d. Includes incising factor.

e. Northern species with no incising factor

R507.4.1 Joist bearing. Joist ends shall be provided with vertical and rotational support. The ends of joists shall have a minimum of 1.5 inches (38 mm) of bearing on a wood ledger board or on metal hangers. Where rotational support is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where rotational support is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3)10d threaded nails or (3)#10x3 inch (76 mm) long wood screws. For free-standing decks, rotational support of the joist ends adjacent to the building wall shall be permitted by a rim joist or full depth nominal 2x blocking toe nailed at each end with (3)10d nails.

R507.5 Deck Beams. The maximum span for deck beams, as shown in Figure R507.2, shall be in accordance Table R507.5. Beams shall be permitted to cantilever at each end up to one-fourth of the beam span. The plies of a multi-ply beam shall be fastened with a minimum of two rows of 10d threaded nails at 16 inches (406 mm) on center along each edge. Splices of multi-span beams shall be located at interior post locations.

TABLE R507.5
MAXIMUM BEAM SPAN LENGTHS [a]

SPECIES	SIZE [b]	MAIN JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	7-1	6-2	5-6	5-0	4-8	4-4	4-1
	2-2x8	9-2	7-11	7-1	6-6	6-0	5-7	5-3
	2-2x10	11-10	10-3	9-2	8-5	7-9	7-3	6-10
	2-2x12	13-11	12-0	10-9	9-10	9-1	8-6	8-0
	3-2x6	8-7	7-8	6-11	6-3	5-10	5-5	5-2
	3-2x8	11-4	9-11	8-11	8-1	7-6	7-0	6-7
	3-2x10	14-5	12-10	11-6	10-6	9-9	9-1	8-7
	3-2x12	17-5	15-1	13-6	12-4	11-5	10-8	10-1
Douglas fir-larch [c], spruce-pine-fir,	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8

redwood [c], western cedars, ponderosa pine [d], red pine [d]	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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

a. Deck beams shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end .No 2 grade, wet service factor.

b. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

c. Includes incising factor.

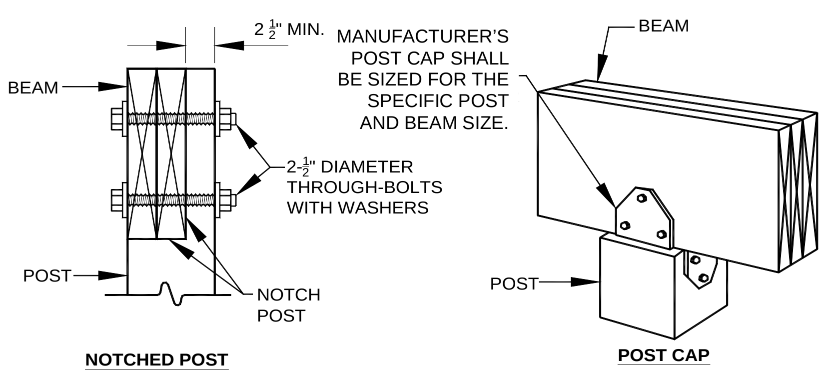
d. Northern species with no incising factor.

R507.5.1 Beam bearing. Single-ply beams and multi-ply beams shall have all of their bearing directly on wood posts or on an approved metal post cap in accordance with Figure R507.6.1 and not less than 3 inches (76 mm) on concrete or masonry.

R507.6 Deck posts. For typical single level wood decks, posts shall be measured from the top of the footing to the underside of the beam. The maximum height of the post shall be in accordance with the following:

1. Posts comprised of a minimum nominal 4x4 shall be permitted to a maximum height of 8 feet (2438 mm),
2. Posts comprised of a minimum nominal 6x6 shall be permitted to a maximum height of 14 feet (5486 mm).
3. Posts comprised of southern pine, of 4x4 or 4x6, grade #2 shall be permitted to a maximum height of 10 feet (3048 mm).
4. Posts comprised of southern pine, of 6x6 shall be permitted to a maximum height of 18 feet (5486 mm).

R507.6.1 Deck post to deck beam connection. Deck beams shall be attached to deck posts in accordance with Figure R507.6.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm

FIGURE R507.6.1
TYPICAL BEAM BEARING

R507.7 Deck footings. Deck footings shall be constructed in accordance with Section R403 and Figure R507.7. The size of the footing shall be adequate for the load applied by the posts.

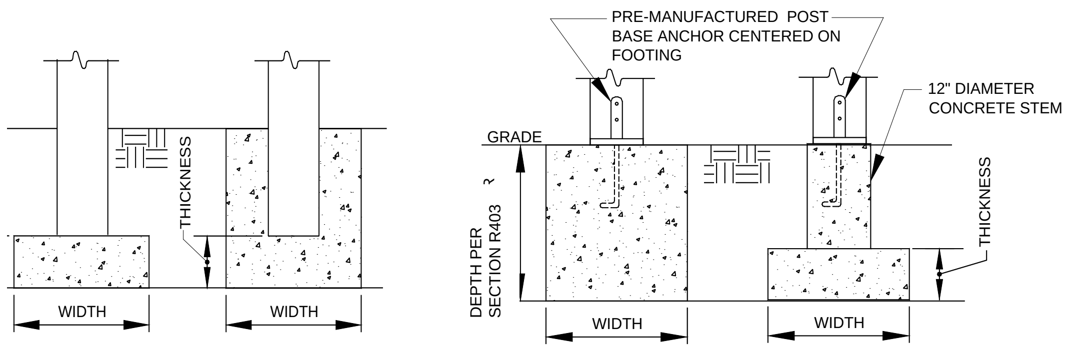


FIGURE R507.7
TYPICAL DECK FOOTINGS

R507.7.1 Footing depth. The minimum depth of footings shall be in accordance with Section R403.1.4 or as approved by the building official. A deck footing within 4 feet of the house shall be sit at least to the depth of the house footing.

R507.7.2 Post connection to footing. Where the top of the footings are at or above grade, the posts shall be prevented from being displaced by a connector between the post and the concrete. Where the top of the footings are below grade the post shall be permitted to sit on top of the footing or may be embedded in the concrete.

R507.8 Deck ledger connection to the building.. The connection between a deck ledger and the building shall be in accordance with this section.

R507.8.1 Deck ledger connection to band joist. The deck ledger shall be connected to a 2-inch nominal lumber band joist with ½-inch lag screws or bolts with washers in accordance with Table R507.8.1 and Figure R507.8.1(1). The bolts or lag screws shall be spaced in accordance with Figure R507.8.1(2). As an alternative to the detail in Figure R507.8.1, the ledger boards shall be permitted to be offset from the band joist a maximum distance of ½ inch (13 mm) with the installation of stacked washers. The exterior wall finish shall be removed prior to installation of the ledger board. Flashing at a door threshold shall be installed to prevent water intrusion from rain or melting ice and snow.

R507.8.2 Deck ledger connection to concrete foundation walls. A ledger board shall be connected to a concrete or solid masonry foundation wall with approved ½ inch (13 mm) diameter expansion anchors at a spacing specified in Table R507.8.1(1) and as shown in Figure R507.8.2. Expansion anchors shall be installed per the manufacturer.

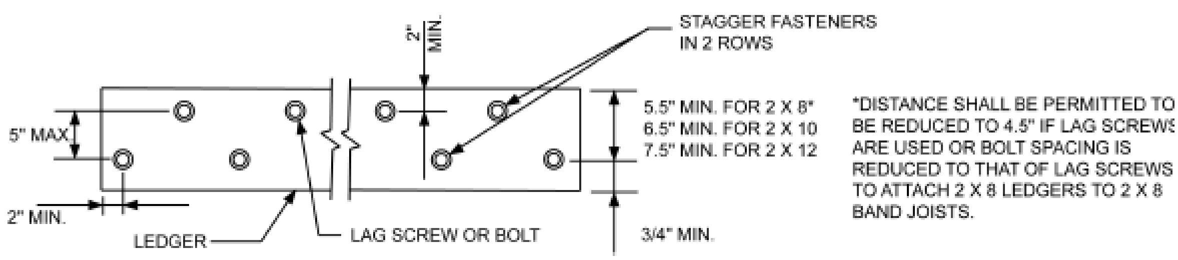
R507.8.3 Ledger board to hollow masonry foundation wall. A ledger board shall be connected to a hollow masonry foundation wall with approved ½ inch (13 mm) diameter epoxy anchors at a spacing specified in Table R507.8.1(1) and as shown in Figure R507.8.3. Epoxy anchors shall be installed per the manufacturer.

R507.8.4 Alternate connections. An approved engineered wood rim board with a minimum thickness of 1 inch (25 mm) shall be permitted to substitute for a 2x lumber band joist provided it was designed and manufactured to support a deck. A ledger board attachment to a masonry or stone veneer, ribbon board of open web floor trusses, band joist of a cantilevered floor and other conditions not addressed herein shall be designed in accordance with accepted engineering practice, or the deck shall be free-standing in accordance with Section R507.10.

TABLE R507.8.1(1)
FASTENER SPACING

FASTENER	BAND BOARD	JOIST SPAN						
		≤6'	> 6'-8'	> 8'-10'	> 10'-12'	> 12'-14'	> 14'-16'	> 16'-18'
½" lag screws [a]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	30"	23"	18"	15"	13"	11"	10"
½" through bolts	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	34"	29"	24"	21"	19"
½" through bolts and ½" stacked washers [b]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	29"	24"	21"	18"	16"
Expansion anchors	-	36"	36"	34"	29"	24"	21"	19"
Epoxy anchors	-	32"	32"	32"	24"	24"	16"	16"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm
a. The tip of the lag screw shall fully extend beyond the inside face of the band board.
b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½ inches (13 mm).



For SI: 1 inch = 25.4 mm.

FIGURE R507.8.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

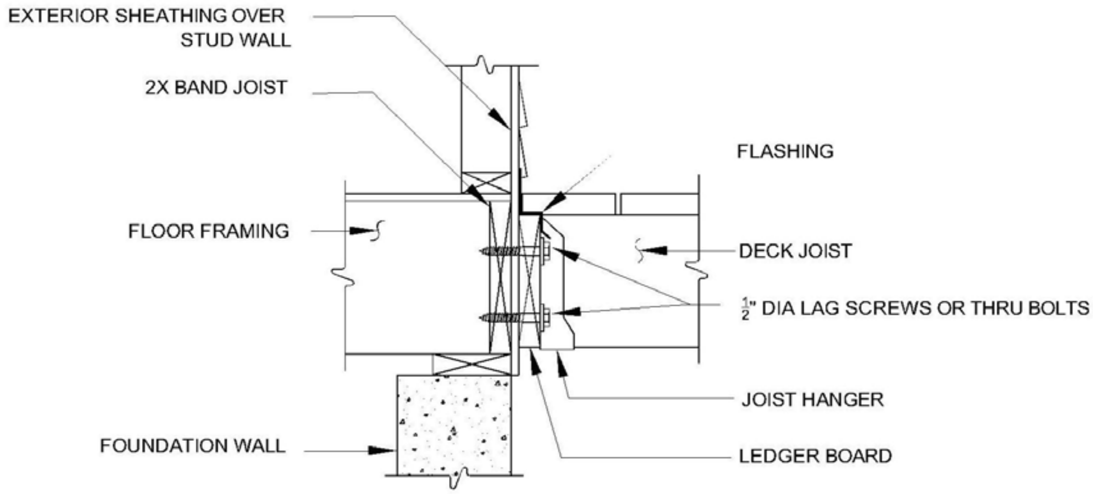


FIGURE R507.8.1(2)
LEDGER BOARD TO BAND BOARD ATTACHMENT

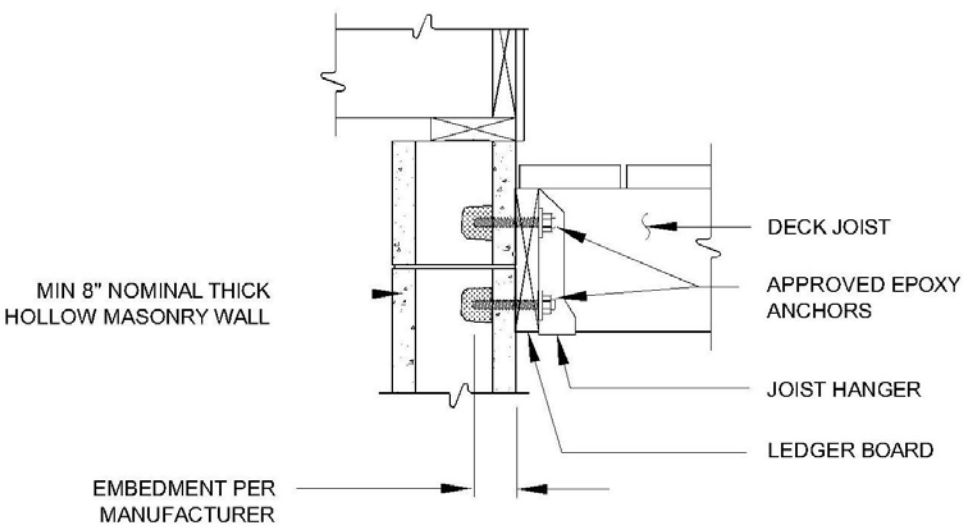


FIGURE R507.8.2
LEDGER BOARD TO SOLID FOUNDATION WALL ATTACHMENT

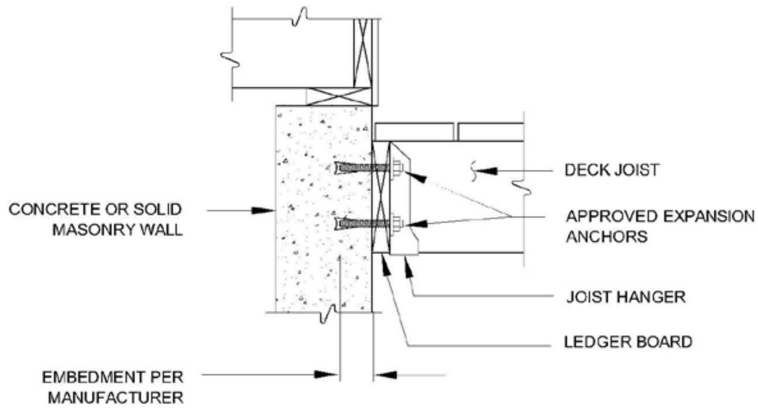
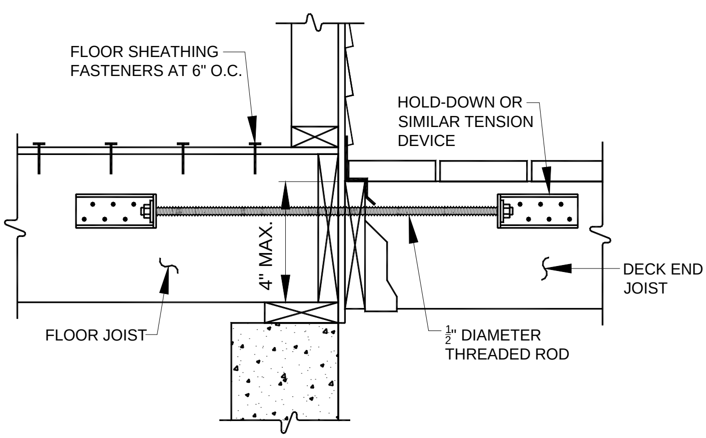


FIGURE R507.8.3
LEDGER BOARD TO HOLLOW MASONR FOUNDATION WALL ATTACHMENT

R507.9.3 Attachment to resist lateral load. A lateral load connection is required by Section R507.2. The following options shall be deemed to comply; other design solutions are permitted in accordance with R301.

R507.9.3.1 Connection at parallel joists. Where floor joists and deck joists are parallel, a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) at each end joist as shown in Figures R507.3.1(1) and R507.9.3.1(2) shall be permitted. Floor sheathing to floor joists fasteners shall be permitted to be substituted with two reinforcing angles on each side of the joist with a minimum capacity of 375 pounds (1668 N).



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

FIGURE R507.9.3.1(1)
CONNECTION AT PARALLEL JOISTS

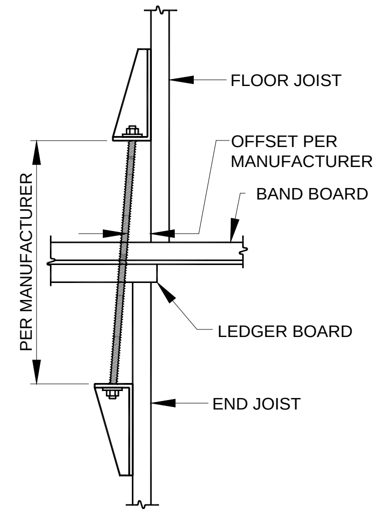
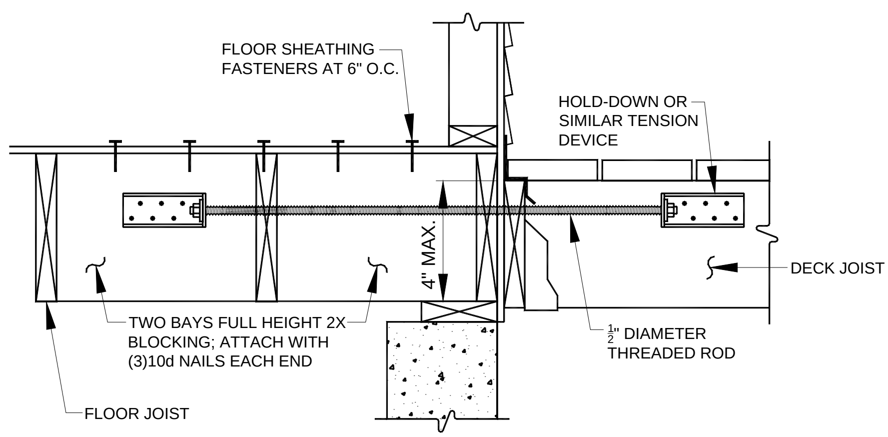


FIGURE R507.9.3.1(2)
OFFSET AT PARALLEL JOISTS

R507.9.3.2 Connection at perpendicular joists. Where floor joists and deck joists are perpendicular, provide a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) at each end joist and blocking between floor joists as shown in Figure R507.9.3.2. Floor sheathing to floor joists fasteners shall be permitted to be substituted with two reinforcing angles on each side of the joist with a minimum capacity of 375 pounds (1668 N).



For SI: 1 inch = 25.4 mm

FIGURE R507.9.3.2
LATERAL SUPPORT WHERE INTERIOR JOIST PERPENDICULAR TO DECK

R507.10 Free-standing decks. As shown in Figure R507.10, free-standing decks shall have an additional beam and posts adjacent the building exterior wall in place of a ledger board attachment. The beam shall be sized in accordance with Section R507.6 and shall be located adjacent the exterior wall or at a maximum distance equal to the allowable joist cantilever.

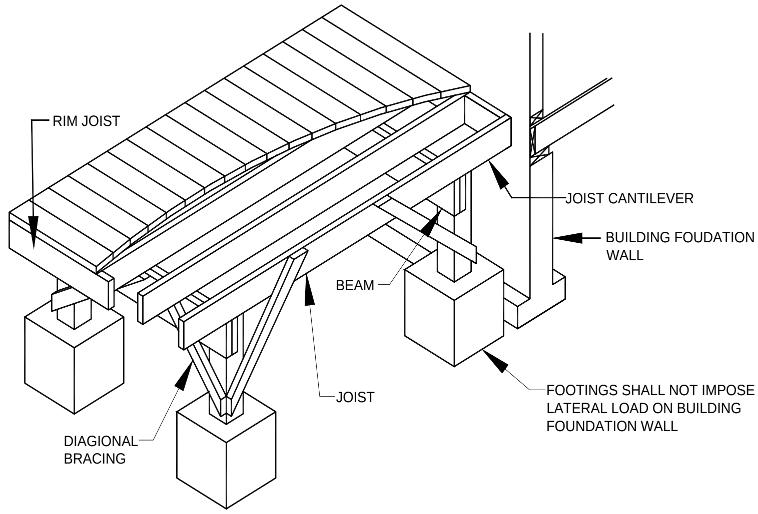
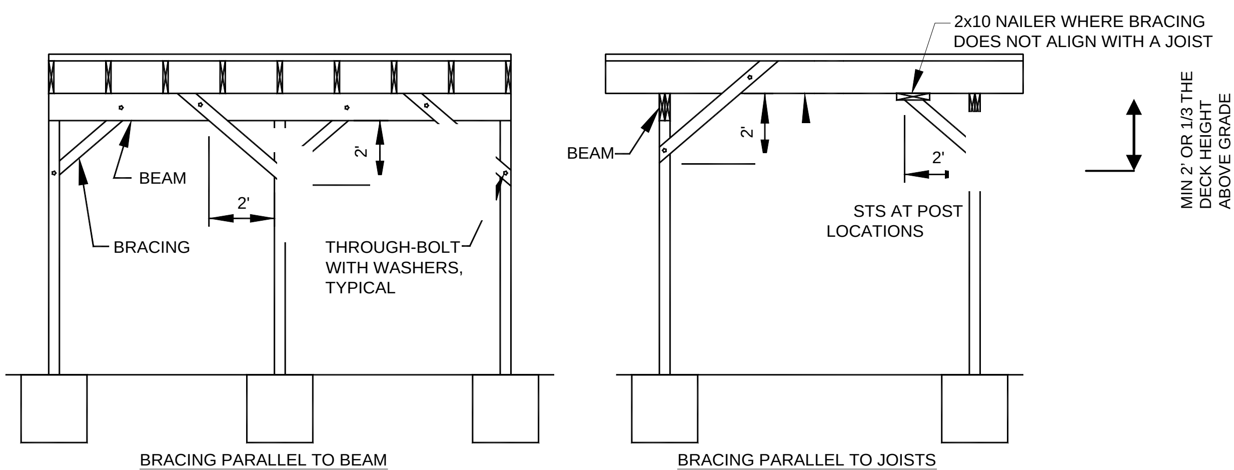


FIGURE R507.10
FREE-STANDING DECK

R507.10.1 Diagonal bracing. Diagonal bracing shall be installed on free-standing decks greater than 30 inches (762 mm) above grade in accordance with Figure R507.10.1. Bracing shall be placed at a 45 degree angle at each post location in the parallel and perpendicular directions to the beam. Bracing shall be a minimum of nominal 2x4 lumber and shall be fastened to framing with one 1/2 inch (9 mm) diameter through bolt with washers at each end. The diagonal brace shall be a minimum of 2 feet long measured as shown in Figure R507.10.1 or at least 1/3 the height of the deck above grade.

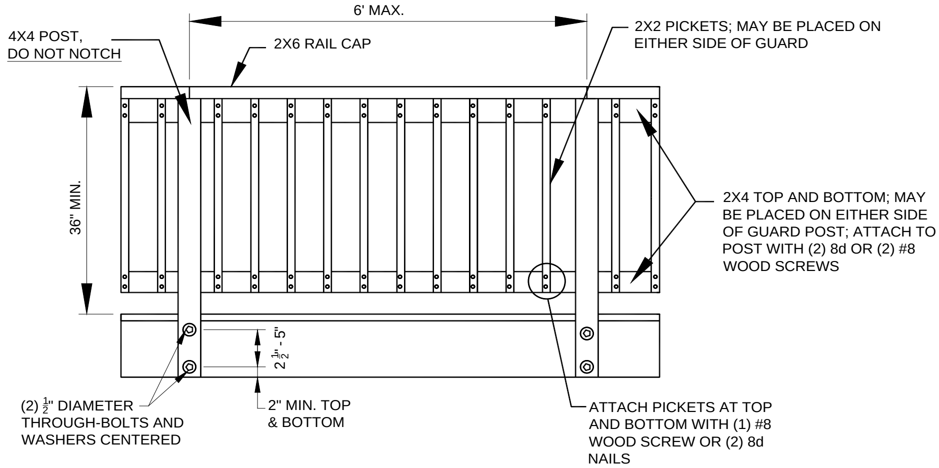


For SI: 1 foot = 304.8 mm

FIGURE R507.10.1
FREE-STANDING DECK DIAGONAL BRACING

R507.12 Deck guards. Deck guards shall be designed and constructed in accordance with Sections R301.5 and R312. Other materials and construction techniques shall be permitted in accordance with Section R301.

R507.12.1 Guard construction. Where the guard requirements of Sections R301.5 and R312 are met using the details shown in Figures R507.12.1(1) through R507.12.1(3), guard posts shall be attached to the inside or outside face of the rim joist or end joist. Hold-down anchors shall have a minimum capacity of 1,800 pounds (8006 N).



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

FIGURE R507.12.1(1)
DECK GUARD

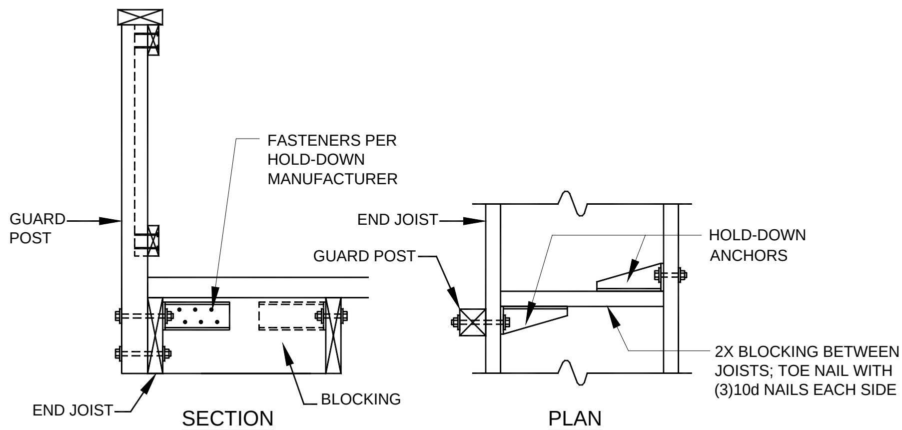


FIGURE R507.12.1(2)
GUARD POST TO END JOIST

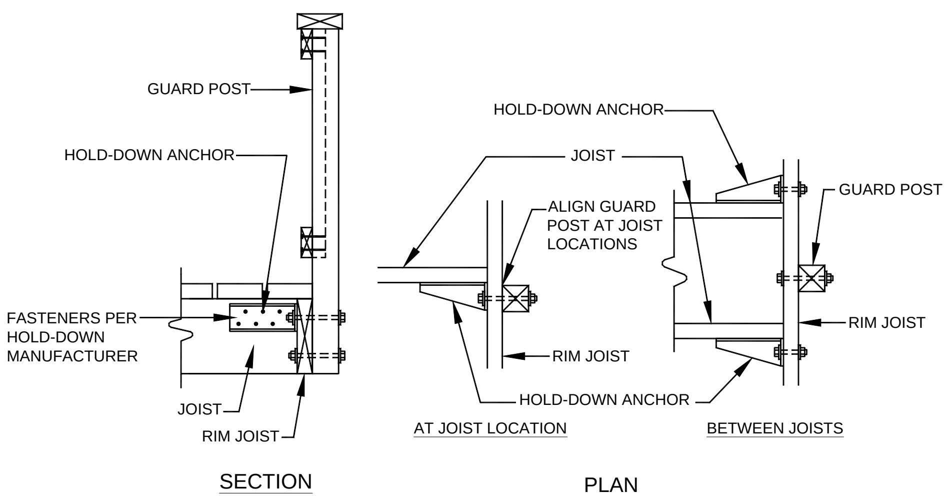
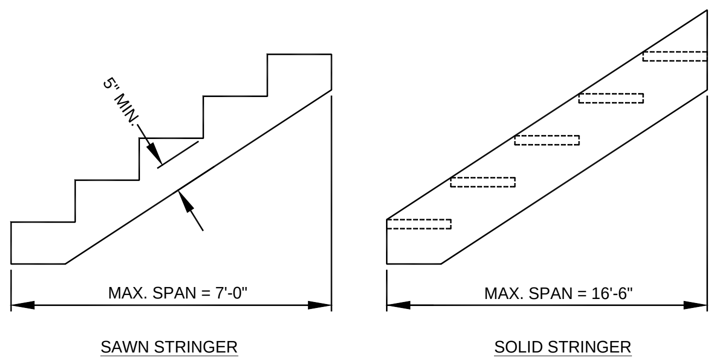


FIGURE R507.12.1(3)
GUARD POST TO RIM JOIST

R507.13 Deck stairs. Deck stairs shall be constructed in accordance with this section and Section R311.7. Where a flight of stairs has a vertical rise greater than that allowed per Section R311.7.3, an intermediate landing shall be provided in accordance with Section R311.7.6 and designed as a free-standing deck in accordance with Section R507.10.

R507.13.1 Stair stringers. Stair stringers shall be constructed of sawn nominal 2x12 members at 18 inches (457 mm) on center with a throat dimension of 5 inches (127 mm) and a maximum span length as shown in Figure R507.13.1. Stairs with a width equal to 36 inches (914 mm) shall be permitted to be constructed with two solid 2x12 stringers with a maximum span length as shown in Figure R507.13.1.



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

FIGURE R507.13.1
STAIR STRINGER REQUIREMENTS

R507.13.2 Stringer bearing. Stringers shall be attached to posts or bear on joist hangers attached to the deck structure and on footings at grade in accordance with Figure R507.13.2. Joist hangers shall be specifically designed to accommodate sloped connections and shall have a minimum capacity of 625 pounds (2780 N). Reinforcing angles at rim joist locations only shall have a minimum capacity of 325 pounds (1446 N).

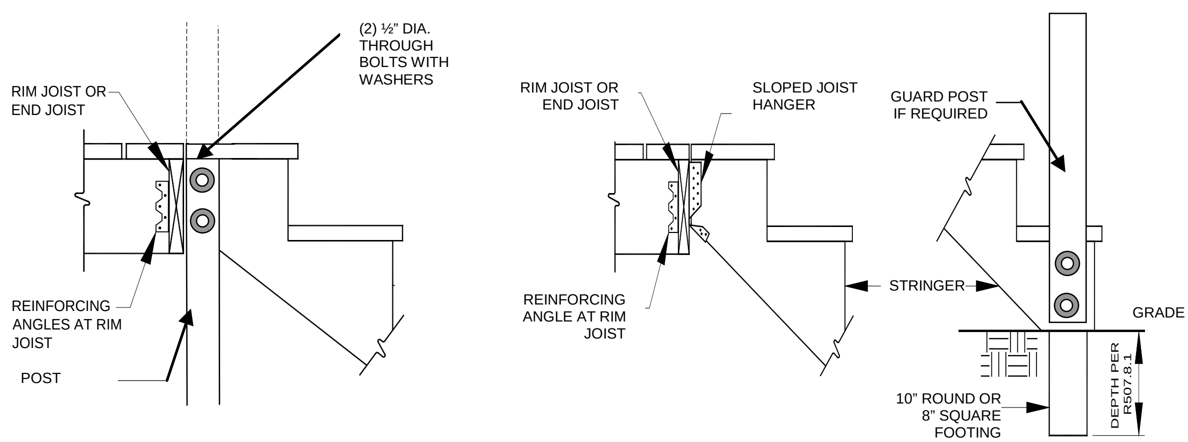


FIGURE R507.13.2
STRINGER BEARING

R507.13.3 Treads and risers. Stair treads shall be constructed in accordance with Section R311.7 and Figure R507.13.3. Treads shall be composed of nominal 2x6 lumber. Treads of stairs constructed with solid stringers shall be permitted to be composed of span rated decking. Risers shall be permitted to be composed of nominal 1x lumber. Openings in risers shall not allow the passage of a 4 inch (102 mm) diameter sphere.

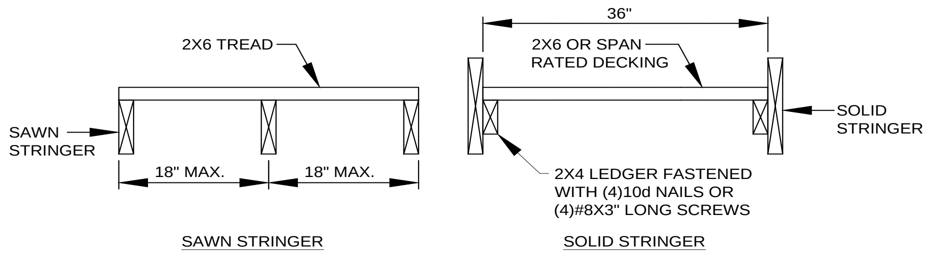
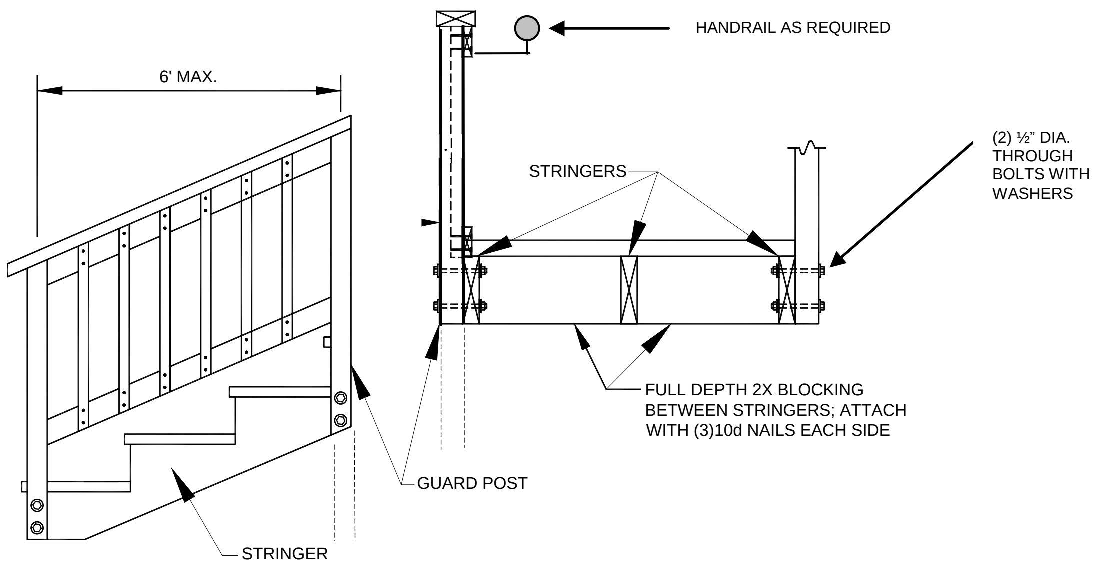


FIGURE R507.13.3
TREAD REQUIREMENTS

R507.13.4 Stair guard. Guards for stairs shall be as required per Section R312.1.1 and constructed in accordance with Section R507.12. The attachment of a stair guard post to the stringers shall be constructed in accordance with Figure R507.13.4.



For SI: 1 foot = 304.8 mm

FIGURE R507.13.4
STAIR GUARD CONNECTION

R507.13.5 Stair handrails. When required, handrails for stairs shall be as required per Section R311.7.8. When required and where the top guard rail does not comply with the handrail grip-size requirements in Section R311.7.8.3, a separate, conforming handrail shall be required.

R507.13.6 Ramps. Ramps from decks shall be as required in Section R311.8. Details for stringers, guards and handrails shall be similar to those for stairs.

Reason: With the increasing attention being paid to deck safety, the 2012 IRC took a major step forward by establishing a new Section R507 that covers deck construction. However, Section R507 consists almost entirely of connection details for anchoring the deck to the house, and does not provide any prescriptive requirements for building the deck itself. Some information is completely missing, like joist spans for naturally durable wood species, joist spans for wet lumber, beam spans, post sizes, bracing, footings and stair stringer spans.

Currently about one-third of the building permits pulled in our county are for decks. A significant number of these decks are built by homeowners or "handymen", rather than professional deck or home builders. Since the current code provides them no prescriptive guidelines, many jurisdictions across the country have tried to help either by creating locally developed deck guides or by directing the homeowner/builder to the *Prescriptive Residential Wood Deck Construction Guide (DCA6)*, a free document published by the American Wood Council (AWC).

Background on the *DCA6:* it is a document that originated in August 2006 when an ad-hoc task group was created to address prescriptive provisions for residential wood deck construction. While not a true consensus standard committee, the group was fairly balanced with representatives of ICC, AWC, home builders, municipal representative from Fairfax County, VA, construction hardware manufacturers, and the truss industry represented. The provisions of the *DCA6* gather requirements from throughout the IRC into one place, whether they be prescriptive requirements already contained in other sections, or new solutions derived from the performance provisions. A *Commentary* is also included in the document, to give the user an understanding of the data and/or experience upon which the provision is based.

While deck guides written outside the code development process have served a purpose, we think it is important that a set of deck construction provisions be contained in the IRC itself.

This submittal is based largely upon the provisions of the *DCA6*, with the intent to create a simple yet complete deck code section that provides prescriptive methods for safe deck construction. The submittal is presented in a simplified format so that it can be used by building officials, builders, inspectors and homeowners. The proponents recognize that every possible construction detail or condition is not covered by this submittal – the intent is to provide permitted methods for meeting the code, and not to preclude the use of other construction methods or materials that can always approved by the authority having jurisdiction using R104.11 or R301.

I have been privy to several other alternate deck proposals that are being considered for the 2015 IRC. My thought is that these proposals are well intentioned, but essential components were omitted for political reasons. Along with members of industry, I have developed what I believe to be a cleaner, more organized, more complete proposal with most of the same provisions of these other drafts and *DCA6* without the worry that some provisions might be politically improper to some constituents.

In conclusion, the average deck builder, plan reviewer and inspector have nothing in the IRC to help them with a deck design. Homeowners and non-professionals need to have simple prescriptive methods for building a safe deck, and we believe this proposal provides those guidelines.

Bibliography:

DCA6. http://www.awc.org/publications/DCA/DCA6/DCA6-09.pdf

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

R507-RB-BAJNAI-SHACKELFORD.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt this is a needed change but there are too many technical flaws such as the diagonal bracing for lateral loads is lacking. The proponent's should work with industry to resolve any differences and bring it back.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

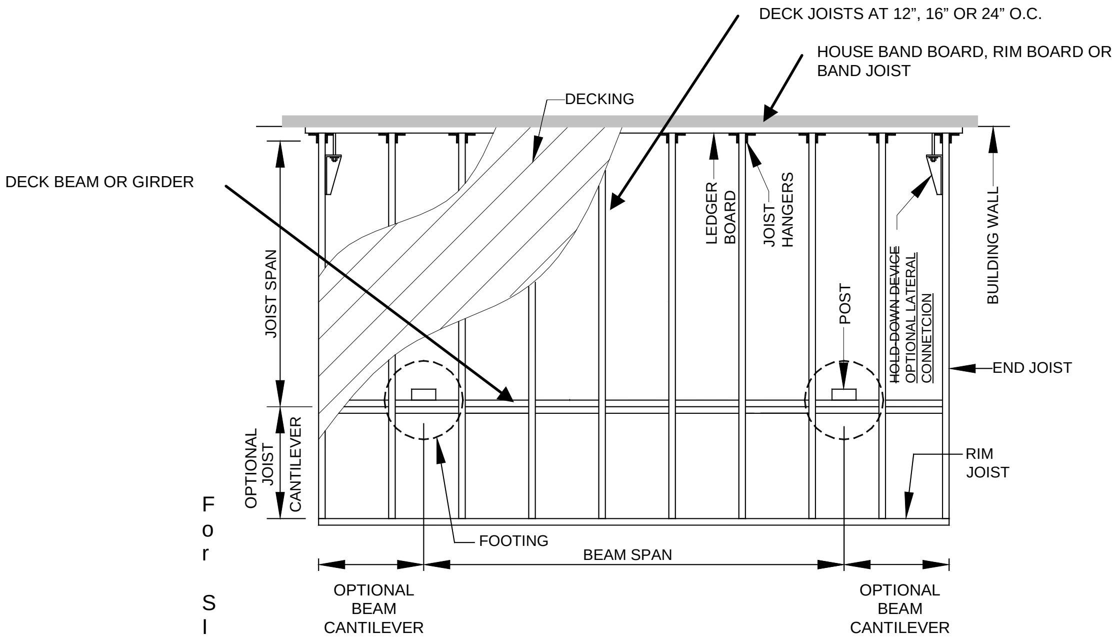
Chuck Bajnai, Chesterfield County, VA, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R507
DECKS

R507.1 Wood decks. ~~Typical wood decks~~ Decks of wood-frame construction shall be designed and constructed in accordance with this section. ~~Other grades, species, loading, materials and conditions~~ The use of other species of lumber or lesser grades of materials or different loading conditions not described herein shall be permitted in accordance with Section 301.1.1. ~~Loading for large concentrated loads, such as hot tubs, is beyond the scope of this section.~~

R507.2 Requirements. Deck construction shall be capable of accommodating ~~applied loads~~ all vertical and lateral loads in accordance with Section R301 and transmitting them to the supporting structural elements. Figure R507.2 is intended for purposes of identifying typical parts, and not to limit the design.



For SI:

1 inch = 25.4 mm

For SI: 1 inch = 25.4 mm

FIGURE R507.2
DECK CONSTRUCTION

R507.3 Materials. Materials used in the construction of a wood-framed deck shall comply with the ~~provisions~~ requirements of this section.

R507.3.1 ~~Preservative-treated l~~Lumber. All lumber shall be minimum No 2 grade dimension lumber. Lumber may be cut, drilled or notched in accordance with Section R502.8 except where prohibited in Section R507.11. In geographical areas where decay-resistant lumber is required, ~~All~~ lumber ~~for decks~~ shall be either naturally durable~~, minimum No.2 grade dimension lumber~~ and identified in accordance with Section R502.1, or~~,~~ preservative-treated in accordance with Section R317. ~~All lumber in contact with the ground shall be identified as suitable for ground contact.~~ Where termite-resistant lumber is required per Table R301.2 (1), lumber shall comply with Section R318.

~~**R507.3.2 Wood Decking.** Wood decking shall comply with any of the following materials:~~

1. ~~Wood decking with a minimum nominal thickness of $^5/_4$ inches (32 mm) shall be installed at 90 degrees to deck joists that are spaced at a maximum of 16 inches (406 mm) on center and up to 45 degrees when spaced at a maximum of 12 inches (305 mm) on center.~~
2. ~~Wood decking with a nominal 2 inch (51 mm) thickness shall be installed at an angle between 45 and 90 degrees to deck joists that are spaced at a maximum of 24 inches (610 mm) on center.~~
3. ~~Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.~~

R507.~~3.3~~ 3.2 ~~Wood/p~~Plastic composites. ~~Wood/p~~Plastic composite~~s used as exterior~~ deck boards, stair treads, ~~handrails and guardrail~~ guard and handrail systems shall ~~be permitted~~ comply with the requirements of R317.4 and installed in accordance with the manufacturer's installation instructions.

R507.~~3.4~~ 3.3 ~~Metal guardrail systems~~ Other materials. ~~Metal guardrail and handrail systems~~ Metal, glass, concrete or other materials used for deck construction, including guard and handrail systems shall be permitted in accordance with the requirements in Chapter 3 and installed in accordance with the manufacturer's installation instructions.

R507.~~3.5~~ 3.4 Fasteners and connectors. Nails, bolts with nuts and washers, screws, fasteners and connectors shall be ~~coated~~ protected in accordance with Section R317.3. ~~Proprietary fasteners shall be permitted provided they are compatible with the preservative-treated lumber being used.~~
~~Fasteners and connectors within 300 feet of salt water shoreline shall be stainless steel.~~ Fasteners and connectors shall be installed in accordance with manufacturer's installation instructions.

R507.~~3.6~~ 3.5 Flashing. Flashing shall be corrosion-resistant metal of minimum nominal 0.019 inch (0.5 mm) thickness or approved non-metallic material.

R507.4 Deck boards. Deck board spans shall comply with the requirements of Table R507.4. Wood deck boards shall be attached to each supporting member with a minimum of (2) 8d nails or (2) #8 wood screws.

TABLE R507.4
MAXIMUM DECK BOARD SPANS

MATERIAL TYPE AND NOMINAL SIZE	DECK BOARDS PERPENDICULAR TO JOIST	DECK BOARDS DIAGONAL TO JOIST[a]
5/4-inch thick wood	16 inches	12 inches
2-inch thick wood	24 inches	16 inches
Plastic composite	Per R507.3	Per R507.3

For SI: 1 inch = 25.4 mm
a. Maximum angle of 45 degrees from perpendicular for wood deck boards

R507.~~4~~ 5 Deck joists. Spans for typical wood deck joist configurations~~,~~ shall be measured as shown in Figure R507.~~4~~ 5, and shall ~~be in accordance with~~ not exceed the span lengths per Table R507.~~4~~ 5. Deck joists shall be permitted to cantilever a maximum of one-fourth of the actual joist span.

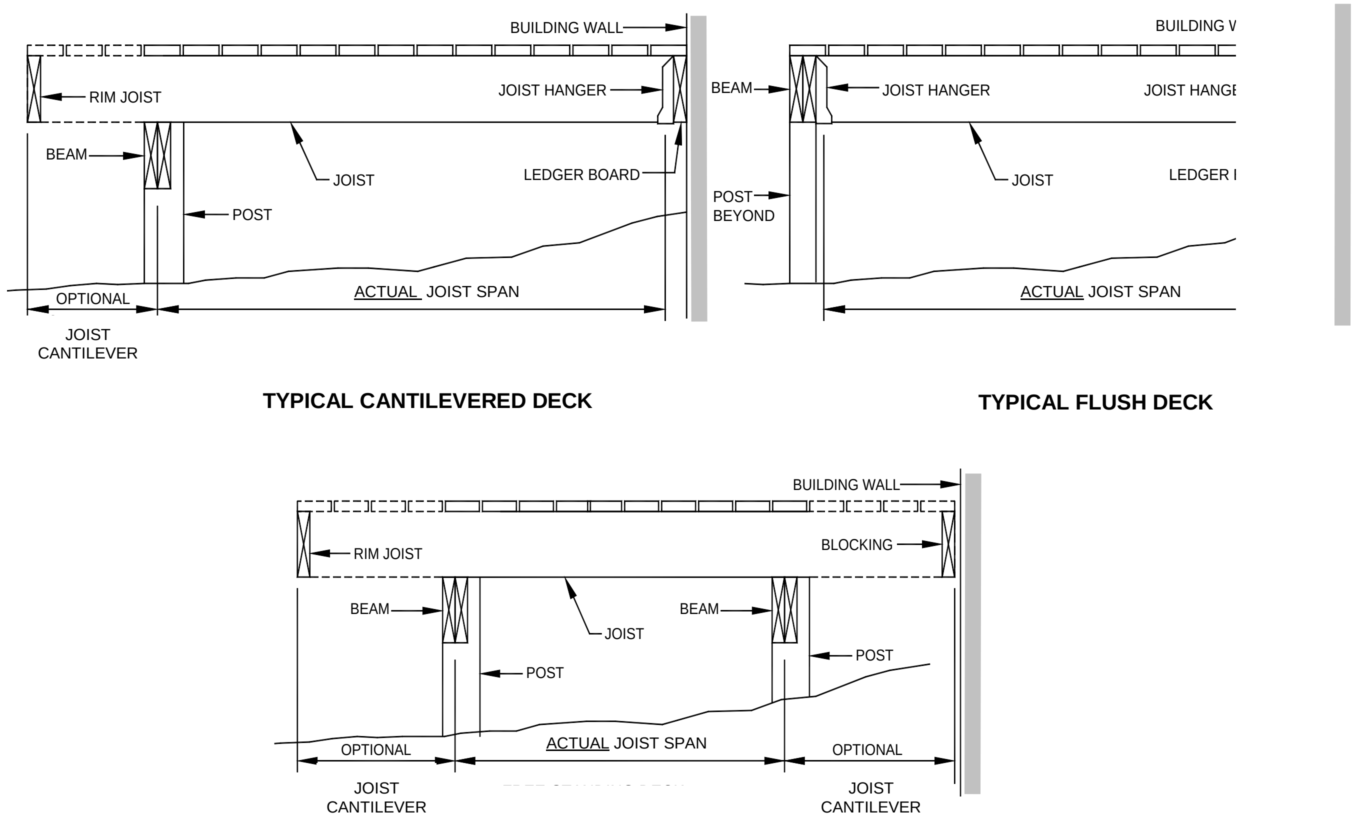


FIGURE R507.~~4~~ 5
TYPICAL DECK JOIST CONFIGURATIONS

R507.~~4.1~~ 5.1 ~~Joist bearing~~ Deck joist support. ~~Joist ends~~ Ends of deck joists shall be ~~provided with~~ supported to prevent vertical and ~~rotational support.~~ lateral displacement. The ends of joists shall have a minimum of 1.5 inches (38 mm) of bearing on a deck beam, wood ledger board or on metal hangers. Joists shall be connected to deck beams with approved fasteners or connectors. Where ~~rotational~~ lateral support is provided by joist hangers or blocking between joists, ~~their~~ the depth of hanger or blocking shall equal not less than 60 percent of the joist depth. Where ~~rotational~~ lateral support is provided by rim joists, ~~they~~ the rim joist shall be secured to the end of each joist with a minimum of (3)10d ~~threaded~~ nails or (3)#10x3 inch (76 mm) long wood screws. ~~For free-standing decks, rotational support of the joist ends adjacent to the building wall shall be permitted by a rim joist or full depth nominal 2x blocking toe nailed at each end with (3)10d nails.~~

R507.~~5~~ 6 Deck Beams. The maximum ~~span for deck beams, as shown in Figure R507.2 shall be in accordance with Table R507.5~~ allowable deck beam span for single or multiple ply deck beams shall be in accordance with Table R507.6. Beams shall be permitted to cantilever at each end up to one-fourth of the adjacent beam span. The plies of a multi-ply beam shall be fastened with a minimum of two rows of 10d ~~threaded~~ nails at 16 inches (406 mm) or equivalent screws or bolts. ~~on center along each edge. Splices of multi-span beams shall be located at interior post locations.~~

TABLE R507.~~4~~ 5
MAXIMUM DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES [a]	JOIST SIZE	~~MAXIMUM SPACING OF~~ DECK JOIST SPACING WITHOUT ~~NO~~ CANTILEVER [b,f] (in.)			~~MAXIMUM SPACING OF~~ DECK JOIST SPACING WITH CANTILEVERS [c] (in.)		
		12" o.c.	16" o.c.	24" o.c.	12" o.c.	16" o.c.	24" o.c.
Southern pine	2 x 6	~~10-4~~ 9-11	~~9-5~~ 9-0	~~7-10~~ 7-7	~~7-1~~ 6-8	~~7-1~~ 6-8	~~7-1~~ 6-8
	2 x 8	~~13-8~~ 13-1	~~12–5~~ 11-10	~~10–2~~ 9-8	~~10-9~~ 10-1	~~10-9~~ 10-1	~~10-2~~ 9-8
	2 x 10	~~17-5~~ 16-2	~~15–10~~ 14-0	~~13–1~~ 11-5	~~15-6~~ 14-6	~~15-6~~ 14-0	~~13-1~~ 11-5
	2 x 12	18-0	~~18–0~~ 16-6	~~15-5~~ 13-6	18-0	~~18-0~~ 16-6	~~15-5~~ 13-6
Douglas fir-larch [d], hem-fir [d] spruce-pine-fir [d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine [e], red pine [e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

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

a. No. 2 grade with wet service factor.
b. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor.
f. Joists are permitted to cantilever from the deck beam by a length not to exceed the depth of the deck joist.

R507.~~5.1~~ 6.1 Beam bearing. Single-ply ~~beams~~ and multi-ply beams shall ~~have all of their bearing~~ bear directly on wood posts or on an approved metal post cap in accordance with Figure R507.~~6.1~~ 7.1 and not less than 3 inches (76 mm) on concrete or masonry walls or piers.

R507.~~6~~ 7 Deck posts. ~~For typical single level wood decks, p~~Posts shall be measured from the top of the footing to the underside of the beam. The maximum height of the post shall be in accordance with Table R507.7. ~~the following:~~

~~5. Posts comprised of a minimum nominal 4x4 shall be permitted to a maximum height of 8 feet (2438 mm),~~
~~2. Posts comprised of a minimum nominal 6x6 shall be permitted to a maximum height of 14 feet (5486 mm).~~
~~3. Posts comprised of southern pine, of 4x4 or 4x6, grade #2 shall be permitted to a maximum height of 10 feet (3048 mm).~~
~~4. Posts comprised of southern pine, of 6x6 shall be permitted to a maximum height of 18 feet (5486 mm).~~

TABLE R507.~~5~~ 6
MAXIMUM BEAM SPAN LENGTHS [a]

SPECIES	BEAM SIZE [b]	MAXIMUM MAIN JOIST SPAN (ft-in.) ~~LESS THAN OR EQUAL TO:~~						
		6 ft	8 ft	10 ft	12 ft	14 ft	16 ft	18 ft
Southern pine	(2) - 2x6	~~7-1~~ 6-11	~~6-2~~ 5-11	~~5-6~~ 5-4	~~5-0~~ 4-10	~~4-8~~ 4-6	~~4-4~~ 4-3	~~4-1~~ 4-0
	(2) - 2x8	~~9-2~~ 8-9	~~7-11~~ 7-7	~~7-1~~ 6-9	~~6-6~~ 6-2	~~6-0~~ 5-9	~~5-7~~ 5-4	~~5-3~~ 5-0
	(2) - 2x10	~~11-10~~ 10-4	~~10-3~~ 9-0	~~9-2~~ 8-0	~~8-5~~ 7-4	~~7-9~~ 6-9	~~7-3~~ 6-4	~~6-10~~ 6-0
	(2) - 2x12	~~13-11~~ 12-2	~~12-0~~ 10-7	~~10-9~~ 9-5	~~9-10~~ 8-7	~~9-1~~ 8-0	~~8-6~~ 7-6	~~8-0~~ 7-0
	2x6	~~8-7~~ 8-2	~~7-8~~ 7-5	~~6-11~~ 6-8	~~6-3~~ 6-1	~~5-10~~ 5-8	~~5-5~~ 5-3	~~5-2~~ 5-0
	(3) - 2x8	~~11-4~~ 10-10	~~9-11~~ 9-6	~~8-11~~ 8-6	~~8-1~~ 7-9	~~7-6~~ 7-2	~~7-0~~ 6-8	~~6-7~~ 6-4
	(3) - 2x10	~~14-5~~ 13-0	~~12-10~~ 11-3	~~11-6~~ 10-0	~~10-6~~ 9-2	~~9-9~~ 8-6	~~9-1~~ 7-11	~~8-7~~ 7-6
	(3) - 2x12	~~17-5~~ 15-3	~~15-1~~ 13-3	~~13-6~~ 11-10	~~12-4~~ 10-9	~~11-5~~ 10-0	~~10-8~~ 9-4	~~10-1~~ 8-10
Douglas fir-larch [c], spruce-pine-fir, redwood [c], western cedars, ponderosa pine [d], red pine [d]	(1) - 3x6 or (2) - 2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	(1) - 3x8 or (2) - 2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	(1) - 3x10 or (2) - 2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	(1) - 3x12 or (2) - 2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	(1) - 4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	(1) - 4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	(1) - 4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	(1) - 4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	(3) - 2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	(3) - 2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	(3) - 2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	(3) - 2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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

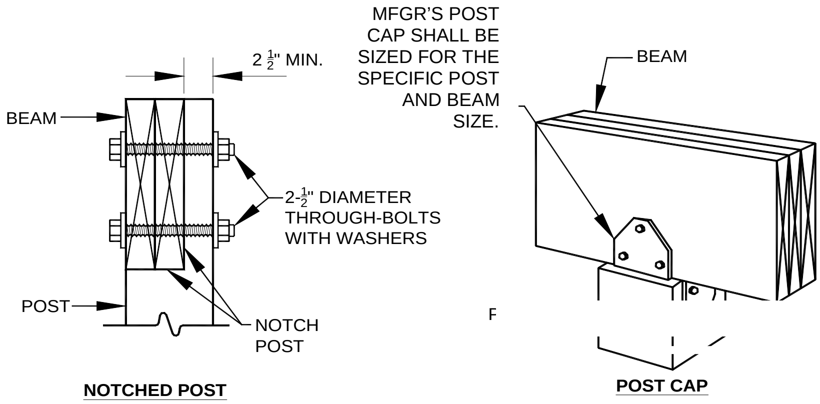
a. Deck beams shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end .No 2 grade, wet service factor.
b. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
c. Includes incising factor.
d. Northern species with no incising factor.

TABLE R507.7
DECK POST HEIGHT

NOMINAL DECK POST SIZE	MAXIMUM HEIGHT
4x4	8'
4x6	8'
6x6	14'

For SI: 1 foot = 304.8 mm.

507.~~6.1~~ 7.1 Deck post connection to deck beam ~~connection.~~ Deck beams shall be attached to wood deck posts in accordance with Figure R507.~~6.1~~ 7.1. Other optional ~~P~~post to beam connections shall be ~~constructed~~ permitted to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm

FIGURE R507.~~6.1~~ 7.1
TYPICAL BEAM BEARING ON WOOD POST

R507.~~7~~ 8 Deck footings. Deck footings shall be constructed in accordance with Section R403 ~~and Figure R507.7~~. The ~~size~~ cross sectional area of the footing shall be adequate to carry the load applied by the posts based on the bearing capacity of the soil.

R507.~~7.1~~ 8.1 Footing depth. The minimum depth of footings shall be in accordance with Section R403.1.4 or as approved by the building official~~. A deck footing within 4 feet of the house shall be sit at least to the depth of the house footing.~~ Where a deck footing is within 4 feet of an existing, adjacent footing, the deck footing shall bear at the same depth as the existing footing.

R507.~~7.2~~ 8.2 Deck ~~P~~post connection to footing. ~~Where the top of the footings are at or above grade, the posts shall be restrained to prevent lateral displacement at the bottom end of the post. Where the top of the footings are below grade the post shall be permitted to sit on top of the footing or may be embedded in the concrete.~~ Deck posts shall be restrained to prevent lateral displacement at the bottom end. Such lateral restraint shall be provided by manufactured connectors or a minimum post embedment of 12-inches in surrounding soils or concrete as shown in Figure R507.8.2.

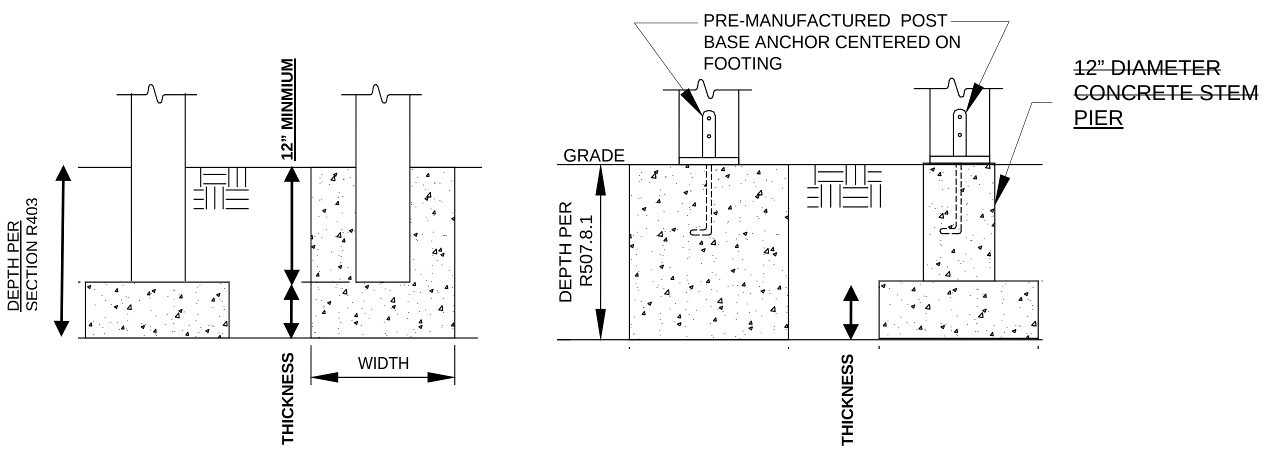


FIGURE R507.~~7.7~~ 8.2
TYPICAL DECK FOOTINGS

R507.~~8~~ 9 Deck ledger board connection to the building. The connection between a deck ledger board and the building shall be in accordance with this section.

R507.~~8.1~~ 9.1 Deck ledger board connection to band joist. The deck ledger board shall be connected to a nominal 2-inch thick ~~nominal~~ lumber band joist with ½-inch lag screws or bolts with washers in accordance with ~~Table R507.8.1 and~~ Figures R507.9.1(1) and R507.9.1(2) and ~~. .2 The bolts or lag screws shall be~~ spaced in accordance with ~~Figure R507.8.1 (2).~~ Table R507.9.1. As an alternative to the detail in Figure R507.~~8.1~~ 9.1(2), the ledger board shall be permitted to be offset from the house band joist or exterior sheathing a maximum distance of ½ inch (13 mm) with the installation of stacked washers.

The exterior wall finish shall be removed prior to installation of the ledger board. Flashing at a door threshold shall be installed to prevent water intrusion from rain or melting ice and snow.

R507.~~8.2~~ 9.2 Deck ledger board connection to concrete foundation walls. A ledger board shall be connected to a concrete or solid masonry foundation wall with approved ½ inch (13 mm) diameter ~~expansion~~ anchors ~~at a spacing specified~~ spaced in accordance with Table R507.~~8.1(1)~~ 9.1 and as shown in Figure R507.~~8.2~~ 9.2. ~~Expansion~~ Adhesive or mechanical ~~A~~ anchors shall be installed per the manufacturer's installation instructions.

R507.~~8.3~~ 9.3 Ledger board connection to hollow masonry foundation wall. A ledger board shall be connected to a hollow masonry foundation wall with approved ½ inch (13 mm) diameter ~~epoxy anchors at a spacing specified in Table R507.8.1(1)~~ anchors spaced in accordance with Table R507.9.1 and as shown in Figure R507.~~8.3~~ 9.3. ~~Epoxy~~ Adhesive or mechanical anchors shall be installed per the manufacturer's installation instructions.

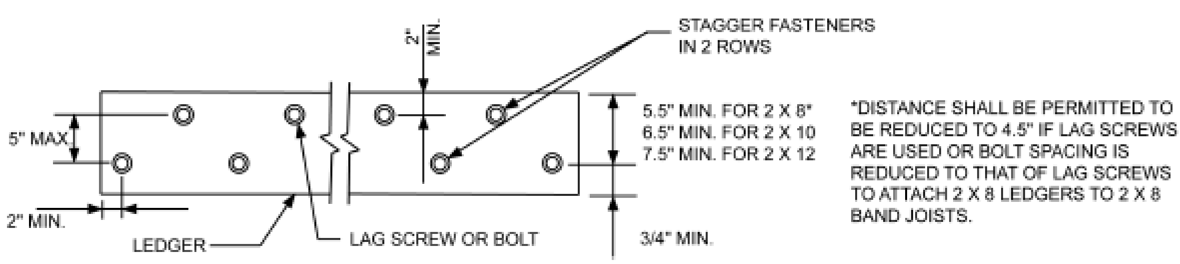
R507.~~8.4~~ 9.4 Alternate connections. An ~~approved~~ engineered wood rim board with a minimum thickness of 1 inch (25 mm) shall be permitted to substitute for a 2x lumber band joist provided ~~it~~ the engineered wood rim board was designed ~~and~~ by the manufacturer~~ed~~ to support a deck. A ledger board attachment to a masonry or stone veneer, ribbon board of open web floor trusses, band joist of a cantilevered floor ~~and~~ or other conditions not addressed herein shall be designed in accordance with accepted engineering practice, or the deck shall be free-standing in accordance with Section R507.10.

TABLE R507.~~8.1(1)~~ 9.1
FASTENER SPACING

FASTENER	BAND BOARD	JOIST SPAN						
		≤6'	> 6'-8'	> 8'-10'	> 10'-12'	> 12'-14'	> 14'-16'	> 16'-18'
½" lag screws [a]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	30"	23"	18"	15"	13"	11"	10"
½" through bolts	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	34"	29"	24"	21"	19"
½" through bolts and ½" stacked washers [b]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	29"	24"	21"	18"	16"
~~Expansion~~ Mechanical anchors [c]	-	36"	36"	34"	29"	24"	21"	19"
~~Epoxy~~ Adhesive anchors [d]	-	32"	32"	32"	24"	24"	16"	16"

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

a. The tip of the lag screw shall fully extend beyond the inside face of the band board.
b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½ inches (13 mm).
c. Mechanical anchors shall have a minimum allowable shear of 725 pounds, and a minimum allowable tension of 505 pounds
d. Adhesive anchors shall have a minimum allowable shear of 675 pounds, and a minimum allowable tension of 505 pounds.



For SI: 1 inch = 25.4 mm.

FIGURE R507.~~8.1(1)~~ 9.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGER~~S~~ BOARDS

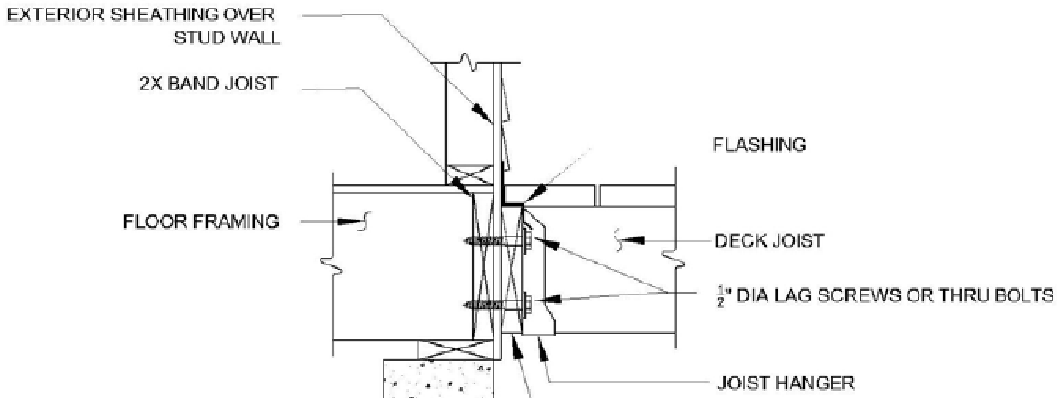


FIGURE R507.~~8.1(2)~~ 9.1(2)
LEDGER BOARD TO BAND BOARD ATTACHMENT

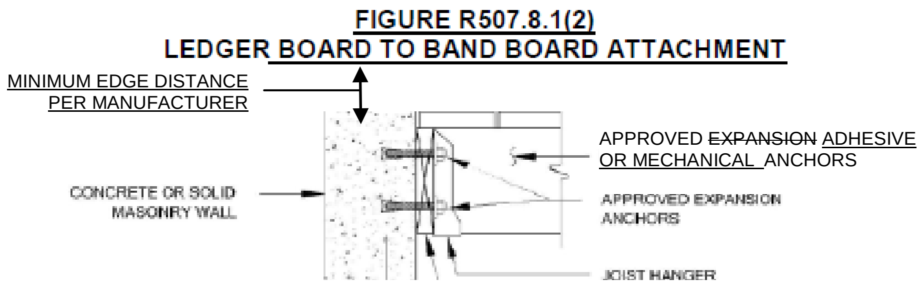


FIGURE R507.~~8.3~~ 9.2
LEDGER BOARD TO SOLID ~~HOLLOW~~ MASONRY FOUNDATION WALL ATTACHMENT

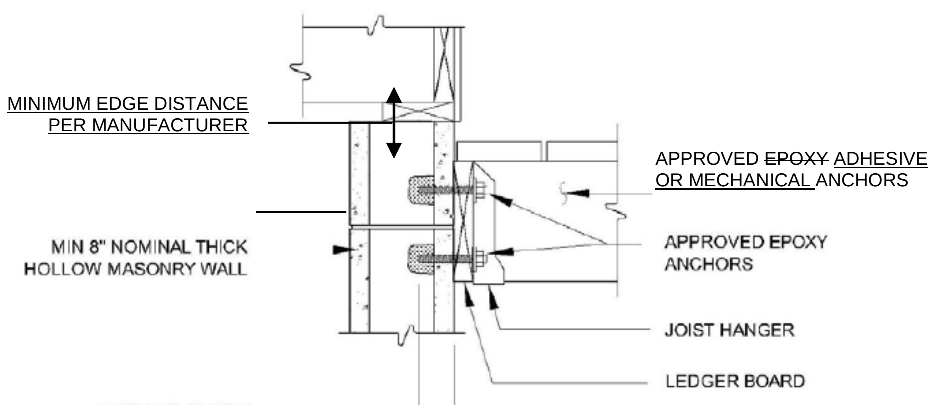


FIGURE R507.~~8.2~~ 9.3
LEDGER BOARD TO ~~SOLID~~ HOLLOW MASONRY FOUNDATION WALL ATTACHMENT

R507.~~9.3~~ 9.5 Attachment to resist lateral load. A lateral load connection is required by Section R507.2. The following ~~options~~ connections shall be deemed to comply; other design solutions are permitted in accordance with R301.

R507.~~9.3.1~~ 9.5.1 Connection at parallel joists. Where floor joists and deck joists are parallel to each other, a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) ~~at each end joist~~ as shown in Figures ~~R507.3.1(1)~~ R507.9.5.1(1) and R507.~~9.3~~ 9.5.1(2) shall be permitted. The hold-down device shall be located within 24 inches of each end joist. ~~Floor sheathing to floor joists~~ The floor sheathing fasteners shall be permitted to be substituted with two reinforcing angles with a minimum capacity of 375 pounds (1668 N) each on each side of the joist ~~with a minimum capacity of 375 pounds (1668 N)~~.

R507.~~9.3.2~~ 9.5.2 Connection at perpendicular joists. Where the floor joists and deck joists are perpendicular to each other, ~~provide~~ a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) ~~at each end joist and blocking between floor joist~~ shall be provided as shown in Figure R507.~~9.3.2~~ 9.5.2. The hold-down device shall be located within 24 inches of each end joist. The ~~F~~floor sheathing ~~to floor joists fasteners~~ shall be permitted to be substituted with two reinforcing angles ~~on each side of the joist with a minimum capacity of 375 pounds (1668 N~~ with a minimum capacity of 375 pounds (1668 N) each on each side of the joist.

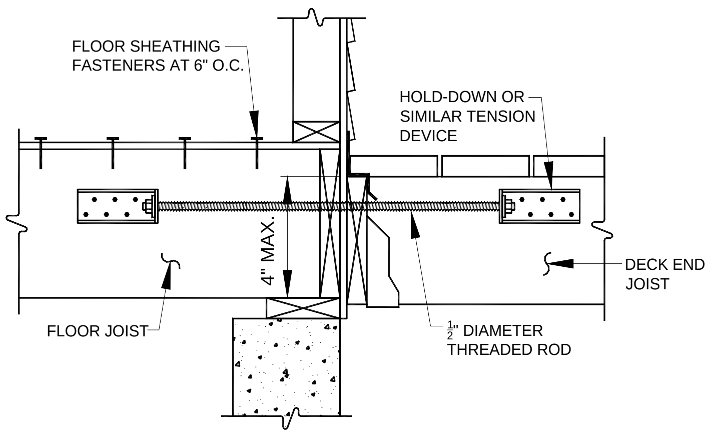


FIGURE R507.~~9.3.1(1)~~ 9.5.1(1)
CONNECTION AT PARALLEL JOISTS

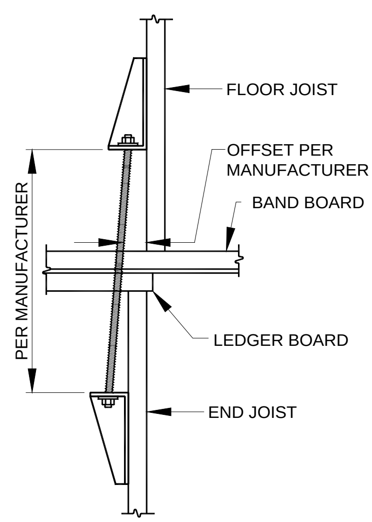
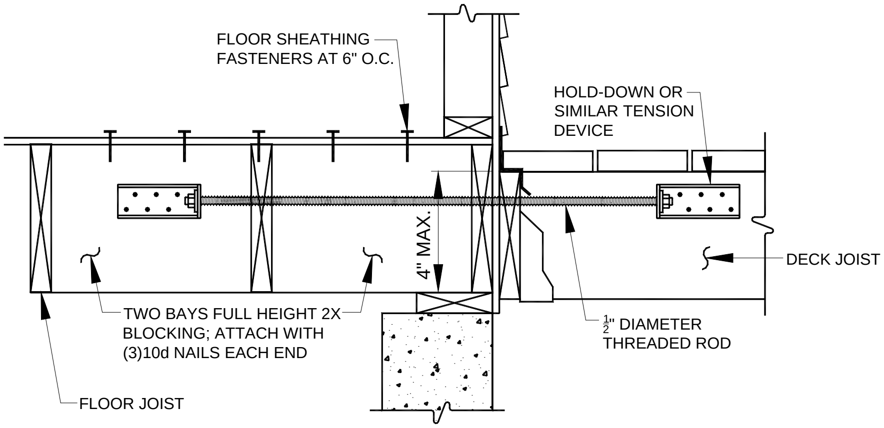


FIGURE R507.~~9.3.1(2)~~ 9.5.1(2)
OFFSET AT PARALLEL JOISTS



For SI: 1 inch = 25.4 mm

FIGURE R507.~~9.3.2~~ 9.5.2
LATERAL SUPPORT WHERE INTERIOR JOIST ARE PERPENDICULAR TO DECK

R507.10 Free-standing decks. As shown in Figures R507.5 and R507.10, free-standing decks shall ~~have an additional beam and posts adjacent the building exterior wall in place of a ledger board attachment.~~ transfer all of the deck loads directly to the footings. ~~The~~ bBeams shall be sized in accordance with Section R507.6 ~~and shall be located adjacent the exterior wall or at a maximum distance equal to the allowable joist cantilever~~.

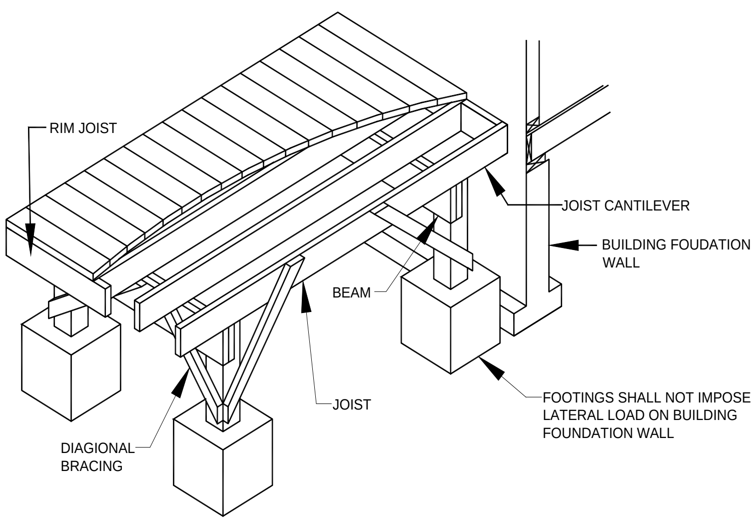
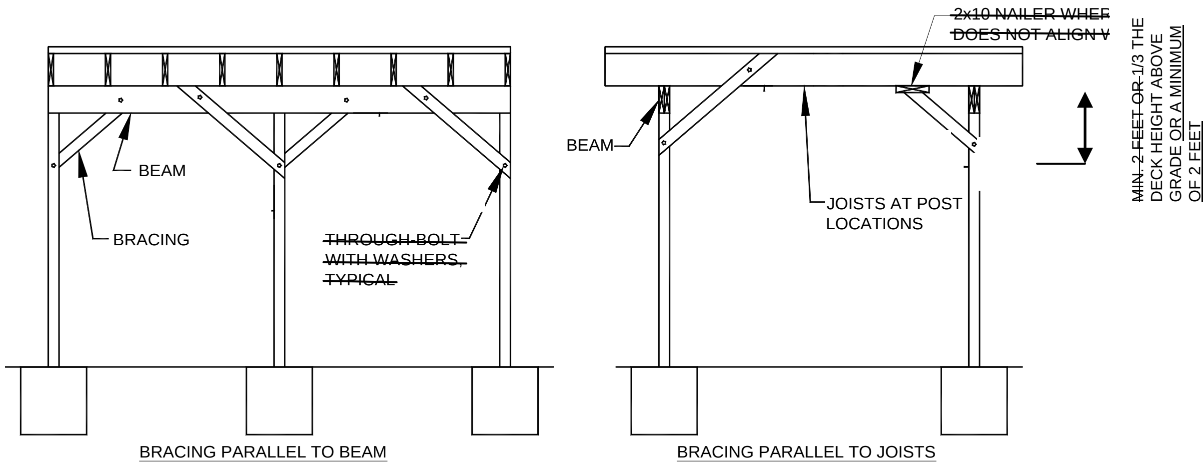


FIGURE R507.10
TYPICAL FREE-STANDING DECK

R507.10.1 Diagonal bracing. Diagonal bracing shall be ~~installed~~ provided in accordance with Figure R507.10.1 on free-standing decks greater than 30 inches above grade ~~in accordance with Figure R507.10.1~~. Bracing shall be placed at a 45 degree angle at each post location in the parallel and perpendicular directions to the beam. Bracing shall be constructed with ~~minimum of~~ nominal 2x4 lumber and shall be fastened to framing with one 1/2 inch (9 mm) diameter through bolt ~~with washers at each end~~ or by the use of other mechanical devices. The length of the diagonal brace shall be ~~a minimum of 2 feet long measured as shown in Figure R507.10.1 or at least~~ 1/3 the height of the deck above grade or a minimum of 2 feet.



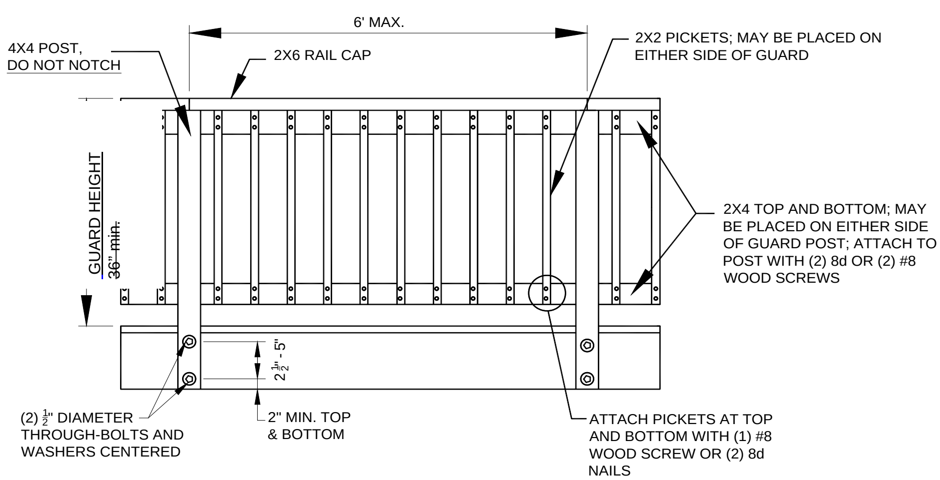
For SI: 1 foot = 304.8 mm

FIGURE R507.10.1
FREE-STANDING DECK DIAGONAL BRACING

R507.~~12~~ 11 Deck guards. Deck guards shall be designed and constructed in accordance with Sections R301.5 and R312. Other materials and construction ~~techniques~~ details shall be permitted in accordance with Section R301. Wood deck guards shall not be notched.

R507.~~12.1~~ 11.1 Guard construction. ~~Where the guard requirements of Sections R301.5 and R312 are met using the details shown in Figures R507.12.1(1) through R507.12.1(3),~~ Guard posts shall be attached to the inside or outside face of the rim joist or end joist as shown in Figures R507.11.1(1) through R507.11.1(3), Hold-down ~~anchors~~ fasteners shall have a minimum capacity of 1,800 pounds (8006 N).

R507.11.2 Guard rail construction. The guard rail cap shall be nailed to the top of the guard post with a minimum of four 16d common nails or #12 by 3" long screws, or an alternate connection that will resist 200 pounds of shear force.



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

FIGURE R507.~~12.1(1)~~ 11.1(1)
TYPICAL DECK GUARD

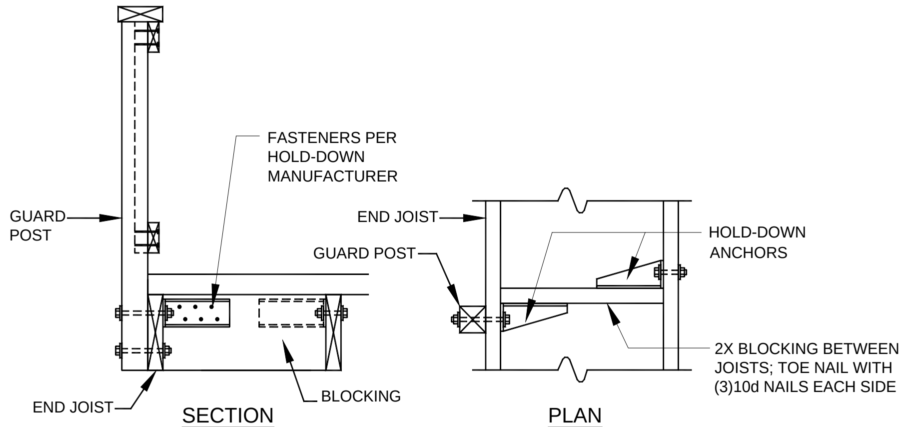


FIGURE R507.1~~2.1(2)~~ 11.1(2)
GUARD POST TO END JOIST CONNECTION

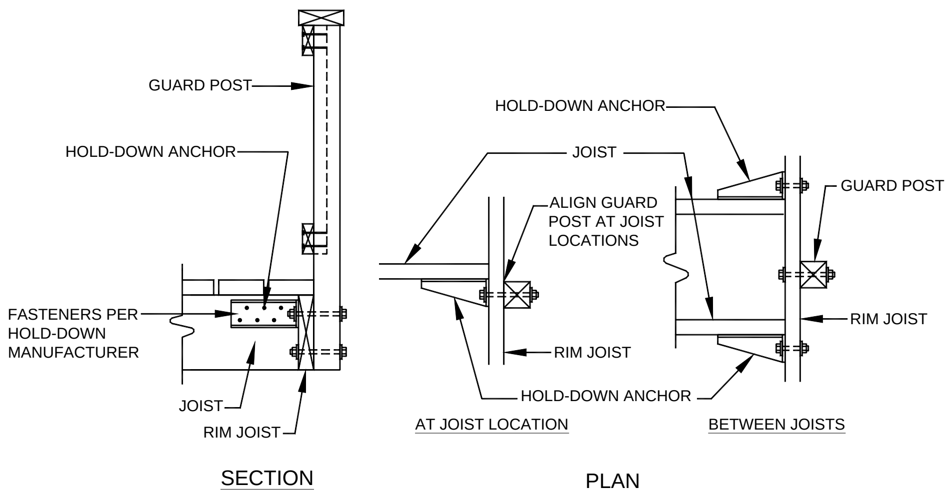
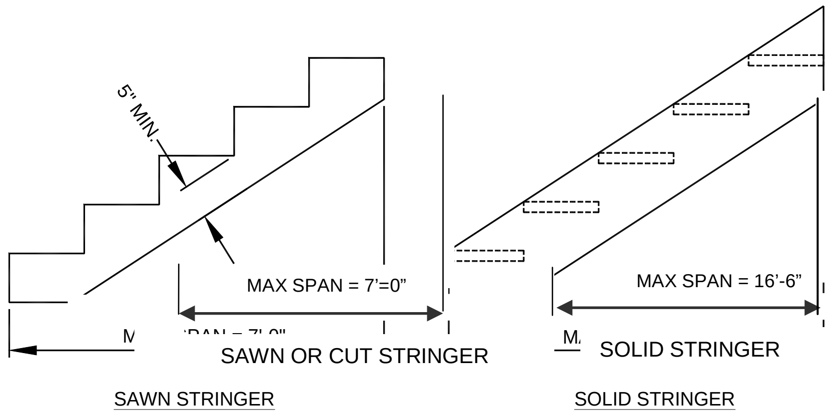


FIGURE R507.~~12.1(3)~~ 11.1(3)
GUARD POST TO RIM JOIST CONNECTION

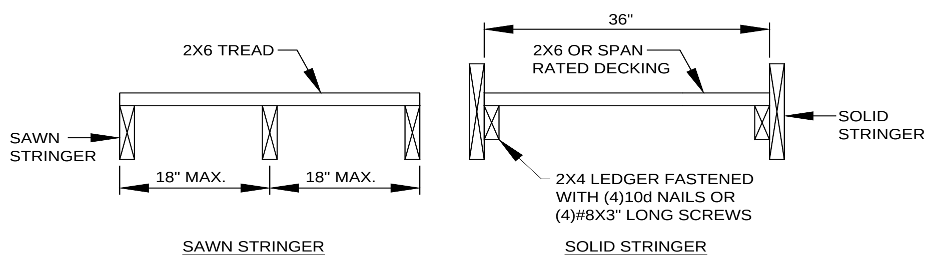
R507.~~13~~ 12 Deck stairs. Deck stairs shall be constructed in accordance with this section and Section R311.7. Where a flight of stairs has a vertical rise greater than that allowed per Section R311.7.3, an intermediate landing shall be provided ~~in accordance with Section R311.7.6 and designed as a free-standing deck in accordance with Section R507.10~~.

R507.~~13.1~~ 12.1 Stair stringers. Stair stringers shall be constructed of ~~sawn~~ nominal 2x12 ~~members at 18 inches on center with a throat dimension of 5 inches and a maximum span length~~ lumber as shown in Figures R507.~~13.1~~ 12.1(1) and R507.12.1(2) ~~Stairs with a width equal to 36 inches shall be permitted to be constructed with two solid 2x12 stringers wit a maximum span length as shown in Figure R507.13.1.~~ Stringers with spans greater than those shown in Figure R507.12.1(1) shall be supported with intermediate posts and footings spaced along its length.



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

FIGURE R507.13.1 12.1(1)
STAIR STRINGER REQUIREMENTS



For SI: 1 inch = 25.4 mm

FIGURE R507.~~13.3~~ 12.1(2)
~~TREAD~~ STRINGER WIDTH REQUIREMENTS

~~**R507.13.2 Stringer bearing.** Stringers shall be attached to posts or bear on joist hangers attached to the deck structure and on footings at grade in accordance with Figure R507.13.2. Joist hangers shall be specifically designed to accommodate sloped connections and shall have a minimum capacity of 625 pounds (2780 N). Reinforcing angles at rim joist locations only shall have a minimum capacity of 325 pounds (1446 N).~~

~~**FIGURE R507.13.2**~~
~~**STAIR STRINGER BEARING**~~

R507.~~13.3~~ 12.2 Treads and risers. Stair treads shall be constructed in accordance with Section R311.7 and Figure R507.~~13.3~~ 12.1(2). Treads shall be composed of nominal 2x~~6~~ lumber or plastic composites. ~~Treads of stairs constructed with solid stringers shall be permitted to be composed of span rated decking.~~ Risers shall be permitted to be composed of nominal 1x lumber. Openings in risers shall not allow the passage of a 4 inch (102 mm) diameter sphere.

R507.~~13.4~~ 12.3 Stair guards. Guards for stairs shall be as required per Section R312.1.1 ~~and constructed in accordance with Section R507.12. The attachment of a stair guard post to the stringers shall be constructed in accordance with Figure R507.13.4~~.

~~**FIGURE R507.13.4**~~
~~**STAIR GUARD CONNECTION**~~

R507.~~13.5~~ 12.4 Stair handrails. ~~When required, handrails for stairs shall be as required~~ A stair handrail may be required per Section R311.7.8. ~~When required and where the top guard rail does not comply with the handrail grip-size requirements in Section R311.7.8.3, a separate, conforming handrail shall be required.~~ When a guard is required in accordance with Section R312.1.1, the top rail shall comply with the handrail grip size requirements of Section R311.7.8.3 or a separate handrail shall be provided.

R507.~~13.6~~ 13 Ramps. Ramps from decks shall be as required in Section R311.8. Details for stringers, guards and handrails shall be similar to those for stairs.

Commenter's Reason: This proposal was originally submitted to address the lack of prescriptive deck construction details in the IRC. Prescriptive details are needed in the code to help the "weekend warrior" or other inexperienced builders who do not build decks on a regular basis. The construction of safe decks is an important issue that warrants inclusion in the IRC.

The committee in Dallas agreed that Section R507 was woefully deficient in providing minimum prescriptive deck criteria. This public comment integrates many comments from multiple interested parties.

Arguing in support of this proposal in Dallas, several proponents rightfully pointed out that many jurisdictions across the country have deferred to DCA6 as an acceptable guide for building decks. In the absence of IRC criteria, DCA6 was a respected alternative. This submission is based on many of the provisions in DCA6.

The opponents in Dallas argued that some of the details were different than those used in their parts of the country. They missed the opening sentences in the first section – that this proposed code change was intended to provide 1) *typical* requirements and details and 2) other materials and methods were equally acceptable. It was argued that providing minimum requirements for the average homeowner in no way was intended to stifle deck craftsmen.

Numerous examples of engineered solutions and commonly accepted details have been sent to me from many parts of the country. There are YouTube videos from well established stores, like Home Depot, that are offering "how to" videos that are teaching the average homeowner wrong ways to build decks. Some of these are so egregiously wrong that they could jeopardize life safety. In the absence of good code, the handy homeowner will resort to anything – good or bad: to paraphrase a TV commercial: "everyone knows that everything on the internet is correct"

In conclusion, there are several public comments to RB 264 and RB268 being submitted to fill the void on how to build decks safely. There is a short version, a medium length version and this more complete version. We think that less is less, and more is better. We submit this longer version because the average deck builders, plan reviewers and inspectors have nothing in the IRC to help them with a deck design. Homeowners and non-professionals need to have simple prescriptive methods for building a safe deck, and we believe this proposal provides those guidelines.

I strongly recommend that you support RB268 so that we will have prescriptive criteria in the code for building decks.

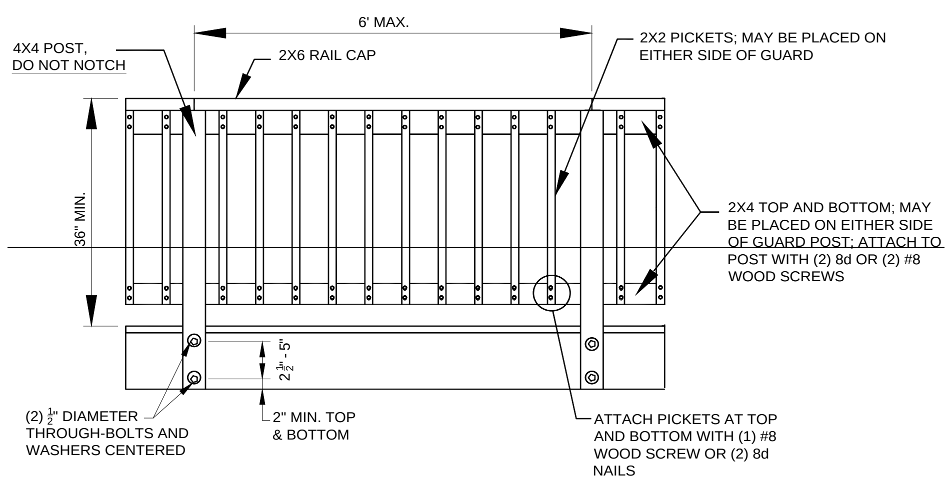
Public Comment 2:

Chuck Bajnai, Chesterfield County, VA, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

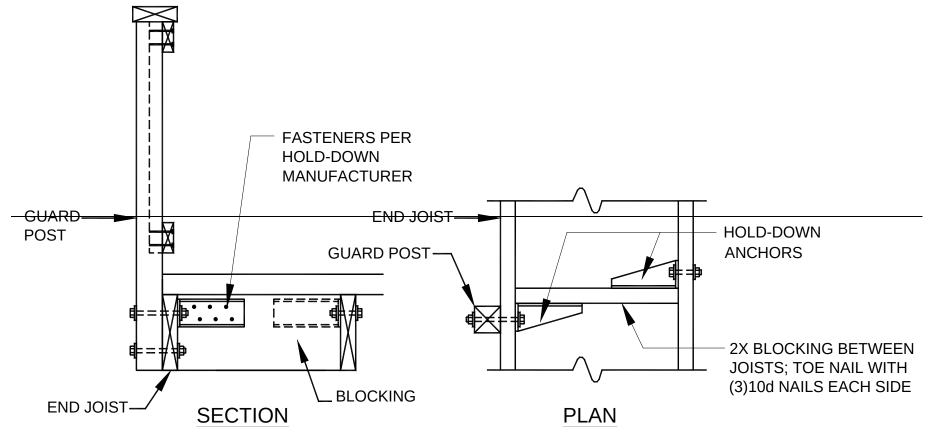
R507.12 Deck guards. Deck guards shall be designed and constructed in accordance with Sections R301.5 and R312. ~~Other materials and construction techniques shall be permitted in accordance with Section R301.~~ <u>Deck guards shall not be notched.</u>

~~**R507.12.1 Guard construction.** Guard posts shall be attached to the inside or outside face of the rim joist or end as shown in Figures R507.12.1(1) through R507.12.1(3), Hold-down anchors shall have a minimum capacity of 1,800 pounds (8006 N).~~

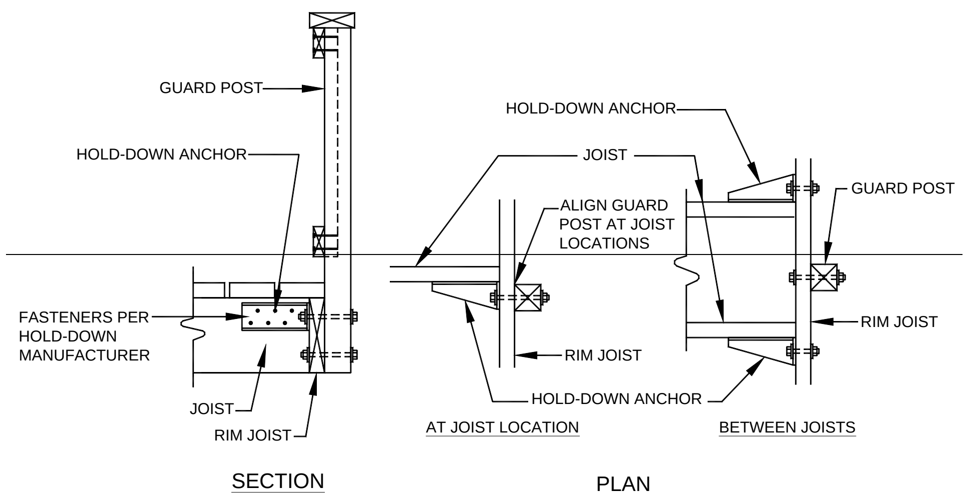


~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm~~

~~**FIGURE R507.12.1(1)**~~
~~**DECK GUARD**~~



~~FIGURE R507.12.1(2)~~
~~GUARD POST TO END JOIST~~



~~FIGURE R507.12.1(3)~~
~~GUARD POST TO RIM JOIST~~

Commenter's Reason: The guard post detail was created after extensive testing by Virginia Tech. The connector in the detail was the only solution they could get to pass the testing criteria for a guard rail. While other devices or details may be available, no one has provided engineering test data for any other options.

Having said that, a major objection to RB268 by the opponents was this guard-rim joist connection detail. As an effort to reach a compromise, I am requesting these details be deleted.

Public Comment 3:

John Orang, Barefoot Decks, representing self, requests Disapproval.

Commenter's Reason: We have been building decks in Colorado since 1994. During that time we have built hundreds of decks and learned a lot along the way.

When I heard of the new lateral post attachment method that is proposed for the 2015 IRC, I had to stop and take a hard look at it. We have spent several years addressing this very issue and in the past year have come up with our very own patent pending bracket that has tested very well. Our crews are very comfortable with the ease of use that this bracket offers and me. As the company owner, I am extremely happy with the stability of the rail as well as minimum deflection.

The reason I am writing a response to this hearing isn't to pitch my product but only to voice my opinion against being forced to use a product that in my opinion performs less favorably, especially when it comes to deflection.

I am sure there are a variety of methods to achieve the current 500 lb safety factor and forcing one product on thousands of creative deck builders seems to go against the grain of what we are all about.

Thanks for your consideration

RB268-13

Final Action: AS AM AMPC____ D

RB270-13
R602.3, R602.4

Proposed Change as Submitted

Proponent: Dennis St. Denis, D & L Quality Homes, representing self (lstdenis2@cogeco.ca)

Revise as follows:

R602.3 Design and construction. Exterior walls of woodframe construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). Wall sheathing shall be fastened directly to framing members and, when placed on the exterior side of an exterior wall shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). Wood structural panel sheathing used for exterior walls shall conform to DOC PS 1, DOC PS 2 or, when manufactured in Canada, CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and performance Category by a grade mark or certificate of inspection issued by an approved agency and shall conform to the requirements of Table R602.3(3). Wall sheathing used only for exterior wall covering purposes shall comply with Section R703.

Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice. <u>Load Bearing Warning Signs shall be installed on every second stud along the full length of the load bearing wall, at a height of 5 feet and attached with screws or nails.</u>

> **Exception:** Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R502.5(1) and R502.5(2).

R602.4 Interior load-bearing walls. Interior load-bearing walls shall be constructed, framed and fireblocked <u>and Load Bearing Warning Signs installed</u> as specified for exterior walls.

Reason: Load Bearing Walls and Load Points are being removed by homeowners and contractors during renovations and also being cut into by sub-contractors during new home construction or renovations without knowing what the possible outcome can be. The resulting problems are people being severly injured, ceilings and/or roofs collapsing and fatalities. All of this can be avoided if these SAFETY WARNING SIGNS were enforced as a building code.

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

R602.3-RB-STDENIS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The adding of warning signs may not prevent cutting into load bearing walls. The signs are hidden within the wall cavity and may never be seen prior to cutting into the wall.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dennis St Denis, D&L Quality Homes, representing self, Guy Bourdeau, representing self, E. Hillfrich, Hilfrich, Inc, Lanielle St Denis, representing self, request Approval as Submitted.

Commenter's Reason:

(**D. St Denis):** I am asking the committee to reconsider their decision and approve my code change AS SUBMITTED. The opponent's arguments in my opinion were non-valid. Some of the arguments were, size and lettering on the signs, people not being able to read English, stamps on roof truss, renovators/people cutting into walls. These arguments do not compare to structure being compromised, sever injuries and death. Through research, I have proof of injuries, fatalities and structural compromise. The opponents provided no proof to back their arguments.

Opponents arguments.

Size and lettering on signs: Load Bearing Warning Signs are currently on the market, in production in Canada and soon The United States. Therefore size and lettering would be consistent.

People not being able to read English: English is the official language in the USA and the signs are available in bilingual. Therefore this argument is non-valid.

Stamps on roof trust: This is not related to this code change.

People cutting into walls: I have over 30 years in construction and have yet to see someone grab a saw and cut into a wall. People also do think of electrical wires and plumbing inside walls before cutting into them. The electrical code alone states that wall plugs must be a certain distance from one another. This puts electrical plugs on every wall. People who see this will not attempt to cut through a wall, its common sense. Removing the outer/finish layer is the preferred and most widely used way in home renovations.

I have submitted proof with my code change that there is a drastic need for warning signs on load bearing structure. This matter needs to be addressed as soon as possible. How many other people must get injured? How many other people must loose there life before something is done? The committee should stand by their commitment and make the right decision in ensuring public safety in the built environment.

I have also submitted along with this public comment form, more proof from the Ministry of Labour (Federal Government of Canada) showing injuries reported from walls collapsing due to removing structure. The search was done from 2006 until 2011 with 9 reports during this short time. You cannot get any more clear proof then this. No matter what country I search in, what state or province, there is proof showing that warning signs on load bearing walls is needed in the building code. The committee should stand behind building safety month, promoting safety in the built environment as stated on the website.

(Bourdeau): I wish the council would change its position and approve the code change as proposed. The industry spoke against the code change giving reasons such as; home owners not being able to read or understand the signs, building inspectors not being able to enforce the change, people not tearing the wall apart but cutting the wall down.

All these reasons can be accepted at face value but the opposite can also be argued to the effect that some people can read, building inspectors have to check the site after the framing is done at which point the signs would be on, and most people do not cut walls down as there are wires and plumbing hidden inside the walls. So the industries arguments are shallow.

Please do not forget that the purpose of the council is to create a code that protects the residential homeowner. This can be achieved by creating standards and tables that insures a construction is up to par. The council can also use another level of protection as does the electrical industry, plumbing industry and the department of highways. That level of protection is the use of warning signs.

Using the arguments of the building industry and applying them to the electrical industry would read as follows, do not put no entry warning signs on electric fencing around electric substations because people cannot read those signs, because it is not enforceable by the inspectors.

Using the arguments of the building industry, and applying them to the department of highway, would mean taking out warning signs of upcoming curves, of falling rocks and other such signs because people cannot read them or understand what they mean.

As a homeowner and past contractor/renovator, load bearing warning signs would have made my job easier and would have saved from damage to property in several instances. I would like to recall to the council's attention the death of employees in Bangladesh who were crushed under the collapse of their building. I would also like to recall the collapse of the mall in Northern Ontario which killed two people. I would also like to draw your attention to the proponent's research which submits twelve or more incidents in the residential sector of collapse, injury and death.

I therefore expect that the council will consider the proponent's submission with a positive outcome.

(Hilfrich): This proposal will go a long way to reducing the risks of damage to or removal of loadbearing wall elements during renovation work by untrained persons and thereby increase the safety and longevity of these structures. Too often, individual homeowners, or unskilled or poorly trained contractors remove or damage loadbearing elements of a structure without providing any replacement structural members. Inclusion of the small warning signage will significantly reduce these type of situations from going unnoticed and uncorrected.

(L. St Denis): I am asking the council to change its position and approve the code change as proposed. This is a growing problem, as many people are being killed and seriously injured when it comes to construction and renovation of homes. A list of such injuries and deaths has been submitted by the proponent . The issues that were addressed at the public hearing held in Texas by the community are issues that all building code proposals face when created and altered. There are some contractors that are illiterate and/or from other dialects that may not be able to read the signs, but the sign can be altered to suit. The same issues can be said when reading the book of building codes, however you have overcome that issue. There may be some confusion as to where the signs may be exposed, such as not being in the appropriate places, but I'm sure the inspectors that need to locate these signs will know where they should be and this will give them the opportunity to educate the contractors that get it wrong, as to what a load bearing wall is. There was also the issue of how contractors remove walls to obtain the open concept. Some take the drywall off, while others cut into the walls in the place they wish to open. Regardless of the method of removal, the signs will still be visible as they need to be placed 5 feet from the floor, which is almost at eye level and on every second stud. If a cutting tool is used, when they encounter the sign, it will be more difficult to cut through and this will prompt them to take a look and see the sign.

The loss of life and serious injuries caused by load points being removed without the proper education is a subject that the building code association needs to keep in mind when making the decision of accepting or rejecting this proposal. The purpose of your existence is to prevent death and injury and this proposal is exactly what you need to do so. This is a growing problem that not only entails do it yourselfers that don't know what they're doing, but also scab/immoral contractors that do everything they can to save a dollar. These people don't have the desire they need to do things right and the committee is there to push them to change. This building code proposal is exactly what you need to accomplish this goal.

RB270-13

Final Action: AS AM AMPC____ D

RB277-13

Table R602.3(1), Table R703.4

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

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

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS
32	Water-repellent siding (weighing less than 11 psf) attachment to Wood Structural Panel sheathing, either direct or over foam insulation [k]	Ring shank nail (0.148" min. dia.)	12" o.c. (per 12" of siding width)[l]
		Smooth or screw shank nail (0.148" min. dia.)	3" o.c. (per 12" of siding width)[l]
		Vinyl siding nail (0.120" min. dia.)	3" o.c. (per 12" of siding width)[l]
		#6 screw (0.138" min. dia.)	12" o.c. (per 12" of siding width)[l]
		#8 screw (0.164" min. dia.)	16" o.c. (per 12" of siding width)[l]

(Portions of table not shown remain unchanged)

k. Fastener length shall be sufficient to penetrate back side of the minimum 7/16" WSP sheathing by at least ¼".
l. Spacing of fasteners is per 12" of siding width. For other siding widths, multiply SPACING OF FASTENERS above by a factor of 12/s, where s is the siding width in inches. For example, if 8" lap siding, multiply SPACING OF FASTENERS above by 12/8 or 1.5. Fastener spacing shall never be greater than the manufacturer's minimum recommendations.

Revise as follows:

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners

(Portions of Table not shown remain unchanged)

d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions or Table R602.3(1).

Reason:
1. With the elimination of the term "nailable sheathing" in Chapter 7 last cycle, users of Table R703.4 are left without guidance on how to attach siding products to wood structural panel sheathing alone. Additionally, the trend toward the use of non-structural foam sheathing over structural sheathing has led to the development of the proposal for Item 32 above. It provides attachment recommendations for any siding products with an applied weight of less than 11 psf direct to wood structural panel sheathing or through any thicknesses of foam sheathing without having to penetrate the wall framing. This can be essential when attaching siding through thicker foam insulation panels as actually finding the framing with fasteners can be a challenge.

Footnote k requires the fastener used to penetrate the wood structural panel sheathing back side by at least ¼ inch. This will ensure that the cylindrical shank of the fastener is engaged in the wood structural panel, providing the maximum withdrawal capacity. This also provides the user with the maximum flexibility when selecting fasteners. For example, when attaching vinyl siding over 2 inches of foam sheathing into 7/16-inch wood structural panel sheathing, the fastener can be any length greater than

(1/8” + 2” + 7/16” + ¼”=) 2-13/16 inches, so a 3-inch long nail should work. For a smooth shank nail, a 10d Common nail (3” x 0.148”) meets both the length and diameter requirements. If 1 inch of penetration was required in the stud, a nail of (1/8” + 2” + 7/16” + 1”=) 3-9/16 inches would be required. As such, 20d box nail (4” x 0.148”) or some specialty nail would be required.

Footnote l provides the methodology for adjusting the fastener spacing to accommodate lap siding greater or less than 12 inches in width. The adjustment calls for 12” to be divided by the siding width. The fastener spacing provided for in Item 32 is then multiplied by this factor.

The above proposal is based on ASCE 7-10 V_{ult}, <140 miles per hour, maximum 30 ft building height, Exposure C or less.

The table was developed based on the principle of engineering mechanics and confirmed by full-scale wind tunnel tests at the Insurance Institute for Business & Home Safety (IBHS) Research Center in Chester County, South Carolina. The wind tunnel test report is available at http://www.apawood.org/TechnicalPapers/IBHS_WindTunnelTestReport.pdf or by contacting the APA help desk at help@apawood.org.

2. Footnote d to Table R703.4 was changes to add proposed item 32 to the list of information sources available for nailing direct to wood structural panel sheathing.

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

R602.3(1)T-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is an undefined term “water-repellant siding”. The 3” o.c. nail of vertical vinyl siding is impractical.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

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

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS
32	~~Water-repellent siding~~ Exterior wall covering (weighing less than 11 psf) attachment to ~~Wood Structural Panel~~ wood structural panel sheathing, either direct or over foam ~~insulation~~ sheathing a maximum of 2 inches thick.[k]	Ring shank roofing nail (0.120” min. dia.)	12” o.c. (per 12” of siding width)[l]
		Ring shank nail (0.148" min. dia.)	~~12”~~ 15” o.c. (per 12” of siding width)[l]
		~~Smooth or screw shank nail (0.148" min. dia.)~~	~~3” o.c. (per 12” of siding width)[l]~~
		~~Vinyl siding nail (0.120" min. dia.)~~	~~3” o.c. (per 12” of siding width)[l]~~
		#6 screw (0.138" min. dia.)	12” o.c. (per 12” of siding width)[l]
		#8 screw (0.164" min. dia.)	16” o.c. (per 12” of siding width)[l]

k. Fastener length shall be sufficient to penetrate back side of the ~~minimum 7/16"~~ wood structural panel sheathing by at least 1/4”. The wood structural panel sheathing shall be 7/16” or thicker in thickness.

l. Spacing of fasteners is per 12" of siding width. For other siding widths, multiply SPACING OF FASTENERS above by a factor of 12/s, where s is the siding width in inches. For example, if 8" lap siding, multiply SPACING OF FASTENERS above by 12/8 or 1.5. Fastener spacing shall never be greater than the manufacturer's minimum recommendations.

(Portions of table/footnotes not shown remain unchanged)

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacture's installation instructions or Table R602.3(1).

(Portions of table/footnotes not shown remain unchanged)

Commenter's Reason: APA attempted to work with other industries while developing this code change proposal. There was, however, not sufficient time to fully resolve some of the outstanding issues with the Vinyl Siding Institute (VSI) in December 2012. This PC reflects the resolution between APA and the VSI. We also took this opportunity to make some adjustments to the original proposal that we were unable to make through the Floor Modification procedure.

Additional proposal adjustments –

1. Recent research conducted by the foam industry suggests that limiting the thickness of the foam sheathing to 2 inches or less will minimize the potential for long term sagging of the siding material. With thicker foam sheathing, the fasteners used to attach the foam are essentially cantilevered through the foam away from the main member of the connection. For smaller diameter fasteners, the cantilevered fasteners can bend over time causing the water-resistant barrier to sag downward. Even though the use of the wall sheathing alone to anchor the siding requires a closer fastener spacing than that tested by the foam industry and should result in greater resistance to long term sagging of the siding, we have chosen to be conservative in our proposal to ensure good performance of the siding and its attachment to the wood structural panel sheathing.
2. We also changed the term "foam insulation" to "foam sheathing" to be consistent with the code definition.
3. We changed "Water repellent siding" to "Exterior wall covering" as it seemed more clearly described as such.
4. Footnote K was rewritten separating the requirements of the footnote into two separate sentences to ensure correct interpretation of the provisions. The requirements are:
   a. Full penetration of the wood structural panel sheathing by at least ¼ inch to ensure that the pyramidal tip of the fastener is not considered in the "depth of penetration" of the fastener, as the tip contributes nothing to the withdrawal capacity of the fastener. We want the nail to penetrate the wood structural panel sheathing, *regardless of thickness* to provide a visual indication of the nails' presence, adequate length and penetration of the wood structural panel sheathing.
   b. The second separate requirement is the minimum thickness of the wood structural panel sheathing. The tables are based on the use of 7/16" minimum thickness sheathing.
5. Two entries were eliminated as the unadjusted spacing of 3" on center was deemed to be far less useful than the deformed-shank fastener information provided.
6. The ring-shank roofing nail was added to the table as they have been used in part of the country.

RB277-13

Final Action: AS AM AMPC____ D

RB278-13
Table R602.3(1)

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

Table R602.3(1)
FASTENING SCHEDULE ~~FOR STRUCTURAL MEMBERS~~

~~ITEM~~	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER [a, b, c]	SPACING AND LOCATION ~~OF FASTENERS~~
		Roof	
1	Blocking between ceiling joists or rafters to top plate~~, toe nail~~	3-8d (2 ½ " x 0.113")	at each end, toe nail
2	Ceiling joists to top plate~~, toe nail~~	3-8d (2 ½ " x 0.113")	per joist, toe nail
3	Ceiling joist not attached to parallel rafter laps over partitions~~, face nail~~ (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	3-10d (3" x 0.128")	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	Per Table R802.5.1(9)	Face nail
~~4~~5	Collar tie to rafter, ~~face nail~~ or 1 1/4" x 20 gage ridge strap to rafter	3-10d (3" x 0.128")	Face nail
~~5~~6	Rafter or roof truss to plate~~, toe nail~~	3-16d box nails (3 ½" x 0.135"); or 3-10d common nails (3" x 0.148")	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss [j]
~~6~~7	Roof rafters to ridge, valley or hip rafters: or, roof rafter to minimum 2-inch ridge beam ~~toe nail face nail~~	4-16d (3 ½ " x 0.135") 3-16d (3 ½ " x 0.135")	Toe nail End nail
		Wall	
~~7~~8	~~Built-up studs—face nail~~ Stud to stud (not at braced wall panels)	10d (3" x 0.128")	24" o.c. face nail
~~8~~9	~~Abutting studs at intersecting wall corners, face nail~~ Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d (3 ½ " x 0.135")	12" o.c. face nail
~~9~~10	~~Built-up header, two pieces with 1/2" spacer~~ Built-up header (2-inch to 2-inch header)	16d (3 1/2" × 0.135")	16" o.c. ~~along~~ each edge face nail
~~10~~	~~Continued header, two pieces~~	~~16d (3 1/2" × 0.135")~~	~~16" o.c. along each edge~~
11	Continuous header to stud~~, toe nail~~	4-8d (2 ½ " × 0.113")	Toe nail
~~12~~	~~Double studs, face nail~~	~~10d (3" × 0.128")~~	~~24" o.c.~~
~~13~~12	~~Double top plates, face nail~~ Top plate to top plate	10d (3" × 0.128")	24" o.c. face nail
~~14~~13	~~Double top plates, minimum 24-inch offset of end joints, face nail in lapped area~~ Top plate to top plate, at end joints	8-16d (3 ½ " × 0.135")	Face nail on each side of end joint (minimum 24" lap splice length each side of end joint)
~~15~~14	~~Sole plate to joist or blocking, face nail~~ Bottom plate to joist, rim joist, band	16d (3 ½ " × 0.135")	16" o.c. face nail

	joist or blocking (not at braced wall panels)			
~~16~~15	~~Sole plate to joist or blocking at braced wall panels~~ Bottom plate to joist, rim joist, band joist or blocking at braced wall panels	3-16d (3 1/2" × 0.135")	16" o.c. face nail	
~~17~~16	Stud to ~~sole~~ bottom plate~~, toe nail~~	3-8d (2 1/2" × 0.113") or 2-16d (3 1/2" × 0.135")	Toe nail End nail	
~~18~~17	Top or ~~sole~~ bottom plate to stud~~, end nail~~	2-16d (3 1/2" × 0.135")	End nail	
~~19~~18	Top plates, laps at corners and intersections~~, face nail~~	2-10d (3" × 0.128")	Face nail	
~~20~~19	1" brace to each stud and plate~~, face nail~~	2-8d (2 1/2" × 0.113") 2 staples 1 3/4"	Face nail --	
~~21~~20	1" × 6" sheathing to each bearing~~, face nail~~	2-8d (2 1/2" × 0.113") 2 staples, 1" crown, 16 ga., 1 3/4" long	Face nail --	
~~22~~	~~1" × 8" sheathing to each bearing, face nail~~	~~2-8d (2 1/2" × 0.113")~~ ~~3 staples 1 3/4"~~	~~--~~ ~~--~~	
~~23~~21	~~Wider than 1" × 8" sheathing to each bearing, face nail~~ 1" x 8" and wider sheathing to each bearing	1"x 8": 2-8d (2 1/2" × 0.113") 3 staples, 1" crown, 16 ga., 1 3/4" long Wider than 1"x 8": 3-8d (2 1/2" × 0.113") 4 staples, 1" crown, 16 ga., 1 3/4" long	Face nail --	
	Floor			
~~24~~22	Joist to sill, top plate, or girder~~, toe nail~~	3-8d (2 1/2" × 0.113")	Toe nail	
~~25~~23	~~Rim joist to top plate, toe nail (roof applications also)~~Rim joist, band joist, or blocking to sill or top plate (roof application also)	8d (2 1/2" × 0.113")	6" o.c. toe nail	
~~26~~	~~Rim joist or blocking to sill plate, toe nail~~	~~8d (2 ½" × 0.113")~~	~~6" o.c.~~	
~~27~~24	1" × 6" subfloor or less to each joist~~, face nail~~	2-8d (2 1/2" × 0.113") 2 staples, 1" crown, 16 ga., 1 3/4" long	Face nail	
~~28~~25	2" subfloor to joist or girder~~, blind and face nail~~	2-16d (3 1/2" × 0.135")	Blind and face nail	
~~29~~26	2" planks (plank & beam - floor & roof)	2-16d (3 1/2" × 0.135")	at each bearing, face nail	
~~30~~27	Built-up girders and beams, 2-inch lumber layers	10d (3" × 0.128")	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.	
~~31~~28	Ledger strip supporting joists or rafters	3-16d (3 1/2" × 0.135")	At each joist or rafter, face nail	
29	Joist to band joist or rim joist	4-10d (3" x 0.128")	End nail	
30	Bridging to joist	2-10d (3" x 0.128")	Each end, toenail	
ITEM	**DESCRIPTION OF BUILDING MATERIALS**	**DESCRIPTION OF FASTENER**[b,c,e]	**SPACING OF FASTENERS**	
			Edges (inches)[i]	**Intermediate supports**[c,e] **(inches)**
	Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing			
~~32~~31	3/8" - 1/2"	6d common (2" × 0.113") nail (subfloor	6	12[g]

		wall)[j] 8d common (2 1/2" × 0.131") nail (roof)[f]		
~~33~~32 ~~34~~33	19/32" - 1" 1 1/8" - 1 1/4"	8d common nail (2 1/2" × 0.131") 10d common (3" × 0.148") nail; or 8d (2 1/2" × 0.131") deformed nail	6 6	12[g] 12
Other wall sheathing [h]				
~~35~~34	1/2" structural cellulosic fiberboard sheathing	1 1/2" galvanized roofing nail, 7/16" ~~crown or~~ head diameter, or 1" crown staple 16 ga., 1 1/4" long	3	6
~~36~~35	25/32" structural cellulosic fiberboard sheathing	1 3/4" galvanized roofing nail, 7/16" ~~crown~~ head diameter, or 1" crown staple 16 ga., 1 1/2" long	3	6
~~37~~36	1/2" gypsum sheathing [d]	1 1/2" galvanized roofing nail; staple galvanized, 1 1/2" long; 1 1/4 screws, Type W or S	7	7
~~38~~37	5/8" gypsum sheathing [d]	1 3/4" galvanized roofing nail; staple galvanized, 1 5/8" long; 1 5/8" screws, Type W or S	7	7
Wood structural panels, combination subfloor underlayment to framing				
~~39~~38	3/4" and less	6d deformed (2" × 0.120") nail; or 8d common (2 1/2" × 0.131") nail	6	12
~~40~~39	7/8" - 1"	8d common (2 1/2" × 0.131") nail; or 8d deformed (2 1/2" × 0.120") nail	6	12
~~41~~40	1 1/8" - 1 1/4"	10d common (3" × 0.148") nail; or 8d deformed (2 1/2" × 0.120") nail	6	12

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

a. All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.

b. Staples are 16 gage wire and have a minimum 7/16-inch on diameter crown width.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. For regions having basic wind speed of 110 mph or greater, 8d deformed (21/2" × 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.

g. For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

h. Gypsum sheathing shall conform to ASTM C 1396 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to ASTM C 208.

i. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

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

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

This proposed change is the second part of an effort by the ICC Building Code Action Committee to create a consistent format for the conventional wood frame fastener schedules in the IBC and the IRC. The revised descriptions in this proposed change were approved in the corresponding Table 2304.9.1 of the IBC (see S265). The row descriptions and organization of the IBC table (and now proposed in this IRC table) will be substantially the same, allowing for ease of use.

Complete consistency between the actual fastening specified in the two codes was beyond the scope of the committee work. In the approved IBC table some changes were made in order to provide alternatives currently permitted in the IRC, and to establish some common nail equivalents. No substantial changes are proposed to the IRC fastening, since the existing table generally permits the substitution of box nails for common nails, and the current fastening is well established. Rather, changes have been limited to the ordering, modification, addition, or combining of the fastening descriptions for clarity and consistency.

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

R602.3(1)-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this does not add clarity. The committee prefers RB272-13.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, and Dennis Pitts, American Wood Council request Approval as Submitted.

Commenter's Reason:

(Bajnai): The ICC Building Code Action Committee (BCAC) request that the code development committee be overturned and this proposal be *approved as submitted.*

Confusion during testimony at the hearings inferred that RB278 was in conflict with RB272. The BCAC worked with AWC to be sure they are completely compatible.

1. This is the second half of a two part code change to reformat the prescriptive fastener schedule in the IRC with IBC, Table 2304.9.1. The first half was approved in the last cycle (S265-12) in Portland.

2. RB272-13, submitted by the American Wood Council, primarily makes adjustments to the actual fastenings specified (number and size of nails) in order to increase flexibility of options and also to establish baseline capacities for all the connections, when comparing the codes.

3. Approval of both RB278 and RB272 will result in a uniform table format, as well as more uniform fastener specifications, between the two codes. Merging the two proposals will not be difficult since one adjusts the descriptions, and the other the specified fastening.

(Pitts): We support the formatting revisions put forward by the BCAC in RB278 and consider them compatible with RB272. This change revises descriptions of some entries to be consistent with what was approved for the prescriptive fastener schedule in the IBC (see S265-12). With RB272 and RB278 both approved, the final table would appear as follows:

Table R602.3(1)
FASTENING SCHEDULE

	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER [a, b, c]	SPACING AND LOCATION
		Roof	
1	Blocking between ceiling joists or rafters to top plate	4-8d box (2.5 " x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	at each end, toe nail
2	Ceiling joists to top plate	4-8d box (2.5 " x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	per joist, toe nail
3	Ceiling joist not attached to parallel rafter laps over partitions (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	4-10d box (3"x 0.128"); or 3-16d common (3.5" x 0.162"); or 4-3" x 0.131" nails	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.3.1, R802.3.2,	Per Table R802.5.1(9)	Face nail

	Table R802.5.1(9))		
5	Collar tie to rafter, or 1 1/4" x 20 gage ridge strap to rafter	4 -10d box (3"x 0.128"); or 3-10d common (3" x 0.148"); or 4-3" x 0.131" nails	Face nail
6	Rafter or roof truss to plate	3-16d box nails (3.5" x 0.135"); or 3-10d common nails (3" x 0.148"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131 nails	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss [j]
7	Roof rafters to ridge, valley or hip rafters; or, roof rafter to minimum 2-inch ridge beam	4-16d box (3.5 " x 0.135"); or 3-10d common (3.5" x 0.148"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails 3-16d box (3.5 " x 0.135") 2-16d common (3.5" x 0.162"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Toe nail End nail
		Wall	
8	Stud to stud (not at braced wall panels)	16d common (3.5" x 0.162") 10d box (3" x 0.128"); or 3" x 0.131" nails	24" o.c. face nail 16" o.c.
9	Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d box (3.5 " x 0.135"); or 3" x 0.131" nails 16d common (3.5" x 0.162")	12" o.c. face nail 16" o.c.
10	Built-up header (2-inch to 2-inch header)	16d common (3.5" x 0.162") 16d box (3.5" x 0.135")	16" o.c. each edge face nail 12" o.c. along each edge
11	Continuous header to stud	5-8d box (2.5 ″ × 0.113″); or 4-8d common (2.5" x 0.131"); or 4-10d box (3" x 0.128")	Toe nail
12	Top plate to top plate	16d common (3.5" x 0.162") 10d box (3" x 0.128"); or 3" x 0.131" nails	16" o.c. face nail 12" o.c.
13	Top plate to top plate, at end joints	8-16d common (3.5" x 0.162"); or 12-16d box (3.5" x 0.135"); or 12-10d box (3" x 0.128"); or 12-3" x 0.131" nails	Face nail on each side of end joint (minimum 24" lap splice length each side of end joint)
14	Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)	16d common (3.5" x 0.162") 16d box (3.5" x 0.135"); or 3" x 0.131" nails	16" o.c. face nail 12" o.c.
15	Bottom plate to joist, rim joist, band joist or blocking at braced wall panels	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162"); or 4-3" x 0.131" nails	16" o.c. face nail
16	Stud to bottom plate	4-8d box (2.5″ × 0.113″);or 3-16d box (3.5″ × 0.135″); or 4-8d common (2.5" x 0.131"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	Toe nail End nail
17	Top or bottom plate to stud	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	End nail
18	Top plates, laps at corners and intersections	3-10d box (3″ × 0.128″); or 2-16d common (3.5" x 0.162"); or 3-3" x 0.131" nails	Face nail
19	1" brace to each stud and plate	3-8d box (2.5″ × 0.113″); or 2-8d common (2.5" x 0.131"); or 2-10d box (3" x 0.128") 2 staples 1.75″	Face nail
20	1" × 6" sheathing to each bearing	3-8d box (2.5″ × 0.113″); or 2-8d common (2.5" x 0.131"); or 2-10d box (3" x 0.128") 2 staples, 1" crown, 16 ga., 1.75″ long	Face nail

21	1” x 8” and wider sheathing to each bearing	1”x 8”: 3-8d box (2.5″ × 0.113″); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 3 staples, 1” crown, 16 ga., 13/4″ long Wider than 1”x 8”: 4-8d box (2.5″ × 0.113″); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 4 staples, 1” crown, 16 ga., 1.75" long	Face nail	
	Floor			
22	Joist to sill, top plate, or girder	4-8d box (2.5″ × 0.113″); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Toe nail	
23	Rim joist, band joist, or blocking to sill or top plate (roof application also)	8d box (2.5″ × 0.113″) 8d common (2.5" x 0.131"); or 10d box (3" x 0.128"); or 3" x 0.131" nails	4” o.c. toe nail 6" o.c.	
24	1" × 6" subfloor or less to each joist	3-8d box (2.5″ × 0.113″); or 2-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 2 staples, 1” crown, 16 ga., 1.75″ long	Face nail	
25	2" subfloor to joist or girder	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162")	Blind and face nail	
26	2" planks (plank & beam - floor & roof)	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162")	at each bearing, face nail	
27	Built-up girders and beams, 2-inch lumber layers	20d common (4” x 0.192”); or 10d box (3" x 0.128"); or 3" x 0.131" nails And: 2-20d common (4” x 0.192”); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Nail each layer as follows: 32″ o.c. at top and bottom and staggered. 24” o.c. face nail at top and bottom staggered on opposite sides Face nail at ends and at each splice	
28	Ledger strip supporting joists or rafters	4-16d box (3.5″ × 0.135″); or 3-16d common (3.5" x 0.162"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	At each joist or rafter, face nail	
29	Joist to band joist or rim joist	4-10d (3" x 0.128")	End nail	
30	Bridging to joist	2-10d (3" x 0.128")	Each end, toenail	
	DESCRIPTION OF BUILDING MATERIALS	**DESCRIPTION OF FASTENER[b,c,e]**	**SPACING OF FASTENERS**	
			Edges (inches)[i]	**Intermediate supports[c,e] (inches)**
	Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing			
31	3/8" - 1/2"	6d common (2" × 0.113") nail (subfloor wall)[j] 8d common (2.5" × 0.131") nail (roof)[f]	6	12[g]
32	19/32" - 1"	8d common nail (2.5" × 0.131")	6	12[g]
33	11/8" - 11/4"	10d common (3" × 0.148") nail; or 8d (2.5" × 0.131") deformed nail	6	12
	Other wall sheathing [h]			
34	1/2" structural cellulosic fiberboard sheathing	1.5" galvanized roofing nail, 7/16" head diameter, or 1" crown staple 16 ga., 11/4" long	3	6
35	25/32" structural cellulosic fiberboard sheathing	1.75" galvanized roofing nail, 7/16" head diameter, or 1" crown staple 16 ga., 11/2" long	3	6
36	1/2" gypsum sheathing [d]	1.5" galvanized roofing nail; staple	7	7

		galvanized, 11/2" long; 11/4 screws, Type W or S		
37	5/8" gypsum sheathing [d]	1.75" galvanized roofing nail; staple galvanized, 15/8" long; 15/8" screws, Type W or S	7	7
Wood structural panels, combination subfloor underlayment to framing				
38	3/4" and less	6d deformed (2" × 0.120") nail; or 8d common (2.5" × 0.131") nail	6	12
39	7/8" - 1"	8d common (2.5" × 0.131") nail; or 8d deformed (2.5" × 0.120") nail	6	12
40	11/8" - 11/4"	10d common (3" × 0.148") nail; or 8d deformed (2.5" × 0.120") nail	6	12

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

a. All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.
b. Staples are 16 gage wire and have a minimum 7/16-inch on diameter crown width.
c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.
d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.
e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).
f. For regions having basic wind speed of 110 mph or greater, 8d deformed (21/2" × 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.
g. For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.
h. Gypsum sheathing shall conform to ASTM C 1396 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to ASTM C 208.
i. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.
j. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

The above final table reflects the following:

RB278 deleted current row 10, whereas RB 272 modified the fastenings—deletion of current row 10 was assumed to be the final result.

RB278 deleted current row 12, whereas RB 272 modified the fastenings—deletion of current row 12 was assumed to be the final result.

RB278 deleted current row 22, whereas RB 272 modified the fastenings—deletion of current row 22 was assumed to be the final result.

RB278 deleted current row 26, whereas RB 272 modified the fastenings—deletion of current row 26 was assumed to be the final result.

The deleted rows contained descriptions that were combined into other rows by virtue of the reformatting in RB278, so the deleted rows fastenings are contained in other rows of the proposed table and nothing is lost.

Public Comment 2:

Randall Shackelford, Simpson Strong-Tie Company, requests Approval as Modified by this Public Comment.

Table R602.3(1)
FASTENING SCHEDULE

	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER [a, b, c]	SPACING AND LOCATION
	Roof		
1	Blocking between ceiling joists or rafters to top plate	3-8d (2 ½ " x 0.113")	~~at each end~~ toe nail
2	Ceiling joists to top plate	3-8d (2 ½ " x 0.113")	per joist, toe nail
3	Ceiling joist not attached to parallel rafter laps over partitions (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	3-10d (3" x 0.128")	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	Per Table R802.5.1(9)	Face nail
5	Collar tie to rafter, or 1 1/4" x 20 gage ridge strap to rafter	3-10d (3" x 0.128")	Face nail each rafter
6	Rafter or roof truss to plate	3-16d box nails (3 ½" x 0.135"); or 3-10d common nails (3" x 0.148")	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss [j]
7	Roof rafters to ridge, valley or hip rafters: or, roof rafter to minimum 2-inch ridge beam	4-16d (3 ½ " x 0.135") 3-16d (3 ½ " x 0.135")	Toe nail End nail
	Wall		
8	Stud to stud (not at braced wall panels)	10d (3" x 0.128")	24" o.c. face nail
9	Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d (3 ½ " x 0.135")	12" o.c. face nail
10	Built-up header (2-inch to 2-inch header with ½" spacer)	16d (3 ½" × 0.135")	16" o.c. along each edge, face nail
11	Continuous header to stud	4-8d (2 ½ " × 0.113")	Toe nail
12	Top plate to top plate	10d (3" × 0.128")	24" o.c. face nail
13	Top plate to top plate, at end joints	8-16d (3 ½ " × 0.135")	Face nail on each side of end joint (minimum 24" lap splice length each side of end joint)
14	Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)	16d (3 ½ " × 0.135")	16" o.c. face nail
15	Bottom plate to joist, rim joist, band joist or blocking at braced wall panels	3-16d (31/2" × 0.135")	3 each 16", face nail
16	Stud to bottom plate	3-8d (21/2" × 0.113") or 2-16d (31/2" × 0.135")	Toe nail End nail
17	Top ~~or bottom~~ plate to stud	2-16d (31/2" × 0.135")	End nail
18	Top plates, laps at corners and intersections	2-10d (3" × 0.128")	Face nail
19	1" brace to each stud and plate	2-8d (21/2" × 0.113") 2 staples 13/4"	Face nail --
20	1" × 6" sheathing to each bearing	2-8d (21/2" × 0.113") 2 staples, 1" crown, 16 ga., 13/4"long	Face nail --
21	1" x 8" and wider sheathing to each bearing	1"x 8": 2-8d (21/2" × 0.113") 3 staples, 1" crown, 16 ga., 13/4" long Wider than 1"x 8": 3-8d (21/2" × 0.113") 4 staples, 1" crown, 16 ga., 13/4" long	Face nail --
	Floor		

Commenter's Reason: We support the BCAC's reorganization of this table for consistency with the IBC's fastening for Conventional Construction. There are just a few items that we think can be improved.

- Line 1, for blocking between roof members, the toe nails are to the top plate along the length of the blocking, not at each end into the ceiling joist or rafter. The purpose of the blocking is to transfer shear forces into the top plate, and the toenailing has to be into the top plate to do this.
- Line 5, the fastening of the collar tie or ridge strap has to be into *each* rafter, not just a total of three nails.
- Line 10, the fastening of the built-up header uses 16d 3-1/2" long nails, so the minimum thickness of the built-up header must be 3-1/2". Therefore there must be a spacer, so we propose restoring the words "with ½" spacer".
- Line 10, the nails are installed "along" each edge, so we propose restoring that word to the fastener location.
- Line 15, the fastening at braced wall panels requires that three 16d nails be installed every 16". We propose adding "3 each" to remove the possibility for interpreting this as requiring only one nail every 16" o.c.
- Line 17, the fastening of stud to bottom plate is already covered in the previous line, so it can be deleted here.

RB278-13

Final Action: AS AM AMPC____ D

RB281-13
Table R602.3(5)

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association

Revise as follows:

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

a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted where ~~justified by analysis~~ in compliance with exception 2 of Section R602.3.1 or designed in accordance with accepted engineering practice.

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The BCAC discussed what was inferred by "…where justified by analysis." meant. The conclusion was that this footnote should say that stud wall can be increased above 10 feet when the wall is compliant with exception 2 of Section R602.3.1 – in which case an engineered solution is not required.

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

R602.3(5)-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This change removes ambiguous language and adds clarity to the footnote.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

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

a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Bearing walls shall be sheathed on at least one side or bridging shall be installed not greater than 4 feet apart measured vertically from either end of the stud. Increases in unsupported height are permitted where in compliance with exception 2 of Section R602.3.1 or designed in accordance with accepted engineering practice.

(Portions of Table not shown remain unchanged)

Commenter's Reason: This proposal was ***approved as submitted***. The ICC Building Code Action committee (BCAC) submits this public comment address an omission.

The stud table, Table R602.3(5), assumes there is gypsum wall board or sheathing applied to at least one side of the studs to stabilize weak axis bending. It came to our attention that this is not explicit in the other sections of the code, though it is implied. This further modification addresses the possible omission. Without wall finish on at least one side, the studs would not be within the L / d limit required by the AWC/AF&PA NDS and the buckling capacity of the studs in the weak direction could be exceeded.

RB281-13

Final Action: AS AM AMPC____ D

RB282-13
Table R602.3.1

<u>Proposed Change as Submitted</u>

Proponent: James Bela, Oregon Earthquake Awarenes

Revise as follows:

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO WIND SPEEDS OF 100 MPH OR LESS
IN SEISMIC DESIGN CATEGORIES A, B, C <u>b,c</u>, D_0 <u>b,c</u> , D_1 <u>b,c</u>, and D_2 b,c

c. <u>Dimension Lumber grades for wood wall studs shall be minimum Construction grade lumber.</u> Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

(Portions of Table not shown remain unchanged)

Reason: (a) Wood is an orthotropic material; and it therefore exhibits "unique and independent material properties" in 3 different orthogonal directions. Trees, unfortunately, also produce naturally occurring but "strength reducing characteristics" in sawn lumber: such as knots, shakes, and splits. Therefore wall studs at the MAXIMUM ALLOWABLE LENGTH limits will have their performances, in actuality, determined by this combination or mixture of "clear wood and strength reducing characteristics."
[http://bssc.nibs.org/client/assets/files/bssc/Topic13-SeismicDesignofWoodStructuresNotes.pdf]

(b) All of the SEISMIC DESIGN CATEGORIES (C, D_0, D_1 and D_2) are at risk to experience damaging intensities of earthquake shaking; and they are not, as too often is incorrectly assumed, *guarantees* of "low - to moderate - to high" earthquake loading (comparable to other external loadings that one might anticipate and design for – such as snow load.
See IRC-14-3_FIG. R301.2(2) SEISMIC DESIGN CATEGORIES SITE CLASS D.doc for a full discussion on the systemic errors and fundamental flaws in designating SEISMIC DESIGN CATEGORIES under the USGS National Seismic Hazard Maps (as incorporated now into ASCE 7-10).

Since earthquake damage results from multiple factors: Strength of shaking, Length of shaking, Type of soil, Type of building materials, and Type of building "lateral force resisting system" – WOOD WALL STUDS should exhibit the same lumber grade.

See Buildings and earthquakes—Which stands? Which falls?
http://www.iris.edu/hq/files/programs/education_and_outreach/retm/tm_100112_haiti/BuildingsInEQs_2.pdf

(c) Finally, since the lower SEISMIC DESIGN CATEGORIES downgrade the expected earthquake effects; they permit fewer lateral force resisting elements in walls (and also allow brittle elements (gypsum sheathing) rather than ductile elements (nailed wood shear walls: alternately referred to as "braced wall panels" in the IRC).

Summary: Above 10 ft in height, where we are beginning to push the limits of a "prescriptive code," WOOD WALL STUDS should all exhibit the same engineering properties of "minimum construction grade lumber" – in order to ensure both adequate and reasonable earthquake safety performance.

STUD *LIGHT* . . . is no match for earthquakes!

See Graphic: Damage to wood stud wall – 1994 Northridge EQ

See also: IRC-14-3FIG. R301.2(2) SEISMIC DESIGN CATEGORIES SITE CLASS D.doc

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

R602.3.1T-RB-BELA.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This change does not clarify the code nor change the technical requirements.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing FEMA/NIBS Code Resource Support Committee and City of Seattle DPD, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO WIND SPEEDS OF 100 MPH OR LESS, IN ALL SEISMIC DESIGN CATEGORIES ~~A, B, C [b,c], D_0 [b,c], D_1 [b,c], and D_2~~ [b,c]

c. ~~Dimension Lumber grades for wood wall studs shall be minimum Construction grade lumber.~~ Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

Commenter's Reason: The proponent of the original code change has correctly identified a point of confusion as to the application of footnotes b and c to this table: do they apply just to Seismic Design Category (SDC) D2, or to other SDC's as well? While the proponent suggested applying them to SDC's C through D2, the Code Resource Support Committee (CRSC) came to the conclusion that the intent was the footnotes apply to all SDC's. The CRSC also came to the conclusion that allowing construction grade lumber in these walls was not appropriate, and the footnote should remain unchanged from the 2012 IRC. At the Committee Action Hearings, the CRSC proposed a modification to make these changes, but the Committee decided to disapprove the whole item.

Given the apparent confusion, the CRSC feels there is value in clarifying the code. The modifications proposed in this Public Comment are identical to the modification submitted at the Committee Action Hearings:

1. The table title is modified to delete the individual listing of Seismic Design Categories
2. Footnotes b and c now clearly apply to all Seismic Design Categories.

3. The originally proposed change to Footnote c is not adopted, resulting in the retention of the original 2012 IRC text.

RB282-13

Final Action: AS AM AMPC____ D

RB283-13

R602.3.1, Table R602.3.1

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table R602.3(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls.
2. ~~Studs more than 10 feet in height which are in accordance with Table R602.3.1.~~
   Where snow loads do not exceed 25 pounds per square foot, walls exposed to wind loads of 100 mph or less shall be permitted over 12 feet tall for either supporting a roof load with not more than 6' of tributary length, or for a gable end wall. The studs shall be a minimum 2x6 at 16 inches on center with a maximum height of 18 feet or 2x6 at 12 inches on center with a maximum height of 20 feet. Openings shall be permitted with jack studs supporting the header in accordance with Section R602.7 and double king studs outboard of the jacks on each side of the opening. If any portion of the two-story wall is required to be a qualified braced wall panel to achieve compliance with Section R602.10.2 for either floor, then the wall shall be designed by a registered design professional in accordance with the International Building Code.

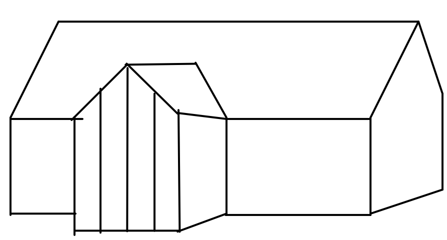
~~TABLE R602.3.1~~
~~MAXIMUM ALLOWABLE LENGTH OF WOOD STUDS EXPOSE TO WIND SPEEDS OF 100 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D_0, D_1, and D_2~~ ~~[b,c]~~

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

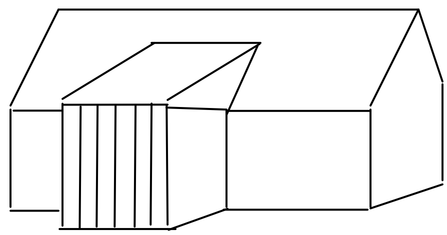
Table R602.3.1 has been the source of a lot of confusion. The footnote b is seldom read or understood. This change is submitted to:

1. Eliminate the table - the source of the confusion
2. Provide clarification as to where it can be applied (see the three options below)
3. Write in code language the requirements for when tall studs can be used.
4. To say that you cannot use these tall studs where the wall is an integral part of the wall bracing system.

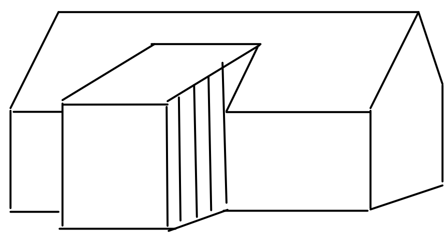
Tall studs could be used for two-story gable ended wall supporting nothing more than self weight.



Tall studs could be used for a two-story projection where the roof framing runs perpendicular to the wall so long as the overbuilt roof has a trib length of 6' or less



Tall studs could be used for a two-story projection where the roof framing runs parallel to the wall such that it was supporting nothing more than self weight



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

R602.3.1-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The reason is unclear and the revision will not add any clarity to the code provisions. This would remove the use of the prescriptive design in the WFCM and require an engineered design.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table R602.3(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls.
2. ~~Studs more than 10 feet in height which are in accordance with Table R602.3.1.~~ Where snow loads are less than or equal to 25 pounds per square foot, and the ultimate design wind speed is less than or equal to 130 mph, 2x6 studs supporting a roof load with not more than 6' of tributary length shall have a maximum height of 18 feet where spaced

at 16 inches on center, or 20 feet where spaced at 12 inches on center. Studs shall be minimum No. 2 grade lumber.

~~TABLE R602.3.1~~
~~MAXIMUM ALLOWABLE LENGTH OF WOOD STUDS EXPOSE TO WIND SPEEDS OF 100 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D_0, D_1, and D_2 [b,c]~~

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committee's concerns.

1. The BCAC expressed in the original code change that the table could be more clearly understood in text rather than in table format. The code development committee disagreed. The BCAC has rewritten the text to make it even more clear.

2. This public comment removes reference to the IBC and engineered design so that design in accordance with WFCM is still permitted.

3. The reason the original code change proposal was written was because the footnote b to the table is frequently missed or applied incorrectly.
The basic stud table only allows studs to be 10 feet tall.
The exception in the wall bracing section will allow studs to be 12 feet tall.
Studs can go to 20 feet when the footnote b to Table R602.3.1 is applied, namely walls can carry a maximum of 6' of tributary width.

RB283-13
Final Action: AS AM AMPC____ D

RB284-13
R602.3.2

<u>Proposed Change as Submitted</u>

Proponent: Edward L. Keith, P.E., APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.3.2 Top plate. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches (610 mm). Joints in plates need not occur over studs. Plates shall be not less than 2-inches (51 mm) nominal thickness and have a width at least equal to the width of the studs.

> ~~**Exception:** A single top plate may be installed in stud walls, provided the plate is adequately tied at joints, corners and intersecting walls by a minimum 3-inch by 6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side provided the rafters or joists are centered over the studs with a tolerance of no more than 1 inch (25 mm). The top plate may be omitted over lintels that are adequately tied to adjacent wall sections with steel plates or equivalent as previously described.~~
>
> <u>**Exception:** A single top plate used as an alternative to a double top plate shall comply with the following:</u>
>
> 1. <u>The top plate shall be tied at corners an intersecting walls with a 3-inch by 6-inch by 0.036-inch-thick (76 mm by 152 mm by .0914 mm) galvanized steel plate or equivalent.</u>
> 2. <u>The steel plate tie at corners and intersecting walls shall be natiled to each wall or segment of wall with six 8d (2-1/2" x 0.113") nails on each side of the joint.</u>
> 3. <u>Splices in the top plate at butt joints shall be tied with a 3-inch by 12-inch by 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate or equivalent.</u>
> 4. <u>The steel plate tie at butt joints shall be nailed to each segment of wall with twelve 8d (2-1/2" x 0.113") nails on each side of the joint.</u>
> 5. <u>The rafters or joists shall be centered over the studs with a tolerance of not more than 1-inch (25 mm).</u>
> 6. <u>Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Items 1 and 2 for header connections at corners and intersections, and Items 3 and 4 for header connections made along a single wall line.</u>

Reason: This is a companion item to S284-12/13 <u>adopted</u> in Portland in the October Final Action Hearing.

Item 14 of the 2012 IRC Table R602.3(1) establishes the minimum capacity required to insure an adequate tension splice in top plates. Aside from simply providing continuity between wall segments, the top-plate splice also acts as a tension tie (often called a collector or drag strut) to distribute the roof and floor shear loads into the bracing elements often spaced as much as 20 feet apart. Assuming spruce-pine-fir top plates the Table R602.3(1), item 14 requires a top-plate splice with eight 16d box nails on each side of the splice. In accordance with the NDS Table 11N, assuming SPF plates and a duration of load of 1.6 for lateral loads, the design capacity of the item 14 connection is (88 lb/nail x 8 nails x 1.6 dol =) 1126 lbs.

While sufficient for intersections and corners the *3-inch by 6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side…"* only provides about 600 lbf tension capacity (NDS Table 11P, SPF framing, box nails: 60 lbf/nail x 6 nails x 1.6 dol = 576 lbf). This is about ½ of what is requires in Table R602.3(1), item 14. As such, the splice plate requirement for in-line butt joints in single top plate systems should be twice what is currently required:

"…<u>at least the equivalent of 3-inch by 12-inch by a 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by twelve 8d (2-1.2" x 0.113") nails on each side…</u>"

As a matter of clarification the type of nail to be used was described as only the penny-weight was specified. This is in keeping with current code style guidelines. I also specified which splice type was appropriate for headers when present. As these are neither corners nor intersections, it is clear that the butt-joint splice was the appropriate reference.

In addition, the reference to "a minimum" was deleted in favor of "at least the equivalent of" as it seemed more appropriate. "Lintels" was also changed in favor of "headers", as lintels is a term more often associated with concrete construction where headers is more commonly used in wood construction.

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

R602.3.2-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This change needs additional work based on the committee's previous action on RB274-13. The proponent will submit a public comment and bring back to the public comment hearing.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R602.3.2 Top plate. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches (610 mm). Joints in plates need not occur over studs. Plates shall be not less than 2-inches (51 mm) nominal thickness and have a width at least equal to the width of the studs.

~~**Exception:** A single top plate used as an alternative to a double top plate shall comply with the following:~~

1. ~~The top plate shall be tied at corners an intersecting walls with a 3-inch by 6-inch by 0.036-inch-thick (76 mm by 152 mm by .0914 mm) galvanized steel plate or equivalent.~~
2. ~~The steel plate tie at corners and intersecting walls shall be nailed to each wall or segment of wall with six 8d (2-1/2" x 0.113") nails on each side of the joint.~~
3. ~~Splices in the top plate at butt joints shall be tied with a 3-inch by 12-inch by 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate or equivalent.~~
4. ~~The steel plate tie at butt joints shall be nailed to each segment of wall with twelve 8d (2-1/2" x 0.113") nails on each side of the joint.~~
5. ~~The rafters or joists shall be centered over the studs with a tolerance of not more than 1-inch (25 mm).~~
~~6. Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Items 1 and 2 for header connections at corners and intersections, and Items 3 and 4 for header connections made along a single wall line.~~

Exceptions: A single top plate used as an alternative to a double top plate shall comply with the following:

1. The single top plate shall be tied at corners, intersecting walls, and at in-line splices in straight wall lines in accordance with Table R602.3.2.
2. The rafters or joists shall be centered over the studs with a tolerance of not more than 1-inch (25 mm).
3. Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Table R602.3.2.

TABLE R602.3.2
SINGLE TOP-PLATE SPLICE CONNECTION DETAILS.

CONDITION	TOP-PLATE SPLICE LOCATION			
	Corners and Intersecting Walls		Butt Joints in Straight Walls	
	Splice Plate Size	Min. Nails Each Side of Joint	Splice Plate Size	Min. Nails Each Side of Joint
Structures in SDC A – C; and in SDC D_0, D_1 and D_2 with braced wall line spacing less than 25 feet	3" x 6" x 0.036" galvanized steel plate or equivalent	(6) 8d box(2-1/2" x 0.113") nails	3' x 12" x 0.036" galvanized steel plate or equivalent	(12) 8d box (2-1/2" x 0.113") nails
Structures in SDC D_0, D_1 and D_2, with braced wall line	3" by 8" by 0.036" galvanized steel plate	(9) 8d box (2-1/2" x 0.113") nails	3' x 16" x 0.036" galvanized steel plate	(18) 8d box (2-1/2" x 0.113") nails

spacing greater than or equal to 25 feet:	or equivalent		or equivalent	

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

Commenter's Reason: The original code change proposal is a companion item to S284-12/13 adopted in Portland in the October Final Action Hearing. Item 14 of the 2012 IRC Table R602.3(1) establishes the minimum capacity required to insure an adequate tension splice when using a single top plate splice. We, as the proponents, asked for disapproved to permit us to alter this proposal to account for the second *double* top plate splice added to Table R602.3(1) via RB274-13. RB274-13 recognized the increased *double* top plate attachment requirements for higher seismic SDCs and when the braced wall spacing is 25 feet or greater. This new requirement for double top plate splices at in-line joints and at corners or intersections increases the required nailing by 50%.

As such, the *single* top plate splice requirements also increase by 50% when splices occur in SDC D_0, D_1 and D_2 with braced wall line spacing greater than or equal to 25 feet. With the addition of the high seismic double top plate requirement in IRC Table R602.3(1) as a result of RB274-13, it became necessary to ensure that the same capacity could be obtained by the prescriptive single top-plate splice provisions in Section R602.3.2. This Public Comment adds the single top plate splice requirements for SDC D_0, D_1 and D_2 with braced wall line spacing greater than or equal to 25 feet.

RB284-13

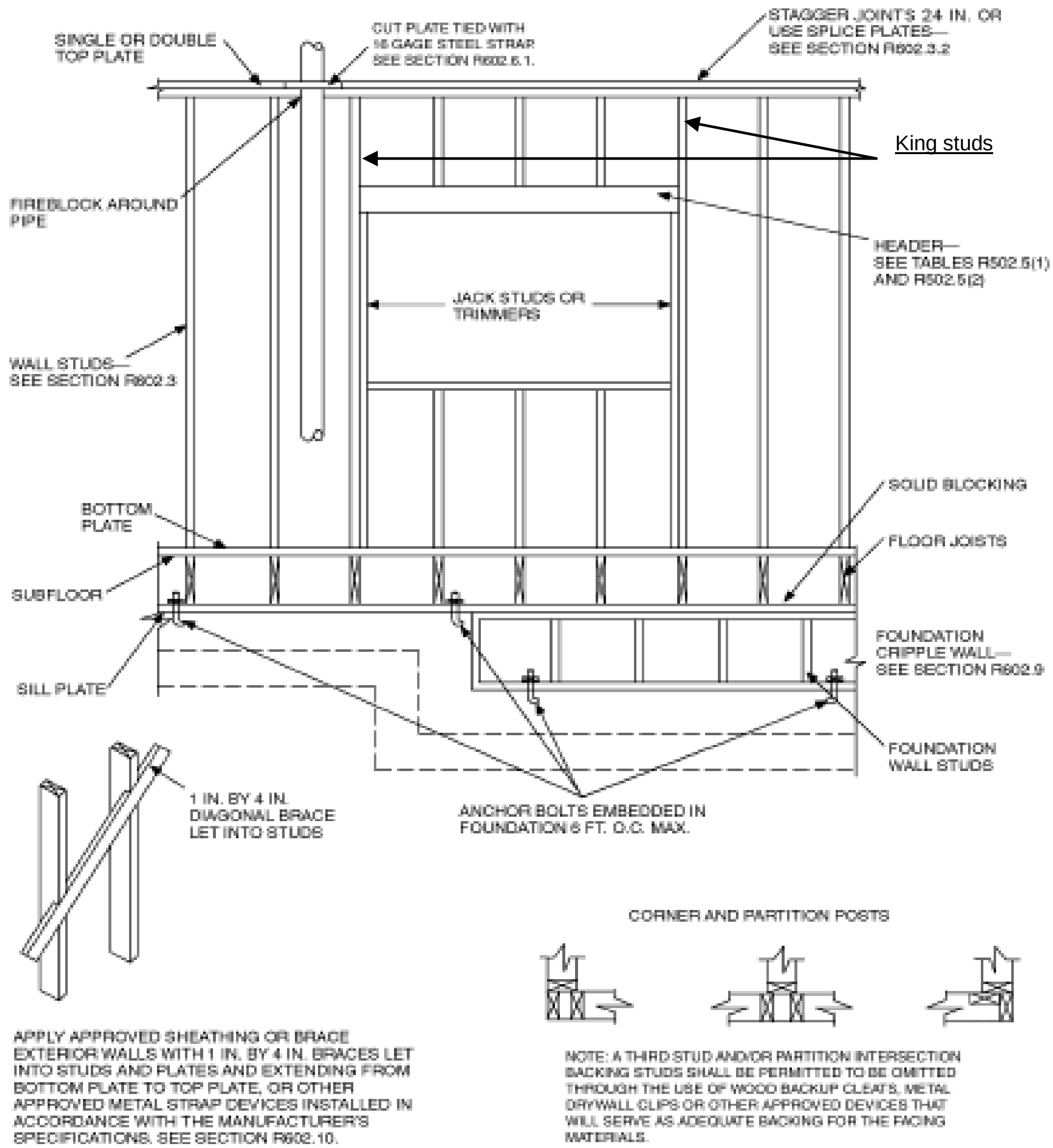
Final Action: AS AM AMPC____ D

RB286-13
Figure R602.3(2), R602.7.4 (New)

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:



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

FIGURE R602.3(2)
FRAMING DETAILS

<u>602.7.4 Supports for headers.</u> <u>Headers shall be supported on each end with one or more jack studs in accordance with Table R502.5(1) or Table R502.5(2). A king stud shall be adjacent to the jack stud on each end of the header and nailed at each end of the header with 4-16d nails.</u>

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The code is silent about how headers should be supported to prevent header rotation. The king studs should be used to stabilize the header with nails on each end.

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

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

602.7.4 Supports for headers. Headers shall be supported on each end with one or more jack studs in accordance with Table R502.5(1) or Table R502.5(2), or approved framing anchors.. A king stud shall be installed ~~adjacent to the jack stud~~ on each end of the header and face nailed at each end of the header with 4-16d nails (3.5" x 0.135").

Committee Reason: Approval was based upon the proponent's published reason and the modification. The modification adds clarity for the header supports.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

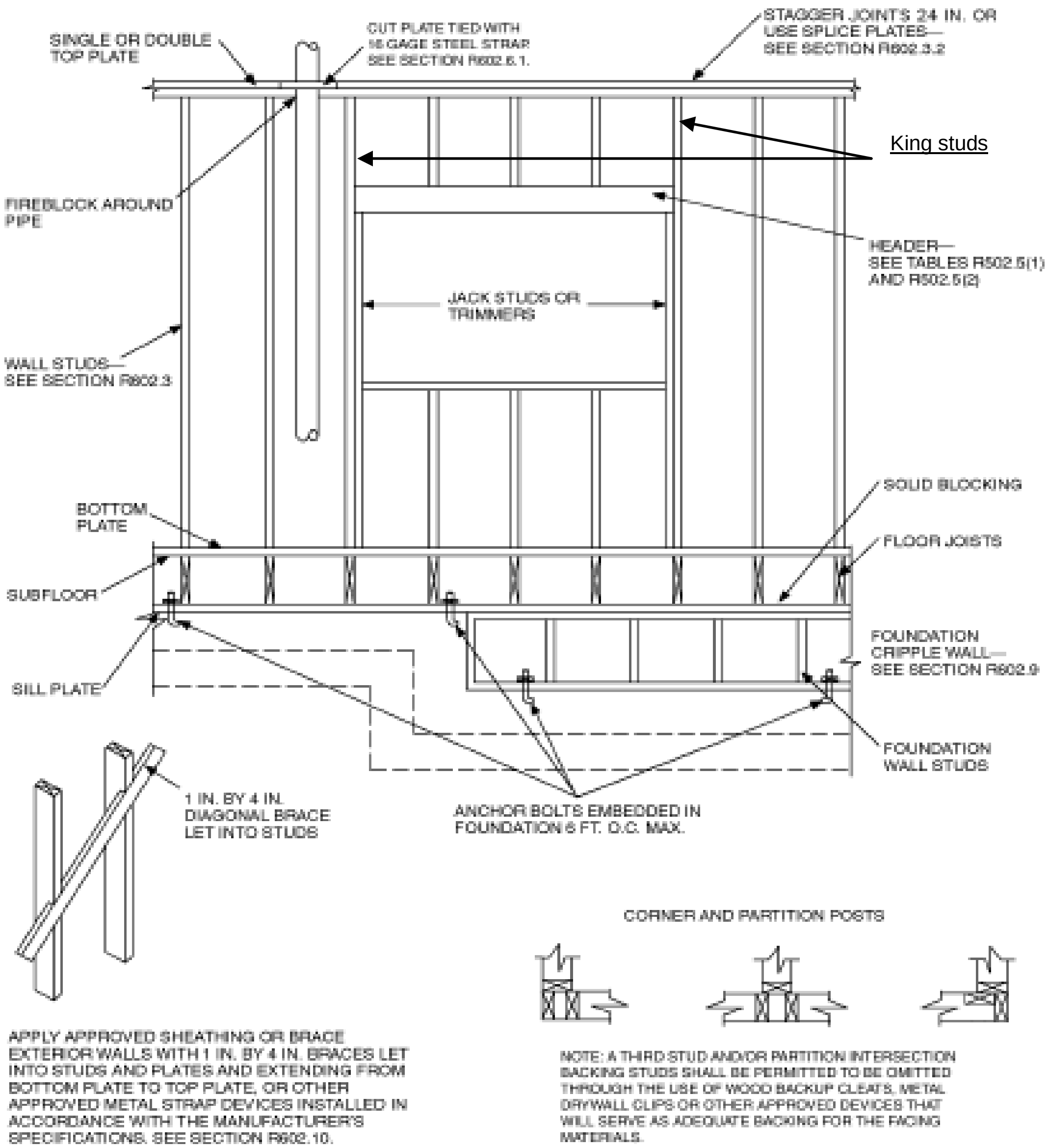
Dennis Pitts, American Wood Counctil, requests Approval as Modified by this Public Comment.

Further Modify the proposal as follows:

602.7.4 Supports for headers. Headers shall be supported on each end with one or more jack studs or with approved framing anchors in accordance with Table R502.5(1) or Table R502.5(2) ~~, or approved framing anchors~~. ~~A king stud shall be installed~~ The full height stud adjacent to ~~on~~ each end of the header ~~and~~ shall be ~~face~~ end nailed ~~at~~ to each end of the header with 4-16d nails (3.5"x 0.135"). The minimum number of full height studs at each end of a header shall be in accordance with Table R602.7.4.

TABLE R602.7.4
MINIMUM NUMBER OF FULL HEIGHT STUDS
AT EACH END OF HEADERS IN EXTERIOR WALLS

Header Span (feet)	Maximum Stud Spacing (in.) per Table R602.3(5)	
	16	24
≤ 3'	1	1
4'	2	1
8'	3	2
12'	5	3
16'	6	4



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

FIGURE R602.3(2)
FRAMING DETAILS

Replace “KING STUDS” with “FULL HEIGHT STUDS ADJACENT TO HEADER – SEE SECTION R602.7.4”

Commenter’s Reason: During the Committee Hearings, several proposals were approved with varying requirements for full height stud at ends of headers (i.e. RB286, RB287 and RB288). This public comment intends to provide consistency in requirements. Separate public comments to RB287 and RB288 are proposed to allow coordination with proposed revisions in this public comment.

Proposed modifications utilize the term “full height stud” in lieu of “king stud” to be more consistent with terminology currently used in the IRC and Wood Frame Construction Manual (WFCM). The minimum number of full height studs is based on header span and maximum stud spacing in order to maintain the number of studs displaced by the opening over which the header spans. The current requirement for only one full-height at each end of longer headers is appropriate for shorter header spans but inadequate for longer header spans.

The maximum stud spacing per Table R602.3(5) is specifically listed in the column heading to make clear that the maximum stud spacing, not actual stud spacing, is the determining factor for the number of required full height studs at each end of the header. In construction, actual stud spacing is often 16” on center; however, the maximum stud spacing often permitted in the IRC is 24” on center. If the actual stud spacing is used and is less than the maximum stud spacing per Table R602.3(5), the required number of full height studs at each end of the header would be over-estimated.

RB286-13

Final Action: AS AM AMPC____ D

RB287-13

R602.7, R602.7.1, Table R602.7.1, Table R602.7.1(2) (NEW)

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing self (jcrandell@aresconsulting.biz)

Revise as follows:

R602.7 Headers. For header spans see Tables R502.5(1), R502.5(2), and R602.7.1(1).

R602.7.1 Single member headers. Single headers shall be framed with a single flat 2-inch-nominal (51 mm) member or wall plate not less in width than the wall studs on the top and bottom of the header in accordance with Figures R602.7.1(1) and R602.7.1(2). The number of king studs required at each end of a single member header shall comply with Table R602.7.1(2). The total number of king studs provided at both ends of a single member header need not exceed the number of layout studs displaced by the wall opening.

TABLE R602.7.1(1)
SPANS FOR MINIMUM No.2 GRADE SINGLE HEADER[a, b, c, f]

SINGLE HEADERS SUPPORTING	SIZE	WOOD SPECIES	GROUND SNOW LOAD (psf)								
			≤ 20[d]			30			50		
			Building Width (feet)[e]								
			20	28	36	20	28	36	20	28	36
Roof and ceiling	2 × 8	Spruce-Pine-Fir Hem-Fir or Southern Pine Douglas-Fir ~~or Southern Pine~~	4-10 5-1 5-3	4-2 4-4 4-6	3-8 3-10 4-0	4-3 4-6 4-7	3-8 3-10 3-11	3-3 3-5 3-6	3-7 3-9 3-10	3-0 3-2 3-3	2-8 2-10 2-11
	2 × 10	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	6-2 6-6 6-8	5-3 5-6 5-8	4-8 4-11 5-1	5-5 5-8 5-10	4-8 4-11 5-0	4-2 4-4 4-6	4-6 4-9 4-11	3-11 4-1 4-2	3-1 3-7 3-9
	2 × 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	7-6 7-10 8-1	6-5 6-9 6-11	5-9 6-0 6-2	6-7 6-11 7-2	5-8 5-11 6-1	4-5 5-3 5-5	5-4 5-9 5-11	3-11 4-8 5-1	3-1 3-8 4-6
Roof, ceiling and one center-bearing floor	2 × 8	Spruce-Pine-Fir Hem-Fir or Southern Pine Douglas-Fir ~~or Southern Pine~~	3-10 4-0 4-1	3-3 3-5 3-7	2-11 3-1 3-2	3-9 3-11 4-1	3-3 3-5 3-6	2-11 3-0 3-1	3-5 3-7 3-8	2-11 3-0 3-2	2-7 2-8 2-9
	2 × 10	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern~~	4-11 5-1 5-3	4-2 4-5 4-6	3-8 3-11 4-1	4-10 5-0 5-2	4-1 4-4 4-5	3-6 3-10 4-0	4-4 4-6 4-8	3-7 3-11 4-0	2-10 3-4 3-7

		~~Pine~~									
	2 × 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	5-8 5-11 6-1	4-2 4-11 5-3	3-4 3-11 4-8	5-5 5-10 6-0	4-0 4-9 5-2	3-6 4-2 4-10	4-9 5-5 5-7	3-6 4-2 4-10	2-10 3-4 4-3
Roof, ceiling and one clear span floor	2 × 8	Spruce-Pine-Fir Hem-Fir or Southern Pine Douglas-Fir ~~or Southern Pine~~	3-5 3-7 3-8	2-11 3-1 3-2	2-7 2-9 2-10	3-4 3-6 3-7	2-11 3-0 3-1	2-7 2-8 2-9	3-3 3-5 3-6	2-10 2-11 3-0	2-6 2-7 2-9
	2 × 10	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	4-4 4-7 4-8	3-7 3-11 4-0	2-10 3-5 3-7	4-3 4-6 4-7	3-6 3-10 4-0	2-9 3-3 3-6	4-2 4-4 4-6	3-4 3-9 3-10	2-7 3-1 3-5
	2 × 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	4-11 5-6 5-8	3-7 4-3 4-11	2-10 3-5 4-4	4-9 5-6 5-7	3-6 4-2 4-10	2-9 3-3 4-3	4-6 5-4 5-6	3-4 3-11 4-8	2-7 3-1 4-2

For SI: 1 inch=25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Table is based on a maximum roof-ceiling dead load of 15 psf.

c. The header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header in lieu of the required jack stud.

d. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.

e. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

f. The header shall bear on a minimum of one jack stud at each end.

TABLE R602.7.1(2)
NUMBER OF KING STUDS REQUIRED AT EACH END OF A SINGLE MEMBER HEADER[a]

STUD SIZE	OPENING WIDTH (FEET)	BASIC WIND SPEED (MPH) & EXPOSURE CONDITION																	
		85/B			90/B			100/B, 85/C			110/B, 90/C, 85/D			120/B, 100/C, 90/D			130/B, 110/C, 100/D		
		WALL HEIGHT (FEET)																	
		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
2x4	2	1	1	2	1	1	2	1	2	2	2	2	2	2	2	3	2	2	3
	3	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4
	4	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	3	4
	6	2	2	3	2	2	3	2	3	3	3	3	4	3	4	5	4	4	5
	8	2	3	3	2	3	3	3	3	4	3	4	5	4	5	6	4	5	7
	10	2	3	4	3	3	4	3	4	5	4	5	6	4	6	7	5	6	8
2x6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2
	4	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2
	6	1	1	1	1	1	2	1	2	2	1	2	2	2	2	2	2	2	3
	8	1	1	2	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3
	10	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	3	3	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 1.609 km/h.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber.

Reason: This proposal provides king stud requirements for wall openings spanned by single member headers to ensure structural integrity to compensate for removal of full-height layout studs over the span of the wall opening. The number of king studs required is based on wind loading only because the jack stud required with single member headers supports gravity loading (as is the case with the header requirements in Chapter 5). This proposal is in response to discussions with a concerned code official subsequent to approval of the single member header provisions last code cycle. The changes to renumbered Table R602.7.1(1) are intended to align with Southern Pine design value changes forthcoming for the respective single member header sizes.

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

R602.7-RB-CRANDELL.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a needed change that addresses the issue of king studs at single headers.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R602.7.1 Single member headers. Single headers shall be framed with a single flat 2-inch-nominal (51 mm) member or wall plate not less in width than the wall studs on the top and bottom of the header in accordance with Figures R602.7.1(1) and R602.7.1(2) and face nailed to the top and bottom of the header with 10d box nails (3" x 0.128") spaced 12" o.c.

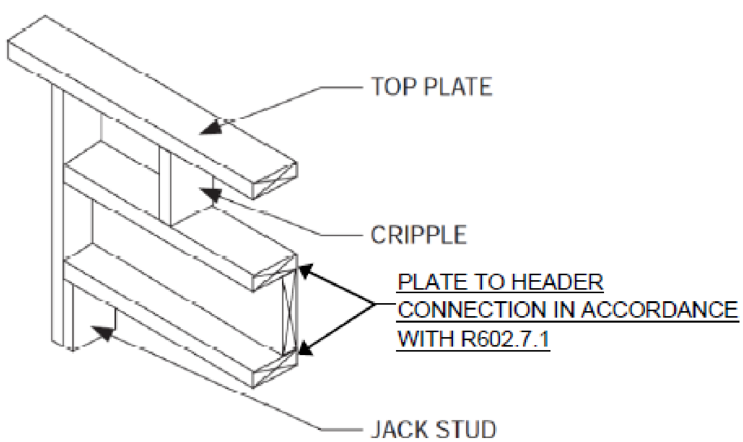


FIGURE R602.7.1(1)
SINGLE MEMBER HEADER IN EXTERIOR BEARING WALL

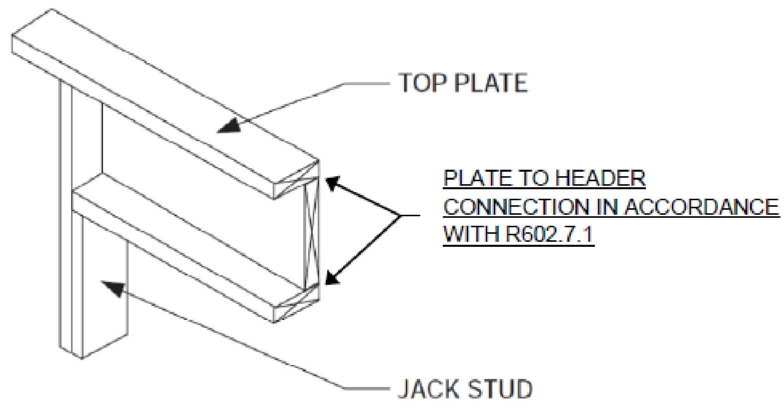


FIGURE R602.7.1(2)
ALTERNATIVE SINGLE MEMBER HEADER WITHOUT CRIPPLE

Commenter's Reason: This proposal specifies nailing of the plates to the header as a means of bracing the header to limit development of out-of-plane buckling under gravity loads. The specified nailing matches recommended nailing for double top plate connections in accordance with RB272 (which was approved as submitted). Additional labeling of the referenced single ply header figure is provided to clarify location of intended nailing between plates and header.

Replacement of RB287 (which was recommended for approval as submitted) is being proposed with this public comment to remove inconsistencies and duplication resulting from two other proposals as follows:

a) RB286 (approved as modified) addresses full-height stud requirements for all headers – not just single ply headers. Retention of full-height stud requirements in RB287 as approved by the IRC committee will result in inconsistent full-height stud requirements for support of single ply headers relative to multi-ply headers.

b) RB252 (approved as submitted) corrects spans for single ply headers to account for Southern Pine design values changes and incorporates single ply header spans in the existing header table. Retention of single ply header spans in RB287 as approved by the IRC committee will result in inconsistent header spans from those in the approved as modified version of RB252 to reflect new Southern Pine design values.

RB287-13

Final Action: AS AM AMPC____ D

RB288-13

R602.7, R602.7.2 (NEW), Table R602.7.2(1) (NEW), Table R602.7.2(2) (NEW), Table R602.7.3(1) (NEW), R602.7.3(2) (NEW), Figure R602.7.2 (NEW)

Proposed Change as Submitted

Proponent: Vladimir Kochkin, NAHB Research Center, Inc. (vkochkin@nahbrc.org), Jay H. Crandell, P.E., ARES Consulting (jcrandell@aresconsulting.biz)

Revise as follows:

R602.7 Headers. For header spans and number of jack studs required, see Tables R502.5(1), R502.5(2)~~,~~ ~~and~~. For single member header requirements, refer to Section R602.7.1. For rim board header requirements, refer to Section R602.7.2.

R602.7.2 Rim Board Headers. Rim board header size, material, and span shall be in accordance with Tables R602.7.2(1) and R602.7.2(2). Rim board headers shall be constructed in accordance with Figure R602.7.2 and shall be supported at each end by king studs. The number of king studs required to support each end of a rim board header shall comply with greater number from Table R602.7.3(1) and Table R602.7.3(2). For 2x6 walls with a single top plate and for 2x4 walls, the number of king studs shall not be less than two at each end of a two-ply rim board header. The total number of king studs provided at both ends of the rim board header need not exceed the number of layout studs displaced by the wall opening. Each ply of built-up king studs shall be face-nailed to the adjacent ply with 2-10d (3" x 0.128") nails at 16 inches on center. Rim board headers supporting concentrated loads, such as reactions from floor or roof girders or wall opening framing above the rim board header, shall be designed.

TABLE R602.7.2(1)
MAXIMUM ALLOWABLE SPANS FOR SINGLE-PLY RIM BOARD HEADERS[a,b]

RIM HEADERS SUPPORTING:	SIZE	WOOD SPECIES OR TYPE[d]	GROUND SNOW LOAD (psf) ≤ 20[e] Building Width (feet) 20[f]	28	36	30 20	28	36	50 20	28	36
Roof, ceiling, and wall	2x10	SPF-S, SYP	5-7	4-11	4-5	5-1	4-5	3-8	4-3	3-3	2-7
		HF	5-11	5-2	4-8	5-3	4-7	4-2	4-6	3-11	3-2
		DF	6-1	5-4	4-9	5-5	4-9	4-3	4-8	4-0	3-7
	2x12	SPF-S, SYP	6-10	5-8	4-7	5-11	4-6	3-8	4-3	3-3	2-7
		HF	7-2	6-3	5-6	6-5	5-5	4-5	5-2	3-11	3-2
		DF	7-4	6-5	5-10	6-7	5-9	5-2	5-8	4-11	4-4
	1-1/8"x 9-1/2"	Engr. Wood	4-5	3-10	3-6	3-11	3-5	3-1	3-4	2-11	2-7
	1-1/8"x 11-7/8"		5-6	4-10	4-4	4-11	4-4	3-11	4-2	3-8	3-2
	1-1/4"x 9-1/2"	Engr. Wood	6-4	5-7	5-0	5-9	5-0	4-6	4-10	4-3	3-9
	1-1/4"x 11-7/8"		7-7	6-8	6-0	6-10	5-11	5-4	5-10	5-0	4-5
Roof, ceiling, wall, and one center-bearing floor[c]	2x10	SPF-S, SYP	4-11	4-1	3-3	4-10	3-11	3-2	4-4	3-2	2-6
		HF	5-1	4-5	3-11	5-0	4-4	3-9	4-6	3-10	3-1
		DF	5-3	4-6	4-0	5-2	4-5	4-0	4-8	4-0	3-7
	2x12	SPF-S, SYP	5-6	4-1	3-3	5-4	3-11	3-2	4-4	3-2	2-6
		HF	6-3	5-0	3-11	6-1	4-9	3-9	5-3	3-10	3-1
		DF	6-5	5-6	4-11	6-3	5-5	4-10	5-8	4-10	4-3
	1-1/8"x 9-1/2"	Engr. Wood	3-10	3-3	2-11	3-9	3-3	2-11	3-5	2-11	2-6
	1-1/8"x 11-7/8"		4-9	4-1	3-8	4-8	4-0	3-7	4-3	3-7	3-1
	1-1/4"x 9-1/2"	Engr. Wood	5-6	4-9	4-3	5-5	4-8	4-2	4-11	4-2	3-9
	1-1/4"x 11-7/8"		6-7	5-8	5-1	6-6	5-7	5-0	5-10	5-0	4-3
Roof, ceiling, wall and one clear span floor[c]	2x10	SPF-S, SYP	4-4	3-3	2-7	4-3	3-2	2-6	4-0	2-11	2-4
		HF	4-7	3-11	3-1	4-6	3-9	3-0	4-4	3-7	2-10
		DF	4-8	4-0	3-7	4-7	4-0	3-6	4-6	3-10	3-5
	2x12	SPF-S, SYP	4-5	3-3	2-7	4-3	3-2	2-6	4-0	2-11	2-4
		HF	5-4	3-11	3-1	5-2	3-9	3-0	4-10	3-7	2-10
		DF	5-8	4-11	4-4	5-7	4-10	4-2	5-6	4-8	3-11
	1-1/8"x 9-1/2"	Engr. Wood	3-5	2-11	2-7	3-4	2-11	2-7	3-3	2-10	2-6
	1-1/8"x 11-7/8"		4-3	3-8	3-2	4-2	3-7	3-1	4-1	3-6	2-11
	1-1/4"x 9-1/2"	Engr. Wood	4-11	4-3	3-9	4-10	4-2	3-8	4-9	4-1	3-7
	1-1/4"x 11-7/8"		5-10	5-0	4-4	5-9	4-11	4-2	5-7	4-10	3-11

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. Table is based on a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.
c. Floor joists framing into rim header shall be attached to the rim header using joist hangers sized to support the joist bearing load or an approved design.
d. Solid sawn wood rim members shall be minimum No. 2 grade. Engineered wood rim members shall meet or exceed the following material design properties and comply with applicable usage limitations in accordance with the manufacturer's approved data:
   1-1/8" members: F_b=600 psi, F_v=270 psi, E=550,000 psi, $F_{c,perp}$=550 psi
   1-1/4" members: F_b=1,130 psi, F_v=355 psi, E=660,750 psi, $F_{c,perp}$=680 psi
e. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.
f. To determine the allowable span for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with "roof, ceiling, and wall" support condition.

TABLE R602.7.2(2)
MAXIMUM ALLOWABLE SPANS FOR TWO-PLY RIM BOARD HEADERS[a,b]

RIM HEADERS SUPPORTING:	SIZE	WOOD SPECIES OR TYPE[d]	GROUND SNOW LOAD (psf) ≤ 20[e] Building Width (feet) 20[f]	28	36	30 20	28	36	50 20	28	36
Roof, ceiling, and wall	2-2x10	see Table R502.5(1)									
	2-2x12	see Table R502.5(1)									
	(2)1-1/8"x 9-1/2" (2)1-1/8"x 11-7/8"	Engr. Wood	6-3 7-9	5-5 6-10	4-11 6-2	5-7 7-0	4-11 6-1	4-5 5-6	4-9 5-11	4-2 5-2	3-8 4-7
	(2)1-1/4"x 9-	Engr.	8-4	7-8	7-1	7-9	7-1	6-4	6-11	6-0	5-4

	1/2” (2)1-1/4”x 11-7/8”	Wood	10-5	9-5	8-6	9-8	8-5	7-7	8-2	7-1	6-5
Roof, ceiling, wall, and one center-bearing floor[c]	2-2x10	see Table R502.5(1)									
	2-2x12	see Table R502.5(1)									
	(2)1-1/8”x 9-1/2” (2)1-1/8”x 11-7/8”	Engr. Wood	5-5 6-9	4-8 5-10	4-2 5-2	5-4 6-8	4-7 5-8	4-1 5-1	4-9 6-0	4-1 5-1	3-8 4-7
	(2)1-1/4”x 9-1/2” (2)1-1/4”x 11-7/8”	Engr. Wood	7-7 9-4	6-9 8-0	6-0 7-2	7-6 9-2	6-7 7-10	5-11 7-0	6-11 8-3	5-11 7-1	5-3 6-3
Roof, ceiling, wall and one clear span floor[c]	2-2x10	see Table R502.5(1)									
	2-2x12	see Table R502.5(1)									
	(2)1-1/8”x 9-1/2” (2)1-1/8”x 11-7/8”	Engr. Wood	4-10 6-0	4-2 5-9	3-8 4-7	4-9 5-11	4-1 5-1	3-7 4-6	4-7 5-9	3-11 4-11	3-6 4-4
	(2)1-1/4”x 9-1/2” (2)1-1/4”x 11-7/8”	Engr. Wood	7-0 8-4	6-0 7-1	5-4 6-4	6-10 8-2	5-11 7-0	5-3 6-3	6-8 7-11	5-9 6-10	5-1 5-11

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. Table is based on a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.
c. Floor joists framing into rim header shall be attached to the rim header using joist hangers sized to support the joist bearing load or an approved design.
d. For solid sawn wood, refer to Table R502.5(1). Engineered wood rim members shall meet or exceed the following material design properties and comply with applicable usage limitations in accordance with the manufacturer’s approved data and usage limitations:
   1-1/8” members: F_b=600 psi, F_v=270 psi, E=550,000 psi, $F_{c,perp}$=550 psi
   1-1/4” members: F_b=1,130 psi, F_v=355 psi, E=660,750 psi, $F_{c,perp}$=680 psi
e. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.
f. To determine the allowable span for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with “roof, ceiling, and wall” support condition.

TABLE R602.7.3(1)
NUMBER OF KING STUDS REQUIRED FOR GRAVITY LOAD RESISTANCE[a]

KING POST SUPPORTING:	OPENING WIDTH (FEET)	2x4 FRAMING									2x6 FRAMING								
		GROUND SNOW LOAD (PSF)									GROUND SNOW LOAD (PSF)								
		≤ 20[b]			30			50			≤ 20			30			50		
		BUILDING WIDTH (FEET)									BUILDING WIDTH (FEET)								
		20[c]	28	36	20	28	36	20	28	36	20	28	36	20	28	36	20	28	36
Roof, ceiling, and wall	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	1	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1
	6	2	2	2	2	2	3	2	3	3	1	1	1	1	1	1	1	2	2
	8	2	2	3	2	3	3	3	4	5	1	1	2	1	2	2	2	2	2
	10	2	3	3	3	3	4	4	5	6	1	2	2	1	2	2	2	2	3
	12	3	3	4	3	4	5	4	5	6	1	2	2	2	2	2	2	3	3
Roof, ceiling, wall, and one center-bearing floor[c]	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	2	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	1	2	2	1	2	2	2	2	3	1	1	1	1	1	1	1	1	1
	6	2	2	3	2	2	3	2	3	4	1	1	2	1	1	2	1	2	2
	8	2	3	4	2	3	4	3	4	5	1	2	2	1	2	2	2	2	2
	10	3	4	4	3	4	5	3	5	6	2	2	2	2	2	2	2	2	3
	12	3	4	5	3	4	5	4	5	7	2	2	3	2	2	3	2	3	3
Roof, ceiling, wall and one clear span floor[c]	2	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
	3	1	2	2	1	2	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	2	2	3	2	2	3	2	2	3	1	1	1	1	1	1	1	1	2
	6	2	3	4	2	3	4	2	3	4	1	2	2	1	2	2	1	2	2
	8	3	4	5	3	4	5	3	4	5	2	2	2	2	2	2	2	2	3
	10	3	5	6	4	5	6	4	5	6	2	2	3	2	2	3	2	3	3
	12	4	5	7	4	5	7	4	6	7	2	3	3	2	3	3	2	3	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber, a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.

b. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.

c. To determine the required number of king studs for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with "roof, ceiling, and wall" support condition.

TABLE R602.7.3(2)
NUMBER OF KING STUDS REQUIRED FOR WIND LOAD RESISTANCE[a]

STUD SIZE	OPENING WIDTH (FEET)	BASIC WIND SPEED (MPH) & EXPOSURE CONDITION																	
		85/B			90/B			100/B, 85/C			110/B, 90/C, 85/D			120/B, 100/C, 90/D			130/B, 110/C, 100/D		
		WALL HEIGHT (FEET)																	
		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
2x4	2	1	1	2	1	1	2	1	2	2	2	2	2	2	2	3	2	2	3
	3	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4
	4	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	3	4
	6	2	2	3	2	2	3	2	3	3	3	3	4	3	4	5	4	4	5
	8	2	3	3	2	3	3	3	3	4	3	4	5	4	5	6	4	5	7
	10	2	3	4	3	3	4	3	4	5	4	5	6	4	6	7	5	6	8
	12	3	3	4	3	4	5	4	5	6	4	5	7	5	6	7	6	7	8
2x6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2
	4	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2
	6	1	1	1	1	1	2	1	2	2	1	2	2	2	2	2	2	2	3

	8	1	1	2	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3
	10	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	3	3	4
	12	2	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	4	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 1.609 km/h.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber.

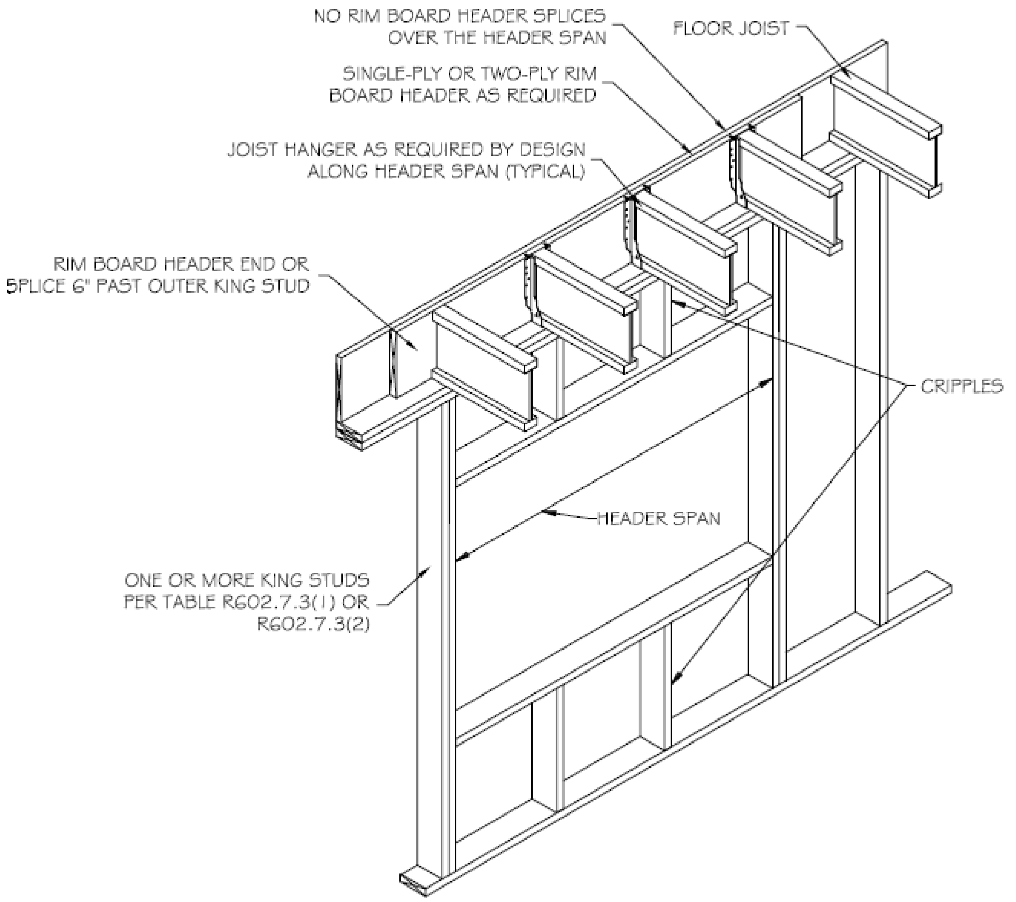


FIGURE R602.7.2
RIM BOARD HEADER CONSTRUCTION

Reason: This proposal adds a rim board header option to promote more resource and energy efficient wall framing. The analysis of rim board headers for this proposal is based on the same methodology applied for the existing IRC provisions for single headers and is consistent with header analysis as applied in the Wood Frame Construction Manual (WFCM). Both solid sawn and engineered wood members are included. King stud requirements are added to ensure adequate support of rim board headers and out-of-plane wind load resistance as this type of header construction uses only king studs which serve as jamb or trimmer studs for the wall opening below.

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

R602.7-RB-KOCHKIN.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a much needed change because rim board headers are more energy efficient and it brings advanced framing technique in the code. The opponent will work with the proponent to bring back a public comment to address the changes in the modification that was disallowed.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R602.7.2 Rim Board Headers. Rim board header size, material, and span shall be in accordance with Table R602.7.1 for single-ply rim board headers and Table R502.5(1) for two-ply rim board headers. Rim board headers shall be constructed in accordance with Figure R602.7.2 and shall be supported at each end by full height studs. The number of full height studs at each end shall not be less than the number of studs displaced by half of the header span based on the maximum stud spacing in accordance with Table R602.3(5). Rim board headers supporting concentrated loads shall be designed in accordance with accepted engineering practice.

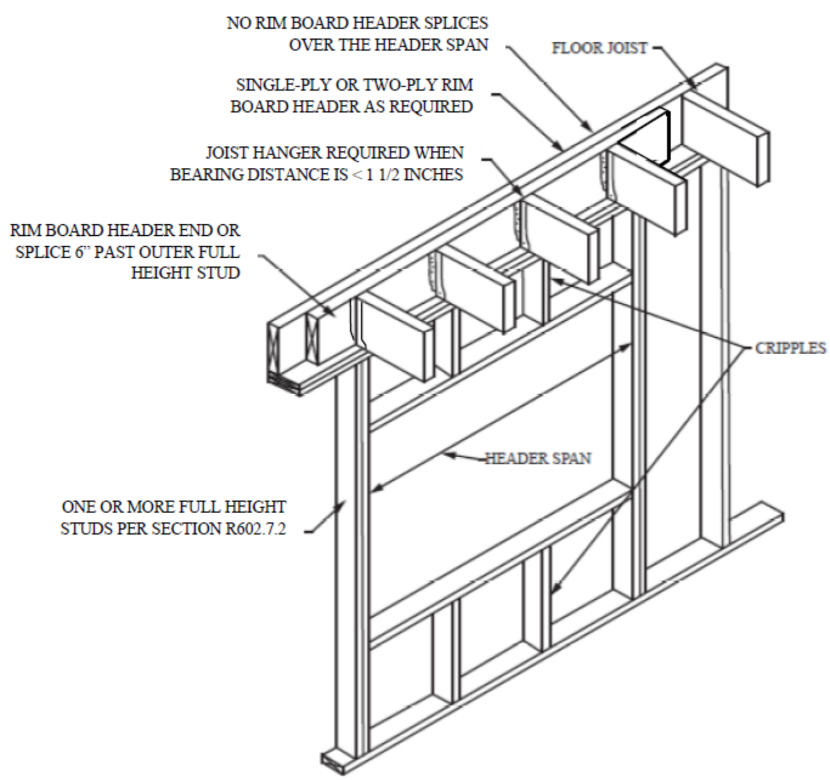


FIGURE R602.7.2
RIM BOARD HEADER CONSTRUCTION

Commenter's Reason: This public comment replaces RB288 (which was recommended for approval as submitted) with simplified requirements for sawn lumber rim board headers based on referencing existing header tables updated by Committee action on RB250 (which was approved as modified), RB252 (which was approved as submitted), and RB286 (which was approved as modified).

Committee action on RB250 and RB252 establishes updated header spans for single ply and multi ply headers to account for changes in Southern Pine design values. Those header spans are equally applicable to rim board headers without required duplication of span information in separate rim board header tables. Reference to existing header tables removes unwarranted inconsistencies in tabulated spans and simplifies the code. It should be noted that RB252-13 combines Tables R602.7.1 and R502.5(1) into a single table R602.7(1). That change will necessitate the reference in the first sentence of this proposal to be changed to "Rim board header size, material, and span shall be in accordance with Table R602.7(1)."

Committee action on RB286 established full height stud requirements. A public comment to RB286 accounts for varying required number of full height studs based on header span and maximum stud spacing. This public comment is based on the same approach for determining the number of full height studs to support the rim board header and greatly simplifies the code while ensuring adequate full height stud support of rim board headers.

Importantly, this public comment is applicable to only sawn lumber rim board headers. Spans for engineered rim board headers are not included in this public comment because standardized design values across manufacturers are not available and in some cases engineered rim boards are not permitted to span over openings. A modification proposed at the hearing in Dallas by the proponent was ruled out of order. The committee indicated that they wanted a public comment to make the corrections even though the floor modification was ruled out of order. AWC has worked with the proponent to develop this public comment.

Nailing of full height studs it is addressed by minimum nailing for stud to stud connections and is therefore not included in the simplified proposal to avoid unnecessary duplication with the minimum nailing schedule table.

RB288-13

Final Action: AS AM AMPC____ D

RB302-13
Table R602.10.3(4)

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR [a,b] [Multiply length from Table R602.10.3(3) by this factor]	APPLICABLE METHODS
Walls with stone or masonry veneer, town-houses in SDC-C [~~d~~,e,f]	(Figure)	1.0		All intermittent and continuous methods
	(Figure)	1.5		
	(Figure)	1.5		

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice.

d. Applies to stone or masonry veneer exceeding the first story height. See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior *braced wall lines* and all *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

f. Applies to stone and masonry veneer exceeding the first story height and not extending up into the gable end.

(Portions of Table not shown remain unchanged)

Reason: The purpose of these proposals is to clarify the IRC.

1. The reference to Section R602.10.6.5 in the second portion of Footnote d is clearly applicable to SDCs D_0, D_1 and D_2 only. The above portion of the table is applicable to townhouses in SDC C. It is confusing referencing a footnote, part of which is clearly not relevant. It calls into question the relevant portions of the footnote. As the first portion of footnote d is applicable to townhouses in SDC C, to avoid confusion we propose the relevant information be duplicated in its own Footnote f.
2. The second portion of the proposed footnote adds the gable end to the not-to-extend criteria. The IRC is clear that the line of demarcation between using the standard bracing provisions and the Method BV-WSP is when the brick or masonry veneer extends up past the first story height. It is not clear what to do when the veneer extends up the gable-end wall. The definition of story in Chapter 2 provided below could lead one to believe that the gable–end wall was part of the story below:

   STORY. *That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.*

   From a structural perspective, however the mass in a gable end-wall can equal or exceed the mass of a veneered second story. For example, a 40-foot wide building with a 12:12 pitch can have gable-end wall that is a maximum of 20 feet tall above the top of the wall below. As the area is triangular the average height of this gable-end wall is 10 feet tall. This is the same mass as a veneered 10 foot second story wall.

   It is clearly NOT the intent of the IRC to permit the standard bracing provisions for only a single story UNLESS the same or larger mass is part of a gable-end wall. The above proposal clarifies the intent of this section with respect to veneered gable-end walls.

   This portion of the proposed change is duplicated in another code change proposal.

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

R602.10.3(4)T #2-RB-KEITH.do**c**

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based upon the proponent's request for disapproval. There is information missing and a pointer is needed to refer back to the proper code section.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Edward L. Keith, APA – The engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR [a,b] [Multiply length from Table R602.10.3(3) by this factor]	APPLICABLE METHODS
Walls with stone or masonry veneer, town-houses in SDC-C [d,e~~,f~~]	(Figure)	1.0		All intermittent and continuous methods
	(Figure)	1.5		
	(Figure)	1.5		
Walls with stone or masonry veneer, detached one-and two-family dwellings in SDC D_0 – D_2 [d,f]	Any story	See Table R602.10.6.5		BV-WSP

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice.

d. Applies to stone or masonry veneer exceeding the first story height. ~~See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height~~.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior *braced wall lines* and all *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

f. ~~Applies to stone and masonry veneer exceeding the first story height and not extending up into the gable end~~. See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height

Commenter's Reason: While RB302 accurately reflects the intent of the existing provisions of the 2012 IRC, clarifying the intent has made it evident that there was a hole in the existing provisions. The existing provisions fail to provide guidance on what to do when the brick or stone veneer extends up into the gable end. APA worked with industry to try to fill this hole but was *unable to come up with an agreement* on just how to do so. It was also pointed out that any addition of such new material to the code could be construed as being outside the scope of a Public Comment.

As an agreement was *not to be reached* at this time I am submitting this public comment to only correct the footnote problems currently in the code and described in the original code submittal.

In short, the reference to Section R602.10.6.5 in the second portion of footnote d is clearly applicable to SDCs D_0, D_1 and D_2 only. The table as published in the 2012 IRC has this footnote listed is applicable to townhouses in SDC C, as shown above. It is confusing to the user to have a footnote, part of which is clearly not relevant as it calls into question the relevant portions of the footnote. As the first portion of footnote d is applicable to townhouses in SDC C as well as SDC D+, to avoid confusion we propose to remove the portion of footnote d that is relevant only for SDC D+ and move that SDC D+-only portion to a new footnote (footnote f) and reference this only in SDC D+ row in the table.

The portion of the proposed footnote, "~~and not extending up into the gable end~~" was not part of the original footnote d and was part of the compromise that *could not be achieved* during the interim. It is thus removed, making the proposed change as modified by this Public Comment essentially an editorial clarification of the table.

We recommend overturning the committee's recommendation for denial and approve this much needed footnote clarification.

RB302-13

Final Action: AS AM AMPC____ D

RB308-13
R602.10.4.4 (NEW), Table R602.10.4.4 (NEW)

Proposed Change as Submitted

Proponent: Kirk Grundahl, Qualtim, representing the Structural Building Components Association (SBCA) (kgrundahl@qualtim.com)

Add new text as follows:

R602.10.4.4 Design Values. For the purpose of braced wall design, the capacity of wood structural panels to resist lateral loads, as found in Table R 602.10.3(1) are found in Table R602.10.4.4.

TABLE R602.10.4.4
SIMPLIFIED SHEAR VALUES FOR BRACED WALL LINES

Sheathing Material	Bottom plate connection to foundation	Fastener	Fastener Spacing	Any Species Stud Framing		
				Tested capacity	System Effects Factor	IRC Lateral Design Capacity
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing -- Wind.	Anchor bolts in accordance with code requirements	6d (2" x 0.113" nails) or 8d (2 1/2 x 0.131"	6:12	335	1.80	600
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing (with 1/2" gypsum on interior face of wall. -- Wind	Anchor bolts in accordance with code requirements	6d (2" x 0.113") or 8d (2 1/2 x 0.131"nails and Types S or W drywall screws.	6:12 WSP & 16:16 for GWB	465	1.80	840

a.The lateral design capacity of braced wall panels is based on full scale wall assembly tests using the minimum restraint provisions of the IRC, further adjusted by the partial restraint/systems effect factor.

Reason: Over the past several years, SBCRI has conducted a great deal of research into the requirements of the IRC, section R602.10 and the design capacity of wall assemblies built to those provisions. Table R602.10.3(1), Bracing Requirements Based on Wind Speed, was developed by the Ad-Hoc Wall Bracing Committee. The Lateral Design Capacity shown in the table above is the capacity determined by the committee to be used as the nominal strength of braced wall panels built to the minimum requirements of the IRC and using Method WSP. The braced wall panel lengths shown in Table R602.10.3(1) were calculated using these values. The system effect factor shown simply shows the factor required to be multiplied by the actual performance wood structural panels in buildings constructed to the minimum requirements of the IRC in order to achieve the stated lateral design capacity. This factor accounts for the increase in capacities due to additional framing, interior partitions, floor and ceiling framing, corner framing, etc. The tested capacities shown are the approximate capacities of wood structural panels used in buildings built to the minimum requirements of the IRC. Table R602.10.1 simply adds design value transparency to this section to show what the assumed system effect is once all of the building's construction detailing has been completed (i.e. additional strength from the addition of interior partitions, windows and doors, corner framing, interior gypsum, etc.). This approach is intended to be an aid to all registered design professionals as they make decisions about how best to resist applied loads and the safety considerations thereof. Full details of this research can be found at http://sbcri.info/bwpex.php and additional background on current design values is found here http://sbcri.info/bcters.php In addition, the Background on how the IRC wall bracing provisions were derived can be found in an article by Crandell-Martin in the spring 2009 edition of Wood Design Focus, " The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements)"

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

R602.10.4.4 (NEW)-RB-GRUNDAHL.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based upon the proponent's request for disapproval and the committee's action on RB309-13.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Larry Wainright, Qualtim, representing Structural Building Components Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.10.4.4
SIMPLIFIED SHEAR VALUES FOR WIND LOADING BRACED WALL LINES

Sheathing Material	Bottom plate connection to foundation	Fastener	Fastener Spacing	Any Species Stud Framing		
				Tested capacity	System Effects Factor	IRC Lateral Design Capacity
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing -- ~~Wind.~~	Anchor bolts in accordance with code requirements	6d (2" x 0.113" nails) or 8d (2 1/2 x 0.131"	6:12	~~335~~ 350	1.80	600
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing (with 1/2" gypsum on interior face of wall~~. -- Wind~~	Anchor bolts in accordance with code requirements	6d (2" x 0.113") or 8d (2 1/2 x 0.131"nails and Types S or W drywall screws.	6:12 WSP & 16:16 for GWB	~~465~~ 450	1.80	840

a.The lateral design capacity of braced wall panels is based on full scale wall assembly tests using the minimum restraint provisions of the IRC, further adjusted by the partial restraint/systems effect factor.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In addition to the original reason statements provided in RB308 and RB309 the following should be considered:
SBCRI has completed additional testing and as a result, proposes the modifications shown above. The proposed 350 plf for wood structural panels (WSP's) installed without gypsum is the tested capacity of WSP's in full scale tests as well as in 23' wall assemblies when built to the minimum requirements of the IRC. The stated System Effects factor is simply a factor used to convert the tested capacities to the capacity currently in use in the IRC. It is recognized that the systems effect factor does not exactly result in the stated IRC capacity. The calculated value is rounded to the capacity currently in use. This proposal does not seek to modify what is currently in use. (i.e. the tested capacity, 350 plf times the systems effect factor of 1.8 equals 630 plf. This was rounded down to the 600 plf currently in use.)

When the Ad-Hoc Wall Bracing Committee (AHWBC) first developed these provisions, they did the best that they could, given the testing that was available at the time. Most of the testing that was available came from testing of fully restrained walls. This testing formed the basis of the committees work and judgments were made with regard to the partial restraint of buildings constructed to the IRC as well as the systems effects of completed construction. The table able does not change any of that work, but simply restates the basis of the design capacities using the capacities from tests of buildings constructed in accordance with the minimum IRC and then applying the factor necessary to get back to the current IRC design values.

With regard to the addition of gypsum to braced wall panels: The Ad-Hoc Wall bracing committee used 200 plf as the capacity of the gypsum added to the back side of the braced wall panel. The 200 plf capacity is predicated on the use of nailing at 7" o.c. at the edges of the panel and in the field. **Additionally, the gypsum must be installed vertically (See Table R602.3 (1), Line 37 and footnote "d").** This orientation and fastening pattern is rarely accomplished in the field. The more common fastening is in accordance with the interior coverings section (R702.3.5) which allows both horizontal and vertical applications and screw spacing at 16” o.c. SBCRI tested both of these conditions. The 200 plf capacity of the gypsum is confirmed when installed per the AHWBC assumptions, but only achieves 100 plf when installed with 16:16 screws.

The IRC-Building Committee’s stated two reasons for disapproving RB309 follow. First, the proposal was not limited to wind as stated in testimony. While the limitation was stated in the table, the revision above moves the wind limitation to the title of the table to be clearer as to the application. Second, they stated that design values do not belong in a prescriptive code. However, there are often parts of a building that do not comply with the IRC and that must be designed. Currently, the only direction a building designer has to obtain design values to use engineering based reference documents such as SDPWS which provide design capacities based on fully restrained conditions. This proposal simply gives the building designer an accurate assessment of the design capacities currently provided for in the IRC using the minimum IRC construction as the basis of the capacity.

RB308-13

Final Action: AS AM AMPC____ D

RB310-13
Table R602.10.5

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		**MINIMUM LENGTH[a] (in.)**					**CONTRIBUTING LENGTH (in.)**
		WALL HEIGHT					
		8 ft	**9 ft**	**10 ft**	**11 ft**	**12 ft**	
CS-PF	SDC A, B and C	16	18	20	22[e]	24[e]	1.5 x Actual[b]
	SDC D_0, D_1 and D_2	16	18	20	22[e]	24[e]	Actual[b]

(Portions of Table not shown remain unchanged)

Reason: Currently Method PFG (Portal Frame at Garage) is permitted in the 2012 IRC Table R602.10.5 with a 1.5 multiplier to convert the leg length to a length contributing to bracing. The multiplier was permitted because Method PFG was restricted for use in areas of low seismicity (SDCs A, B and C).

Cyclic testing conducted at APA in 2006 of the CS-PF (Continuous Sheathed – Portal Frame) showed that the CS-PF has a design strength at least as high as the PFG tested in a similar manner. Based on the results of this testing it is reasonable to permit the same multiplier to be applied to the Method CS-PF when similarly restricted to areas of low seismicity as is Method PFG.

Please note that the CS-PF portal frame can have a leg length as small at 16 inches, where the PFG has a minimum leg length of 24 inches. What makes the CS-PF perform as well or better than the PFG, even with a shorter leg length, is the fact that the CS-PF has nearly twice as many fasteners as the PFG. It is the fastener interaction between the framing and sheathing that determine the ultimate capacity of this wood-structural-panel/framing bracing system.

Note that the IRC bracing provisions are difficult to meet in many cases as a result of narrow building lots and the aesthetic requirements of modern homes. Areas around garages and picture windows are especially difficult to accommodate and still meet the minimum bracing requirements of the code. Permitting the equal-to-stronger minimum 16-inch CS-PF the same multiplier as the 24-inch PFG is both rational and extremely helpful in making the 2012 IRC bracing provisions viable.

We ask the committee to extend the same multiplier to the 16-inch CS-PF that is applied to the 24-inch PFG when the same use restrictions are applied. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216.

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

R602.10.5T-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. Also, it provides a useful option for using method CS-PF in low seismic areas.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Randall Shackelford, P.E., Simpson Strong-Tie Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		MINIMUM LENGTH [a] (in.)					CONTRIBUTING LENGTH (in.)
		WALL HEIGHT					
		8 ft	9 ft	10 ft	11 ft	12 ft	
CS-PF	~~SDC A, B, and C~~	~~16~~	~~18~~	~~20~~	~~22~~	~~24~~	~~1.5 × Actual [b]~~
	~~SDC D_0, D_1, and D_2~~	16	18	20	22	24	Actual [b, c]

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.
NP = Not Permitted.
a. Linear interpolation shall be permitted.
b. Use the actual length when it is greater than or equal to the minimum length.
c. In SDC A, B, or C, where Method CS-PF is installed on a concrete foundation, supporting a roof or one story and a roof, and on either side of a garage, the contributing length shall be 1.5 times the actual length.
~~c~~ d. Maximum header height for PFH is 10 feet in accordance with Figure R602.10.6.2, but wall height may be increased to 12 feet with pony wall.
~~d~~ e. Maximum opening height for PFG is 10 feet in accordance with Figure R602.10.6.3, but wall height may be increased to 12 feet with pony wall.
~~e~~ f. Maximum opening height for CS-PF is 10 feet in accordance with Figure R602.10.6.4, but wall height may be increased to 12 feet with pony wall.

Commenter's Reason: The purpose of this Public Comment is to allow the CS-PF bracing method to count for 1.5 times its width, as method PFG does, when the exact same limitations are used.

The original proponent's reason statement ended with the following: "We ask the committee to extend the same multiplier to the 16-inch CS-PF that is applied to the 24-inch PFG when the same use restrictions are applied. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216." (*Emphasis by proponent*).

However, the same use restrictions do not apply to the CS-PF as the PFG.
Besides being limited to Seismic Design Category A, B, and C, the PFG is also required to be installed on a concrete foundation, be on either side of a garage opening, and be supporting a roof only or one story and a roof.

The CS-PF can be installed on the first of three stories, on a second or third story, at any wall opening, and with up to 4 portal frames on a braced wall line.

Although the original proposal looked fairly simple, the end result is that the CS-PF will have a 50% increase in capacity, which is significant. But the proponent submitted absolutely no data as evidence to justify this 50% increase. The two tests referenced are not available anywhere that I could find. So our first thought was to argue for denial of this proposal.

But we heard the members testify at the Committee Action Hearing that they needed this increase at garage openings to help houses meet the 2012 bracing amounts.

So this Public Comment will allow the 50% increase in capacity, but only when the CS-PF has the same limitations as Method PFG, just as the proponent asked.

RB310-13
Final Action: AS AM AMPC____ D

RB320-13
R602.10.8.2(3)

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

Add detail as shown below to Figure R602.10.8.2(3): (Remainder unchanged)

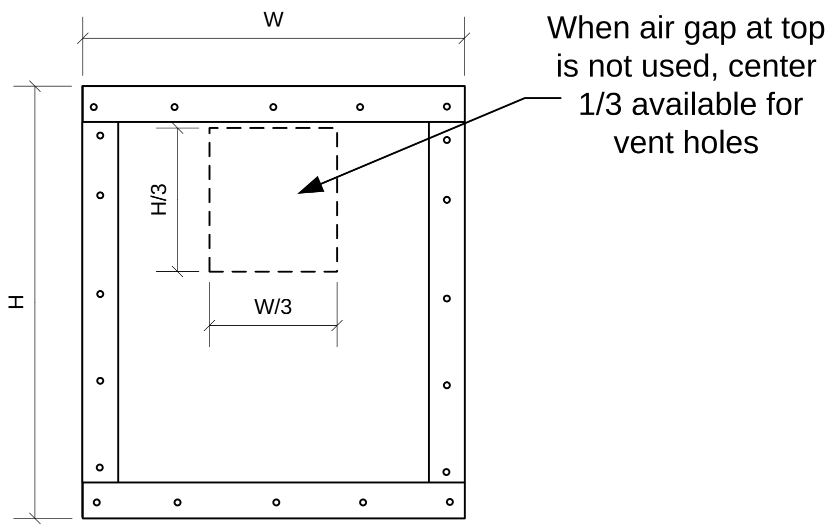


FIGURE R602.10.8.2(3)
BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

Reason: When the air gap is not desired, as in the case of an engineered roof system, the ventilation requirements can be met by placing an opening in the fabricated blocking panels. An opening sized as shown above will not compromise the ability of the fabricated blocking panel to resist overturning or transfer shear from the roof diaphragm to the wall below.

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

R602.10.8.2(3)F-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. Also, provides missing information on how to deal with ventilation.

Assembly Action: **None**

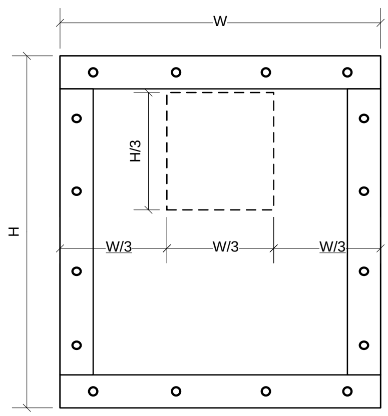
Individual Consideration Agenda

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

Public Comment:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:



~~When~~ Where air gap at top is not used, center ~~1/3~~ W/3 available for vent holes

FIGURE R602.10.8.2(3)
BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

Commenter's Reason: While the original proposal was recommended for approval as submitted, a number of minor editorial improvements were recommended be attendees at the mid-year meeting. The minor changes are:

- The addition of "W/3" to either side of the opening.
- Changing "When" to "Where" in the annotation.
- Changing "1/3" to "W/3" in the annotation.

This public comment makes these editorial improvements, making the code easier to understand, administer and use.

RB320-13

Final Action: AS AM AMPC____ D

RB324-13
R602.12, Table R602.12.4

Proposed Change as Submitted

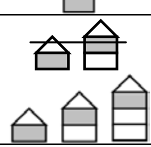
Proponent: Brian Foley, P.E., Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov)

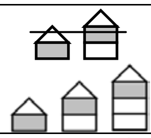
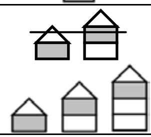
Revise as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed below shall be permitted to be braced in accordance with this section as an alternate to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than ~~two~~ three stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of $^{1}/_{2}$ inches (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the basic wind speed is less than or equal to ~~90~~ 100 mph (~~40~~ 44 m/s), and the Exposure Category is A or B.
7. The structure shall be located in Seismic Design Category of A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in ~~two~~three-story buildings.

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

WIND SPEED	STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE [a,b]						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE [a,b]					
			Length of short side (ft) [c]						Length of long side (ft) [c]					
			10	20	30	40	50	60	10	20	30	40	50	60
90		10	1	2	2	2	3	3	1	2	2	2	3	3
			2	3	3	4	5	6	2	3	3	4	5	6
			2	3	4	6	7	8	2	3	4	6	7	8
		15	1	2	3	3	4	4	1	2	3	3	4	4
			2	3	4	5	6	7	2	3	4	5	6	7
			2	4	5	6	7	9	2	4	5	6	7	9

WIND SPEED	STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE [a,b]						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE [a,b]					
			Length of short side (ft) [c]						Length of long side (ft) [c]					
			10	20	30	40	50	60	10	20	30	40	50	60
100		10	1	2	2	3	3	4	1	2	2	3	3	4
			2	3	4	5	6	7	2	3	4	5	6	7
			2	4	5	7	8	10	2	4	5	7	8	10
		15	2	3	3	4	4	6	2	3	3	4	4	6
			3	4	6	7	8	10	3	4	6	7	8	10
			3	6	7	10	11	13	3	6	7	10	11	13

For SI: 1 ft = 304.8 mm

a. Interpolation shall not be permitted.

b. Cripple walls or wood-framed basement walls in a walk-out condition of a one-story structure shall be designed as the first floor of a two-story house.

c. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.

Reason: Using the wall bracing values for wind speed of 100 mph and three stories from Section R602.10, the use of Simplified Wall Bracing can be expanded to a wide range of areas and building types without impacting safety. Since the 90 mph values in Table R602.12.4 were calculated from R602.10, then the 100 mph will create an accurate bracing amounts as it would if calculated from the wind tables of R602.10.

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

R602.12 #3-RB-FOLEY.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

For SI: 1 ft = 304.8 mm

a. Interpolation shall not be permitted.

b. Cripple walls or wood-framed basement walls in a walk-out condition ~~of a one-story structure~~ shall be ~~designed~~ designated as the first ~~floor~~ story ~~of a two-story house~~ and the stories above shall be redesignated as the second and third stories, respectively, and shall be prohibited in a three-story structure..

c. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.

Committee Reason: Approval was based upon the proponent's published reason. The modification clarifies where a cripple wall or wood-framed basement wall is considered a story.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Brian Foley, P.E. Fairfax County, VA, representing Virginia Building and Code Officials Association and Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed in items 1-8 shall be permitted to be braced in accordance with this section as an alternative to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than three stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.

2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.

3. Wall height shall not be greater than 10 feet (2743 mm).

4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.

5. All exterior walls shall have gypsum board with a minimum thickness of ½ inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.

6. The structure shall be located where the ~~basic~~ ultimate design wind speed is less than or equal to 130 ~~100~~ mph (58 m/s) ~~(44 m/s)~~, and the Exposure Category is ~~A,~~ B or C.

7. The structure shall be located in Seismic Design Category A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.

8. Cripple walls shall not be permitted in three-story buildings.

(Portions of code change proposal not show remain unchanged)

Commenter's Reason: The purpose of this public comment is to correlate RB324 with the comprehensive update of the IRC wind provisions to the ultimate design wind speed basis of ASCE 7-10 and the 2012 IBC. RB324 increased the scope of the simplified wall bracing method from 90mph to 100mph, but those wind speeds reflect the old ASCE 7-05 basis (now the "nominal design wind speed" or V_{ASD}). This code change converts the limit from 100mph V_{ASD} to the equivalent 130mph V_{ULT}.

RB324-13

Final Action: AS AM AMPC____ D

RB327-13
R602.12.6.2

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.12.6.2 Method CS-PF *Braced wall panels* constructed as Method CS-PF in accordance with Section R602.10.6.4 shall be permitted when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-PF panel shall equal ~~0.5~~ 0.75 bracing units. A maximum of four CS-PF panels shall be permitted on all segments of walls parallel to each side of the circumscribed rectangle. Segments of walls which include a Method CS-PF panel shall meet the requirements of Section R602.10.4.2.

Reason: Currently each Method PFG (Portal Frame at Garage) is permitted in the 2012 IRC Section R602.12.6.3 to contributing 0.75 bracing units to the required amount of bracing. The contribution amount is based on the 1.5 multiplier to the length of the vertical leg of the portal frame permitted in Table R602.10.5. This multiplier was added in the "legacy" IRC provisions because Method PFG was restricted for use in areas of low seismicity (SDCs A, B and C).

Cyclic testing conducted at APA in 2006 of the CS-PF (Continuous Sheathed – Portal Frame) showed that the CS-PF has a design strength at least as high as the PFG tested in a similar manner. Based on the results of this testing it is reasonable to permit the same contributing amount of bracing units for the Method CS-PF when similarly restricted to areas of low seismicity as is the Simplified Method.

Please note that the CS-PF portal frame can have a leg length as small at 16 inches, where the PFG has a minimum leg length of 24 inches. What makes the CS-PF perform as well or better than the PFG, even with a shorter leg length, is the fact that the CS-PF has nearly twice as many fasteners as the PFG. It is the fastener interaction between the framing and sheathing that determine the ultimate capacity of this wood-structural-panel/framing bracing system.

Note that the IRC bracing provisions are difficult to meet in many cases as a result of narrow lot widths and the aesthetic requirements of modern homes. Areas around garages and picture windows are especially difficult to accommodate and still meet the minimum bracing requirements of the code. Permitting the equal-to-stronger minimum 16-inch CS-PF the to have the same adjustment factor as the 24-inch PFG is both rational and extremely helpful in broadening the scope of the 2012 IRC Simplified Bracing provisions.

We ask the committee to permit the 16-inch CS-PF the same 0.75 bracing unit contribution as is applied to the 24-inch PFG when used in the Simplified Bracing Method. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216.

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

R602.12.6.2-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Based upon the committee's previous action on RB310-13 and the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Randall Shackelford, P.E., Simpson Strong-Tie Company, requests Disapproval.

Commenter's Reason: We ask that the membership deny RB327 for the following reasons:

1. This is a 50 percent increase in capacity requested with absolutely no technical substantiation submitted. The referenced test reports are no longer available anywhere that I could find.
2. In the simplified method, the CS-PF *ALREADY* counts for 1.5 times its width. The CS-PF counts for 0.5 bracing units, or one half of a braced wall panel. The CS-PF is 16" wide, increase that by 50% and you get 24" wide, which is exactly half a braced wall panel. So this is a completely different issue than RB310. This is double dipping. Asking for a 50% increase on top of an already existing 50% increase.
3. Even if RB310 is approved, that proposal does NOT say that the CS-PF should count for exactly the same length as the PFG method. It says that they both should count for 1.5 times their width. The PFG is 24" wide, times 1.5 equals 36" or 0.75 of a bracing unit, which is what the code says. The CS-PF is 16" wide, times 1.5 equals 24", which is 0.5 of a bracing unit, which is what the code says. So the code already treats the CS-PF and PFG exactly the same by counting them as 1.5 times their width.
4. The proponent's reason states that "it is reasonable to permit the same contributing amount of bracing units for the Method CS-PF <u>when similarly restricted to areas of low seismicity</u> as is the Simplified Method." However, the proponent mentions nothing of the other code limitations that apply to Method PFG, such as the requirements that the portal be installed on a concrete foundation, at garage openings only, and only where supporting a roof or one story and a roof.

Therefore this proposal is not needed.

RB327-13

Final Action: AS AM AMPC____ D

RB329-13
R602.10 (NEW), R602.11, R602.12, Appendix R (NEW)

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee/American Chemistry Council (jcrandell@aresconsulting.biz); Larry Wainright, Structural Building Components Association; Paul Lautrup, OX Engineered Products

Revise as follows:

APPENDIX R
WALL BRACING SUPPLEMENTAL PROVISIONS

~~R602.10~~ AR602.10 Wall bracing.

~~R602.10.1~~ AR602.10.1 Braced wall lines.

~~R602.10.1.1~~ AR602.10.1.1 Length of a braced wall line.

FIGURE ~~R602.10.1.1~~ AR602.10.1.1 BRACED WALL LINES

~~R602.10.1.2~~ AR602.10.1.2 Offsets along a braced wall line.

~~R602.10.1.3~~ AR602.10.1.3 Spacing of braced wall lines.

TABLE ~~R602.10.1.3~~ AR602.10.1.3 BRACED WALL LINE SPACING

~~R602.10.1.4~~ AR602.10.1.4 Angled walls.

FIGURE ~~R602.10.1.4~~ AR602.10.1.4 ANGLED WALLS

~~R602.10.2~~ AR602.10.2 Braced wall panels.

~~R602.10.2.1~~ AR602.10.2.1 Braced wall panel uplift load path.

~~R602.10.2.2~~ AR602.10.2.2 Locations of braced wall panels.

FIGURE ~~R602.10.2.2~~ AR602.10.2.2 LOCATION OF BRACED WALL PANELS

~~R602.10.2.2.1~~ AR602.10.2.2.1 Location of braced wall panels in Seismic Design Categories D_0, D_1 and D_2.

~~R602.10.2.3~~ AR602.10.2.3 Minimum number of braced wall panels.

~~R602.10.3~~ AR602.10.3 Required length of bracing.

TABLE ~~R602.10.3(1)~~ AR602.10.3(1) BRACING REQUIREMENTS BASED ON WIND SPEED

TABLE ~~R602.10.3(2)~~ AR602.10.3(2) WIND ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

TABLE ~~R602.10.3(3)~~ AR602.10.3(3) BRACOMG REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

TABLE ~~R602.10.3(4)~~ AR602.10.3(4) SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

~~R602.10.4~~ AR602.10.4 Construction methods for braced wall panels.

TABLE ~~R602.10.4~~ AR602.10.4 BRACING METHODS

~~R602.10.4.1~~ AR602.10.4.1 Mixing methods.

~~R602.10.4.2~~ AR602.10.4.2 Continuous sheathing methods.

~~R602.10.4.3~~ AR602.10.4.3 Braced wall panel interior finish material.

~~R602.10.5~~ AR602.10.5 Minimum length of a braced wall panel.

TABLE ~~R602.10.5~~ AR602.10.5 MINIMUM LENGTH OF BRACED WALL PANELS

FIGURE ~~R602.10.5~~ AR602.10.5 BRACED WALL PANELS WITH CONTINUOUS SHEATHING

~~R602.10.5.1~~ AR602.10.5.1 Contributing length.

~~R602.10.5.2~~ AR602.10.5.2 Partial credit.

TABLE ~~R602.10.5.2~~ AR602.10.5.2 PARTIAL CREDIT FOR BRACED WALL PANELS LESS THAN 48 INCHES IN ACTUAL LENGTH

~~R602.10.6~~ AR602.10.6 Construction of Methods ABW, PFH, PFG, CS-PF and BV-WSP.

~~R602.10.6.1~~ AR602.10.6.1 Method ABW: Alternate braced wall panels.

TABLE ~~R602.10.6.1~~ AR602.10.6.1 MINIMUM HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS

FIGURE ~~R602.10.6.1~~ AR602.10.6.1 METHOD ABW-ALTERNATE BRACED WALL PANEL

~~R602.10.6.2~~ AR602.10.6.2 Method PFH: Portal frame with hold-downs.

FIGURE ~~R602.10.6.2~~ AR602.10.6.2 METHOD PFH-PORTAL FRAME WITH HOLD-DOWNS

~~R602.10.6.3~~ AR602.10.6.3 Method PFG: Portal frame at garage door openings in Seismic Design Categories A, B and C.

FIGURE ~~R602.10.6.3~~ AR602.10.6.3 METHOD PFG-PORTAL FRAME AT GARAGE DOOR OPENINGS IN SEISMIC DESIGN CATEGORIES A, B AND C

~~R602.10.6.4~~ AR602.10.6.4 Method CS-PF: Continuously sheathed portal frame.

FIGURE ~~R602.10.6.4~~ AR602.10.6.4 METHOD CS-PF-CONTINUOUSLY SHEATHED PORTAL FRAME PANEL CONSTRUCTION

TABLE ~~R602.10.6.4~~ AR602.10.6.4 TENSION STRAP CAPACITY REQURIED FOR RESISTING WIND PRESURES PERPENDICULAR TO METHOD PFH, PFG AND CS-PF BRACED WALL PANELS

~~R602.10.6.5~~ AR602.10.6.5 Wall bracing for dwellings with stone and masonry veneer in Seismic Design Categories D_0, D_1 and D_2.

TABLE ~~R602.10.6.5~~ AR602.10.6.5 METHOD BV-WSP WALL BRACING REQURIEMENTS

FIGURE ~~R602.10.6.5~~ AR602.10.6.5 METHOD BV-WSP-WALL BRACING FOR DWELLINGS WITH STONE AND MASONRY VENEER IN SEISMIC DESIGN CATEGORIES D_0. D_1, AND D_2

~~R602.10.6.5.1~~ AR602.10.6.5.1 Length of bracing.

~~R602.10.7~~ AR602.10.7 Ends of braced wall lines with continuous sheathing.

FIGURE ~~R602.10.7~~ AR602.10.7 END CONDITIONS FOR BRACED WALL LINES WITH CONTINUOUS SHEATHING

~~R602.10.8~~ AR602.10.8 Braced wall panel connections.

FIGURE ~~R602.10.8(1)~~ AR602.10.8(1) BRACED WALL PANEL CONNECTION WHEN PERPENDICULAR TO FLOOR/CEILING FRAMING

FIGURE ~~R602.10.8(2)~~ AR602.10.8(2) BRACED WALL PANEL CONNECTION WHEN PARALLEL TO FLOOR/CEILING FRAMING

~~R602.10.8.1~~ AR602.10.8.1 Braced wall panel connections for Seismic Design Categories D_0, D_1 and D_2.

~~R602.10.8.2~~ AR602.10.8.2 Connections to roof framing.

FIGURE ~~R602.10.8.2(1)~~ AR602.10.8.2(1) BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS

FIGURE ~~R602.10.8.2(2)~~ AR602.10.8.2(2) BRACED WALL PANEL CONNCECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

FIGURE ~~R602.10.8.2(3)~~ AR602.10.8.2(3) BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

~~R602.10.9~~ AR602.10.9 Braced wall panel support.

FIGURE ~~R602.10.9~~ AR602.10.9 MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

~~R602.10.9.1~~ AR602.10.9.1 Braced wall panel support for Seismic Design Category D_2.

~~R602.10.10~~ AR602.10.10 Panel joints.

~~R602.10.11~~ AR602.10.11 Cripple wall bracing.

~~R602.10.11.1~~ AR602.10.11.1 Cripple wall bracing for Seismic Design Categories D_0 and D_1 and townhouses in Seismic Design Category C.

~~R602.10.11.2~~ AR602.10.11.2 Cripple wall bracing for Seismic Design Category D_2.

~~R602.10.11.3~~ AR602.10.11.3 Redesignation of cripple walls.

~~R602.11~~ AR602.11 Wall anchorage.

~~R602.11.1~~ AR602.11.1 Wall anchorage for all buildings in Seismic Design Categories D_0, D_1 and D_2 and townhouses in Seismic Design Category C.

~~R602.11.2~~ AR602.11.2 Stepped foundations in Seismic Design Categories D_0, D_1 and D_2.

R602.10 Wall bracing. Buildings, and portions thereof, shall be braced in accordance with one or more of the following sections using bracing materials and methods complying with Section R602.10.1 and load path detailing in accordance with Section R602.10.5:

1. Intermittent bracing per Section R602.10.2,
2. Continuous sheathing per Section R602.10.3,
3. Engineered design per Section R602.10.4, or
4. Appendix R – Wall Bracing Supplemental Provisions

Where a building, or portion thereof, does not comply with Section R602.10.2, Section R602.10.3, or Section R602.10.5, those portions shall be designed and constructed in accordance with Section R602.10.4. Townhouses in Seismic Design Category C and all buildings in Seismic Design Categories D_0, D_1, and D_2 shall comply with the bracing requirements in Appendix R or be designed in accordance with Section R602.10.4.

R602.10.1 Bracing materials and methods. Wall bracing materials and methods shall comply with Table R602.10.1.

TABLE R602.10.1
BRACING METHODS[a,b]

Method	Minimum Brace Material Thickness or Size	Minimum Braced Wall Panel Width or Brace Angle	Connection Criteria	
			Minimum Fasteners	Maximum Spacing
LIB Let-in Bracing	1x4 wood brace (or approved metal brace installed per manufacturer instructions)	45^o angle and maximum 16”oc stud spacing[c]	2-8d common nails or 3-8d box nails (2-1/2” long x 0.113” dia.)	Per stud and top and bottom plates
DWB Diagonal wood boards	¾” (1” nominal)	48”	2-8d box nails (2-1/2” long x 0.113” diameter) or 2 – 1-3/4” long 16ga. staples	Per stud and top and bottom plates
WSP Wood structural panel	3/8”	48”[d]	6d common nail or 8d box nail (2-1/2” long x 0.113” diameter)	6” edges, 12” field
SFB Structural Fiberboard Sheathing	½”	48”[d]	1-1/2” long x 0.120” dia. galvanized roofing nails	3” edges, 6” field
GB Gypsum Board (installed on both sides of wall)	½”	96” (48” for use with Section R602.10.3)	5d cooler nails or #6 screws	7” edges, 7” field (including top and bottom plates)
PCP Portland cement	¾” (maximum	48”	1-1/2” long, 11 gage, 7/16”	6” o.c. on all framing

plaster	16"oc stud spacing)		diameter head nails or 7/8" long, 16 gage staples	members
CS-WSP[e] Continuously sheathed WSP	3/8"	Refer to Table R602.10.1.1	Same as WSP	Same as WSP
CS-SFB[e] Continuously sheathed SFB	½"		Same as SFB	Same as SFB
PF Portal Frame[f]	7/16"	See Figure R602.10.1	See Figure R602.10.1	See Figure R602.10.1

For SI: 1 inch = 25.4 mm

a. Alternative bracing materials and methods, when approved in accordance with Section R104.11, shall be permitted to be used as a substitute for any of the bracing materials listed in Table R602.10.1 provided at least equivalent performance is demonstrated. Where the tested bracing strength or stiffness differs from tabulated materials, the bracing amount required for the alternative material shall be permitted to be factored to achieve equivalence.

b. All edges of panel-type wall bracing shall be attached to framing or blocking, except GB bracing horizontal joints shall not be required to be blocked where joints are finished.

c. Method LIB shall not be permitted for walls supporting a roof and two stories. Two LIB braces installed at a 60° angle shall be permitted to be substituted for each 45° angle LIB brace.

d. A braced wall panel shall be permitted to be reduced to a 32-inch length when studs at each end of the braced wall panel are anchored to foundation or framing below using hold-down device with minimum 2,800 lbs design tension capacity. For detached single story garages and attached garages supporting roof only, a minimum 24-inch brace panel length shall be permitted on one wall containing one or more garage door openings.

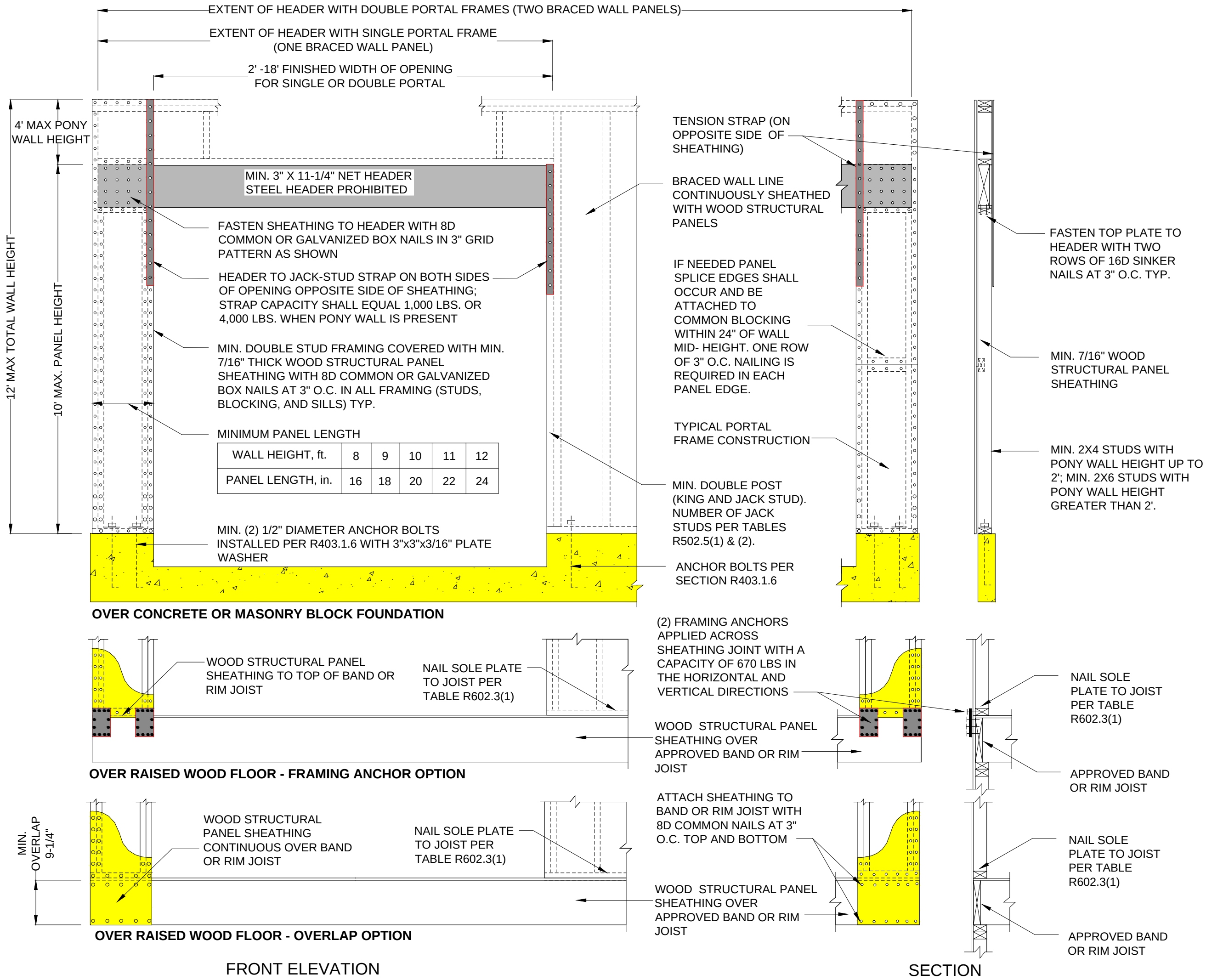
e. Bracing methods CS-WSP and CS-SFB shall have sheathing installed on all sheathable surfaces above, below, and between wall openings.

f. For purposes of bracing in accordance with Section R602.10.2, two Method PF brace panels having a minimum width of 24-inches each shall be considered equivalent to one braced wall panel.

TABLE R602.10.1.1
MINIMUM WIDTHS OF METHOD CS-WSP AND CS-SFB BRACED WALL PANELS

Maximum Opening Height Adjacent to Braced Wall Panel	**Minimum Length of Braced Wall Panel (inches)**			
	8' tall wall	**9' tall wall**	**10' tall wall**	**12' tall wall**
Up to 5' – 4"	24	27	30	36
Up to 6' – 8"	32	30	30	36
Up to 8'	48	41	38	36
Up to 9'	-	54	46	41
Up to 10'	-	-	60	48
Up to 12'	-	-	-	72

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



WALL HEIGHT, ft.	8	9	10	11	12
PANEL LENGTH, in.	16	18	20	22	24

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 lb = 4.45 N
NOTE: Minimum PF panel length shall be 24 inches (610 mm) for use with Section R602.10.2.

FIGURE R602.10.1
METHOD PF – PORTAL FRAME CONSTRUCTION

602.10.2. Intermittent Bracing. Intermittent bracing shall comply with Sections R602.10.2.1 and R602.10.2.2.

R602.10.2.1 Limitations. The intermittent bracing requirements of Section R602.10.2.2 shall be limited to the following conditions of use:

1. Basic design wind speed shall not exceed 100 mph (161 km/h).
2. Bracing methods shall be LIB, DWB, WSP, SFB, GB, PCP, and PF in accordance with Table R602.10.1.
3. Overall plan length of the house is limited to 75 feet (22.9 m) and the overall plan width shall be no less than one-third the overall plan length.
4. Wall height at each story level shall not exceed 10 feet (3.05 m).
5. Roof eave-to-ridge height shall not exceed 10 feet (3.05 m) unless the roof is considered as an additional story for the purpose of determining bracing amounts required.
6. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5.
7. Floors supporting brace panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
8. Townhouses shall be stabilized independently of adjacent units unless a design is provided to permit lateral load transfer between adjacent units.

R602.10.2.2 Requirements. Braced wall panels shall be constructed of bracing methods, materials, and minimum braced panel lengths complying with Table R602.10.1. The number of braced wall panels required for each side of a building (elevation view) at each story level of the building shall comply with Table R602.10.2 and shall be oriented parallel to the building side. The following additional requirements shall apply:

1. In no case shall the amount of bracing be less than two braced wall panels on exterior walls comprising each side of a building (elevation view) for each story level of the building.
2. Braced wall panel shall be located on each building side at each story level in accordance with Figure R602.10.2.2.
3. No more than one-half the number of braced wall panels required on a building side shall be permitted to be relocated from exterior walls to interior walls oriented in the same plan direction and within one-half the floor plan dimension perpendicular to the exterior wall.
4. Use of multiple bracing methods and materials complying with Table R602.10.1 shall be permitted.
5. Houses with skewed wings shall be constructed in accordance with either Section R602.10.3 or designed in accordance with Section R602.10.4.
6. Garage door openings supporting a floor load above shall be braced using Method PF unless the building plan level containing the garage opening wall complies with all the bracing requirements of this section.
7. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

TABLE R602.10.2
NUMBER OF BRACED WALL PANELS REQUIRED
FOR EACH HOUSE ELEVATION (BUILDING SIDE) AT EACH STORY LEVEL[1]

Wind Velocity	Story Level Supporting:	Longest Overall Dimension of Floor Plan for a Given Story Level		
		25'	50'	75'
90 mph	Roof Only	1	2	3
	Roof + 1 Story	2	4	6
	Roof + 2 Stories	3	6	9
100 mph	Roof Only	2	3	4
	Roof + 1 Story	3	5	8
	Roof + 2 Stories	4	8	11

For SI: 1 foot = 305 mm

a. Interpolation between dimensions shall be permitted. Extrapolation is prohibited.

b. Table applies to wind exposure B. For wind exposure C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively.

c. Fractions of panels shall be rounded to the nearest one-half braced wall panel. The following braced wall panel conditions shall be permitted to be counted as one-half a braced wall panel: (1) one 60 degree LIB, (2) one 48" GB or one 96" GB with gypsum wall board on one side, or (3) one 36" WSP, SFB, or PCP braced wall panel for wall heights not more than 9 feet (2.75 m).

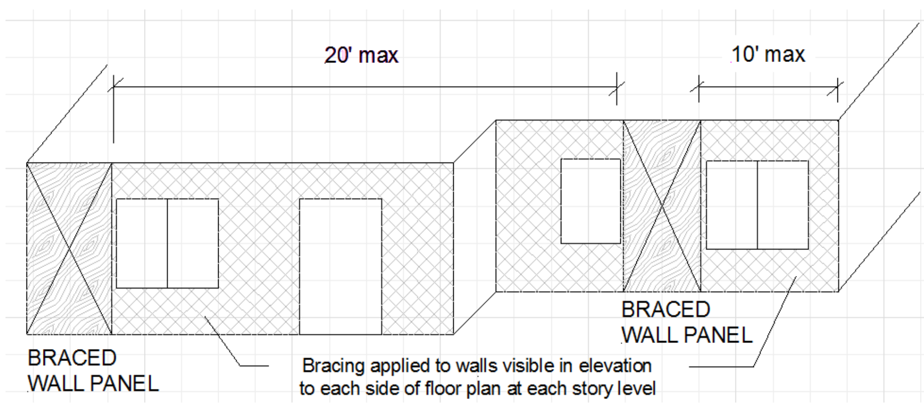


FIGURE R602.10.2.2
LOCATION OF BRACED WALL PANELS

R602.10.3 Continuous Sheathing.

R602.10.3.1 Limitations. The continuous sheathing requirements of Section R602.10.3 shall be limited to bracing methods CS-WSP and CS-SFB in accordance with Table R602.10.1 with the following conditions of use:

1. Basic design wind speed shall not exceed 110 mph (177 km/h).
2. Wall height at each story level shall not exceed 12 feet (3.66 m).
3. Eave to ridge height shall not exceed 20 feet (6.10 m).
4. Exterior walls shall be sheathed on all sheathable surfaces including infill areas between braced wall panels, above and below wall openings and on gable end walls.
5. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5.
6. Floors supporting braced wall panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
7. Townhouses shall be stabilized independently of adjacent units, unless a design is provided to permit lateral load transfer between adjacent units.

R602.10.3.2 Requirements. The required length of bracing for each side of a building (plan elevation) at each story level shall be determined using Table R602.10.3 and Figure R602.10.3(1). The cumulative contributing length of braced wall panels assigned to a rectangle side and each complying with Table R602.10.1.1 shall be greater than or equal to the required length of bracing. The following additional requirements shall apply:

1. Braced wall panels on exterior or interior walls shall be assigned to the nearest rectangle side as shown in Figure R602.10.3(2) for each story level floor plan.
2. Braced wall panels shall be distributed and installed in accordance with Figure R602.10.3(3).
3. A minimum of one-half the required bracing amount for each rectangle side should be located on exterior walls within 8 feet of the location of the rectangle side.
4. Interior braced wall panels using Method GB shall be assigned to the closest parallel rectangle side and shall contribute 0.5 times their actual length.
5. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

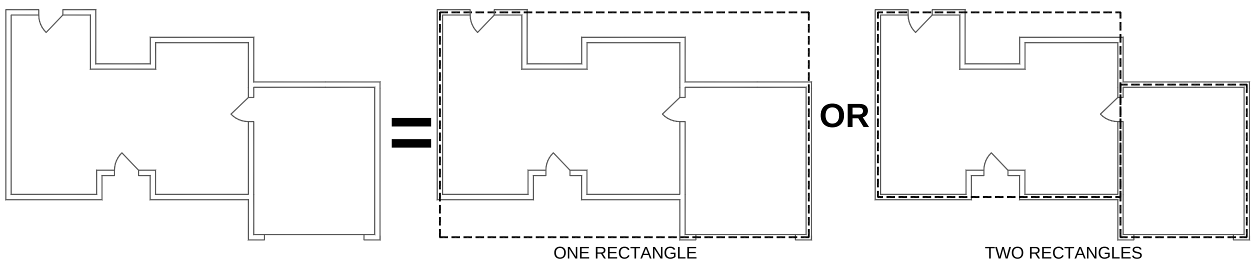


FIGURE R602.10.3(1)
CIRCUMSCRIBED RECTANGLES[a,b,c]

a. Each floor plan level shall be circumscribed with one or more rectangles around the entire floor plan at the floor level under consideration as shown in Figure R602.10.3.

b. Rectangles shall surround all enclosed offsets and projections such as sunrooms and attached garages for a given story level floor plan. Chimneys, partial height projections, and open structures, such as carports and decks, shall be excluded from the rectangle.

c. Each rectangle shall have no side greater than 80 feet (24.4 m) with a maximum rectangle length-to-width ratio of 3:1. Rectangles shall be permitted to be skewed to accommodate diagonal walls.

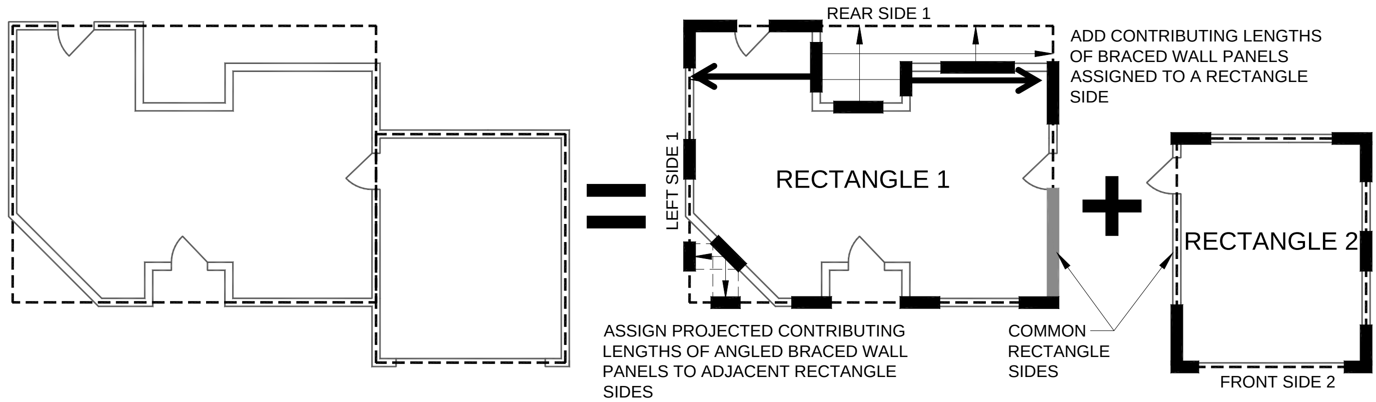
TABLE R602.10.3
REQUIRED LENGTH OF BRACING ALONG EACH SIDE
OF A CIRCUMSCRIBED RECTANGLE [a,b,c,d]

WIND SPEED	EAVE-TO RIDGE HEIGHT (FEET)	NUMBER OF LEVELS ABOVE [e]	REQUIRED LENGTH (FEET) OF BRACING ON ANYSIDE OF RECTANGLE – Length of perpendicular side (ft)[f]: 10	20	30	40	50	60	70	80
90	10	None	2.0	3.5	5.0	6.0	7.5	9.0	10.5	12.0
		One story	3.5	6.5	9.0	12.0	14.5	17.0	19.8	22.6
		Two stories	5.0	9.5	13.5	17.5	21.5	25.5	29.2	33.4
	15	None	2.6	4.6	6.5	7.8	9.8	11.7	13.7	15.7
		One story	4.0	7.5	10.4	13.8	16.7	19.6	22.9	26.2
		Two stories	5.5	10.5	14.9	19.3	23.7	27.5	32.1	36.7
	20	None	2.9	5.2	7.3	8.8	11.1	13.2	15.4	17.6
		One story	4.5	8.5	11.8	15.6	18.9	22.1	25.8	29.5
		Two stories	6.2	11.9	16.8	21.8	27.3	31.1	36.3	41.5
100	10	None	2.5	4.0	6.0	7.5	9.5	11.0	12.8	14.6
		One story	4.5	8.0	11.0	14.5	18.0	21.0	24.5	28.0
		Two stories	6.0	11.5	16.5	21.5	26.5	31.0	36.2	41.4
	15	None	3.4	5.2	7.8	9.8	12.4	14.3	16.7	19.1
		One story	5.2	9.2	12.7	16.7	20.7	24.2	28.2	32.2
		Two stories	6.6	12.7	18.2	23.7	29.2	34.1	39.8	45.5
	20	None	3.8	5.9	8.8	11.1	14.0	16.2	18.9	21.6
		One story	5.9	10.4	14.4	18.9	23.4	27.3	31.8	36.3
		Two stories	7.5	14.4	20.6	26.8	33.0	38.5	44.9	51.3
110	10	None	3.0	5.0	7.0	9.0	11.5	13.3	15.5	17.5
		One story	5.0	9.5	13.5	17.5	21.5	25.5	29.5	34.0
		Two stories	7.5	14.0	20.0	26.0	32.0	37.5	44.0	50.0
	15	None	4.2	6.3	9.5	11.9	15.0	17.3	20.2	23.1
		One story	6.3	11.2	15.4	20.2	25.0	29.3	34.2	39.1
		Two stories	8.0	15.4	22.0	28.7	35.3	41.3	48.2	55.1
	20	None	4.6	7.2	10.6	13.4	16.9	19.6	22.9	26.2
		One story	7.2	12.6	17.4	22.9	28.3	33.0	38.5	44.0
		Two stories	9.1	17.4	24.9	32.4	39.9	46.6	54.4	62.2

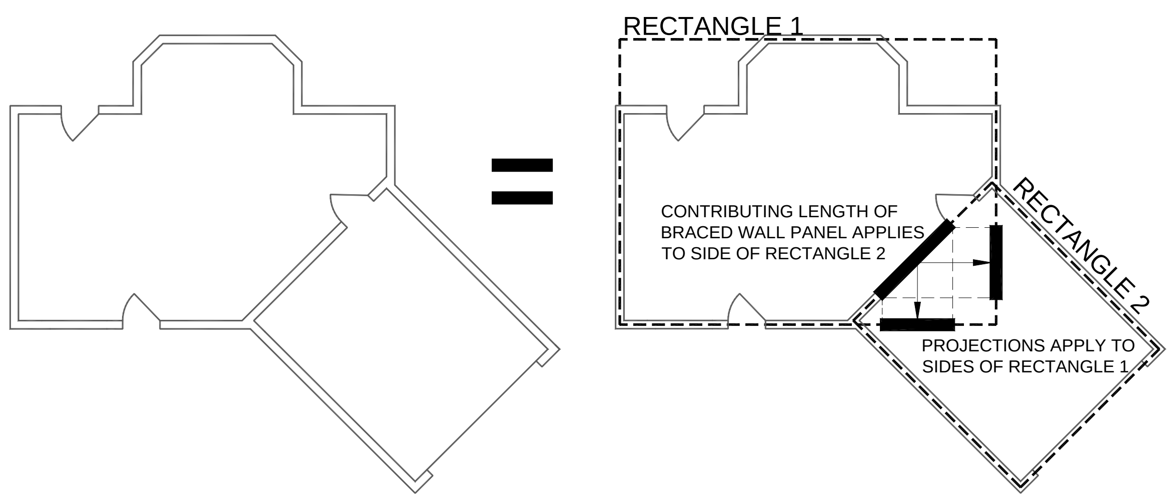
For SI: 1 ft = 304.8 mm

a. Interpolation shall be permitted; extrapolation shall be prohibited.
b. For Exposure Category C or D, multiply the required length of bracing by a factor of 1.3 or 1.6, respectively.

c. For wall heights other than 10 ft (3.05 m), multiply the required length of bracing by the following factors: 0.90 for 8 feet (2.44 m), 0.95 for 9 feet (2.74 m), 1.05 for 11 feet (3.35 m) and 1.10 for 12 feet (3.66 m).
d. Where minimum ½" gypsum wall board interior finish is not provided, the required bracing amount for the affected rectangle side shall be multiplied by 1.40.
e. A floor, habitable or otherwise, contained wholly within the roof rafters or roof trusses need not be considered a story for purposes of determining wall bracing provided the eave to ridge height does not exceed 20 feet (6.10 m).
f. Perpendicular sides to the front and rear sides are the left and right sides. Perpendicular sides to the left and right sides are the front and rear sides.



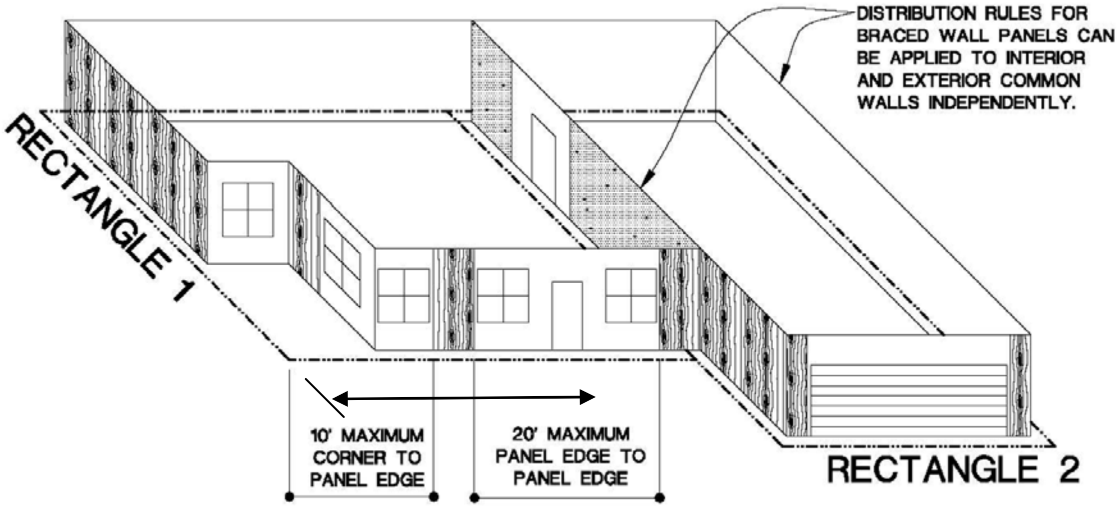
(a) Regular Floor Plan



(b) Skewed Floor Plan

FIGURE R602.10.3(2)
ASSIGNMENT OF BRACED WALL PANELS CIRCUMSCRIBED RECTANGLE SIDES[a,b,c]

a. Projected contributing lengths of angled braced wall panels shall be assigned to the closest rectangle sides.
b. Where multiple rectangles share a common side or sides, as shown in Figure R602.10.3(2)(a), the total required length of bracing on the common side shall equal the sum of the required lengths from each of the shared rectangle sides.
c. Braced wall panels located on a common wall where skewed rectangles intersect, as shown in Figure R602.10.3(2)(b), shall have their contributing length applied towards the required length of bracing for the parallel rectangle side and its projected contributing lengths towards the adjacent skewed rectangle sides. Where the common side of rectangle 2 as shown in Figure R602.10.3(2)(b) has no physical wall, the portion shall be designed in accordance with Section R602.10.4.



For SI: 1 ft = 304.8 mm

FIGURE R602.10.3(3)
DISTRIBUTION OF BRACED WALL PANELS[a,b,c,d]

a. A braced wall panel complying with Table R602.10.1.1 shall be located on each elevation view within 10 feet (3.05 m) of the corners of circumscribed rectangles.
b. The distance between adjacent edges of braced wall panels shall be no more than 20 feet (6.10 m) as measured along the rectangle side.
c. A minimum 24-inch-wide CS-WSP or 32-inch-wide CS-SFB panel shall be located on each side of inside and outside corners or an 800 lb rated tie-down shall be fastened to the edge of the braced wall panel closest to each corner.
d. Interior and exterior wall segments which contribute to the common sides of multiple rectangles shall be permitted to apply the distribution requirements given above to each wall segment independently.

R602.10.4 Wall bracing by engineered design. Designs using bracing materials and methods listed in Table R602.10.1 or approved alternative materials and methods shall be permitted and shall comply with accepted engineering practice. Accepted engineering practice shall include the following:

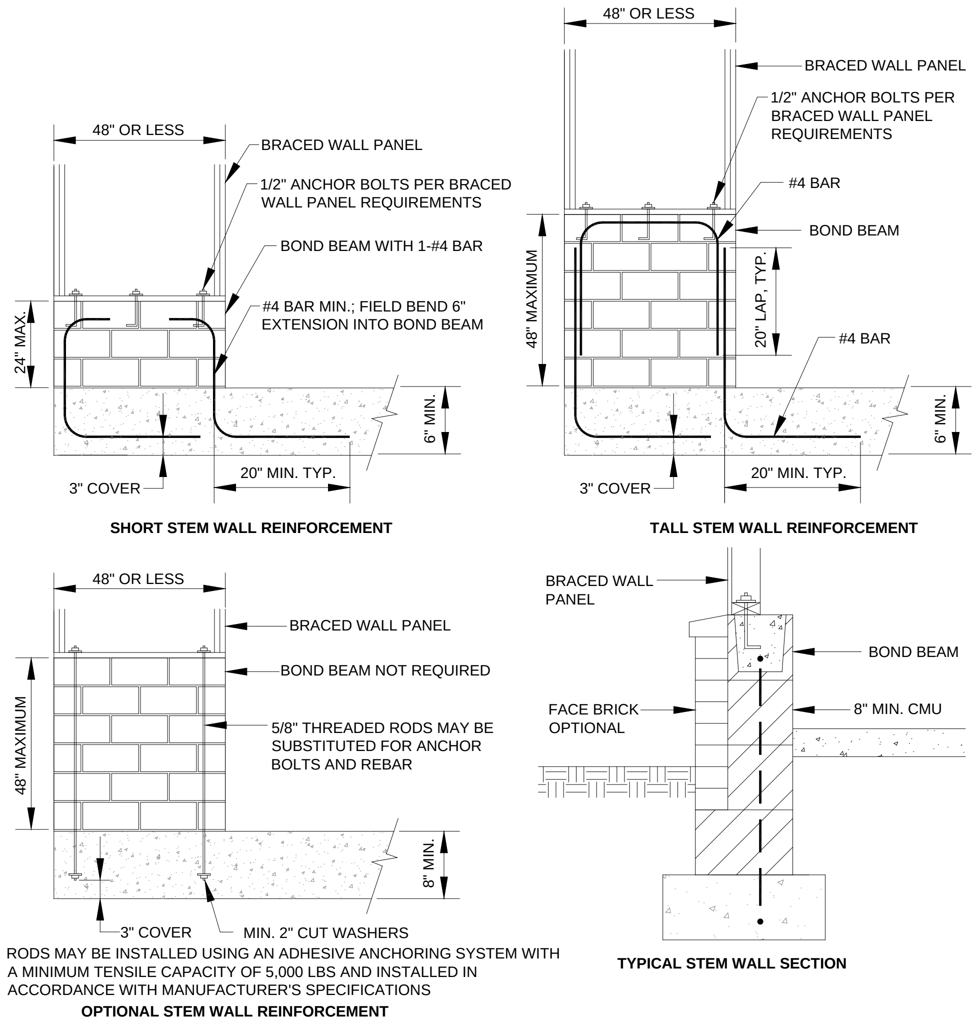
1. Design in accordance with Section R301, or
2. Design equivalent to the analysis basis and scope of the prescriptive provisions of R602.10, including determination of design loads, design unit shear values, and bracing amounts.

R602.10.5 Load path details. Construction shall comply with applicable detailing requirements of this section to ensure an adequate continuous load path for transfer of bracing loads and uplift loads from the roof to the foundation.

R602.10.5.1 Wind uplift load path. Framing connections to transfer roof uplift forces shall comply with Section R602.3.5 and Section R802.11.

R602.10.5.2 Foundation anchorage. Braced wall panels shall be connected to the foundation per Section R403.1.6 and as required in Figure R602.10.1 for portal frames (Method PF).

R602.10.5.3 Masonry or concrete pedestals. Masonry or concrete stem walls with a length of 48 inches (1220 mm) or less supporting braced wall panels shall be reinforced in accordance with Figure R602.10.4.3. Concrete stem walls shall be 6” nominal minimum thickness.



NOTE: GROUT BOND BEAMS AND ALL CELLS WHICH CONTAIN REBAR, THREADED RODS AND ANCHOR BOLTS.

For SI: 1 in=25.4 mm

FIGURE R602.10.5.3
MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

R602.10.5.4 Blocking of floor framing. When parallel to floor framing, braced wall panels shall be connected to a band, rim or header joist, floor framing or perpendicular full-height solid blocking between floor framing at 16 inches (406 mm) on center. When perpendicular to floor framing, braced wall panels shall be connected to full-height solid blocking between floor framing. Attachments shall be in accordance with Table R602.3(1). Manufactured lumber or truss blocking panels shall be permitted to substitute for full-height solid blocking.

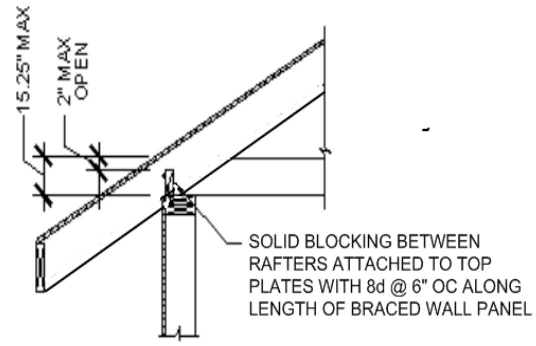
R602.10.5.5 Blocking of roof framing. When parallel to roof framing, braced wall panels shall be connected to a band, rim or header joist, or roof truss. When perpendicular to roof framing, the top plates of exterior braced wall panels shall be connected to the rafters or roof trusses above in accordance with Table R602.10.5.5 and fastened in accordance with Table R602.3(1).

TABLE R602.10.5.5
BRACED WALL PANEL CONNECTIONS TO PERPENDICULAR ROOF FRAMING

DISTANCE FROM TOP OF BRACED WALL PANEL TO TOP OF RAFTER OR ROOF	REQUIREMENT	REFERENCED FIGURE

TRUSS, (in)		
≤ 9.25	No blocking required	NA
9.25 – 15.25	Solid 2x blocking between rafters or trusses	R602.10.5.5(1)
15.25 – 48	Vertical blocking panels	R602.10.5.5(2)
> 48	Designed in accordance with accepted engineering practice	NA

For SI: 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm

FIGURE R602.10.5.5(1)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR TRUSSES

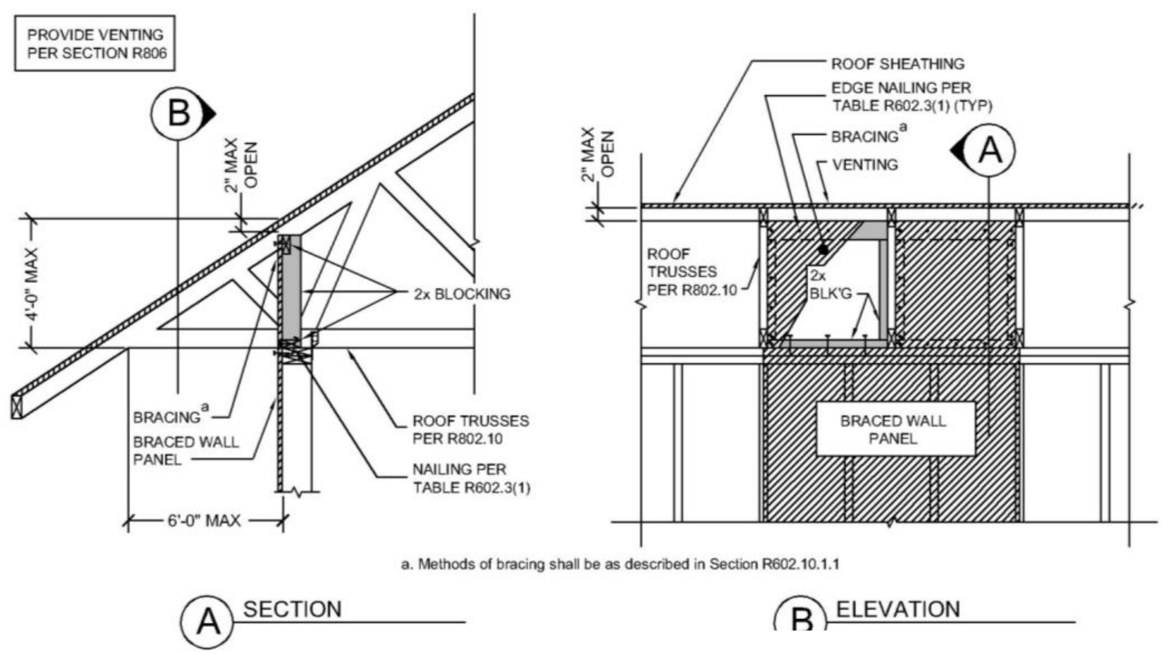


FIGURE R602.10.5.5(2)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

R602.10.5.6 Cripple walls and framed walls of walk-out basements. The required length of bracing for cripple walls with a maximum height of 48 inches (1220 mm) or less along its entire length shall be equal to the wall above. The required length of bracing for cripple walls with a height greater than 48 inches (1220 mm) at any location along its length and for framed walls of a walk-out basement shall be determined in accordance with Section R602.10.2 or R602.10.3, considering the cripple wall or walk-out basement as an additional story. As an alternative, the required length of bracing shall be permitted to equal to the wall above multiplied by a factor of 1.15.

R602.10.5.7 Open Elevated Foundations. Open elevated foundations, such as pile foundations shall be constructed to transfer all lateral loads from the wall bracing system to the piles or elevated piers, including shears, overturning, and uplift loads. Piles or elevated piers along with their foundations shall be sized and/or embedded to transfer all lateral loads imposed by the wall bracing system to the ground.

R602.10.5.8 Balloon frame wall bracing. Balloon frame walls shall have a maximum height of two stories unless constructed in accordance with an approved design. Wall framing shall be continuous from lowest floor to the wall top plate at the roof. Braced wall panels shall extend to the full-height of the balloon frame wall. All edges of sheathing shall be supported on and fastened to blocking or framing. The required brace wall panel length assigned to the balloon frame wall shall be based on the bracing required for the lowest floor level supporting the balloon frame wall as determined in accordance with Section R602.10.2 or R602.10.3. For balloon framed walls having a maximum height of two stories and a maximum length of 12 feet (3.66 m), braced wall panels shall be permitted to be placed parallel to the balloon framed wall on each side and at each story adjacent to the balloon framed wall, and no bracing shall be required for the balloon frame wall portion. Two story interior open ceiling areas shall not extend into the building from the balloon frame wall more than one-half the distance to the opposite building side unless bracing around the opening in the floor diaphragm is designed in accordance with Section R602.10.4.

~~**R602.12 Simplified wall bracing.** Buildings meeting all of the conditions listed in items 1-8 shall be permitted to be braced in accordance with this section as an alternative to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.~~

1. ~~There shall be no more than two stories above the top of a concrete or masonry foundation or basement wall.Permanent wood foundations shall not be permitted.~~
2. ~~Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.~~
3. ~~Wall height shall not be greater than 10 feet (2743 mm).~~
4. ~~The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.~~
5. ~~All exterior walls shall have gypsum board with a minimum thickness of $^1/_2$ inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.~~
6. ~~The structure shall be located where the basic wind speed is less than or equal to 90 mph (40 m/s), and the Exposure Category is A or B.~~
7. ~~The structure shall be located in Seismic Design Category A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.~~
8. ~~Cripple walls shall not be permitted in two-story buildings.~~

~~**R602.12.1 Circumscribed rectangle.** The bracing required for each building shall be determined by circumscribing a rectangle around the entire building on each floor as shown in Figure R602.12.1. The rectangle shall surround all enclosed offsets and projections such as sunrooms and attached garages. Open structures, such as carports and decks, shall be permitted to be excluded. The rectangle shall have no side greater than 60 feet (18 288 mm), and the ratio between the long side and short side shall be a maximum of 3:1.~~

~~**R602.12.2 Sheathing materials.** The following sheathing materials installed on the exterior side of exterior walls shall be used to construct a bracing unit as defined in Section R602.12.3. Mixing materials is prohibited.~~

1. ~~Wood structural panels with a minimum thickness of $^3/_8$ inch (9.5 mm) fastened in accordance with Table R602.3(3).~~

2. ~~Structural fiberboard sheathing with a minimum thickness of $^1/_2$ inch (12.7 mm) fastened in accordance with Table R602.3(1).~~

~~**R602.12.3 Bracing unit.** A bracing unit shall be a full-height sheathed segment of the exterior wall with no openings or vertical or horizontal offsets and a minimum length as specified herein. Interior walls shall not contribute toward the amount of required bracing. Mixing of Items 1 and 2 is prohibited on the same story.~~

1. ~~Where all framed portions of all exterior walls are sheathed in accordance with Section R602.12.2, including wall areas between bracing units, above and below openings and on gable end walls, the minimum length of a bracing unit shall be 3 feet (914 mm).~~
2. ~~Where the exterior walls are braced with sheathing panels in accordance with Section R602.12.2 and areas between bracing units are covered with other materials, the minimum length of a bracing unit shall be 4 feet (1219 mm).~~

~~**R602.12.3.1 Multiple bracing units.** Segments of wall compliant with Section R602.12.3 and longer than the minimum bracing unit length shall be considered as multiple bracing units. The number of bracing units shall be determined by dividing the wall segment length by the minimum bracing unit length. Full-height sheathed segments of wall narrower than the minimum bracing unit length shall not contribute toward a bracing unit except as specified in Section R602.12.6.~~

~~**R602.12.4 Number of bracing units.** Each side of the circumscribed rectangle, as shown in Figure R602.12.1, shall have, at a minimum, the number of bracing units in accordance with Table R602.12.4 placed on the parallel exterior walls facing the side of the rectangle. Bracing units shall then be placed using the distribution requirements specified in Section R602.12.5.~~

~~**R602.12.5 Distribution of bracing units.** The placement of bracing units on exterior walls shall meet all of the following requirements as shown in Figure R602.12.5.~~

1. ~~A bracing unit shall begin no more than 12 feet (3658 mm) from any wall corner.~~
2. ~~The distance between adjacent edges of bracing units shall be no greater than 20 feet (6096 mm).~~
3. ~~Segments of wall greater than 8 feet (2438 mm) in length shall have a minimum of one bracing unit.~~

~~**R602.12.6 Narrow panels.** The bracing methods referenced in Section R602.10 and specified in Sections R602.12.6.1 through R602.12.6.3 shall be permitted when using simplified wall bracing.~~

~~**R602.12.6.1 Method CS-G.** *Braced wall panels* constructed as Method CS-G in accordance with Tables R602.10.4 and R602.10.5 shall be permitted for one-story garages when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-G panel shall be equivalent to 0.5 of a bracing unit. Segments of wall which include a Method CS-G panel shall meet the requirements of Section R602.10.4.2.~~

~~**R602.12.6.2 Method CS-PF.** *Braced wall panels* constructed as Method CS-PF in accordance with Section R602.10.6.4 shall be permitted when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-PF panel shall equal 0.5 bracing units. A maximum of four CS-PF panels shall be permitted on all segments of walls parallel to each side of the circumscribed rectangle. Segments of wall which include a Method CS-PF panel shall meet the requirements of Section R602.10.4.2.~~

~~**R602.12.6.3 Methods PFH and PFG.** *Braced wall panels* constructed as Method PFH and PFG shall be permitted when bracing units are constructed using wood structural panels. Each PFH panel shall equal one bracing unit and each PFG panel shall be equal to 0.75 bracing units.~~

~~**R602.12.7 Lateral support.** For bracing units located along the eaves, the vertical distance from the outside edge of the top wall plate to the roof sheathing above shall not exceed 9.25 inches (235 mm) at the location of a bracing unit unless lateral support is provided in accordance with Section R602.10.8.2.~~

~~**R602.12.8 Stem walls.** Masonry stem walls with a height and length of 48 inches (1219 mm) or less supporting a bracing unit or a Method CS-G, CS-PF or PFG *braced wall panel* shall be constructed in accordance with Figure R602.10.9. Concrete stem walls with a length of 48 inches (1219 mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall be reinforced sized and located in accordance with Figure R602.10.9.~~

Reason: In recent years, great concern has arisen regarding the complexity of the IRC wall bracing provisions. Much good work was done by the ICC Ad Hoc Wall Bracing Committee to resolve significant technical issues and deficiencies in the IRC bracing provisions, including conventional bracing provisions which had not kept up with changes in housing over the years, resulting in concerns with structural safety and performance. Unfortunately, the technical solutions required added complexity to resolve. Now, in an understandable reaction to this added complexity, many attempts are being made to simplify the wall bracing provisions. However, some of these attempts at simplicity are doing so by essentially picking "winners and losers" (e.g., removing certain bracing methods and materials from consideration in a favored simplified approach). The approach of this proposal is to be inclusive and simple while adhering to the technical advancements achieved by the ICC Ad Hoc Wall Bracing Committee.

The proposal is formatted as follows for ease of use:

1. Section R602.10 -- provides charging language for two simplified bracing approaches (intermittent and continuous), an engineered approach, and the existing IRC 2012 provisions (Appendix R).
2. Section R602.10.1 – provides bracing methods and materials common to both simplified methods and is non-exclusive. [1 sentence, 2 Tables, and 1 Figure]
3. Section R602.10.2 – simplified intermittent bracing (for low wind only, 90 and 100 mph) [1 page of text, 1 Table, 1 Figure]
4. Section R602.10.3 – simplified continuous bracing (for up to 110 mph, wind); [1 page of text, 1 Table and 3 Figures]
5. Section R602.10.4 – provides two engineering approaches, one of which is consistent with IRC bracing provisions to permit engineered solutions analyzed in a manner equivalent to the IRC; [1 paragraph of text]
6. Section R602.10.5 – provides various load path details important to overall building performance and connectivity for any bracing method.[2-1/2 pages including text, figures, and table]

To achieve the goal of this proposal, several factors have been considered as described next.

First, Canada recently updated its residential wall bracing provisions considering the same issues and data that the ICC Ad Hoc Committee considered. However, they ended up with a different solution worthy of consideration and, thus, influenced the approach taken in this proposal. Their approach essentially continued traditional (conventional) bracing practices in the lowest hazard regions of the country in recognition that bracing problems were rare (even in newer homes) in this condition. Thus, for much of the country the simple "status quo" was considered adequate absent any strong evidence to the contrary. This same approach is relevant to the US. In moderate hazard regions of the country, an approach similar to that developed by the IRC Ad Hoc Wall Bracing Committee was implemented in Canada. Finally, in the most extreme high hazard regions of Canada engineered design was implemented (which is already the case for many of the high hazard areas in the US).

Second, a simple and limited scope conventional bracing practice is still effective in the IBC, Section 2308. If these provisions are still considered adequate for commercial building applications, then are they not also suitable for housing? The continuing existence and use of the IBC 2308 conventional wall bracing provisions, as well as past experience, suggest strongly that the answer is YES. The IBC 2308 conventional bracing provisions are inclusive and simple to use. Further, they have been recently reformatted for clarity in IBC 2015 proposal S273-11/12 which was approved at the Group A FAH last fall. Therefore, this proposal makes use of this concept, upgrades the approach to improve bracing performance for wind, and applies it in a limited set of conditions for housing in the IRC applicable only to the lowest hazard regions where past experience has been successful. Again, this action also is consistent with the approach taken in Canada after deliberations of a special task group.

Third, for a broader range of hazard conditions covered by the IRC, a simplified approach based primarily on continuous sheathing methods is adopted. This approach is similar to that being considered in various states (including VA from which this approach was derived). As hazards become greater and bracing loads on homes increase, continuous sheathed bracing becomes a more viable and practical bracing method for homes. This is driven by practicality and performance, not simply as a matter of picking "winners and losers" in the interest of simplifying the code by reducing bracing options and restricting market competition without clear cause in even the lowest hazard regions.

Fourth, in areas where hazards and bracing loads are extreme, engineered solutions provide a better means of maintaining simplicity, affordability or efficiency, and performance. An engineered design has a greater ability and flexibility in addressing load path details which are difficult and complex to adequately address in a prescriptive building code (without making the code more complex than many users are willing to tolerate). In this case, engineering provides a value-added solution. However, to fully realize the value potential of engineering, engineers must be equipped with the same efficient design methodology used by the IRC Ad Hoc Wall Bracing Committee to upgrade the IRC wall bracing provisions. Otherwise, engineering will be non-competitive and resisted by the housing market for no other reason than not having access to the design methods as used to develop the IRC wall bracing provisions. Therefore, this proposal recognizes conventional engineering practices (e.g., IBC and IRC Section 301) and also includes the option to use design consistent with the IRC for buildings within the scope of the IRC. The IRC commentary should be coordinated with the proposal by referencing the following peer-reviewed journal paper explaining the engineering basis of the IRC bracing provisions:

Crandell, J. and Martin, Z., "The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements)", *Wood Design Focus*, Forest Products Society, Madison, WI, Spring 2009.

Fifth, for special conditions not addressed in the proposed simplified conventional bracing and continuous sheathing methods addressed in this proposal, the existing IRC provisions are listed as one of the accepted means of a bracing design and are placed in Appendix R. The more complex provisions of the IRC should only be required in special cases, realizing that these provisions add significant complexity not necessary for most homes in most states and regions of the US.

Finally, bracing materials and methods in the IRC were evaluated using very specific performance criteria that are not currently made explicit such that innovation is encouraged and competition between incumbent materials and new materials is conducted on a fair and level playing field. Therefore, this proposal includes language to allow equivalency on the basis of equivalent bracing performance, not just a narrow equivalency concept based only on equivalency of materials (e.g., a weaker bracing material should be considered as equivalent when a greater amount is required to provide equivalent bracing performance of a building in end use). While this seems like common sense, it has been a major barrier to innovation, evaluation, acceptance, and fair market competition of alternative means and methods of bracing. This also affects the ability to provide competitive and consistent engineered solutions.

Based on the above points and a clear need to take the IRC wall bracing provisions to the next step to better promote simplicity, affordability, performance, and innovation, your support for approval of this proposal is requested.

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

R602.10 (NEW)-RB-CRANDELL-LAUTRUP-WAINRIGHT.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The separation of seismic and non-seismic bracing could just as easily be done within the code. Jurisdiction doesn't always adopt the appendix. Placing the seismic bracing into the appendix would leave a significant portion of the country without a prescriptive high-seismic bracing design.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

APPENDIX R
SIMPLIFIED WALL BRACING PROVISIONS FOR LOW-HAZARD REGIONS

(This appendix is informative and is not part of the *code*.)

AR101 Scope. These bracing provisions shall apply to one- and two-family dwellings located in regions where the ultimate design wind speed does not exceed 140 mph (225 km/h) and where the Seismic Design Category is A or B, or Seismic Design Category C for single-family detached homes, as determined in accordance with Table R301.2(1) of the *International Residential Code*.

AR102 Wall bracing. Buildings, and portions thereof, shall be braced in accordance with one or more of the following sections using bracing materials and methods complying with Section AR102.1 and load path detailing in accordance with Section AR102.5:

1. Intermittent bracing per Section AR102.2,
2. Continuous sheathing per Section AR102.3, or
3. Engineered design per Section AR102.4.

Where a building, or portion thereof, does not comply with Section AR102.2 or Section AR102.3, those portions shall be designed and constructed in accordance with Section AR102.4.

AR102.1 Bracing materials and methods. Wall bracing materials and methods shall comply with Table AR102.1(1).

TABLE AR102.1(1)
BRACING METHODS[a,b]

Method	Minimum Brace Material Thickness or Size	Minimum Braced Wall Panel Width or Brace Angle	Connection Criteria	
			Minimum Fasteners	Maximum Spacing
LIB[c] Let-in Bracing	1x4 wood brace (or approved metal brace installed per manufacturer instructions)	45° angle and maximum 16"oc stud spacing[c]	2-8d common nails or 3-8d box nails (2-1/2" long x 0.113" dia.)	Per stud and top and bottom plates
DWB Diagonal wood boards	¾" (1" nominal)	48"	2-8d box nails (2-1/2" long x 0.113" diameter) or 2 – 1-3/4" long 16ga. staples	Per stud and top and bottom plates
WSP Wood structural panel	3/8"	48"[d]	6d common nail or 8d box nail (2-1/2" long x 0.113" diameter)	6" edges, 12" field
SFB Structural Fiberboard Sheathing	½"	48"[d]	1-1/2" long x 0.120" dia. galvanized roofing nails	3" edges, 6" field
GB Gypsum Board (installed on both sides of wall)	½"	96" (48" for use with Section AR102.3)	5d cooler nails or #6 screws	7" edges, 7" field (including top and bottom plates)
PCP Portland cement plaster	¾" (maximum 16"oc stud spacing)	48"	1-1/2" long, 11 gage, 7/16" diameter head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members
CS-WSP[e] Continuously sheathed WSP	3/8"	Refer to Table AR102.1(2)	Same as WSP	Same as WSP
CS-SFB[e] Continuously sheathed SFB	½"		Same as SFB	Same as SFB
PF Portal Frame[f]	7/16"	See Figure AR102.1	See Figure AR102.1	See Figure AR102.1

For SI: 1 inch = 25.4 mm

a. Alternative bracing materials and methods, when approved in accordance with Section R104.11, shall be permitted to be used as a substitute for any of the bracing materials listed in Table A102.1 provided at least equivalent performance is demonstrated. Where the tested bracing strength or stiffness differs from tabulated materials, the bracing amount required for the alternative material shall be permitted to be factored to achieve equivalence.

b. All edges of panel-type wall bracing shall be attached to framing or blocking, except GB bracing horizontal joints shall not be required to be blocked where joints are finished.

c. Method LIB shall not be permitted for walls supporting a roof and two stories. Two LIB braces installed at a 60° angle shall be permitted to be substituted for each 45° angle LIB brace.

d. A braced wall panel shall be permitted to be reduced to a 32-inch (810 mm) length when studs at each end of the braced wall panel are anchored to foundation or framing below using hold-down device with minimum 2,800 lbs (12.5 kN) design tension capacity. For detached single story garages and attached garages supporting roof only, a minimum 24-inch (610 mm) brace panel length shall be permitted on one wall containing one or more garage door openings.

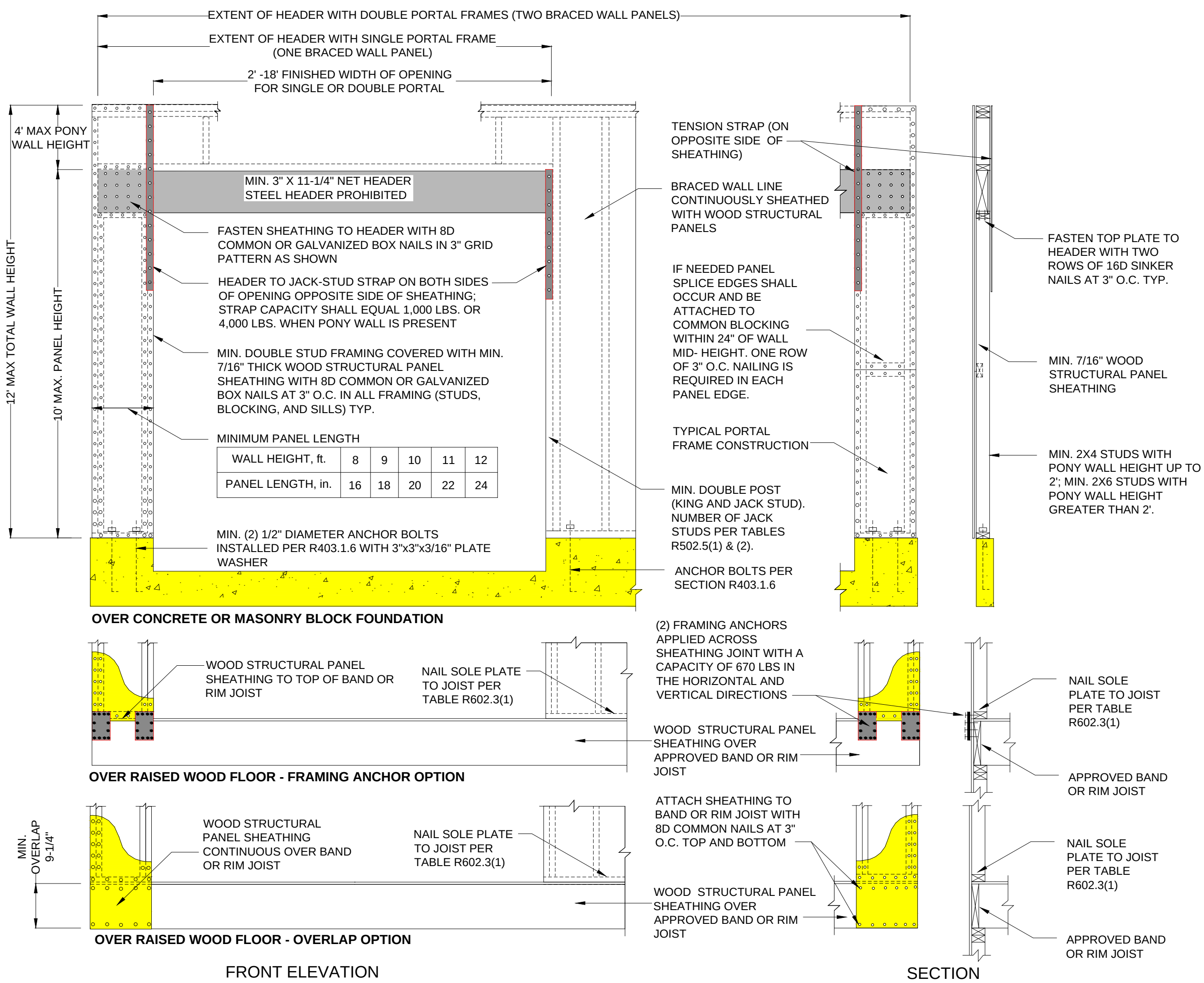
e. Bracing methods CS-WSP and CS-SFB shall have sheathing installed on all sheathable surfaces above, below, and between wall openings.

TABLE AR102.1(2)
MINIMUM WIDTHS OF METHOD CS-WSP AND CS-SFB BRACED WALL PANELS

Maximum Opening Height Adjacent to Braced Wall Panel	Minimum Length of Braced Wall Panel (inches)			
	8' tall wall	9' tall wall	10' tall wall	12' tall wall
Up to 5' – 4"	24	27	30	36
Up to 6' – 8"	32	30	30	36
Up to 8'	48	41	38	36
Up to 9'	-	54	46	41

Up to 10’	-	-	60	48
Up to 12’	-	-	-	72

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



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 lb = 4.45 N

NOTE: Minimum PF panel length shall be 24 inches (610 mm) for use with Section AR102.2.

FIGURE AR102.1
METHOD PF – PORTAL FRAME CONSTRUCTION

AR102.2 Intermittent Bracing. Intermittent bracing shall comply with Sections AR102.2.1 and AR102.2.2.

AR102.2.1 Limitations. The intermittent bracing requirements of Section R102.2.2 shall be limited to the following conditions of use:

1. Basic design wind speed shall not exceed 130 mph (209 km/h).
2. Bracing methods shall be limited to LIB, DWB, WSP, SFB, GB, PCP, and PF in accordance with Table AR102.1(1).
3. Overall plan length of the house shall not exceed 75 feet (22.9 m) and the overall plan width shall be no less than one-third the overall plan length.
4. Wall height at each story level shall not exceed 10 feet (3.05 m).
5. Roof eave-to-ridge height shall not exceed 10 feet (3.05 m) unless the roof is considered as an additional story for the purpose of determining bracing amounts required.
6. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5 of the *International Residential Code*.
7. Floors supporting brace panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
8. Townhouses shall be stabilized independently of adjacent units unless a design is provided to permit lateral load transfer between adjacent units.

AR102.2.2 Requirements. Braced wall panels shall be constructed of bracing methods, materials, and minimum braced panel lengths complying with Table AR102.1(1). The number of braced wall panels required for each side of a building (elevation view) at each story level of the building shall comply with Table AR102.2.2 and shall be oriented parallel to the building side. The following additional requirements shall apply:

1. In no case shall the amount of bracing be less than two braced wall panels on exterior walls comprising each side of a building (elevation view) for each story level of the building.
2. Braced wall panels shall be located on each building side at each story level in accordance with Figure AR102.2.2.
3. No more than one-half the number of braced wall panels required on a building side shall be permitted to be relocated from exterior walls to interior walls oriented in the same plan direction and within one-half the floor plan dimension perpendicular to the exterior wall.
4. Use of multiple bracing methods and materials complying with Table AR102.1(1) shall be permitted.
5. Houses with skewed wings shall be constructed in accordance with either Section AR102.3 or designed in accordance with Section AR102.4.
6. Garage door openings supporting a floor load above shall be braced using Method PF unless the building plan level containing the garage opening wall complies with all the bracing requirements of this section.
7. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

TABLE AR102.2.2
NUMBER OF BRACED WALL PANELS REQUIRED
FOR EACH HOUSE ELEVATION (BUILDING SIDE) AT EACH STORY LEVEL[1]

Wind Velocity	Story Level Supporting:	Longest Overall Dimension of Floor Plan for a Given Story Level		
		25'	50'	75'
115 mph	Roof Only	1	2	3
	Roof + 1 Story	2	4	6
	Roof + 2 Stories	3	6	9
130 mph	Roof Only	2	3	4
	Roof + 1 Story	3	5	8
	Roof + 2 Stories	4	8	11

For SI: 1foot = 305 mm; 1 mph = 1.61 km/h

a. Interpolation between dimensions shall be permitted. Extrapolation is prohibited.
b. Table applies to wind exposure B. For wind exposure C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively.
c. Fractions of panels shall be rounded to the nearest one-half braced wall panel. The following braced wall panel conditions shall be permitted to be counted as one-half a braced wall panel: (1) one 60 degree LIB, (2) one 48" GB or one 96" GB with gypsum wall board on one side, or (3) one 36" WSP, SFB, PCP braced wall panel for wall heights not more than 9 feet (2.75 m), or (4) one Method PF brace panel having a minimum width of 24 inches (610 mm).

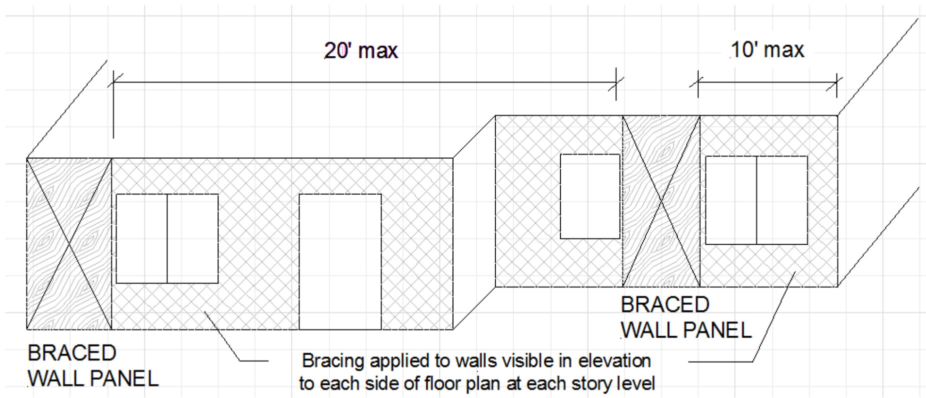


FIGURE AR102.2.2
LOCATION OF BRACED WALL PANELS

AR102.3 Continuous Sheathing.

AR102.3.1 Limitations. The continuous sheathing requirements of Section AR102.3 shall be limited to bracing methods CS-WSP and CS-SFB in accordance with Table AR102.1(1) with the following conditions of use:

1. Basic design wind speed shall not exceed 140 mph (225 km/h).
2. Wall height at each story level shall not exceed 12 feet (3.66 m).
3. Eave to ridge height shall not exceed 20 feet (6.10 m).
4. Exterior walls shall be sheathed on all sheathable surfaces including infill areas between braced wall panels, above and below wall openings and on gable end walls.
5. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5 of the *International Residential Code*.
6. Floors supporting braced wall panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
7. Townhouses shall be stabilized independently of adjacent units, unless a design is provided to permit lateral load transfer between adjacent units.

AR102.3.2 Requirements. The required length of bracing for each side of a building (plan elevation) at each story level shall be determined using Table AR102.3.2 and Figure AR102.3(1). The cumulative contributing length of braced wall panels assigned to a rectangle side, each complying with Table AR102.1(1), shall be greater than or equal to the required length of bracing. The following additional requirements shall apply:

1. Braced wall panels on exterior or interior walls shall be assigned to the nearest rectangle side as shown in Figure AR102.3(2) for each story level floor plan.
2. Braced wall panels shall be distributed and installed in accordance with Figure AR102.3(3).
3. A minimum of one-half the required bracing amount for each rectangle side shall be located on exterior walls within 8 feet of the location of the rectangle side.
4. Interior braced wall panels using Method GB shall be assigned to the closest parallel rectangle side and shall contribute 0.5 times their actual length.
5. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

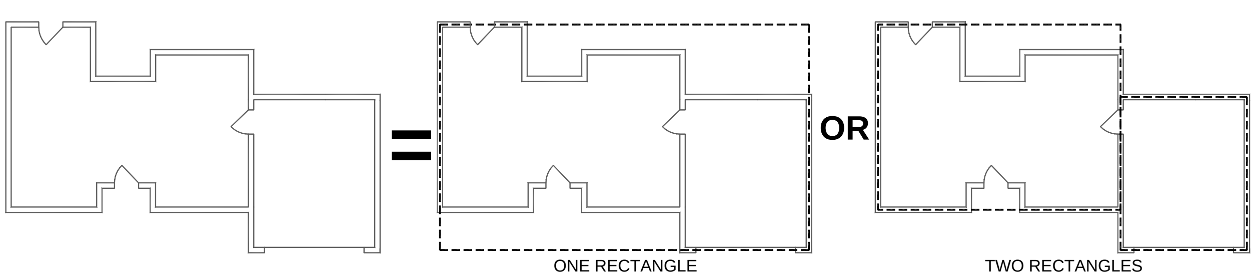


FIGURE AR102.3(1)
CIRCUMSCRIBED RECTANGLES[a,b,c]

a. Each floor plan level shall be circumscribed with one or more rectangles around the entire floor plan at the floor level under consideration as shown in Figure AR102.3(1).

b. Rectangles shall surround all enclosed offsets and projections such as sunrooms and attached garages for a given story level floor plan. Chimneys, partial height projections, and open structures, such as carports and decks, shall be excluded from the rectangle.

c. Each rectangle shall have no side greater than 80 feet (24.4 m) with a maximum rectangle length-to-width ratio of 3:1. Rectangles shall be permitted to be skewed to accommodate diagonal walls.

TABLE AR102.3.2
REQUIRED LENGTH OF BRACING ALONG EACH SIDE OF A CIRCUMSCRIBED RECTANGLE [a,b,c,d]

WIND SPEED	EAVE-TO RIDGE HEIGHT (FEET)	NUMBER OF LEVELS ABOVE [e]	REQUIRED LENGTH (FEET) OF BRACING ON ANYSIDE OF RECTANGLE							
			Length of perpendicular side (ft)[f]							
			10	20	30	40	50	60	70	80
115	10	None	2.0	3.5	5.0	6.0	7.5	9.0	10.5	12.0
		One story	3.5	6.5	9.0	12.0	14.5	17.0	19.8	22.6
		Two stories	5.0	9.5	13.5	17.5	21.5	25.5	29.2	33.4
	15	None	2.6	4.6	6.5	7.8	9.8	11.7	13.7	15.7
		One story	4.0	7.5	10.4	13.8	16.7	19.6	22.9	26.2
		Two stories	5.5	10.5	14.9	19.3	23.7	27.5	32.1	36.7
	20	None	2.9	5.2	7.3	8.8	11.1	13.2	15.4	17.6
		One story	4.5	8.5	11.8	15.6	18.9	22.1	25.8	29.5
		Two stories	6.2	11.9	16.8	21.8	27.3	31.1	36.3	41.5
130	10	None	2.5	4.0	6.0	7.5	9.5	11.0	12.8	14.6
		One story	4.5	8.0	11.0	14.5	18.0	21.0	24.5	28.0
		Two stories	6.0	11.5	16.5	21.5	26.5	31.0	36.2	41.4
	15	None	3.4	5.2	7.8	9.8	12.4	14.3	16.7	19.1
		One story	5.2	9.2	12.7	16.7	20.7	24.2	28.2	32.2
		Two stories	6.6	12.7	18.2	23.7	29.2	34.1	39.8	45.5
	20	None	3.8	5.9	8.8	11.1	14.0	16.2	18.9	21.6
		One story	5.9	10.4	14.4	18.9	23.4	27.3	31.8	36.3
		Two stories	7.5	14.4	20.6	26.8	33.0	38.5	44.9	51.3
140	10	None	3.0	5.0	7.0	9.0	11.5	13.3	15.5	17.5
		One story	5.0	9.5	13.5	17.5	21.5	25.5	29.5	34.0
		Two stories	7.5	14.0	20.0	26.0	32.0	37.5	44.0	50.0
	15	None	4.2	6.3	9.5	11.9	15.0	17.3	20.2	23.1
		One story	6.3	11.2	15.4	20.2	25.0	29.3	34.2	39.1
		Two stories	8.0	15.4	22.0	28.7	35.3	41.3	48.2	55.1
	20	None	4.6	7.2	10.6	13.4	16.9	19.6	22.9	26.2
		One story	7.2	12.6	17.4	22.9	28.3	33.0	38.5	44.0
		Two stories	9.1	17.4	24.9	32.4	39.9	46.6	54.4	62.2

For SI: 1 ft = 305 mm; 1 mph = 1.61 km/h

a. Interpolation shall be permitted; extrapolation shall be prohibited.

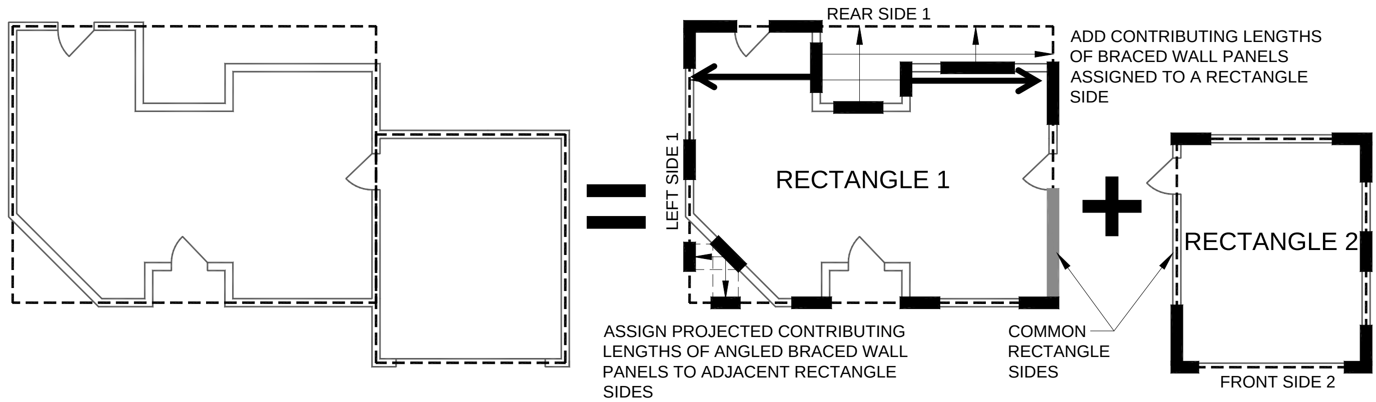
b. For Exposure Category C or D, multiply the required length of bracing by a factor of 1.3 or 1.6, respectively.

c. For wall heights other than 10 ft (3.05 m), multiply the required length of bracing by the following factors: 0.90 for 8 feet (2.44 m), 0.95 for 9 feet (2.74 m), 1.05 for 11 feet (3.35 m) and 1.10 for 12 feet (3.66 m).

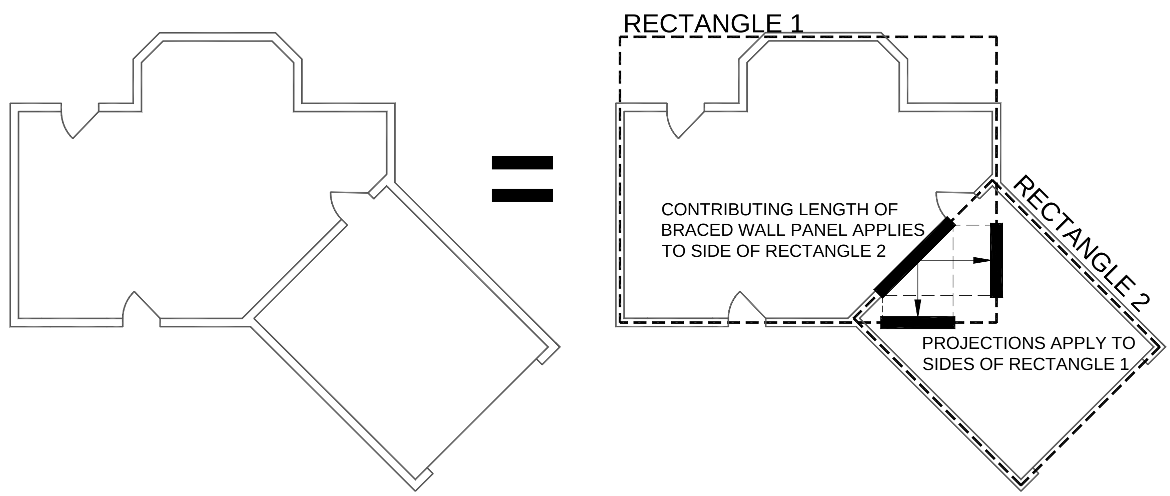
d. Where minimum ½" gypsum wall board interior finish is not provided, the required bracing amount for the affected rectangle side shall be multiplied by 1.40.

e. A floor, habitable or otherwise, contained wholly within the roof rafters or roof trusses need not be considered a story for purposes of determining wall bracing provided the eave to ridge height does not exceed 20 feet (6.10 m).

f. Perpendicular sides to the front and rear sides are the left and right sides. Perpendicular sides to the left and right sides are the front and rear sides.



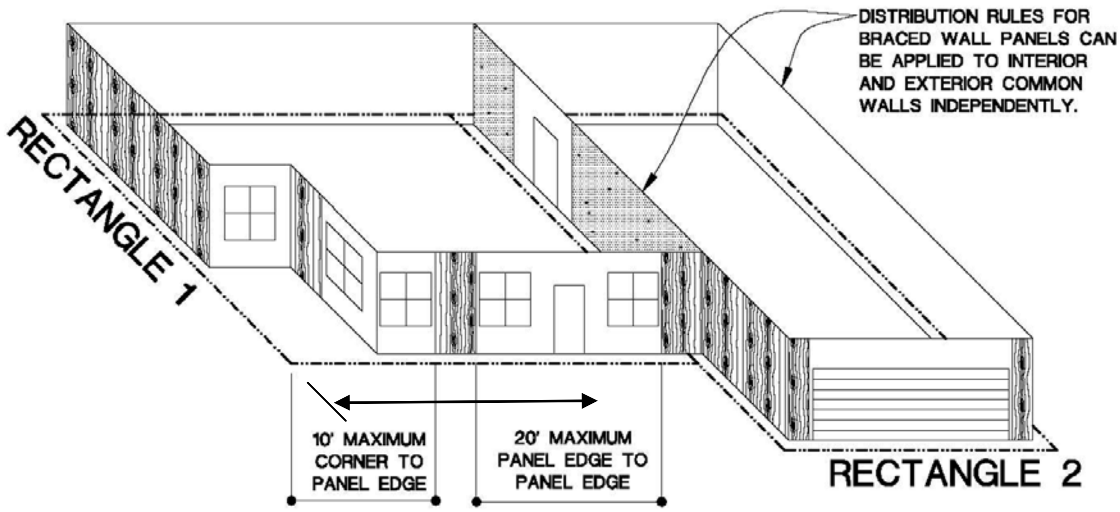
(a) Regular Floor Plan



(b) Skewed Floor Plan

FIGURE AR102.3(2)
ASSIGNMENT OF BRACED WALL PANELS
CIRCUMSCRIBED RECTANGLE SIDES[a,b,c]

a. Projected contributing lengths of angled braced wall panels shall be assigned to the closest rectangle sides.
b. Where multiple rectangles share a common side or sides, as shown in Figure AR102.3(2)(a), the total required length of bracing on the common side shall equal the sum of the required lengths from each of the shared rectangle sides.
c. Braced wall panels located on a common wall where skewed rectangles intersect, as shown in Figure AR102.3(2)(b), shall have their contributing length applied towards the required length of bracing for the parallel rectangle side and its projected contributing lengths towards the adjacent skewed rectangle sides. Where the common side of rectangle 2 as shown in Figure AR102.3(2)(b) has no physical wall, the portion shall be designed in accordance with Section AR102.4.



For SI: 1 ft = 304.8 mm

FIGURE AR102.3(3)
DISTRIBUTION OF BRACED WALL PANELS[a,b,c,d]

a. A braced wall panel complying with Table AR102.1(1) shall be located on each elevation view within 10 feet (3.05 m) of the corners of circumscribed rectangles. Only qualified braced wall panel locations are shown; CS-WSP or CS-SFB sheathing shall be applied to all sheathable surfaces of the wall, including areas above and below wall openings.
b. The distance between adjacent edges of braced wall panels shall be no more than 20 feet (6.10 m) as measured along the rectangle side.
c. A minimum 24-inch-wide CS-WSP or 32-inch-wide CS-SFB panel shall be located on each side of inside and outside corners or an 800 lb rated tie-down shall be fastened to the edge of the braced wall panel closest to each corner.
d. Interior and exterior wall segments which contribute to the common sides of multiple rectangles shall be permitted to apply the distribution requirements given above to each wall segment independently.

AR102.4 Wall bracing by engineered design. Designs using bracing materials and methods listed in Table AR102.1(1) or approved alternative materials and methods shall be permitted and shall comply with accepted engineering practice. Accepted engineering practice shall include the following:

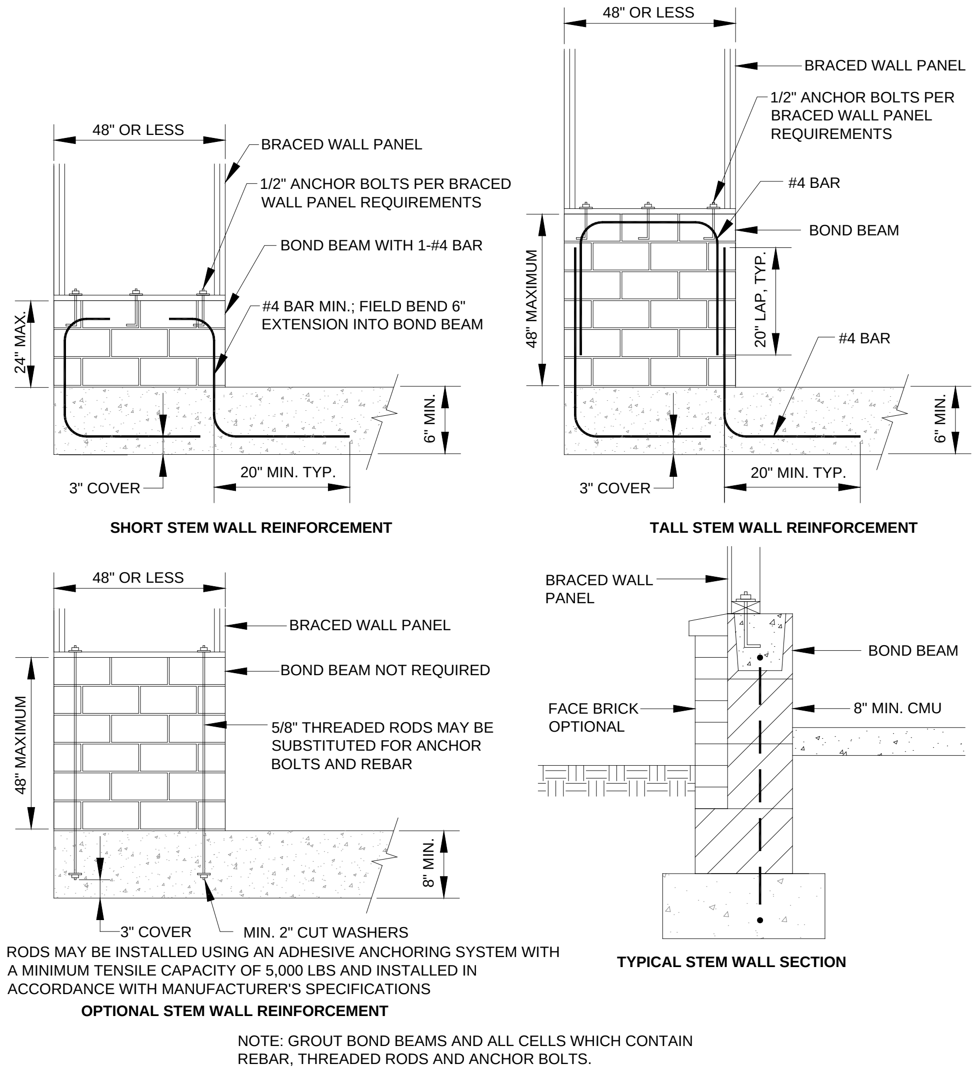
1. Design in accordance with Section R301, or
2. Design equivalent to the analysis basis and scope of the prescriptive provisions of Section R602.10 of the *International Residential Code*, including determination of design loads, design unit shear values, and bracing amounts.
3. Design based on the bracing manufacturer's approved design data and installation instructions.

AR102.5 Load path details. Construction shall comply with applicable detailing requirements of this section to ensure an adequate continuous load path for transfer of bracing loads and uplift loads from the roof to the foundation.

AR102.5.1 Wind uplift load path. Framing connections to transfer roof uplift forces shall comply with Section R602.3.5 and Section R802.11 of the *International Residential Code*.

AR102.5.2 Foundation anchorage. Braced wall panels shall be connected to the foundation per Section R403.1.6 of the *International Residential Code* and as required in Figure AR102.1 for portal frames (Method PF).

AR102.5.3 Masonry or concrete pedestals. Masonry or concrete stem walls with a length of 48 inches (1220 mm) or less supporting braced wall panels shall be reinforced in accordance with Figure AR102.5.3. Concrete stem walls shall be 6" nominal minimum thickness.



For SI: 1 in=25.4 mm

FIGURE AR102.5.3
MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

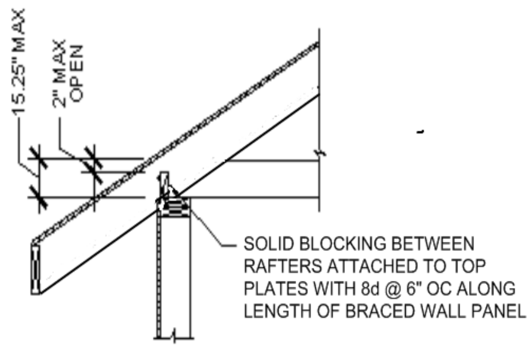
AR102.5.4 Blocking of floor framing. Where parallel to floor framing, braced wall panels shall be connected to a band, rim or header joist, floor framing or perpendicular full-height solid blocking between floor framing at 16 inches (406 mm) on center. Where perpendicular to floor framing, braced wall panels shall be connected to full-height solid blocking between floor framing. Attachments shall be in accordance with Table R602.3(1) of the *International Residential Code*. Manufactured lumber or truss blocking panels shall be permitted to substitute for full-height solid blocking.

AR102.5.5 Blocking of roof framing. Where parallel to roof framing, braced wall panels shall be connected to a band, rim or header joist, or roof truss. Where perpendicular to roof framing, the top plates of exterior braced wall panels shall be connected to the rafters or roof trusses above in accordance with Table AR102.5.5 and fastened in accordance with Table R602.3(1) of the *International Residential Code*.

TABLE AR102.5.5
BRACED WALL PANEL CONNECTIONS TO PERPENDICULAR ROOF FRAMING

DISTANCE FROM TOP OF BRACED WALL PANEL TO TOP OF RAFTER OR ROOF TRUSS, (in)	REQUIREMENT	REFERENCED FIGURE
≤ 9.25	No blocking required	NA
9.25 – 15.25	Solid 2x blocking between rafters or trusses	AR102.5.5(1)
15.25 – 48	Vertical blocking panels	AR102.5.5(2)
> 48	Designed in accordance with accepted engineering practice	NA

For SI: 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm

FIGURE AR102.5.5(1)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR TRUSSES

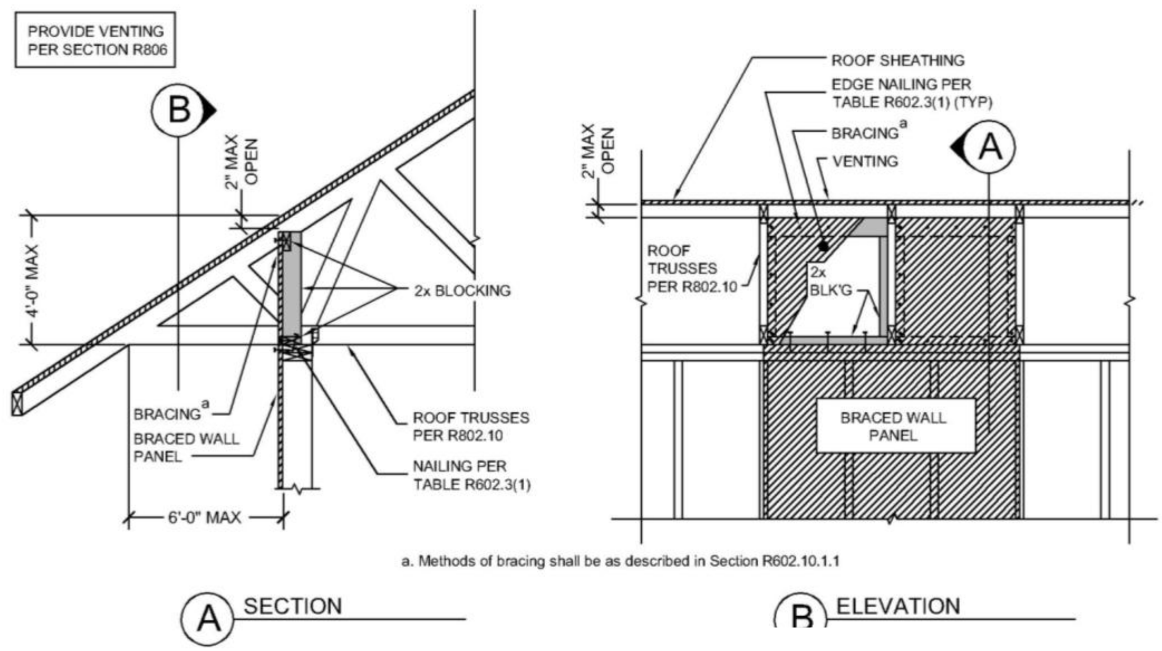


FIGURE AR102.5.5(2)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

AR102.5.6 Cripple walls and framed walls of walk-out basements. The required length of bracing for cripple walls with a maximum height of 48 inches (1220 mm) or less along its entire length shall be equal to the wall above. The required length of bracing for cripple walls with a height greater than 48 inches (1220 mm) at any location along its length and for framed walls of a walk-out basement shall be determined in accordance with Section AR102.2 or AR102.3, considering the cripple wall or walk-out basement as an additional story. As an alternative, the required length of bracing shall be permitted to equal the length required for the wall above multiplied by a factor of 1.15.

AR102.5.7 Open Elevated Foundations. Open elevated foundations, such as pile foundations shall be constructed to transfer all lateral loads from the wall bracing system to the piles or elevated piers, including shears, overturning, and uplift loads. Piles or elevated piers along with their foundations shall be sized and/or embedded to transfer all lateral loads imposed by the wall bracing system to the ground.

AR102.5.8 Balloon frame wall bracing. Balloon frame walls shall have a maximum height of two stories unless constructed in accordance with an approved design. Wall framing shall be continuous from lowest floor to the wall top plate at the roof. Braced wall panels shall extend to the full-height of the balloon frame wall. All edges of sheathing shall be supported on and fastened to blocking or framing. The required brace wall panel length assigned to the balloon frame wall shall be based on the bracing required for the lowest floor level supporting the balloon frame wall as determined in accordance with Section AR102.2 or Section AR102.3. For balloon framed walls having a maximum height of two stories and a maximum length of 12 feet (3.66 m), braced wall panels shall be permitted to be placed parallel to the balloon framed wall on each side and at each story adjacent to the balloon framed wall, and no bracing shall be required for the balloon frame wall portion. Two story interior open ceiling areas shall not extend into the building from the balloon frame wall more than one-half the distance to the opposite building side unless bracing around the opening in the floor diaphragm is designed in accordance with Section AR102.4.

Commenter's Reason: The original proposal is revised based on feedback and direction provided at the first hearing by the code development committee and constructive testimony. The revisions in the public comment are non-technical and only reformat the original proposal and coordinate with other proposals regarding use of ultimate design wind speeds. The existing 2012 IRC bracing provisions remain unchanged and the proposed new simplified bracing provisions are provided as a non-mandatory appendix. States and localities that qualify for use of these provisions can adopt and modify them on an as needed basis to find relief from the complexity of current IRC provisions. Having the appendix will also afford the opportunity for future improvements without constantly changing the provisions in the code that challenge the ability for code users to keep up. The technical justification for the original RB329-13 proposal and this public comment is documented in the proposal agenda for the first hearing.

RB329-13
Final Action: AS AM AMPC____ D

RB337-13
R612.1

Proposed Change as Submitted

Proponent: Jeff Inks, Window and Door Manufacturers Association

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior window<u>s</u> and door<u>s</u> installed in wall<u>s</u>. Windows and doors shall be installed ~~and flashed~~ in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: The intent of this proposal is to clarify that flashing requirements for window and door assemblies are provided exclusively in Chapter 7, Section 703.8. The proposal also corrects conflicting language with 703.8 which expressly allows the use of flashing installation alternatives in addition to the window or door manufacturer's installation instructions when applicable.

In addition this proposal provides an editorial correction by making "door", "window", and "wall" in the first sentence plural.

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

R612.1 #1-RB-INKS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The fenestration manufacturer's written instruction for flashing is needed in addition to the Section R703.8 provisions.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Jeff Inks, Window & Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: The committee's action does not address the intent of the proposal which is to correct the conflict that currently exists in the IRC between Section 612.1 and Section 703.8. As stated in the proposal, flashing requirements for window and door assemblies are provided exclusively in Chapter 7, Section 703.8. Maintaining "and flashed" in section 612.1 is counter to the intent of Section 703.8 and needs to corrected as proposed.

Section 703.8 allows necessary options for flashing to be installed in accordance with the flashing manufacturer's installations instructions for applications not covered by the fenestration manufacturer's instructions. It also provides two additional options, which are either in accordance with a method of registered design professional or other approved materials. Those provisions were approved in the last cycle but the term "flashing" was not removed from Section 612.1 creating the conflict.

Regarding the committee's statement (and reason for disapproval) that the fenestration manufacturers flashing installation instructions are needed in addition to the Section 703.8, manufacturers must still provide them in addition to the provisions of Section 703.8 which provide builders with much greater flexibility.

We therefore urge approval as submitted.

Public Comment 2:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: RB337 removes a redundant requirement in Section R612.1 for the flashing of windows and exterior doors. The requirement that windows and doors are to be flashed in accordance with the fenestration manufacturer's installation instructions is redundant to the criteria of Section 703.8, which is also referenced in Section R612.1. The redundancy is confusing and introduces the possibility for conflict within the IRC.

Section R703.8 requires flashing to be installed in accordance with the fenestration manufacturer's installation and flashing instructions. Applications not addressed in the fenestration manufacturer's instructions are to be flashed in accordance with the flashing manufacturer's instructions. If installation instructions are not provided by the fenestration or flashing manufacturer, window and door openings are to be flashed in accordance with the flashing design or method of a registered design professional, or in accordance with other approved methods.

Section R703.8 further specifies that where flashing instructions or details are not provided by the fenestration or flashing manufacturer, pan flashing shall be installed at the sill of exterior window and door openings. Specific details on the manner in which pan flashing is to be installed, if used, are given in Section R703.8.

Finally, Section R703.8 specifies that flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. The charging paragraph of Section R703.8 specifies that all flashing shall be corrosion resistant, and shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. It further specifies that self-adhered membranes used as flashing shall comply with AAMA 711 and that the flashing shall extend to the surface of the exterior wall finish.

The provisions of Section R703.8 have been carefully crafted to provide to the appropriate flashing of exterior wall fenestration. Reference to other requirements in Section R612.2 serve no purpose, and have the potential to create confusion. It is also possible that the code user may never get to Section 703.8 if they only look for the installation instructions provided by the fenestration manufacturer. If that occurs, the window installation may not be done correctly and serious problems with water penetration into the exterior wall cavity can occur.

For this reason it is important that the redundant requirement for flashing of exterior windows and doors in accordance with the fenestration manufacturer's installation instructions be removed. Its removal will then point the code user to Section 703.8 for the flashing of exterior windows and doors, where much more complete provisions abide.

RB337-13

Final Action: AS AM AMPC____ D

RB338-13
R612.1

Proposed Change as Submitted

Proponent: Jeff Inks, Window and Door Manufacturers Association

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's ~~written~~ published installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: This proposals provides an editorial correction by making "door", "window", and "wall" in the first sentence plural and in addition replaces the term "written" with "published" given manufacturers provide installation instructions in both printed and electronic format which can also be printed by the user. The term "published" more clearly reflects how installation instructions are being provided by manufacturers.

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

R612.1 #2-RB-INKS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The installation instructions from the manufacturer needs to be included with the windows and door just like other manufactured components.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jeff Inks, Window & Door Manufacturers Association, and Julie Ruth JRuth Code Consulting, representing American Architectural Manufacturers Association request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R612.1 General. This section prescribes performance and construction requirements for windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's published installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. ~~Written~~ Published installation instructions shall be provided by the fenestration manufacturer for each window or door.

Commenter's Reason:

(Inks): The modification in this public comment reflects the revisions proposed in the original proposal and also replaces "Written" with "Published" in the last sentence for consistency (which should have been included in the original proposal).

The primary intent of the original proposal is to replace the term "written" with "published" given manufacturers provide installation instructions in both printed and electronic format which can also be printed by the installer. Manufacturers must still and do provide installation instructions for all of their products. The term "published" more clearly reflects how installation instructions are being provided by manufacturers, and can avoid multiple copies of the same installation instructions for the same windows or doors on the job site which ultimately are not used and become a waste.

The other intent of the original proposal is to make an editorial correction in the first sentence by making “door”, “window”, and “wall” in the first sentence plural and we also maintain that intent.

(Ruth): The intent of RB338 was to permit the use of installation instructions that are published, such as on a website, rather than require written installation instructions to be provided.

The proposal was disapproved by the IRC Code Change committee at the Code Development Hearings. Some committee members expressed concern regarding obtaining installation instructions off of a website.

In reality, however, it is much easier and faster to obtain information off of a fenestration manufacturer’s website than it is to obtain printed copies of their installation instructions direct from the manufacturer if the original copy of the instructions is in any way misplaced or damaged in transit from the manufacturer’s facility to the distributor’s warehouse to the jobsite. For example, a simple Google search for “windows installation instructions” yields installation instructions for a number of major North American fenestration manufacturers. If the name of the fenestration manufacturer is included in the search the results are more specific to that particular manufacturer’s product. Instructions received in this manner can easily be distributed to all concerned interested parties, including the installer and the code official, without the need to first obtain a single printed copy from the manufacturer, then have multiple copies made and then distributing them by hand.

This Public Comment replaces “written” with “published” in the last sentence of Section R612.1. This modification would provide for consistency with the proposed change to the second sentence of the same section.

RB338-13

Final Action: AS AM AMPC____ D

RB-339-13
R612.1, R612.2, R612.3

Proposed Change as Submitted

Proponent: Julie Ruth/JRuth Code Consulting, representing American Architectural Manufacturers Association (julruth@aol.com)

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior window and door <u>assemblies</u> installed in wall<u>s</u>. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

R612.2 Performance. Exterior window~~s~~ and door~~s~~ <u>assemblies</u> shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3).

R612.3 Testing and labeling. Exterior window~~s~~ and sliding door <u>assemblie</u>s shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged door <u>assemblie</u>s shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5.

Reason: This proposal clarifies that the performance of the entire window or door assembly must be evaluated to determine compliance with the IRC. Window and door assemblies include the frame, hardware, weather stripping, thresholds, etc as well as the sash (window) or door slab (door). Only by evaluating the entire assembly can it be determined if the opening provides appropriate resistance to wind load, water penetration and air leakage.

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

R612.1-RB-RUTH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Many window and door assemblies are site assembled. This would require testing of site assembled fenestration which is not practical.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior ~~windows and~~ door assemblies<u> and windows </u>installed in walls. ~~Windows and d~~<u>D</u>oor~~s~~ <u>assemblies and windows </u>shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. ~~Window and d~~Door and window openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each door assembly or window ~~or door~~.

R612.2 Performance. Exterior ~~windows and~~ door~~s~~ assemblies and windows shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3).

R612.3 Testing and labeling. Exterior ~~windows and~~ sliding door assemblies and windows shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged door assemblies shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5.

Commenter's Reason: The intent of the original proposal, and this Public Comment, is to clarify that the entire door assembly must be evaluated to determine compliance with code section R612 of the IRC.

During the Dallas CDH there was confusion as to whether the word "assembly" would also apply to windows, and if so, to what extent should other components such as window seats, awnings, etc. be considered part of that assembly?

It was not the intent of the original proposal to require "window assemblies" to be evaluated. The word "window" is understood to mean the assembly of all the components that go into the makeup of a window, including glazing, framing, hardware and sills. Therefore clarification is not needed, and there is a risk that applying it to windows in this section could have the unintended consequences of applying the criteria to components that were not intended.

This Public Comment alters the order in which "windows and doors" appears in the applicable sections. This modification clarifies that the word "assemblies" is only intended to be applied to doors, and not both windows and doors.

The same intent as occurs with "windows" is not as clear with regards to the word "door" in this section. Although the standards referenced by this section clearly intend that the entire door assembly, including door slab, hardware, framing and sill, be evaluated to determine compliance, there is a common misinterpretation of this section that evaluation of the entire assembly is not currently required.

At the present time Section R612.3 of the IRC requires exterior sliding doors to be tested and labeled in accordance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side hinged doors are to be tested and labeled in accordance with this same standard, or comply with Section R612.5. Section R612.5 requires exterior door assemblies that are outside the scope of Section R612.3 to be tested in accordance with ASTM E330.

AAMA/WDMA/CSA 101/I.S.2/A440 requires the testing of the entire door assembly to determine the design pressure rating as well as the air and water penetration resistance of that assembly.

Section R612.5 requires the door assembly to be tested in accordance with ASTM E330 only, to determine its design pressure rating. The test method provided in ASTM E330 is for testing of a fenestration assembly – whether a door, window, curtainwall or storefront system.

During the Dallas CDH RB340 was approved by the IRC Building Committee. If upheld at the FAH, RB340 will add reference to ANSI/AMD 100-13 to Section R612.3. Specifically, R612.3 will then require exterior side-hinged doors to be tested and labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100, or comply with Section R612.5.

ANSI/AMD 100-13 also requires evaluation of the door assembly for compliance with Section R612.3. ANSI/AMD 100 – 13 requires structural testing of the entire door assembly to ASTM E330 to achieve an initial rating, and retesting of the entire assembly if more than one component is substituted into the assembly.

Section 7.3 of ANSI/AMD 100-13 states that "verification of the construction and performance of the originally rated door system shall be required before any component substitution can take place. Components considered for substitution shall be tested in an assembly that uses the same interactive components, anchorage, and installation as the rated door system as defined in the component evaluation sections of this standard."

The requirements in each of these standards (AAMA/WDMA/CSA 101/I.S.2/A440, ASTM E330 and ANSI/AMD 100-13) points to the need to consider the entire door assembly when evaluating the door's capability of maintaining the integrity of the exterior wall in which it occurs. The entire door system includes not just the slab, but attachment hardware such as hinges, locks and latches, as well as thresholds, sills and framing. Change to any one of these can alter how well the integrity of the opening is maintained during severe wind events. For this reason, component substitution must be reviewed on a component by component basis, with consideration of the entire assembly into which the component is being proposed for substitution.

AAMA believes it is important that the inspecting code official be aware of the need to evaluate the entire door assembly in determining compliance with this section. This Public Comment emphasizes that need, and we urge its approval.

RB339-13

Final Action: AS AM AMPC____ D

RB340-13
R612.3, Chapter 44

Proposed Change as Submitted

Proponent: Jessica Ferris, Association of Millwork Distributors (jferris@amdweb.com)

Revise as follows:

R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100, or comply with Section R612.5.

Add new standard to Chapter 44 as follows:

AMD Association of Millwork Distributors
10047 Robert Trent Jones Parkway
New Port Richey, FL 34655-4649

AMD 100 - Structural Performance Rating of Side-Hinged Exterior Door Systems and Procedures for Component Substitution

Reason: The purpose of this proposed code change is to add a new standard to this section of the code, which provides manufacturers of side-hinged exterior doors the option to certify to a structural standard that includes procedures for component substitution.

Incorporating reference to the AMD 100 standard in Section 612.3 will provide producers of side-hinged exterior door systems (SHEDS) with an acceptable alternative method for testing and labeling structural performance requirements. AMD 100 allows for the interchange or substitution of components while maintaining a structurally rated system, which eases the burden of having to test each door configuration assembled for the marketplace. Like AAMA/WDMA/CSA 101/I.S.2/A440, AMD 100 utilizes the ASTM E330 test method for obtaining design pressure ratings of SHEDS.

SHEDS have requirements that are quite different from exterior windows and sliding doors, and as such, have different considerations. The door industry is comprised of not only manufacturers but also smaller distributor and pre-hanger companies, dealers, and builders that purchase their door components from multiple suppliers and interchange these components in their systems regularly depending on customer needs. AMD 100 upgrades SHEDS without negatively affecting this supply chain.

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

Analysis: A review of the standards proposed for inclusion in the code, AMD 100 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R612.3-RB-FERRIS.doc

Committee Action Hearing Results

For staff analysis of the content of AMD 100 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The issue of component substitution for tested side hinged exterior door has been a controversy for years. Industry now has an ANSI approved standard to address this and it is now needed in the code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or ANSI/AMD 100, or comply with Section R612.5.

Add new standard to Chapter 44 as follows:

AMD Association of Millwork Distributors
10047 Robert Trent Jones Parkway
New Port Richey, FL 34655-4649

ANSI/AMD 100 - 13 - Structural Performance Rating of Side-Hinged Exterior Door Systems and Procedures for Component Substitution

Commenter's Reason: The proposal, as submitted, does not specify the edition of AMD 100 that is to be considered for reference in the 2015 IRC. There are multiple editions of AMD 100 currently in circulation. Most notable of those are AMD 100 – 12, and ANSI AMD 100 – 13. It is not clear which edition of the standard was reviewed and approved by the IRC – Building Code Change Committee.

There are significant differences between AMD 100 -12 and ANSI/AMD 100 – 13. The methodology used in AMD 100 – 12 to determine the design pressure rating of exterior side hinged doors is significantly flawed. If put into practice it will lead to failures of exterior door systems. Although AAMA still has some concerns with some aspects of ANSI/AMD 100-13, overall the methodology provided in this edition of the standard is a significant improvement over that provided in AMD 100 – 12, and previous versions of that standard. Therefore, if the 2015 IRC is to reference AMD 100 for the design pressure rating of exterior side hinged doors, it is critical that the correct edition of the standard be referenced.

The earlier editions of the standard – AMD 100 – 12 and previous editions, permitted the design pressure rating of an exterior side hinged door assembly to be determined strictly based upon the design pressure rating of the individual components in the assembly. AAMA has determined through testing that this methodology does not work. Specifically, variation from the mean of as much as 37% was witnessed when assemblies constructed of components with the same design pressure rating were tested in accordance with ASTM E330.

ANSI/AMD 100 – 13 requires the entire door assembly to be tested first, and then permits the substitution of individual components into the assembly in a controlled and prescribed manner. This is similar to the approach taken by AAMA in its program to certify doors to AAMA/WDMA/CSA 101/I.S.2/A440.

We believe this is the appropriate approach to be taken in the evaluation of exterior side hinged doors. This Public Comment clarifies that the edition of AMD 100 to which the exterior side hinged door is to be tested and labeled in ANSI/AMD 100 – 13.

RB340-13

Final Action: AS AM AMPC____ D

RB347-13

R613.3.1, R613.3.7 (NEW), Figure R613.5(1), Table R613.5(1), Figure R613.5(2), Table R613.5(2), Figure R613.5(3), Figure R613.5(4), Figure R613.5(5), R613.5.3 (NEW), R613.5.4 (NEW), Figure R613.5.1, Figure R613.5.2, Figure R613.8, R613.8, R613.9, Figure R613.9, R613.10, Table R613.10, R613.10.1

Proposed Change as Submitted

Proponent: Stephen Kerr S.E., Josephson Werdowatz and Associates, Inc., representing self

Revise as follows:

R613.3.1 Core. The core material shall be composed of foam plastic insulation meeting one of the following requirements:

1. Expanded Polystyrene (EPS) in accordance with ASTM C 578 and have a minimum density of 0.90 pounds per cubic feet (14.4 kg/m^3); or
2. Extruded polystyrene (XPS) in accordance with ASTM C 578 and have a minimum density of 1.3 pounds per cubic feet (14.4 kg/m^3); or
~~2~~3. Polyurethane meeting the physical properties shown in Table R613.3.1, or;
~~3~~4. An *approved* alternative.

All cores shall meet the requirements of Section R316.

R613.3.7 Thermal Barrier. SIP walls shall be separated from the interior of a building by an *approved* thermal barrier in accordance with section R316.4.

R613.5.3 Panel to panel connection. SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.5.3 or by other *approved* methods.

R613.5.4 Corner framing. Corner framing of SIP walls shall be constructed in accordance with Figure R613.5.4.

~~**R613.5.3**~~ **R613.5.5 Wall bracing.** SIP walls shall be braced in accordance with Section R602.10. SIP walls shall be considered continuous wood structural panel sheathing for purposes of computing required bracing. SIP walls shall meet the requirements of Section R602.10.4.2 except that SIPs corners shall be fabricated as shown in Figure R613.9. When SIP walls are used for wall bracing, the SIP bottom plate shall be attached to wood framing below in accordance with Table R602.3(1).

~~**R613.8 Connection.** SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.8 or by other *approved* methods.~~

~~**R613.9 Corner framing.** Corner framing of SIP walls shall be constructed in accordance with Figure R613.9.~~

~~**R613.10**~~ **R613.8 Headers.** SIP headers shall be designed and constructed in accordance with Table R613.~~10~~8 and Figure R613.5.1. SIPs headers shall be continuous sections without splines. Headers shall be at least 11 7/8 inches (302 mm) deep. Headers longer than 4 feet (1219 mm) shall be constructed in accordance with Section R602.7.

~~**R613.10.1 Wood structural panel box headers.** Wood structural panel box headers shall be allowed where SIP headers are not applicable. Wood structural panel box headers shall be constructed in accordance with Figure R602.7.2 and Table R602.7.2.~~

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)[a,b,c]

Wind Speed (3-sec gust)		Ground Snow Load (psf)	Building Width (ft)[d]														
			24			28			32			36			40		
			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
Exp A/B	Exp. C		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5.	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 4.5
110	100	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5~~ 4.5
		50	4.5	4.5	4.5	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5
		70	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	6.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	N/A
120	110	20	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5
		30	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~6.5~~ 4.5	~~N/A~~ 4.5
		50	4.5	4.5	~~N/A~~ 4.5	4.5	~~6.5~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5
		70	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

a. N/A = ~~Not Applicable.~~ Design required.

b. Deflection criterion: L/240

c. Design load assumptions:

~~Deflection criteria: L/240.~~

Roof dead load: ~~7~~10 psf.

Ceiling dead load: 5 psf.

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

Strength axis of facing materials applied vertically.

d. Building width is in the direction of horizontal framing members supported by the header.

TABLE R613.5(2)
MINIMUM THICKNESS FOR SIP WALLS SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF (inches)[a,b,c]

Wind Speed (3 – sec gust)		Ground Snow Load (psf)	Building Width (ft)[d]														
			24			28			32			36			40		
			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
Exp A/B	Exp. C		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~N/A~~ 4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 6.5	~~4.5~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5

100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5
		50	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5
		70	4.5	4.5	~~N/A~~ 4.5	4.5	6.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A	N/A
110	100	20	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~6.5~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5
		30	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5
		50	4.5	~~6.5~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A
		70	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	N/A	N/A	N/A	N/A	N/A
120	110	20	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A
		30	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A
		50	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	N/A	N/A	N/A	N/A	N/A
		70	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	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; 1 pound per square foot = 0.0479kPa.

a. N/A = ~~Not Applicable.~~ Design required.

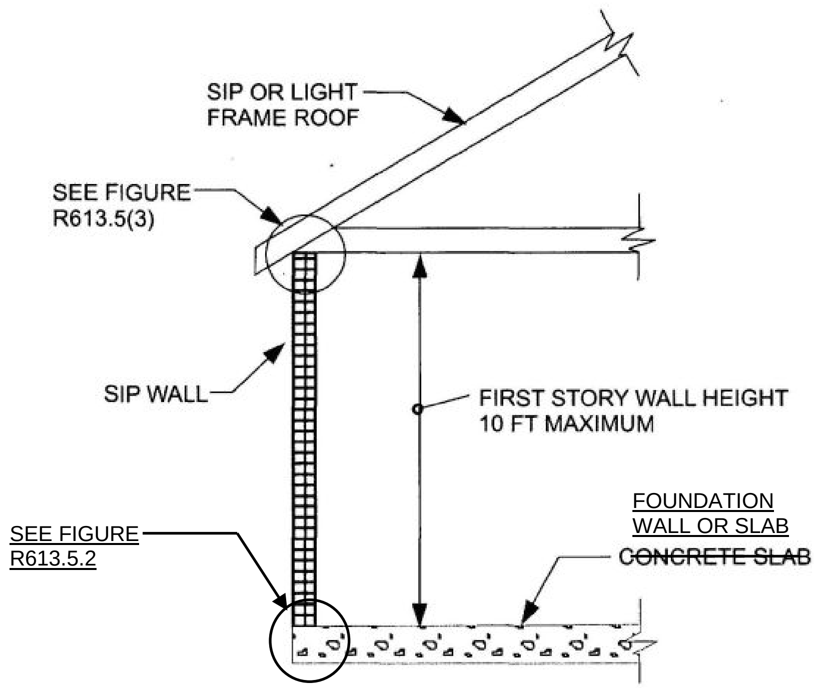
b. Deflection criterion: L/240

c. Design load assumptions:

~~Deflection criteria: *L*/240.~~
Roof dead load: ~~7~~10 psf.
Ceiling dead 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).

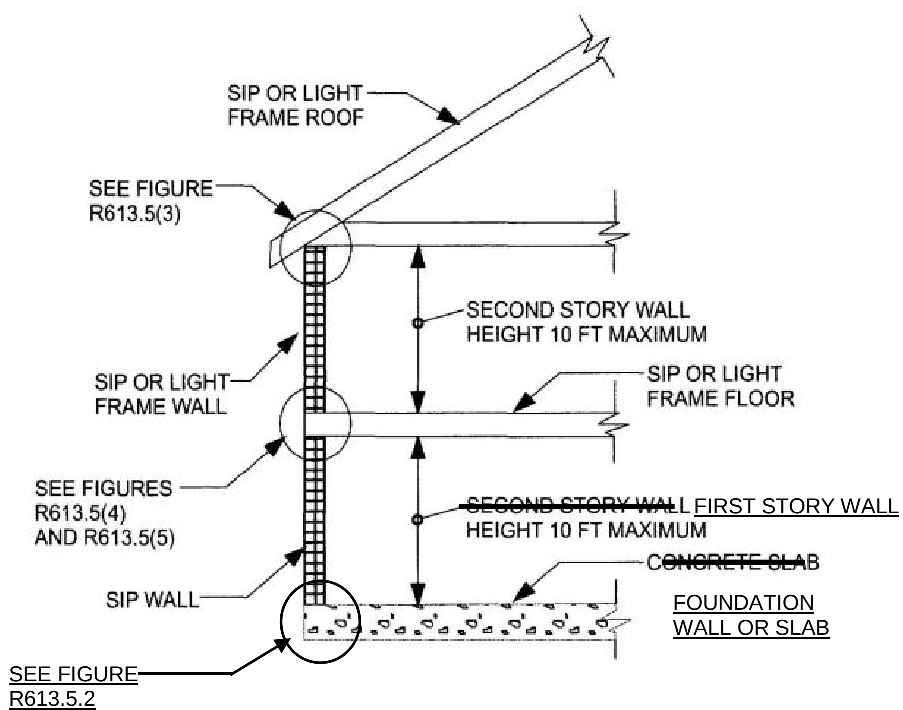
Strength axis of facing materials applied vertically.

d. Building width is in the direction of horizontal framing members supported by the header.



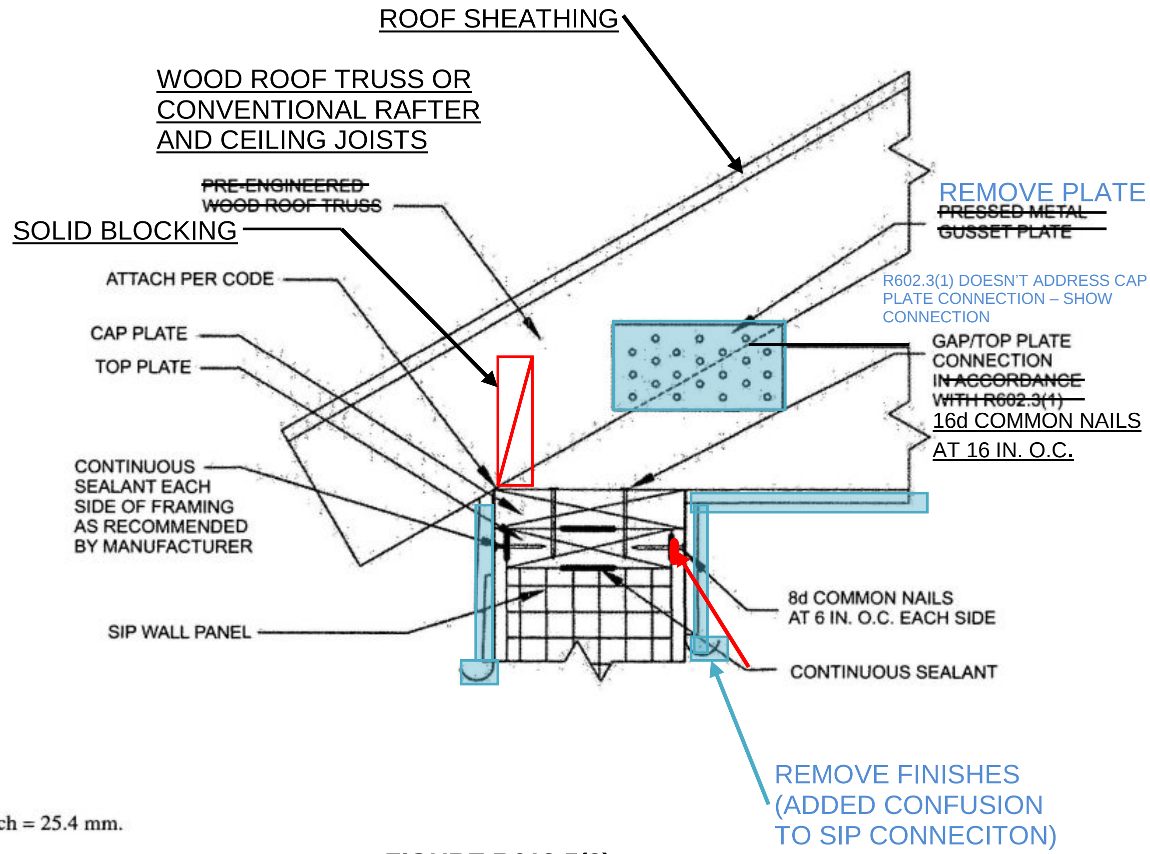
For SI: 1 foot = 304.8 mm.

FIGURE R613.5(1)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS



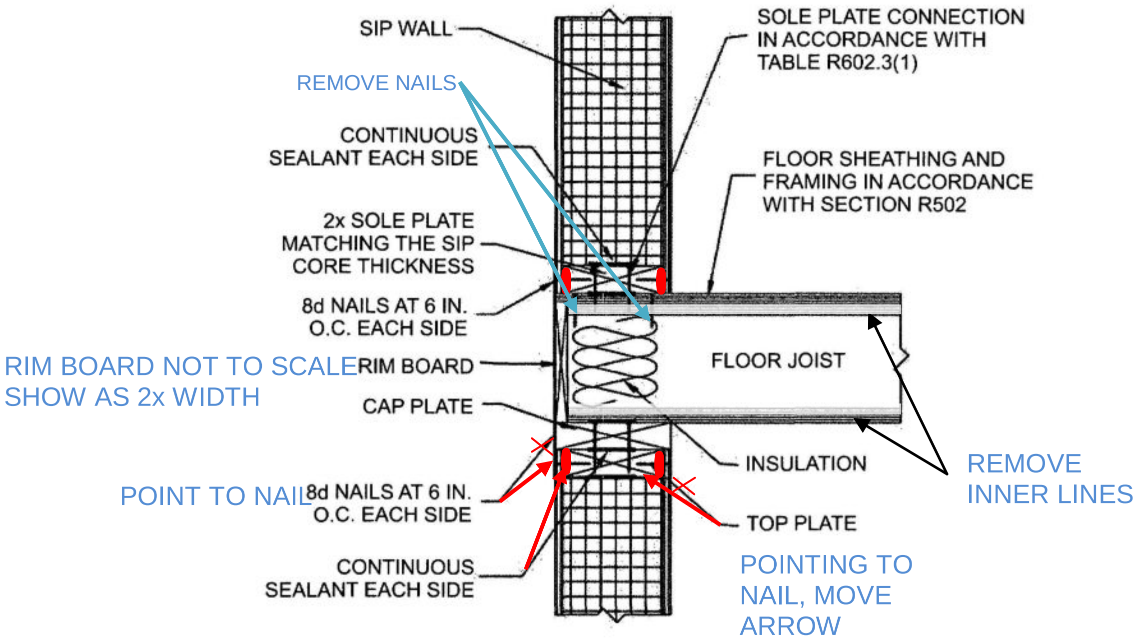
For SI: 1 foot = 304.8 mm.

FIGURE R613.5(2)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS



For SI: 1 inch = 25.4 mm.

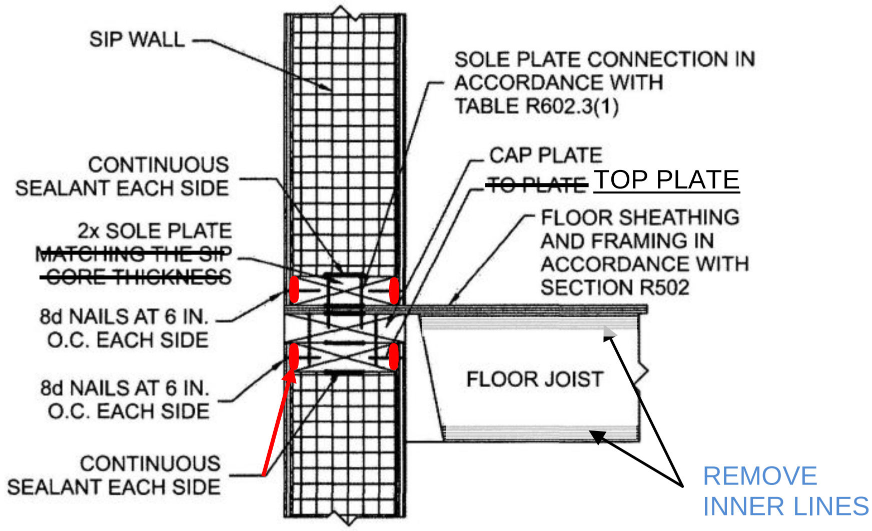
FIGURE R613.5(3)
TRUSSED ROOF TO TOP PLATE CONNECTION



For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Table R602.3(1) and (2) as appropriate.

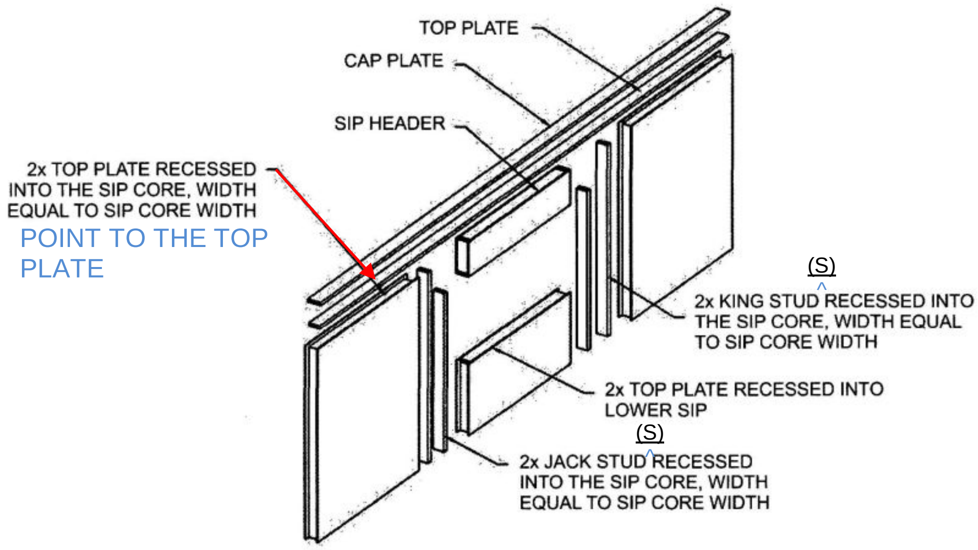
FIGURE R613.5(4)
SIP WALL TO WALL PLATFORM FRAME CONNECTION



For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2), as appropriate.

FIGURE R613.5(5)
SIP WALL TO WALL ~~BALLOON~~ HANGING FLOOR FRAME CONNECTION ~~(I-Joist floor shown for Illustration only)~~



For SI: 1 inch = 25.4 mm.

Notes:

1. Top plates shall be continuous over header.
2. Lower 2x top plate shall have a width equal to the SIP core width and shall be recessed into the top edge of the panel. Cap plate shall be placed over the recessed top plate and shall have a width equal to the SIPs width.
3. SIP facing surfaces shall be nailed to framing and cripples with 8d common or galvanized box nails spaced 6 inches on center.
4. ~~Galvanized nails shall be hot-dipped or tumbled. Framing shall be attached in accordance to Section R602.3(1) unless otherwise provide for in Section R613.~~

ALL

FIGURE R613.5.1
SIP WALL FRAMING CONFIGURATION

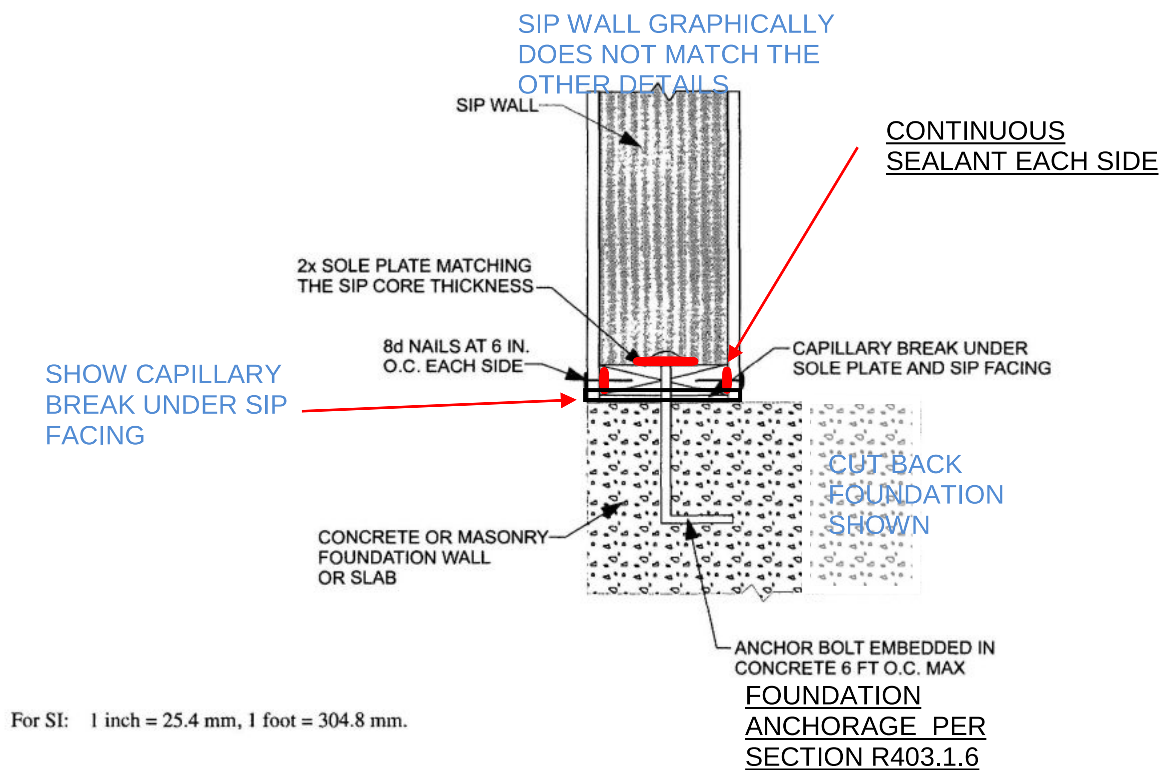
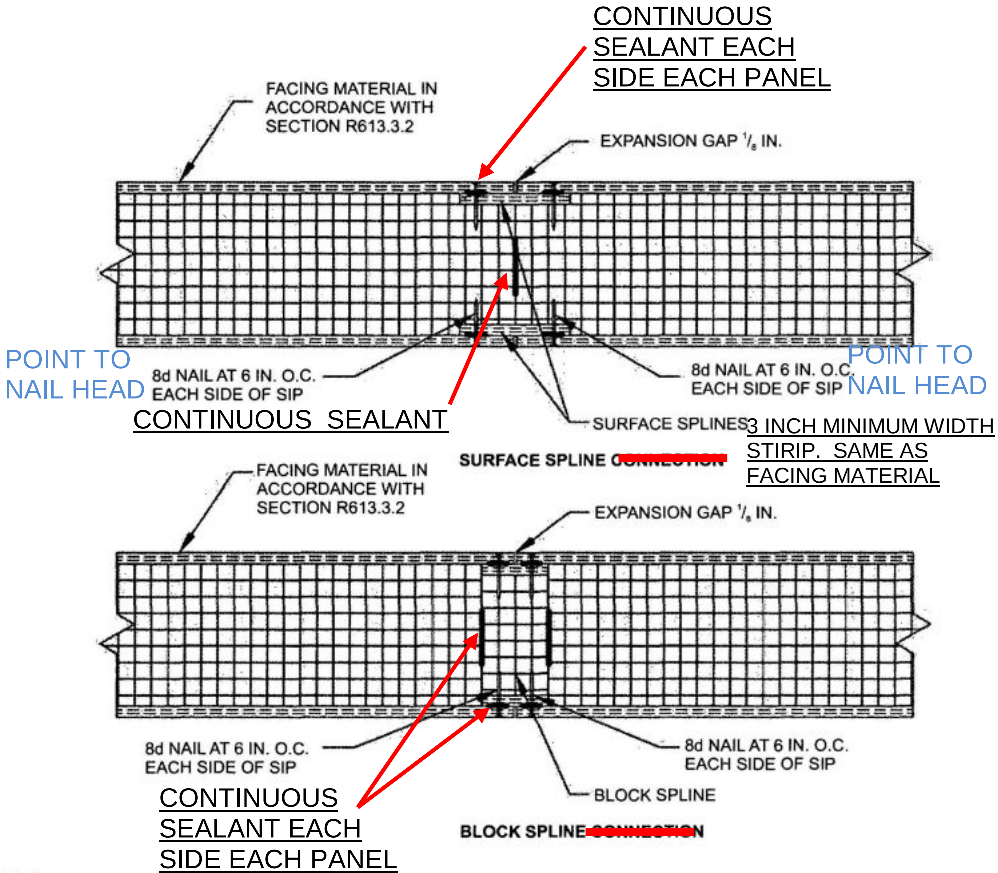
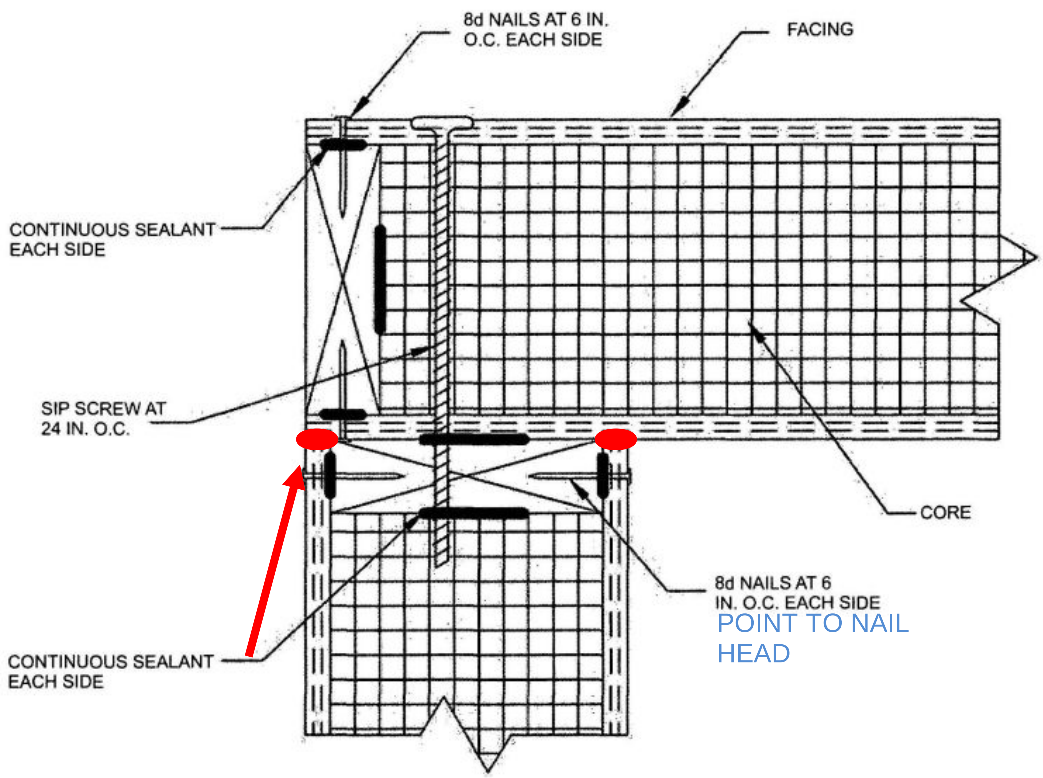


FIGURE R613.5.2
SIP WALL TO CONCRETE SLAB ~~F~~OR FOUNDATION WALL ATTACHMENT



For SI: 1 inch = 25.4 mm.

FIGURE ~~R613.8~~R613.5.3
TYPICAL SIP WALL PANEL TO PANNEL CONNECTION DETAILS ~~FOR VERTICAL IN-PLANE JOINTSPANEL-TO-PANEL CONNECTION~~



For SI: 1 inch = 25.4 mm.

FIGURE ~~R613.9~~R613.5.4
SIP CORNER FRAMING DETAIL

TABLE R613.~~10~~8
MAXIMUM SPANS FOR ~~117/8 INCH DEEP~~ SIP HEADERS (feet)[a, b]

LOAD CONDITION	GROUND SNOW LOAD (psf)	Building width (feet)[c]				
		24	28	32	36	40
Supporting roof only	20	4	4	4	~~4~~ 2	2
	30	4	4	~~4~~ 2	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, 1 pound per square foot = 0.0479kPa.
N/A = ~~Not Applicable.~~ Design required.
a. Deflection criterion: L/240
b. Design load assumptions:
~~Maximum deflection criterion: L/360.~~
~~Maximum r~~Roof dead load: 10 psf.
~~Maximum c~~Ceiling dead load: 5 psf.
~~Maximum s~~Second floor live load: 30 psf.
~~Maximum s~~Second floor dead load: 10 psf.
~~Maximum s~~Second floor dead load from walls: 10 psf.
c. The table provides for roof slopes between 3:12 and 12:12
d. Maximum Roof overhang 24 inches (610mm).
e. Building width is in the direction of horizontal framing members supported by the header.

Reason: The proposal is a reorganization of the entire Structural Insulated Panels (SIPs) section. The intention is to add clarity to the proposal as it is currently written. The original SIP language was based on the HUD document Prescriptive Method for Structural Insulated Panels (SIPs) Used In Wall Systems In Residential Construction. Since the inclusion of SIPs in the IRC, there have been several changes that have revised the SIP requirements, however, in some instances the changes have do not match the language used in other materials (wood, cold formed steel, ect.). Proposed changes are intended to bring the SIPs provisions more in line with the other sections of the IRC.

To Summarize the changes:
- R613.3.1 changes to the core requirements – to bring the specifications from the Structural Insulated Panel Association specifications into the code
- R613.3.7 add thermal barrier requirements from the HUD document into section R613.
- R613.5.3/4 move the connection requirements into the section designated for connections.
- R613.10.1 – remove wood structural headers, since section R602.7 already includes wood structural headers. This section is redundant and not necessary.
- Table 613.5 (1) & (2) – add footnotes to match the presentation of the wood and cold form steel tables. Changes to the values are to bring the thickness from the original HUD document back to the tables.
- Figure changes are editorial and take into account the original HUD and the current Structural Insulated Panel Association detail requirements.
- Table 613.10 header span table, based on the allowable HUD header SIP capacities, revise the allowable spans.

Bibliography: *Prescriptive Method for Structural Insulated Panels (SIPs) Used In Wall Systems In Residential Construction,* U.S. Department of Housing and Urban Development Office of Policy Development and Research, Washington, DC, 2007.

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

R613.3.1-RB-KERR.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Based upon the proponent's request for disapproval. Also, the committee's previous action on RB344-13 clarified some issues. The proponent will work with industry and bring back a public comment.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Stephen Kerr S.E., Josephson Werdowatz and Associates, Inc., representing self, and Edward L. Keith, P.E., APA – The Engineered Wood Association, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R613
STRUCTURAL INSULATED PANEL WALL CONSTRUCTION

R613.1 General. Structural insulated panel (SIP) 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.

R613.2 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 (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall 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 ultimate design wind speed (V_{ult}) of ~~120~~ 155 miles per hour (~~54~~ 69 m/s), Exposure A or B or ~~110~~ 140 miles per hour (~~49~~ 63 m/s) Exposure C, and a maximum ground snow load of 70 pounds per foot (3.35 kPa), and Seismic Design Categories A, B, and C.

R613.3 Materials. SIPs shall comply with the following criteria:

R613.3.1 Core. The core material shall be composed of foam plastic insulation meeting one of the following requirements:

1. Expanded Polystyrene (EPS) in accordance with ASTM C 578 and have a minimum density of 0.90 pounds per cubic feet (14.4 kg/m^3); or
2. Extruded polystyrene (XPS) in accordance with ASTM C 578 and have a minimum density of 1.3 pounds per cubic feet (~~14.4~~ 20.8 kg/m^3); or
3. Polyurethane meeting the physical properties shown in Table R613.3.1, or;
4. An *approved* alternative.

All cores shall meet the requirements of Section R316.

TABLE R613.3.1
MINIMUM PROPERTIES FOR POLYURETHANE INSULATION USED AS SIPS CORE

PHYSICAL PROPERTY	POLYURETHANE
Density, core nominal (ASTM D 1622)	2.2 lb/ft^3
Compressive resistance at yield or 10% deformation, whichever occurs first (ASTM D 1621)	19 psi (perpendicular to rise)
Flexural strength, min. (ASTM C 203)	30 psi
Tensile strength, min. (ASTM D 1623)	35 psi
Shear strength, min. (ASTM C 273)	25 psi
Substrate adhesion, min. (ASTM D 1623)	22 psi
Water vapor permeance of 1.00-in. thickness, max. (ASTM E 96)	2.3 perm
Water absorption by total immersion, max. (ASTM C 272)	4.3% (volume)
Dimensional stability (change in dimensions), max. [ASTM D 2126 (7 days at 158°F/100% humidity and 7 days at -20°F)]	2%

For SI: 1 pound per cubic foot = 16.02 kg/m^3, 1 pound per square inch= 6.895 kPa, °C = [(°F) - 32]1.8.

R613.3.2 Facing. Facing materials for SIPs shall be wood structural panels conforming to DOC PS 1 or DOC PS 2, each having a minimum nominal thickness of 7/16 inch (11 mm) and shall meet the additional minimum properties specified in Table R613.3.2. Facing shall be identified by a grade mark or certificate of inspection issued by an *approved* agency.

TABLE R613.3.2
MINIMUM PROPERTIES[a] FOR ORIENTED STRAND BOARD FACER MATERIAL IN SIP WALLS

Thickness (inch)	Product	Flatwise Stiffness[b] (lbf-in2/ft)		Flatwise Strength[c] (lbf-in/ft)		Tension[c] (lbf/ft)		Density[d] (pcf)
		Along	Across	Along	Across	Along	Across	
7/16	Sheathing	55,600	16,500	1,040	460	7,450	5,800	34

For SI: 1 inch = 25.4 mm, 1 $lbf\text{-}in^2/ft = 9.415 \times 10^{-6}$ kPa/m, 1 lbf-in/ft = 3.707×10^{-4} kN/m, 1 lbf/ft = 0.0146 N/mm, 1 pound per cubic foot = 16.018 kg/m^3.

a. Values listed in Table R613.3.2 are qualification test values and are not to be used for design purposes.
b. Mean test value shall be in accordance with Section 7.6 of DOC PS 2.
c. Characteristic test value (5th percent with 75% confidence).
d. Density shall be based on oven-dry weight and oven-dry volume.

R613.3.3 Adhesive. Adhesives used to structurally laminate the foam plastic insulation core material to the structural wood factors shall conform to ASTM D 2559 or *approved* alternative specifically intended for use as an adhesive used in the lamination of structural insulated panels. Each container of adhesive shall bear a *label* with the adhesive manufacturer's name, adhesive name and type and the name of the quality assurance agency.

R613.3.4 Lumber. The minimum lumber framing material used for SIPs prescribed in this document is NLGA graded No. 2 Spruce-pine-fir. Substitution of other wood species/grades that meet or exceed the mechanical properties and specific gravity of No. 2 Spruce-pine-fir shall be permitted.

R613.3.5 SIP screws. Screws used for the erection of SIPs as specified in Section R613.5 shall be fabricated from steel, shall be provided by the SIPs manufacturer and shall be sized to penetrate the wood member to which the assembly is being attached by a minimum of 1 inch (25 mm). The screws shall be corrosion resistant and have a minimum shank diameter of 0.188 inch (4.7 mm) and a minimum head diameter of 0.620 inch (15.5 mm).

R613.3.6 Nails. Nails specified in Section R613 shall be common or galvanized box unless otherwise stated.

R613.3.7 Thermal Barrier. SIP walls shall be separated from the interior of a building by an *approved* thermal barrier in accordance with section R316.4.

R613.4 SIP wall panels. SIPs shall comply with Figure R613.4 and shall have minimum panel thickness in accordance with Tables R613.5(1) and R613.5(2) for above-grade walls. All SIPs shall be identified by grade mark or certificate of inspection issued by an *approved* agency

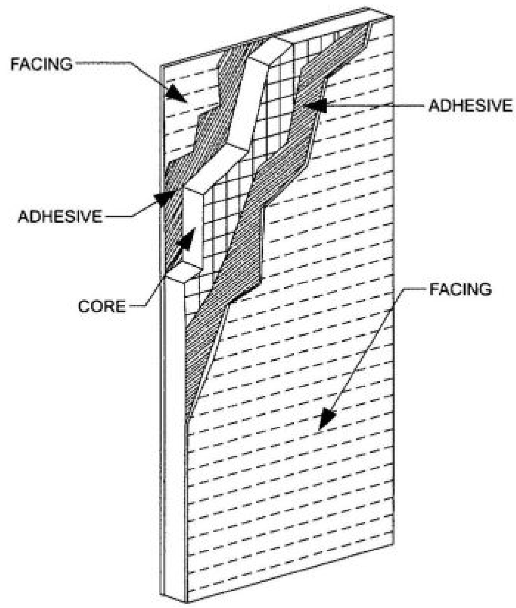


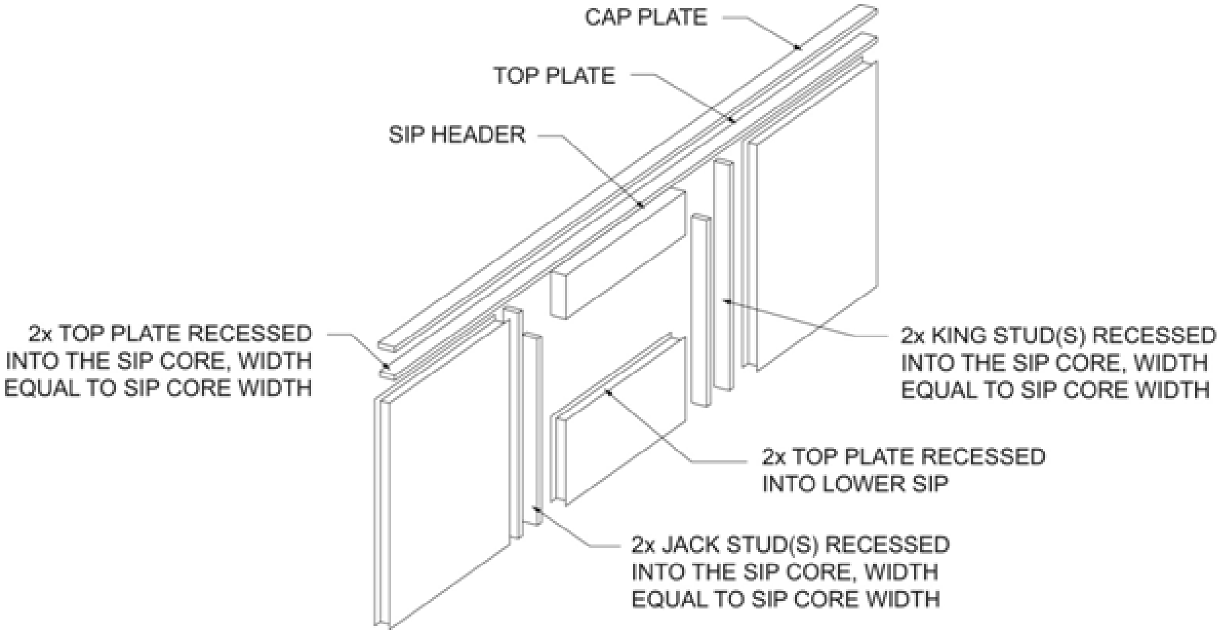
FIGURE R613.4
SIP WALL PANEL

R613.4.1. Labeling. All panels shall be identified by grade mark or certificate of inspection issued by an *approved* agency. Each (SIP) shall bear a stamp or *label* with the following minimum information:

1. Manufacturer name/logo.
2. Identification of the assembly.
3. Quality assurance agency.

R613.5 Wall construction. Exterior walls of SIP construction shall be designed and constructed in accordance with the provisions of this section, Tables R613.5(1) and R613.5(2), and Figures R613.5(1) through R613.5(6). SIP walls shall be fastened to other wood building components in accordance with Tables R602.3(1) through R602.3(4).

Framing shall be attached in accordance with Table R602.3(1) unless otherwise provided for in Section R613.



For SI: I inch = 24.4 mm.

Note:
1. Top plates shall be continuous over header
2. Lower 2 x top plate shall have a width equal to the SIP core width and shall be recessed into the top edge of the panel. Cap plate shall be placed over the recessed top plate and shall have a width equal to the SIP width.
3. SIP facing surface shall be nailed to all framing and cripples with 8d common or galvanized box nails spaced 6 inches on center.

FIGURE R613.5(1)
SIP WALL FRAMING CONFIGURATION

R613.5.1 Top plate connection. SIP walls shall be capped with a double to plate installed to provide overlapping at corner, intersections and splines in accordance with Figure R613.5(1). The double top plates shall be made up of a single 2 by top plate having a width equal to the width of the panel core, and shall be recessed into the SIP below. Over this top plate a cap plate shall be placed. The cap plate width shall match the SIP thickness and overlap the facers on both sides of the panel. End joints in top plates shall be offset at least 24 inches (610 mm).

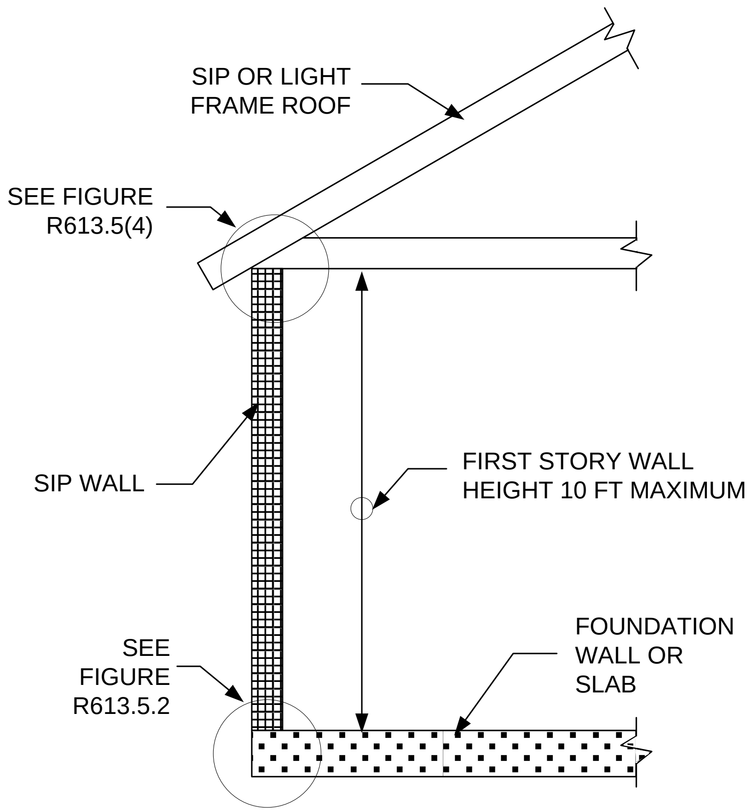


FIGURE R613.5(~~1~~2)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS

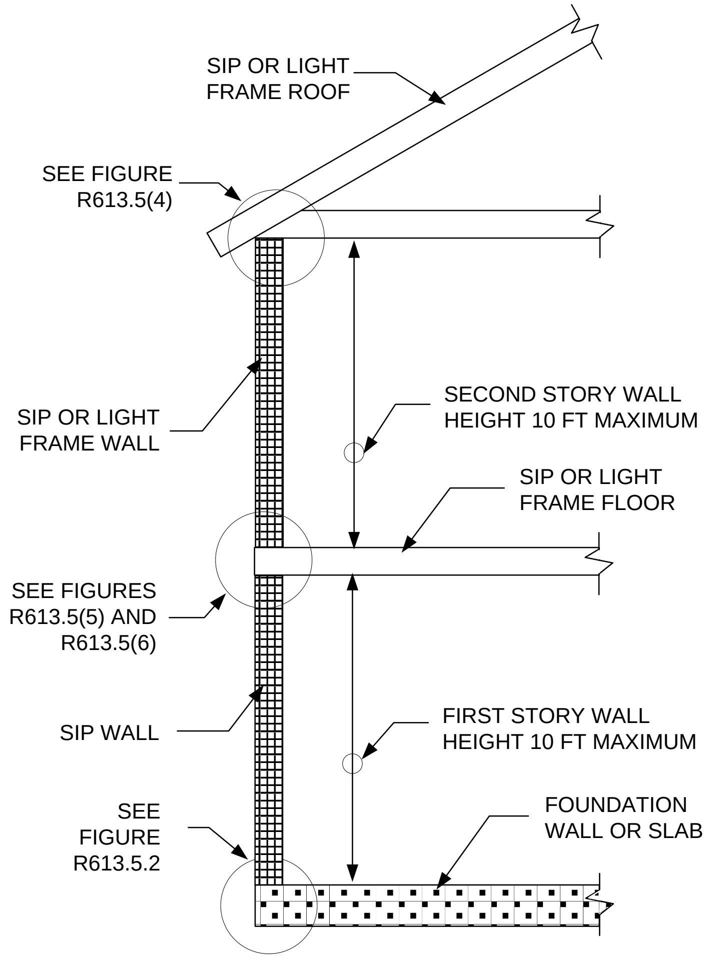


FIGURE R613.5(~~2~~3)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS

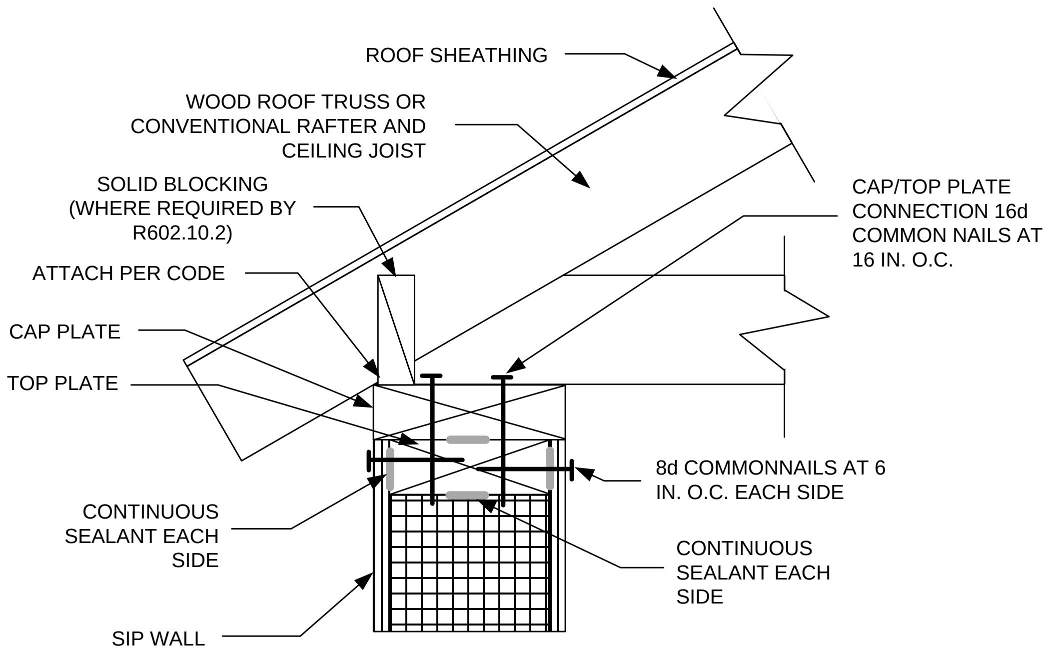
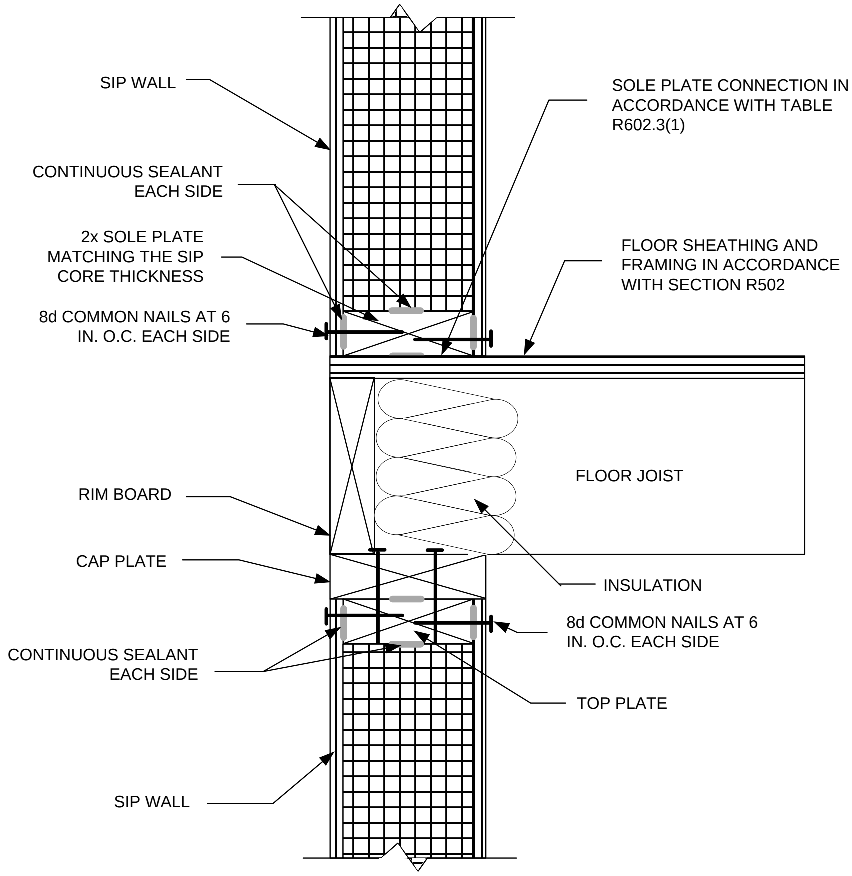


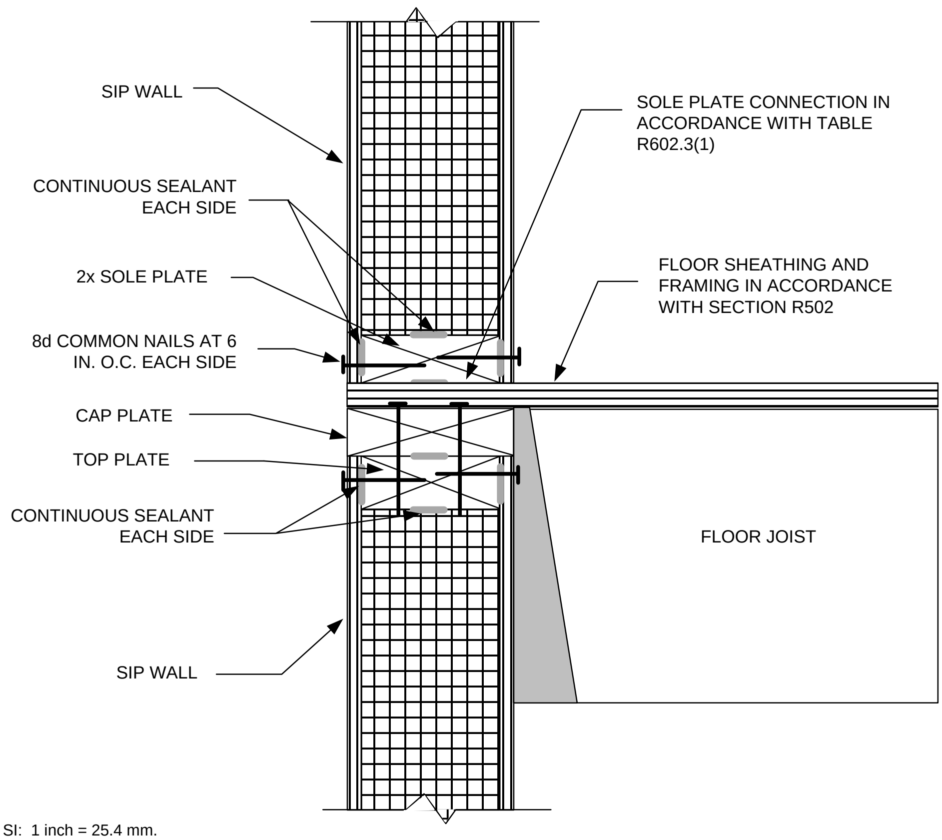
FIGURE R613.5(~~3~~4)

TRUSS OR CONVENTIONAL RAFTER TO TOP PLATE CONNECTION



For SI: 1 inch = 25.4 mm.
Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2) as appropriate.

FIGURE R613.5(4<u>5</u>)
SIP WALL-TO-WALL PLATFORM FRAME CONNECTION



For SI: 1 inch = 25.4 mm.
Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2) as appropriate.

FIGURE R613.5(~~5~~6)
SIP WALL-TO-WALL HANGING-FLOOR FRAME CONNECTION

R613.5.2 Bottom (sole) plate connection. SIP walls shall have full bearing on a sole plate having a width equal to the nominal width of the foam core. When SIP walls are supported directly on continuous foundations, the wall wood sill plate shall be anchored to the foundation in accordance with Figure R613.5.2 and Section R403.1.

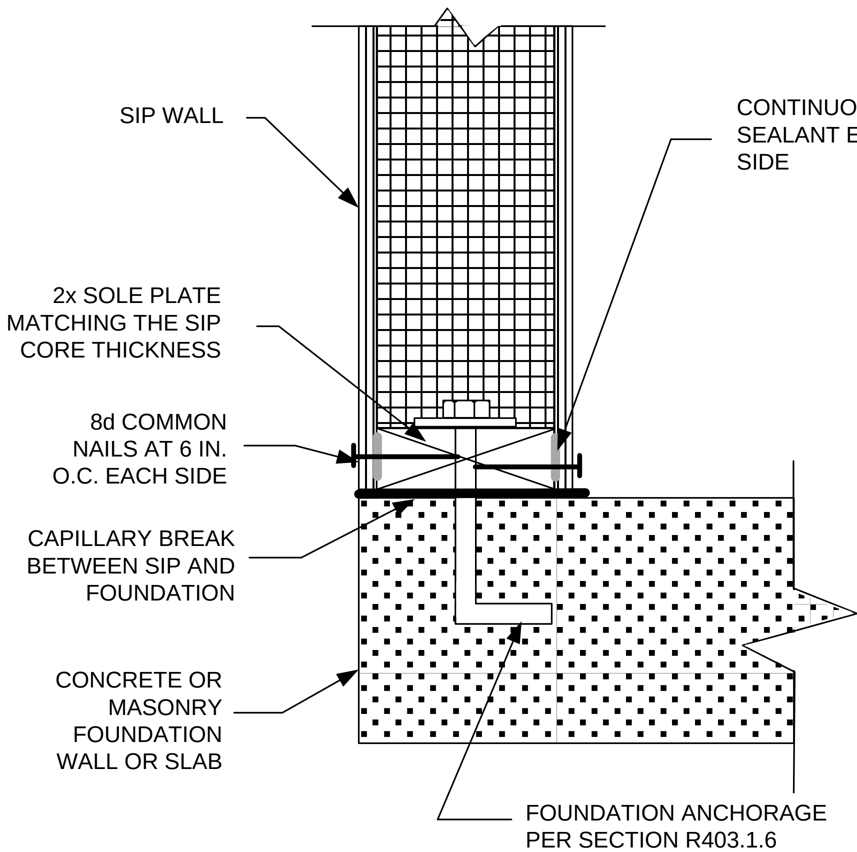
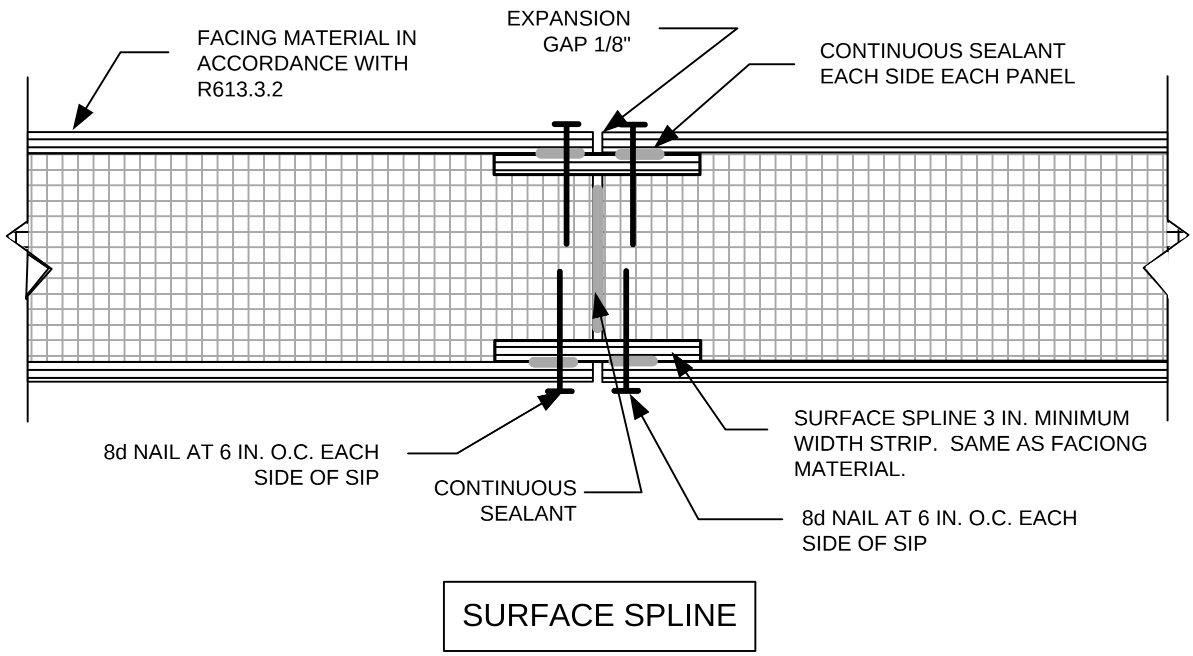


FIGURE R613.5.2
SIP WALL-TO-CONCRETE SLAB OR FOUNDATION WALL ATTACHMENT

R613.5.3 Panel to panel connection. SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.5.3 or by other *approved* methods.



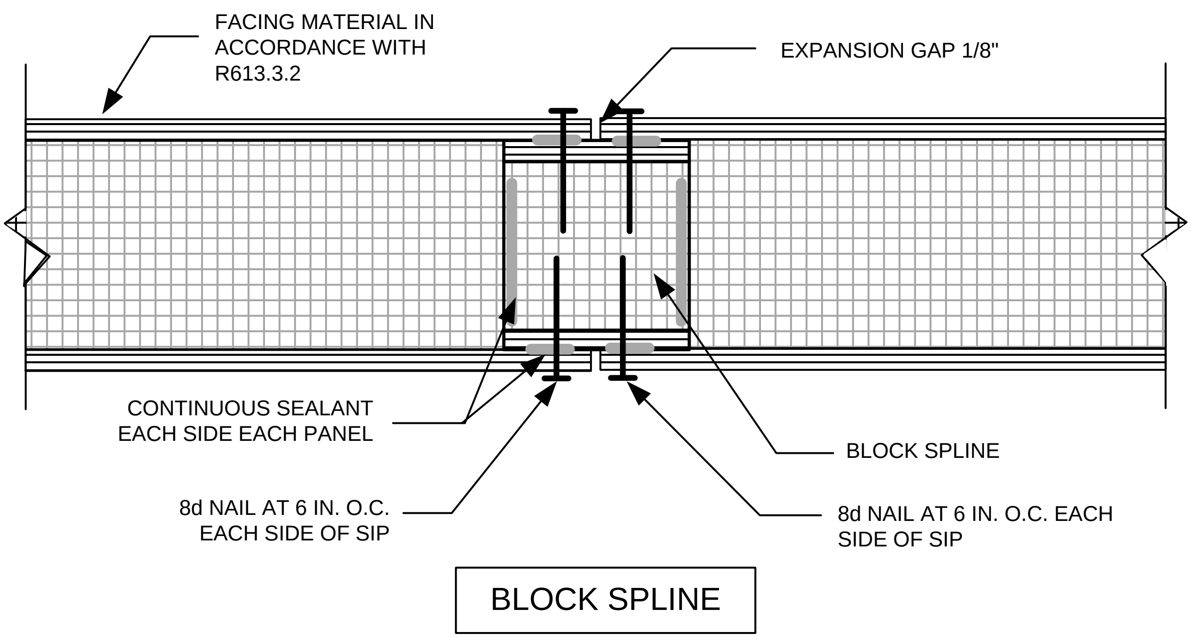


FIGURE R613.5.3
TYPICAL SIP WALL PANEL-TO-PANEL CONNECTION DETAILS

R613.5.4 Corner framing. Corner framing of SIP walls shall be constructed in accordance with Figure R613.5.4.

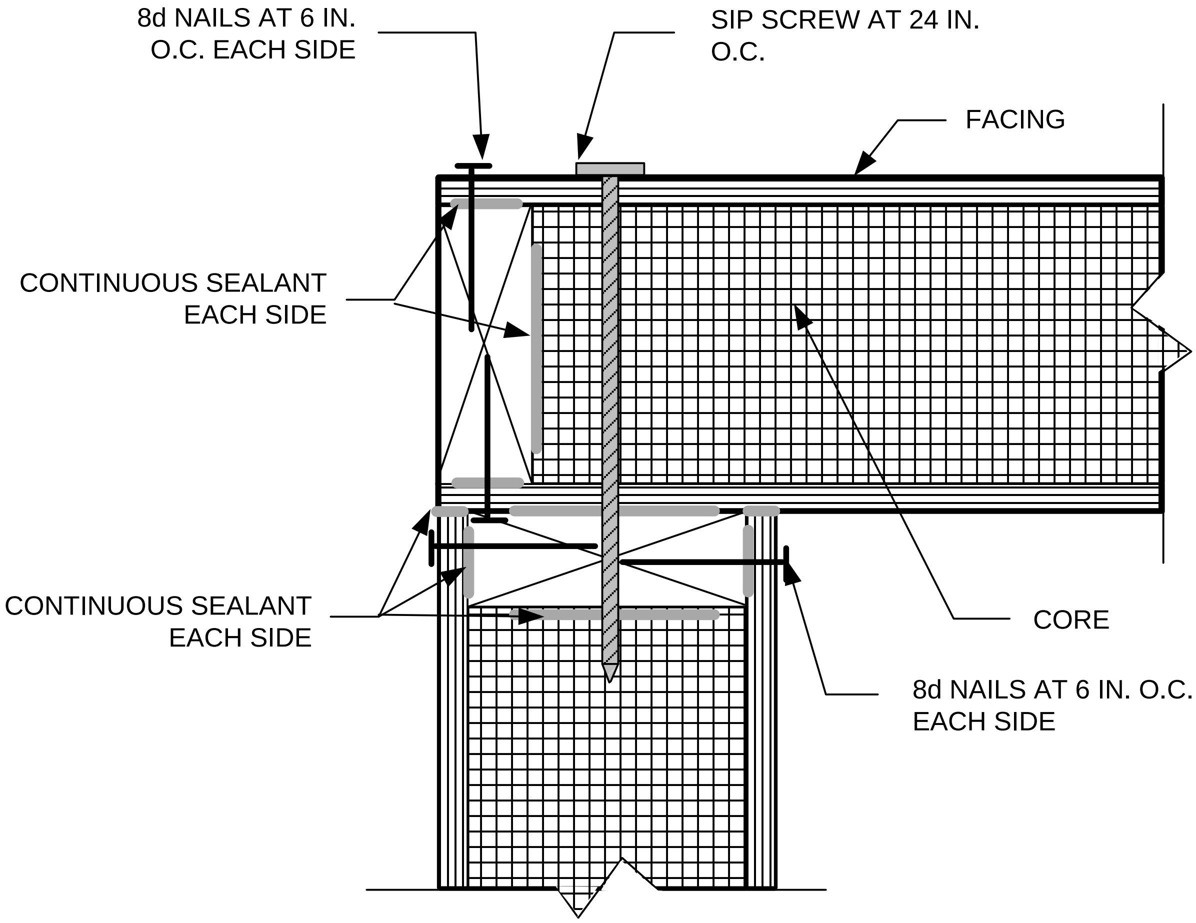


FIGURE R613.5.4
SIP CORNER FRAMING DETAIL

R613.5.5 Wall bracing. SIP walls shall be braced in accordance with Section R602.10. SIP walls shall be considered continuous wood structural panel sheathing for purposes of computing required bracing. SIP walls shall meet the requirements of Section R602.10.4.2 except that SIPs corners shall be fabricated as shown in Figure R613.9. When SIP walls are used for wall bracing, the SIP bottom plate shall be attached to wood framing below in accordance with Table R602.3(1).

R613.6 Interior load-bearing walls. Interior load-bearing walls shall be constructed as specified for exterior walls.

R613.7 Drilling and notching. The maximum vertical chase penetration in SIPs shall have a maximum side dimension of 2 inches (51 mm) centered in the panel core. Vertical chases shall have a minimum spacing of 24-inches (610 mm) on center. Maximum of two 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 the wall panel. The maximum allowable penetration size in a wall panel shall be circular or rectangular with a maximum dimension of 12 inches (305 mm). Overcutting of holes in facing panels shall not be permitted.

R613.8 Headers. SIP headers shall be designed and constructed in accordance with Table R613.8 and Figure R613.5.1. SIPs headers shall be continuous sections without splines. Headers shall be at least 11 7/8 inches (302 mm) deep. Headers longer than 4 feet (1219 mm) shall be constructed in accordance with Section R602.7.

R613.8.1 Wood structural panel box headers. Wood structural panel box headers shall be allowed where SIP headers are not applicable. Wood structural panel box headers shall be constructed in accordance with Figure R602.7.2 and Table R602.7.2.

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)[a,b,c]

Wind Speed (3-sec gust)		Ground Snow Load (psf)	Building Width (ft)[d]														
			24			28			32			36			40		
			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
Exp A/B	Exp. C		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5.	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5
110	100	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5
		50	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5
		70	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	6.5	N/A 4.5	4.5	N/A 4.5	N/A
120	110	20	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5
		30	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5
		50	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5
		70	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

~~a. N/A = Design required.~~

~~b. Deflection criterion: L/240~~

~~c. Design load assumptions:~~

~~Roof dead load: 10 psf.~~

~~Ceiling dead load: 5 psf.~~

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

~~Strength axis of facing materials applied vertically.~~

~~d. Building width is in the direction of horizontal framing members supported by the header.~~

~~TABLE R613.5(2)~~
~~MINIMUM THICKNESS FOR SIP WALLS SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF (inches)~~[a,b,c]

			Building Width (ft)[d]														
Wind Speed (3 –sec gust)		Ground Snow Load (psf)	24			28			32			36			40		
Exp A/B	Exp. C		Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	N/A 4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 6.5	4.5 6.5	N/A 6.5	N/A 6.5
100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5
		50	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5
		70	4.5	4.5	N/A 4.5	4.5	6.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A	N/A
110	100	20	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5
		30	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A 6.5
		50	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A
		70	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A	N/A 6.5	N/A	N/A	N/A	N/A	N/A
120	110	20	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A
		30	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A	N/A 6.5	N/A 6.5	N/A
		50	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A	N/A 6.5	N/A	N/A	N/A	N/A	N/A
		70	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A	N/A 6.5	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; 1 pound per square foot = 0.0479kPa.~~

~~a. N/A = Design required.~~

~~b. Deflection criterion: L/240~~

~~c. Design load assumptions:~~

~~Roof dead load: 10 psf.~~

~~Ceiling dead 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).~~

~~Strength axis of facing materials applied vertically.~~

~~d. Building width is in the direction of horizontal framing members supported by the header.~~

TABLE R613.5(1)

MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ROOF ONLY (inches)[a,b]

Ultimate Design Wind Speed V_{ult} (mph)		Snow Load (psf)	Building Width (ft)														
			24			28			32			36			40		
Exp. B	Exp. C		Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
110	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	6.5
115	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
130	110	20	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
		30	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	4.5	DR
		50	4.5	4.5	DR	4.5	4.5	DR	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR
		70	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR
140	120	20	4.5	6.5	DR	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR
		30	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR
		50	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		70	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8mm; 1 pound per square foot = 0.0479 kPa.

a. Design assumptions:
Maximum deflection criteria: L/240.
Maximum roof dead load: 10 psf.
Maximum roof live load: 70 psf.
Maximum ceiling dead load: 5 psf.
Maximum ceiling live load: 20 psf.
Wind loads based on Table R301.2 (2).
Strength axis of facing material applied vertically.
DR indicates Design Required.

b. Building width is in the direction of horizontal framing members supported by the wall.

TABLE R613.5(2)

MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ROOF ONLY (inches)[a,b]

Ultimate Design Wind Speed V_{ult} (mph)		Snow Load (psf)	Building Width (ft)														
			24			28			32			36			40		
Exp. B	Exp. C		Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
110	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	6.5	DR
		50	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR
		70	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR
115	--	20	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	DR	DR
		30	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR
		50	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR
		70	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
120	--	20	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR
		30	4.5	4.5	DR	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR	DR	DR	DR
		50	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR
		70	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
130	110	20	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR
		30	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		50	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		70	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8mm; 1 pound per square foot = 0.0479 kPa.

a. Design assumptions:
   Maximum deflection criteria: L/240.
   Maximum roof dead load: 10 psf.
   Maximum roof live load: 70 psf.
   Maximum ceiling dead load: 5 psf.
   Maximum ceiling live load: 20 psf.
   Maximum second floor dead load: 10 psf.
   Maximum second floor live load: 30 psf.
   Maximum second floor dead load from walls: 10 psf.
   Maximum first floor dead load: 10 psf.
   Maximum first floor live load: 40 psf.
   Wind loads based on Table R301.2 (2).
   Strength axis of facing material applied vertically.
   DR indicates Design Required.

b. Building width is in the direction of horizontal framing members supported by the wall.

TABLE R613.8
MAXIMUM SPANS FOR 11-7/8 INCH OR DEEPER SIP HEADERS (feet)[a,b]

LOAD CONDITION	GROUND SNOW LOAD (psf)	Building width (feet)[e]				
		24	**28**	**32**	**36**	**40**
Supporting roof[c,d] only	20	4	4	4	2	2
	30	4	4	2	2	2
	50	2	2	2	2	2
	70	2	2	2	~~NA~~ DR	~~NA~~ DR
Supporting roof and one-story	20	2	2	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR
	30	2	2	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR
	50	2	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR
	70	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
~~N/A = Design required.~~
~~a. Deflection criterion: L/240~~
~~b. Design load assumptions:~~
~~Roof dead load: 10 psf.~~
~~Ceiling dead load: 5 psf.~~
~~Second floor live load: 30 psf.~~
~~Second floor dead load: 10 psf.~~
~~Second floor dead load from walls: 10 psf.~~
~~c. The table provides for roof slopes between 3:12 and 12:12~~
~~d. Maximum Roof overhang 24 inches (610mm).~~
~~e. Building width is in the direction of horizontal framing members supported by the header.~~

a. Design assumptions:
Maximum deflection criteria: L/240.
Maximum roof dead load: 10 psf.
Maximum ceiling dead load: 5 psf.
Maximum ceiling live load: 20 psf.
Maximum second floor dead load: 10 psf.
Maximum second floor live load: 30 psf.
Maximum second floor dead load from walls: 10 psf.
Maximum first floor dead load: 10 psf.
Wind loads based on Table R301.2 (2).
Strength axis of facing material applied vertically.
DR indicates Design Required.

b. Building width is in the direction of horizontal framing members supported by the header.
c. The table provides for roof slopes between 3:12 and 12:12.
d. The maximum roof overhang is 24 inches (610 mm).

Commenter's Reason: The proponent and APA requested disapproval of this proposal at the mid-year meeting to permit the proponent and APA time together to correct some issues with the proposal as submitted. This public comment, submitted by the proponent of the original code change AND co submitted by APA is the result of our collaboration. While the section is long the actual Public Comment Changes are actually few and are described below:

- Section R613.3.1 – Corrected the metric equivalent to 1.3 pounds per cubic ft.
- Section R613.5.1 - A charging statement was added to Section R613.5.1 to recognize Figure R613.5 and Figure R613.5 was renumbered to R613.5(1). Original Figures R613.5(1) through R613.5(5) were renumbered accordingly. Annotations in affected figures have been changed to reflect the proposed numbering system.
- Section R613.8.1 – Deleted by the original proposal, this section was re-added by this Public Comment.
- Tables R613.5(1) and R613.5(2) - Were deleted and replaced by the appropriate Ultimate Design Wind Speed Tables provided in RB271.
- Tables R613.5(1) and R613.5(2) older footnotes inadvertently deleted in the 2009 IRC were re-added per RB344.
- Footnote b was added to Tables R613.5(1) and (2), and R613.8 to clarify the intent of the tables.
- Table R613.8 the limitation on the minimum depth of the header was re-added to the title of the table.
- Note that all figures have been redrawn and reformatted to provide a cleaner, more easily understood IRC.

We encourage the code body to accept this public comment providing requisite clarity in addition to updating the provisions to reflect ASCE 7-10 with respect to Ultimate Design Wind Speed.

RB347-13
Final Action: AS AM AMPC____ D

RB348-13
R614 (NEW)

Proposed Change as Submitted

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Add new text as follows:

SECTION R614
IMPACT PROTECTIVE SYSTEMS

R614.1 Safety factor. Impact protective systems shall be tested at 1.5 times the design pressure (positive or negative) expressed in pounds per square feet as determined by the Section R301.2.1.1 of this code for which the specimen is to be tested.

R614.1.1 Labels required. Impact protective systems shall be approved and shall be tested in accordance with Section R301.2.1.2 and shall be labeled as conforming to the standards listed in Section R301.2.1.2 and in accordance with the provisions of this section. Impact resistant glazing shall be labeled in accordance with Section R612.6.1

R614.2 Labels. A permanent label shall be provided on all impact protective systems.

Exception: Wood structural panels permitted at section R301.2.1.2.

R614.2.1 Label information required. The following information shall be included on the labels on impact protective systems:

1. The manufacturer's name and address,
2. The approved testing and labeling agency, and
3. The rated wind design pressure, positive and negative.

Exception: Impact resistant glazing shall comply with Section R612.6.1

R614.3 Location of label. The location of the label on the impact protective systems shall be as follows:

1. Accordions: Bottom of the locking bar or center mate facing the exterior or outside.
2. Rollup: On the bottom of the hood facing the exterior or outside or on the bottom slat facing the exterior or outside.
3. Bahama Awning or Colonial Hinged: On the bottom, placed on the back of the impact protective system.
4. Panels: For metal and plastic panels the label may be embossed or printed spaced not more than every three (3) lineal feet on each panel. The label shall be applied by the manufacturer and shall face the exterior or outside.
5. Framed products: The label shall be on the side or bottom facing the exterior or outside.
6. Labels on all other products shall face the exterior or outside.

Exception: Labels for impact resistant glazing shall comply with Section R612.6.1

R614.4 Installation. All impact protective systems shall be installed in accordance with the manufacturer's installation instructions. Installation instructions shall be provided and shall be available to inspection personnel on the job site.

Reason: Similar provisions have been adopted in the Florida Building Code to assist code enforcement personnel in the inspection of impact protective systems. The Garage Door-Window Labeling Work Group was appointed by the Florida Building Commission in response to problems cited by building officials in determining if the proper impact resistant coverings were provided on a job. In many cases it was found the homeowner was not getting a good product or the product was installed incorrectly. The Workgroup consisted of broad range of interests including a number of manufacturers of both impact protective covering systems and impact rated glazing products, contractors, insurance industry representatives, and code enforcement personnel which identified and worked on the issues. This proposal incorporates the recommendations of the Workgroup.

Cost Impact: The cost of providing labels on impact resistant covering products is estimated by the industry as follows:

a. Water Resistant Self-adhering Permanent Labels approximately $0.15 per label. Such labels would most likely be used on Accordion, Roll, Bahama, and Colonial style shutters.

b. Embossed or ink jet labels used on metal and plastic panels would cost approximately $0.05 per label.

There is no added cost to impact resistant glazing products as they are currently required by the code to be labeled.

The industry believes the minor cost involved is by far outweighed by the benefits to the public by providing data permitting inspection personnel and the general public to ascertain the proper impact resistant covering is provided and installed in accordance with the manufacturer's installation instructions.

R614 (NEW)-RB-BELCHER.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The change has too many undefined terms. The labeling requirements are too restrictive and go beyond what is necessary. Also, the standards are not required to be listed on the label.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Joseph D. Belcher, JDB Code Service, Inc, representing International Hurricane Protection Association (IHPA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R614
IMPACT PROTECTIVE SYSTEMS

R614.1 Safety factor. Impact protective systems shall be tested at 1.5 times the design pressure (positive or negative) expressed in pounds per square feet as determined by the Section R301.2.1.1 of this code for which the specimen is to be tested.

R614.1.1 Labels required. Impact protective systems shall be approved and shall be tested in accordance with Section R301.2.1.2 and shall be labeled as conforming to the standards listed in Section R301.2.1.2 and in accordance with the provisions of this section. Impact resistant glazing shall be labeled in accordance with Section R612.6.1

R614.2 Labels. A permanent label shall be provided on all impact protective systems.

Exception: Wood structural panels permitted at section R301.2.1.2.

R614.2.1 Label information required. The following information shall be included on the labels on impact protective systems:

1. The manufacturer's name and address,
2. The approved testing and labeling agency, and
3. The rated wind design pressure, positive and negative.

Exception: Impact resistant glazing shall comply with Section R612.6.1

~~**R614.3 Location of label.** The location of the label on the impact protective systems shall be as follows:~~

~~1. Accordions: Bottom of the locking bar or center mate facing the exterior or outside.~~
~~2. Rollup: On the bottom of the hood facing the exterior or outside or on the bottom slat facing the exterior or outside.~~

~~3. Bahama Awning or Colonial Hinged: On the bottom, placed on the back of the impact protective system.~~
~~4. Panels: For metal and plastic panels the label may be embossed or printed spaced not more than every three (3) lineal feet on each panel. The label shall be applied by the manufacturer and shall face the exterior or outside.~~
~~5. Framed products: The label shall be on the side or bottom facing the exterior or outside.~~
~~6. Labels on all other products shall face the exterior or outside.~~

~~**Exception:** Labels for impact resistant glazing shall comply with Section R612.6.1~~

R614.4 Installation.
All impact protective systems shall be installed in accordance with the manufacturer's written installation instructions. Written installation instructions shall be provided by the impact protective system manufacturer for each product to be installed. ~~Installation instructions shall be provided and shall be available to inspection personnel on the job site.~~

Commenter's Reason: Safety factor. Currently there are no testing criteria, other than impact and cyclic testing, specified for impact protective systems. The change is an effort to establish a safety factor for the structural testing of such products, i.e. the ability to stay in place during a high wind event. Testimony was provided in Dallas regarding the specified Safety Factor of 1.5 times the design pressure. The safety factor is the same as that specified for the structural testing provisions of ASTM E 330 (ASTM E 330-02 §5.3) and for exterior window and door assemblies not provided for in Section 1710.5.1 in the IBC. (IBC §1710.5.2)

Labels. The code is rife with labeling requirements. Windows, doors, fireplaces, electrical outlets, mechanical equipment, and the list goes on. Labels are a way to ascertain that a manufactured product meets the standards adopted or specified by the code. Impact protective systems are installed to comply with code requirements for opening protection. Without labels, the field inspector, the builder, and the home owner have no way to verify the product installed is the proper product. The label information specified is similar to the requirements for fenestration and is considered the minimum to allow tracking of the product.

Location of label. The location of the label was included to assist inspection personnel by reducing the time needed to find the label on a product. While manufactures of these products are familiar with the various types, testimony was provided at the Code Action Hearings that the types of impact protective systems listed were not defined in the code and persons outside the industry may not be familiar with the nomenclature. The section specifying the label location is stricken to address that concern.

Installation. The intent of the requirement to have manufacturer's installation instructions on the job site was to save the builder a delay for a rejection when the inspection was disapproved because there was nothing for the inspector to use in conducting the inspection of a code requirement. However, I have modified the provision to reflect the manner in which manufacturer's installation instructions are addressed in other parts of the code. (IRC §R612.1Since IRC Section R106.1.2 requires the manufacturer's installation instructions to be on the job site at the time of inspection, that portion of the proposed change is deleted.

Similar provisions have been adopted in the Florida Building Code at the request of code enforcement personnel. Inspectors in the field had no guidelines to inspect by as the impact protective systems are not typically detailed on the plans submitted. The information needed to properly inspect the systems is typically contained in the manufacturer's installation instructions.

RB348-13
Final Action: AS AM AMPC____ D

RB353-13
R302.6, Table R702.3.5

Proposed Change as Submitted

Proponent: Robert Rice, Josephine County, OR, representing Oregon Building Officials Association (structdesigner@yahoo.com)

Revise as follows:

R302.6 Dwelling/garage fire separation. The garage shall be separated as required by Table R302.6. Attachment of gypsum board shall comply with Table R702.3.5. Openings in garage walls shall comply with Section R302.5. ~~This~~ The wall separation provisions of Table R302.6 ~~does~~ do not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall.

TABLE R702.3.5
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD

THICKNESS OF GYPSUM BOARD (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING[c]
				Nails[a]	Screws[b]	
Application without adhesive						
$^{3}/_{8}$	Ceiling[d]	Perpendicular	16	7	12	13 gage, 1$^{1}/_{4}$” long, $^{19}/_{64}$” head; 0.098” diameter, 1$^{1}/_{4}$” long, annular-ringed; or 4d cooler nail, 0.080” diameter, 1$^{3}/_{8}$” long, $^{7}/_{32}$” head.
	Wall	Either direction	16	8	16	
$^{1}/_{2}$	Ceiling	Either direction	16	7	12	13 gage, 1$^{3}/_{8}$” long, $^{19}/_{64}$” head; 0.098” diameter, 1$^{1}/_{4}$” long, annular-ringed; 5d cooler nail, 0.086” diameter, 1$^{5}/_{8}$” long, $^{15}/_{64}$” head; or gypsum board nail, 0.086″ diameter, 1 $^{5}/_{8}$” long, $^{9}/_{32}$” head.
	Ceiling[d]	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
$^{5}/_{8}$	Ceiling	Either direction	16	7	12	13 gage, 1$^{5}/_{8}$” long, $^{19}/_{64}$” head; 0.098” diameter, 1$^{3}/_{8}$” long, annular-ringed; 6d cooler nail, 0.092” diameter, 1$^{7}/_{8}$” long, ¼” head; or gypsum board nail, 0.0915” diameter, 1$^{7}/_{8}$” long, $^{19}/_{64}$” head.
	Ceiling[e]	Perpendicular	24	7	12	
	Type X at garage ceiling beneath habitable rooms	Perpendicular	24	6	6	1 7/8 inches 6d coated nails or equivalent drywall screws.
	Wall	Either direction	24	8	12	13 gage, 1$^{5}/_{8}$” long, $^{19}/_{64}$” head; 0.098” diameter, 1$^{3}/_{8}$” long, annular-ringed; 6d cooler nail, 0.092” diameter, 1$^{7}/_{8}$” long, $^{1}/_{4}$” head; or gypsum board nail, 0.0915” diameter, 1$^{7}/_{8}$” long, $^{19}/_{64}$” head.
	Wall	Either direction	16	8	16	
Application with adhesive						
$^{3}/_{8}$	Ceiling[d]	Perpendicular	16	16	16	Same as above for $^{3}/_{8}$” gypsum board

	Wall	Either direction	16	16	24	
$^1/_2$ or $^5/_8$	Ceiling	Either direction	16	16	16	Same as above for $^1/_2$" and $^5/_8$" gypsum board, respectively
	Ceiling[d]	Perpendicular	24	12	16	
	Wall	Either direction	24	16	24	
Two $^3/_8$ layers	Ceiling	Perpendicular	16	16	16	Base ply nailed as above for $^1/_2$" gypsum board; face ply installed with adhesive
	Wall	Either direction	24	24	24	

For SI: 1 inch = 25.4 mm.

a. For application without adhesive, a pair of nails spaced not less than 2 inches apart or more than $2^1/_2$ inches apart may be used with the pair of nails spaced 12 inches on center.

b. Screws shall be in accordance with Section R702.3.6. Screws for attaching gypsum board to structural insulated panels shall penetrate the wood structural panel facing not less than $^7/_{16}$ inch.

c. Where cold-formed steel framing is used with a clinching design to receive nails by two edges of metal, the nails shall be not less than $^5/_8$ inch longer than the gypsum board thickness and shall have ringed shanks. Where the cold-formed steel framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d, $13^1/_2$ gage, $^{15}/_8$ inches long, $^{15}/_{64}$-inch head for $^1/_2$-inch gypsum board; and 6d, 13 gage, $1^7/_8$ inches long, $^{15}/_{64}$-inch head for $^5/_8$-inch gypsum board.

d. Three-eighths-inch-thick single-ply gypsum board shall not be used on a ceiling where a water-based textured finish is to be applied, or where it will be required to support insulation above a ceiling. On ceiling applications to receive a water-based texture material, either hand or spray applied, the gypsum board shall be applied perpendicular to framing. When applying a water-based texture material, the minimum gypsum board thickness shall be increased from $^3/_8$ inch to $^1/_2$ inch for 16-inch on center framing, and from $^1/_2$ inch to $^5/_8$ inch for 24-inch on center framing or $^1/_2$-inch sag-resistant gypsum ceiling board shall be used.

~~e. Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at maximum 6 inches o.c. by minimum $1^7/_8$ inches 6d coated nails or equivalent drywall screws.~~

Reason: The existing code requires 5/8" Type X gypsum board on garage ceilings when there are habitable rooms above. The general requirement for separations is stated in R302.6 and that section refers to Table R302.6 (shown below) for the specific requirements. The code also has special attachment requirements for this application that are different from other gypsum board attachments. The problem with the current code is that the requirement for the attachment is in a footnote to Table R702.3(5) and is often overlooked. This proposal is to move the requirement for the attachment from the footnote of Table R702.3(5) to the table itself. A sentence is added to R302.6 to point the user to the attachment requirements in Table R702.3(5).

TABLE R302.6
DWELLING/GARAGE SEPARATION

SEPARATION	MATERIAL
From the residence and attics	Not less than $^1/_2$-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage	Not less than $^5/_8$-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than $^1/_2$-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than $^1/_2$-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

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

In addition, since Section R302.6 refers to the Table that covers both walls and ceilings, language is added to clarify the existing language. The current text says, "This provision does not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall". As currently written, it says the provisions of R302.6 don't apply which is the whole section R302.6. Since R302.6 is scoping in nature and sends the user to Table R702.3(5) for technical requirements this change makes it clear that the ceiling requirements still apply.

This proposal does not change any requirements in the existing code.

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

RB353-13

R702.3.5T-RB-RICE.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The new language will exclude alternative materials.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Robert Rice, CBO, Josephine County Oregon, representing Oregon Building Officials Association, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

R302.6 Dwelling/garage fire separation. The garage shall be separated as required by Table R302.6. ~~Attachment of g~~ Gypsum board used to provide the required separation shall ~~comply~~ be attached in accordance with Table R702.3.5. Openings in garage walls shall comply with Section R302.5. The wall separation provisions of Table R302.6 do not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The existing code requires that the garage be separated in accordance with Table R302.6 as shown in the original proposal. The attachment of gypsum board is also already specified in Table R702.3.5. In the current code, the required attachment of 5/8" Type X gypsum board on garage ceilings is specified in footnote "e" of Table R702.3.5 and is different from the attachment of other 5/8" gypsum board. However, this requirement is often overlooked because it is a footnote to the table. The purpose of the original proposal (and this public comment) is to move this existing fastening requirement from the footnote into the table and make reference to it in R302.6. No change is proposed to the existing requirements.

At the Committee Action Hearings, there was concern expressed, *"The new language will exclude alternative materials".* There are **no new requirements or limitations** in the original proposal or this public comment. The existing requirement in Table R302.6 is, "*Not less than 5/8-inch Type X gypsum board or equivalent"* and is not changed by this proposal.

This public comment re-words the second sentence of R302.6 so it is clearer that the separation may or may not be accomplished with gypsum board which is consistent with the language ("…or equivalent".) in Table R302.6.

This proposal does not change any requirements in the existing code.

RB353-13

Final Action: AS AM AMPC____ D

RB355-13
R702.4.2, Table R702.4.2 (New), Chapter 44

Proposed Change as Submitted

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and Self

Revise as follows:

R702.4.2 Backer Boards **~~Fiber-cement, fiber-mat reinforced cementitious backer units, glass mat gypsum backers and fiber-reinforced gypsum backers.~~** ~~Fiber-cement, fiber mat reinforced cementitious backer units, glass mat gypsum backers or fiber-reinforced gypsum backers in compliance with ASTM C 1288, C 1325, C 1178 or C 1278, respectively, and installed in accordance with manufacturers' recommendations shall be~~ Materials used as backers for wall tile in tub and shower areas and wall panels in shower areas shall be of materials listed in Table R702.4.2, and installed in accordance with the manufacturer's recommendations.

R702.4.2
BACKER BOARD MATERIALS

MATERIAL	STANDARD
Glass mat gypsum backing panel	ASTM C 1178
Fiber-reinforced gypsum panels	ASTM C 1278
Nonabestos fiber-cement backer board	ASTM C 1288 or ISO 8336, Category C
Nonasbestos fiber mat reinforced cementitious backer units	ASTM C 1325

Add new standard to Chapter 44 as follows:

ISO

ISO 8336 Fibre-Cement Flat Sheets – Product Specification and Test Methods

Reason: The current wording is cumbersome for the backer board materials permitted for use in this section. The text is revised to reference permitted backer board materials now defined in new TABLE R702.4.2 where all 4 permitted products would now be listed. This revision also makes the addition of future recognized products to the Code easier by simple addition to the table. Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. Fiber-cement producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement products for compliance with ISO 8336. The inclusion of this Standard reference in the IRC will permit manufacturers worldwide to demonstrate product compliance to IBC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade.

IBC Section 2509.2 has, as a result of the Group A IBC Code Hearings, been revised to adopt this format for approved product presentation. The addition of the new referenced ISO standard and "product category" were also approved during the Group A IBC Code Hearings. This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment.

Cost Impact: The code change proposal will not increase the cost of construction because the proposed code change is editorial in nature to better clarify and present the backer board products currently recognized in the Code.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R702.4.2-RB-MULDER.doc

Committee Action Hearing Results

For staff analysis of the content of ISO8336 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: Based upon the committee's previous action on RB256-13 and RB257-13. Also, this is consistent with the IBC structural committee action in Group A.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

John Mulder, Intertek Testing Services NA, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R702.4.2 Backer Boards Materials used as backers for wall tile in tub and shower areas and wall panels in shower areas shall be ~~of materials~~ as listed in Table R702.4.2, and installed in accordance with the manufacturer's recommendations.

Commenter's Reason: The proposed editorial change corrects the grammar of the sentence deleting the double use of the word "materials"

RB355-13
Final Action: AS AM AMPC____ D

RB358-13
R702.7, R702.7.1, Table R702.7.1, R702.7.2

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R702.7 Vapor retarders. Vapor retarders as described in Section R702.7.3 shall be provided in accordance with Sections R702.7.1 and R702.7.2 or an approved design using accepted engineering practice for hygrothermal analysis.

R702.7.1 Class I and II Vapor Retarders. Class I or II vapor retarder membranes shall not be provided on the interior face of frame walls in Climate Zones 1 and 2. Class I vapor retarder membranes shall not be provided on the interior face of frame walls in Climate Zones 3 and 4. A Class I or II vapor retarder material ~~are required~~ shall be provided on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4. The appropriate Climate Zone shall be selected in accordance with Table N1101.10

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.
4. Conditions where Class III vapor retarders are required in Section R702.7.2.

~~R702.7.1~~**R702.7.2 Class III vapor retarders.** Class III vapor retarders shall be permitted where any one of the conditions in Table R702.7.1 is met. Only Class III vapor retarder membranes in accordance with Section R702.7.3 shall be used on the interior face of frame walls where continuous insulation with perm rating of less than 1 perm is applied in accordance with Table R702.7.1 on the exterior side of the frame wall.

~~R702.7.2~~ **R702.7.3 Material vapor retarder class.** The *vapor retarder class* of any material used as a vapor retarder shall be based on the manufacturer's certified testing or a tested assembly. The following vapor retarder membranes shall be deemed to meet the class specified:

Class I: Sheet polyethylene, nonperforated aluminum foil
Class II: Kraft-faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0.
Class III: Latex or enamel paint.

TABLE R702.7.1
CLASS III VAPOR RETARDERS

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a]
Marine 4	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥2.5 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥3.75 over 2x6 wall
5	Vented cladding over wood structural panels. Vented cladding over fiberboard.

	Vented cladding over gypsum. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥5 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥7.5 over 2x6 wall
6	Vented cladding over fiberboard. Vented cladding over gypsum. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥7.5 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥11.25 over 2x6 wall
7 and 8	~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥10 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥15 over 2x6 wall

For SI: 1 pound per cubic foot = 16 kg/m^3.
a. Spray foam with minimum density of 2 lb/ft^3 applied to the interior cavity side of wood structural panels, fiberboard, insulated sheathing or gypsum is deemed to meet the ~~insulated sheathing~~ exterior continuous insulation requirement where the spray foam R-value or the combination of spray foam and exterior continuous insulation R-value meets or exceeds the specified ~~insulated sheathing~~ exterior continuous insulation R-value.

Reason: A similar proposal was approved as submitted for the 2015 IBC (FS 160-12). In this coordinating proposal for the IRC, vapor retarder provisions are identically strengthened to better promote seasonal drying of walls and avoid a "double vapor barrier" condition in combination with a "warm wall" design using insulating sheathing in cold climates. In addition, requirements are clarified to promote proper application and enforcement. For example, provision is added to clarify that low perm vapor retarder membranes on the interior face of walls shall not be used in the warmer climate zones as indicated to avoid a reversed vapor retarder and creation of a condensation plane. Where appropriate, language also is added to differentiate from membrane-type vapor retarders and other materials or practices, such as use of foam plastics which can control vapor condensation as a vapor retarder material and insulation material to prevent dew-point temperatures from occurring within an envelope assembly. Finally, the term "insulated sheathing" is replaced with "continuous insulation" to provide a more generic requirement that is inclusive of a variety of materials that can be used for this purpose.

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

R702.7-RB-CRANDELL.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this is an important issue but the proposal is needlessly complex. The proponent should rework with the modification submitted and bring back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, and Michael D. Fischer, Kellen Company, representing Kellen Codes, Standards and Regulatory Advocacy, request Approval as Modified by this Public Comment.

Replace the proposal as follows:

R702.7 Vapor retarders. Vapor retarders complying with Section R702.7.1 shall be provided in accordance with Table R702.7(1).~~Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.~~

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.
4. Assemblies designed and constructed in accordance with an approved hygrothermal analysis.

~~**R702.7.2 Class III vapor retarders.** Class III vapor retarders shall be permitted where any one of the conditions in Table R702.7.1 is met.~~

R702.7.~~3.~~1 Material vapor retarder class. The *vapor retarder class* of any material used as a vapor retarder shall be based on the manufacturer's certified testing or a tested assembly. The following vapor retarder membranes shall be deemed to meet the class specified:

Class I: Sheet polyethylene, nonperforated aluminum foil
Class II: Kraft-faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0.
Class III: Latex or enamel paint.

TABLE R702.7(1)
REQUIREMENTS FOR VAPOR RETARDER
ON INTERIOR FACE OF ASSEMBLIES

Climate Zone[a]	Class I	Class II	Class III
1-2	not permitted[b]		permitted
3-4	not permitted	permitted[c]	
4 Marine, 5-8	Required[c] -- Class I[d], Class II , or Class III[e]		

a. Climate Zone shall be selected in accordance with Table N1101.10
b. Kraft paper insulation facer or other Class II vapor retarders with equal or greater perm rating shall be permitted.
c. Use of exterior continuous insulation in Climate Zones 4-8 with a Class I or II interior vapor retarder shall be in accordance with the additional requirements of Table R702.7(2)
d. A Class I vapor retarder shall not be provided on the interior face of the assembly where a Class I vapor retarder material is installed on the exterior face of the assembly.
e. The use of Class III vapor retarders in Climate Zones 4 Marine and 5-8 shall be in accordance with Table R702.7(3).

TABLE R702.7(2)
EXTERIOR CONTINUOUS INSULATION
WITH CLASS I OR CLASS II INTERIOR VAPOR RETARDERS

CLIMATE ZONE	Maximum Heating Degree Days (HDD65°F)	Minimum R_e/R_i Ratio[a]
1-3	n/a	n/a
4	5,400	0.2
5	7,200	0.2
6	9,000	0.2
7	12,600	0.35
8	15,000	0.45
8	20,000	0.6
8	>20,000	0.75

For SI: °C = [(°F)-32]/1.8.; 1 R = 0.176 RSI

a. R_e = exterior continuous insulation R-value; R_i = permeable cavity insulation R-value interior of continuous insulation. The minimum ratio of R_e/R_i shall be used to determine acceptable combinations of continuous insulation and cavity insulation. Interpolation for intermediate values of heating degree days shall be permitted.

b. <u>Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum shall be permitted to apply its R-value to the R_e value.</u>

TABLE R702.7(3)~~.1~~
CLASS III INTERIOR VAPOR RETARDERS

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a]
Marine 4	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. Insulated sheathing with *R*-value ≥ 2.5 over 2 × 4 wall. Insulated sheathing with *R*-value ≥ 3.75 over 2 × 6 wall.
5	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. Insulated sheathing with *R*-value ≥ 5 over 2 × 4 wall. Insulated sheathing with *R*-value ≥ 7.5 over 2 × 6 wall.
6	Vented cladding over fiberboard. Vented cladding over gypsum. Insulated sheathing with *R*-value ≥ 7.5 over 2 × 4 wall. Insulated sheathing with *R*-value ≥ 11.25 over 2 × 6 wall.
7 and 8	Insulated sheathing with *R*-value ≥ 10 over 2 × 4 wall. Insulated sheathing with *R*-value ≥ 15 over 2 × 6 wall.

(Portions of Table not shown remain unchanged)

Commenter's Reason:

(Crandell): The original RB358-13 proposal and a floor modification received positive technical feedback and discussion at the code development hearing and the committee recognized that "this is an important issue" (see reason statement with the original proposal). But, the committee also felt that the floor modification needed to be simplified and directed the proponent to "rework with the modification submitted and bring back" to the final action hearing. This public comment is submitted for that purpose.

The following is a brief explanation and summary of the key features of this proposal:

1. There are no technical changes included in this public comment on the original proposal and floor modification as presented at the first hearing (except to coordinate with committee action on RB357).
2. As requested by the committee, the original proposal and floor modification have been reworked to provide a simple means of determining vapor retarder requirements. For most construction, it's a one-step look-up process that begins and ends with Table R702.7(1).
3. If a Class III vapor barrier is used in Climate Zones 4 Marine and 5-8, a simple table is used to look-up requirements (same as existing table in the code, just renumbered to Table R702.7(3))
4. If continuous insulation is used, sizing of the insulation package (ratio of continuous insulation R-value vs. cavity R-value) is provided in Table R702.7(2) to ensure that the insides of such walls are warm enough in a given climate to control condensation potential (e.g., limit occurrence of dew-point temperature within the wall). These provisions are based on a review of scientific literature and successful practices included in the National Building Code (NBC) of Canada since 1995 (1)(2). This approach allows for many compliant solutions. Table R702.7(2) does not apply to walls without exterior continuous insulation.

In addition to the above, this proposal includes clear language to prohibit construction of walls that are dual vapor barrier assemblies which do not provide adequate drying potential of assemblies (refer to Table R702.7(1), footnote d). Furthermore, the proposed Table R702.7(1) makes it very clear where interior vapor retarders of the three classes are permitted, not permitted, or required such that occurrences of a "reversed" vapor retarder wall are avoided (e.g., table clearly prohibits use of a Class I vapor retarder in the inside of walls in hot/humid climates where this causes well-documented condensation and moisture-related problems).

Finally, it is important to note that this proposal introduces no new requirements that are not already intended, except for new Table R702.7(2) which addresses appropriate vapor retarder requirements only for walls with continuous insulation. For additional information on this public comment, including technical references and practical guidance, refer to the additional technical information to be provided at http://fsc.americanchemistry.com .

References on NBC provisions:

(1) Chown, G.A. and Mukhopadhyaya, P. (2005). "NBC 9.25.1.2: The on-going development of building code requirements to address low air and vapour permeance materials", NRCC-47656, 10th Canadian Conference on Building Science and the Integrated Design Process, May 12-13, 2005, National Research Council Canada

(2) Kumaran, M.K. and Haysom, J.C. (2000) "Low-Permeance Materials in Building Envelopes", Construction Technology Update No. 41, Institute for Research in Construction, National Research Council of Canada. Revised March 2002.

(Fischer): The proposed modification in this public comment includes a consideration for the use of spray foam to comply with the continuous insulation prescriptions contained in the proposed tables. This revision brings the comment into agreement with the IRC Building code committee action on RB357-13, and insures that the committee intent on that proposal is maintained in this additional change.

The building science concepts carried in this proposal will improve moisture management within wall assemblies, and thus improve building performance, durability, and effective energy efficiency. It provides clear direction on the use of vapor barriers in high performance walls, and helps to ensure that vapor barrier systems are properly designed, selected, and installed.

RB358-13

Final Action: AS AM AMPC____ D

RB362-13
R703.2, Chapter 44

Proposed Change as Submitted

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.2 Water-resistive barrier. One layer of ~~No.15 asphalt felt~~ water-resistive barrier, free from holes and breaks, complying with ASTM E 2556, such as ASTM D 226 ~~for~~ Type 1 felt, or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. ~~Such felt or material~~ The water-resistive barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, ~~felt~~ the water-resistive barrier shall be lapped not less than 6 inches (152 mm). The ~~felt or other approved material~~ water-resistive barrier shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

Add new standard to Chapter 44 as follows:

ASTM

E2556-10 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

Reason: The proposal updates the water-resistive barrier reference to the most consensus standard. ASTM E2556 includes house wrap materials, and building papers in addition to traditional felt, and therefore is more representative of the state of the industry. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers and therefore should not limit the use of current WRB's. The materials included in ASTM E2556 – felt, Grad D paper, and building wraps – are all installed in the manner currently prescribed in this section of the code.

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

Analysis: A review of the standard proposed for inclusion in the code, ASTM E 2556 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R703.2 #2-RB-WESTON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM E2556-10 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee feels the language contains commentary. The reference standard is not appropriate for the application and the complete system should be tested in lieu of the components.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Theresa A. Weston, PhD., Dupont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.2 Water-resistive barrier. One layer water-resistive barrier, free from holes and breaks, complying with ASTM E 2556, ~~such as ASTM D 226 Type 1 felt~~, or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. The water-resistive barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, the water-resistive barrier shall be lapped not less than 6 inches (152 mm). The water-resistive barrier shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

Commenter's Reason: The original proposal updates the water-resistive barrier reference to include consensus standard for water-resistive barrier materials. ASTM E2556 includes house wrap materials, and building papers in addition to traditional felt, and therefore updates the code to include practices that are have been used for the last two decades and, are in fact, used by the majority of the industry. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers and therefore should not limit or change the use of current WRB's. The materials included in ASTM E2556 – felt, Grade D paper, and building wraps – are all installed in the manner currently prescribed in this section of the code, "applied horizontally, with the upper layer lapped over the lower layer" and therefore, the inclusion of a material only standard is appropriate. The modification does address the committee's comments on commentary and deletes the commentary the committee identified.

RB362-13
Final Action: AS AM AMPC____ D

RB364-13
R703.2, Chapter 44

Proposed Change as Submitted

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.
4. In a wall assembly that has been tested in accordance with and meets the requirements of AAMA 504.

Add new standard to Chapter 44 as follows:

AAMA

AAMA 504-05 Voluntary Laboratory Test Method to Qualify Fenestration Installation Procedures

Reason: This proposal provides a testing alternative to the prescriptive water-resistive barrier material and installation provided in R703.2. This will allow for innovation while still ensuring the performance and durability of the WRB system. AAMA 504 is an industry standard that includes the water resistance testing of assemblies including "*certain physical loading and temperature cycling conditions to simulate service conditions*". The inclusion of physical loading and temperature cycling as a durability assessment is important to water-resistive barrier systems as they have low accessibility after construction and are critical to moisture performance of the wall system.

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

Analysis: A review of the standard proposed for inclusion in the code, AAMA 504 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R703.2 #1-RB-WESTON.docc

Committee Action Hearing Results

For staff analysis of the content of AAMA 504-05 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee feels that the standard only tests a component and not the assembly.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Theresa A. Weston, PhD., Dupont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls in accordance with Section R703.2.1. ~~Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.~~

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.
4. ~~In a wall assembly that has been tested in accordance with and meets the requirements of AAMA 504.~~

R703.2.1 Application. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1. Fenestration openings shall be flashed in accordance with R703.8 or tested in accordance with, and meet the requirements of, AAMA 504.

Commenter's Reason: The original proposal provides a testing alternative to the prescriptive water-resistive barrier material and installation provided in R703.2. AAMA 504 is an industry standard that includes the water resistance testing of assemblies including "*certain physical loading and temperature cycling conditions to simulate service conditions*". The inclusion of physical loading and temperature cycling as a durability assessment is important to water-resistive barrier and integrated flashing systems as they have low accessibility after construction and are critical to moisture performance of the wall system.

The modified proposal answers the committee's concerns on the applicability of the test standard in two ways. First, it separates the application of water-resistive barriers from the water-resistive barrier material requirements. The proposed test method reference addresses the interface of materials. The performance and durability of alternate water-resistive barrier materials must be separately addressed in addition to testing installation methods. Second, the modification limits the use of the test method to be more consistent with the scope of the reference standard.

Public Comment 2:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1. Fenestration openings shall be flashed in accordance with R703.8 or tested in accordance with, and meet the requirements of, AAMA 504.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.
4. ~~In a wall assembly that has been tested in accordance with and meets the requirements of AAMA 504.~~

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The original proposal provided an exception to the requirement for a water resistive barrier in wall assemblies that have been tested in accordance with AAMA 504 and met its requirements. The committee disapproved the proposal as submitted because they felt the standard only tested a component of a wall assembly and not the entire assembly and therefore was not appropriate as an exception to a requirement for the entire assembly.

In actuality AAMA 504 is intended as a test method for verifying the continuity of the water resistive barrier from the exterior wall assembly through to fenestration placed in that assembly. So the committee was correct in their understanding that AAMA 504 was not intended to test a wall assembly. it does, however, test more than a single component. It tests the assembly of components that are used to create an interface between the exterior wall assembly and fenestration placed within that wall.

The integrity of the water resistive barrier through the interface between the exterior wall and fenestration is an important aspect of proper window and door installation. AAMA's members have spent many years studying the properties of water, water penetration, water resistance, and how to properly install a window into an exterior wall while preventing water penetration into the wall from the exterior.

Section R703.2 addresses the water resistive barrier in an exterior wall, and penetration and appendages to that wall. Specifically, penetrations through the exterior wall are required to comply with Section R703.1.

The continuity of the water resistive barrier around and through fenestration openings, however, is not addressed in Section R703.1. This Public Comment modifies the original proposal to specifically address fenestration openings in the exterior wall assembly. It specifies that fenestration openings are to be flashed in accordance with Section R703.8, or they shall be tested in accordance with, and meet the requirements of, AAMA 504. Both methods are appropriate means of providing continuity of the water resistive barrier through and around fenestration openings.

RB364-13

Final Action: AS AM AMPC____ D

RB365-13
R703.1.1, R703.2, R703.2.1 (NEW), R703.2.2 (NEW), R703.8

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee and American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior water that enters the assembly.
Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed according to Section R703.7 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.8, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
   - 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
   - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
   - 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
   - 2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours.

   The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings penetration or intersections of terminations with dissimilar materials.

3. <u>Water resistive barrier materials and methods used as an alternative to Section R703.2.1 or R703.2.2 shall comply with the following:</u>

   1. <u>The testing required by Exception 2 of Section R703.1.1 applies except:</u>

      <u>1.1. Cladding is not required.</u>
      <u>1.2. The minimum pressure differential shall be 2.86 pounds per square foot (137Pa).</u>
      <u>1.3. The minimum test exposure time shall be 15 minutes.</u>

1.4. The performance need not exceed the performance of the water resistive barrier installation specified in Section R703.2.1 or R703.2.2 as tested under identical minimum pressure and exposure time conditions.

2. The alternative water resistive barrier shall be installed in accordance with the manufacturer's installation instructions.

R703.2 Water-resistive barrier. Water-resistive barriers shall comply with Section R703.2.1 or R703.2.2, or shall be approved in accordance with Section R703.1.1, exception #3.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

R703.2.1 No. 15 asphalt felt. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt ~~or other approved water-resistive barrier~~ shall be applied over studs or sheathing of all exterior walls. Such felt ~~or material~~ shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt ~~or other approved material~~ shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

R703.2.2 Grade D paper. Grade D paper behind exterior plaster and lath shall installed in accordance with Section R703.6.3.

R703.8 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish or a water-resistive barrier complying with Section R703.2. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
   1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
   1.2. In accordance with the flashing design or method of a registered design professional.
   1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.

7. At built-in gutters.

Reason:

This proposal reorganizes Section R703.2 and coordinates with water-resistance requirements of Section R703.1.1 to more completely and clearly address the types of water-resistive barriers currently included in the IRC and define requirements for alternatives. It also coordinates proper integration of flashing with the water-resistive barrier layer in Section R703.8.

Most importantly, this proposal addresses a critical gap in the code by establishing a uniform water penetration performance requirement for all types of "other approved" (alternative) water resistive barriers. The proposed water resistance requirements rely on the same test method already include in Section R703.1.1 and modifies the criteria to be appropriate for testing the WRB layer alone (not including cladding) such that alternative WRB's can be used with any cladding material without having to test a full assembly for each type of cladding or apply criteria in Section R703.1.1 that are meant to be applied with cladding present. The proposed water resistance test criteria (2.86 psf and 15 minute duration) are identical to requirements for water penetration testing of water-resistive barrier coatings in accordance with ASTM E2570 and are appropriately more restrictive than the water-resistance criteria applied to water-resistive air-barrier materials per ASTM E1677.

This change is necessary because some alternative water-resistive barrier materials, such as polymer-based barriers (i.e., "building wraps") are approved for use only requiring a material property to be tested and standards for this type of material, such as ASTM E2556, do not address actual installed performance of the water-resistive barrier including penetrations, fastenings, joint detailing and other factors representative of end-use conditions. In fact, ASTM E 2556 states in its scope that "this specification is limited to the evaluation of materials and does not address installed performance." Installed performance is surely the most important consideration and it is neglected in current standards for some materials.

The main reason for this proposal is that WRB performance is largely governed by how it performs as an installed assembly under in-service moisture exposure conditions. This concern is addressed for some types of WRB materials and installations (e.g., WRB panels, WRB coatings, etc.), but not for others (e.g, polymer-based barriers or wraps).

The significance of this concern over the lack of a uniform water-penetration resistance requirement is documented in the literature (Hall, G.D. and Hoigard, K.R., "Water-Resistive Barriers: How do they compare?", *Interface*, November 205). In particular, this reference evaluated current code requirements, acceptance criteria, and field experience. It also reports comparative test data under installed water exposure conditions. The primary conclusions from the study include:

"Current building code provisions offer no rational means of assessing the equivalency of alternative WRB products to ASTM D-266 type 1 asphalt-saturated felt…"

"The three water resistance test methods specified in AC38 vary so significantly in test duration and applied hydrostatic pressure that no meaningful comparison of test data can be made. They fail to address several important moisture transport mechanisms that affect the in-service performance of WRBs."

"Laboratory tests performed by the authors to simulate potential in-service conditions not addressed by AC38 resulted in water penetration through several commercially available WRB materials that, according to published manufacturer information, passed the requirements of AC38 for Grade D barriers."

Clearly, these issues must be addressed in the IRC to ensure acceptable and consistent performance of various types of WRB materials and assemblies. Your approval of this proposal will establish a sound foundation for evaluation of alternative WRB materials and installations to avoid inconsistent requirements resulting in poor or inconsistent performance among alternative WRB materials.

Cost Impact: This proposal will not increase the cost of construction.

R703.1.1-RB-CRANDELL.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels the tests methods should be in a standard and not in the 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:

Jay H. Crandell, AREA Consulting, representing Foam Sheathing Committee of the American Chemistry Council, request Approval as Submitted.

Commenter's Reason: This proposal provides testing requirements for testing of WRB materials as an assembly based on testing criteria that are already included in the code text for wall assemblies with cladding applied (but which are not appropriately and consistently applied to WRB materials and assemblies when tested without cladding applied for qualification purposes). Thus, the code already establishes a precedent for dealing with such matters in the code when existing standards are silent or inconsistent. Thus, the code development committee's reason that performance test should not be included in the code are inconsistent with current and past practice, especially when the code is supposed to provide consistent direction and a uniform performance baseline in these matters. The need for this proposal, as a means of establishing appropriate and consistent minimum test criteria for water-resistance testing of WRB assemblies, is thoroughly presented and supported by the technical literature in the original proposal submission as published in the agenda for the code development committee hearing. Please refer to the original proposal's reasons statement for technical justification. Your support of this PC at the final action hearing will ensure that enforcement of approved WRB materials and assemblies will result in consistent minimum performance across all WRB material types.

RB365-13

Final Action: AS AM AMPC____ D

RB367-13
R703.4, Table R703.5 (NEW)

Proposed Change as Submitted

Proponent: Andrew Herseth, US Dept of Homeland Security, Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. The use of Table R703.4 shall be limited according to the building mean roof height, ultimate design wind speed in accordance with Figure R301.2(4)A, and exposure category in accordance with Section R301.2.1.4 as shown in Table R703.5. Where ~~the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher~~ the limits of Table R703.5 are exceeded, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.5
LIMITS FOR ATTACHMENT PER TABLE R703.4

Maximum Mean Roof Height			
Basic Wind Speed (mph-3-second gust)	**Exposure**		
	B	C	D
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR

NL = not limited by Table R703.5, DR = Design Required
For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s

Reason: The proposal is intended to better establish the current limits of the prescriptive fastening table for wall coverings. The prescriptive fastening requirements in Table R703.4 are limited to a maximum design pressure of 30 psf. According to Table R301.2(2), for Zone 5 and an effective wind area of 10 ft^2, the maximum negative pressure for a basic wind speed of 110 mph is 29.1 psf. This value – less than 30 psf – correlates directly with the 110 mph limitation in Section R703.4. However, the tabulated pressures in Table R301.2(2) are for an assumed Exposure B site condition and a mean roof height of 30 feet. For residential buildings with a basic wind speed of 110 mph and Exposure C or D, or a mean roof height greater than 30 feet, the maximum negative pressure would be substantially higher than 30 psf. For example, consider the case of a residential building located in Exposure C, with a mean roof height of 45 ft. The adjustment factor from Table R301.2(3) would be 1.53. The resulting maximum negative design pressure for a basic wind speed of 110 mph would be (29.1 psf) x 1.53 = 44.5 psf. This wall cladding load far exceeds the current implied limitation of Table R703.4 which is 30 psf.

Table R703.5 has been added to simplify the determination of whether prescriptive fastening provisions of Table R703.4 apply to a specific building. The limits in the table indicate where component and cladding pressures exceed 30 psf as a function of wind speed exposure and mean roof height. In most cases, especially in areas with lower wind speeds, the prescriptive fastening requirements in Table R703.4 will be verified as applicable. Chapter 7 of ICC 600 includes prescriptive attachment schedules for exterior wall coverings that may be applied when mean roof height limits per Table R703.5 are exceeded.

FEMA P-499, *Home Builder's Guide to Coastal Construction* (FEMA, 2009), includes Technical Fact Sheet 5.3 which addresses the attachment of siding in areas where wind loads for wall cladding exceed 30 psf as a result of wind speed, and/or exposure category and/or roof mean height by recommending the selection of a siding product rated for those conditions or higher. The manufacturer's product literature or installation instructions should specify the fastener type, size and spacing, and any other installation details such as requirements for the sheathing materials behind vinyl siding that is needed to achieve the product rating.

New language is also added to require design wind pressures to be determined using an effective wind are of 10 ft^2. For wall cladding, the effective wind area will be governed by the effective wind area of an individual fastener which will almost always be less than 10 ft^2.Guidance for Determining Site-Specific Loads in Chapter 8 of FEMA P-55, *Coastal Construction Manual* (FEMA, 2011), recommends that "for cladding and fasteners, the effective wind area should not be greater than the area that is tributary to an individual fastener. In ASCE 7-10, there is no adjustment for wind areas less than 10 ft2; therefore, sheathing suction loads (should be) based on an effective wind area of 10 ft2 for different zones on the roof."

Changing the trigger for using Table R703.4 from a wind speed limit to a pressure limit will result in better correlation of the actual limits of the table. The new attachment criteria would also make IRC consistent w/ ICC 600 and the Florida Building Code (FBC) where attachment provisions for exterior wall coverings are pressure-triggered.

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

R703.4-RB-HERSETH-OVERCASH.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. ~~The use of Table R703.4 shall be limited according to the building mean roof height, ultimate design wind speed in accordance with Figure R301.2(4)A, and exposure category in accordance with Section R301.2.1.4 as shown in Table R703.5.~~ Where the design wind pressure exceeds 30 psf or where the limits of Table R703.5 are exceeded, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.5
LIMITS FOR ATTACHMENT PER TABLE R703.4

Maximum Mean Roof Height			
~~Basic~~ Ultimate Wind Speed (mph-3-second gust)	**Exposure**		
	B	C	D
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR
140	35'	DR	DR

NL = not limited by Table R703.5, DR = Design Required
For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s

Committee Reason: The change provides for a method to determine that the limits of fastening in Table R703.4 are not exceeded. The modification clarifies the new language and corrects the table.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Council and the Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4(1) or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. Unless specified otherwise in accordance with this code, furring attachments to wall framing shall comply with Table R703.4(2). Where the design wind pressure exceeds 30 psf or where the limits of Table R703.5 are exceeded, the attachment of wall coverings and furring shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.4 (1)
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

(Portions of Table not shown remain unchanged)

TABLE R703.4(2)
MINIMUM FURRING AND ATTACHMENT REQUIREMENTS
TO RESIST MAXIMUM 30 PSF DESIGN WIND LOAD[1,2,3]

Connection Method	16" Furring Spacing		24" Furring Spacing	
	1x3 Wood Furring	1x4 Wood Furring	1x3 or 1x4 Wood Furring	2x3 Wood Furring
8d common nail (2-1/2"x0.131"), minimum 1-1/4 penetration	1 at 12"oc or 2 at 16"oc	2 at 24"oc	2 at 16"oc	2 at 16"oc
#10 Wood Screw (minimum 1" penetration)	1 at 16"oc	1 at 24"oc	1 at 16"oc	1 at 24"oc
#8 screw[4] to minimum 33mil or thicker steel stud (minimum penetration of steel thickness + 3 threads)	1 at 16"oc	2 at 24"oc	1 at 12"oc or 2 at 16"oc	1 at 12"oc or 2 at 24"oc

For SI: 1 inch = 25.4mm

1. Wood furring and wall framing shall be Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS. Wood structural panel wall sheathing of equal or greater effective specific gravity for withdrawal shall be permitted to be included in the penetration depth. The span of 1x4 furring across studs or between fastening points shall not exceed 24" inches for a maximum 16"oc furring spacing. In all other cases, 1x3 or 1x4 wood furring shall not exceed a 16" span across studs or between fastening points.
2. Where the required cladding fastener penetration into wood material exceeds ¾ inch (19.1 mm) and is not more than 1-1/2 inches (38.1 mm), a minimum 2x3 wood furring shall be used or an approved design. Minimum fastener penetration into wall framing shall not be reduced with use of thicker furring member.
3. Cold formed steel framing (studs, tracks, and hat channels) shall be minimum 33 ksi and minimum 33 mil thickness. A minimum 7/8-inch (22.2mm) deep steel hat channel shall be permitted to be substituted for 1x3 or 1x4 wood furring and shall use the respective fastening schedule. A minimum 1.5-inch (38.1mm) deep steel hat channel shall be permitted to be substituted for a 2x furring. Hat channels shall have a minimum 1-1/4 inch (31.8mm) top width, minimum ½-inch (12.7mm) side flanges, and a minimum total width of 2-1/2 inches (63.5mm).
4. Screws into cold formed steel framing shall comply with ASTM C1513. The minimum screw head size shall be 0.285 inches (7.2mm)

TABLE R703.5
LIMITS FOR ATTACHMENT PER TABLE R703.4(1) AND TABLE R703.4(2)

(Portions of Table not shown remain unchanged)

Commenter's Reason: RB367-13 was approved as modified to provide clear limits t prescriptive wall covering attachments for wind load resistance. The intent of this public comment is to further improve the goal of RB367-13 and to coordinate with the committee's action to approve as modified RB389-13 and RB390-13. This proposal is also consistent with the committee's approval of RB392-13 as modified with provisions for cladding connection to steel framing.

Furring attachments are often a part of a wall covering assembly and compatible attachment limits are needed to ensure a complete wind load path from the wall covering, through the furring, and to the framing. The topic of wind pressure resistance of furring attachments was included in proposals RB389-13 and RB390-13 for wood and cold-formed steel framing, but was removed by the proponent's modification approved by the code development committee. The code development committee recognized that wind pressure requirements for furring would be "better handled by other sections of the code" that are broader in scope of application. The appropriate section of code to address this issue is Section R703.4. Thus, it is appropriate to further modify RB367-13 which is directly related to the wind pressure concern for attachment of wall coverings (and furring is used as part of a wall covering assembly). Such information is currently missing from the code and can create a "weak link" for the wind load path through wall covering assemblies to framing.

The furring and attachments in proposed new Table R703.4(2) comply with the maximum 30 psf wind load limit for the IRC which is consistent with the limitations given in Table R703.5 added by RB367-13. The prescribed furring attachment in the proposed new Table R703.4(2) are limited by the lesser of:

1. allowable fastener withdrawal (based on the NDS and AISI S-100)
2. allowable bending strength of furring (based on NDS and AISI S-100)
3. fastener head pull-through (based on test data and literature-topic not addressed in design standard)

RB367-13

Final Action: AS AM AMPC____ D

RB369-13

R703.5.1, R703.5.3, Table R703.5.1(2) (New), Table R703.5.1(3) (NEW), Table R703.5.2, R703.5.3.1, R905.7.5, Table R905.7.5(2) (NEW), R905.8.6

Proposed Change as Submitted

Proponent: David Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau

Revise as follows:

R703.5.1 Application. Wood shakes or shingles shall be applied either single-course or double-course over nominal $^1/_2$-inch (13 mm) wood-based sheathing or to furring strips over $^1/_2$-inch (13 mm) nominal nonwood sheathing . A permeable water-resistive barrier shall be provided over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51 mm) and vertical overlaps of not less than 6 inches (152 mm). Where furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25 mm by 76 mm or 25 mm by 102 mm) and shall be fastened horizontally to the studs with 7d or 8d box nails and shall be spaced a distance on center equal to the actual weather exposure of the shakes or shingles, not to exceed the maximum exposure specified in Table R703.5.2. The spacing between adjacent shingles to allow for expansion shall ~~not exceed $^1/_4$ inch (6 mm)~~ be 1/8 inch (3 mm) to ¼ inch (6 mm) apart and between adjacent shakes, ~~it~~ shall ~~not exceed $^1/_2$ inch (13 mm)~~ be 3/8 inch (10 mm) to ½ inch (13 mm) apart. The offset spacing between joints in adjacent courses shall be a minimum of $1^1/_2$ inches (38 mm).

TABLE R703.5.1(2)
SINGLE COURSE SIDEWALL FASTENERS

Product Type	**Nail Type & Minimum Length**
R & R and Sanded Shingles	**Type (in)**
16” and 18” shingles	3d Box 1 1/4
24” Shingles	4d Box 1 1/2
Grooved Shingles	**Type (in)**
16” and 18” shingles	3d Box 1 1/4
24” shingles	4d Box 1 ½
Split and Sawn Shakes	**Type (in)**
18” Straight-Split Shakes	5d Box 1 3/4
18” and 24” Handsplit Shakes	6d Box 2
24” Tapersplit Shakes	5d Box 1 3/4
18” and 24” Tapersawn Shakes	6d Box 2

TABLE R703.5.1(3)
DOUBLE COURSE SIDEWALL FASTENERS

Product Type	**Nail Type & Minimum Length**
R & R and Sanded Shingles	**Type (in)**
16” and 18” and 24” shingles	5d Box 1 ¾ or same size casing nails
Grooved Shingles	**Type (in)**
16” and 18” and 24”shingles	5d Box 1 3/4
Split and Sawn Shakes	**Type (in)**
18” Straight-Split Shakes	7d Box 2 ¼ or 8d 2 1/2
18” and 24” Handsplit Shakes	7d Box 2 ¼ or 8d 2 1/2
24” Tapersplit Shakes	7d Box 2 ¼ or 8d 2 1/2
18” and 24” Tapersawn Shakes	7d Box 2 ¼ or 8d 2 1/2

TABLE R703.5.2

MAXIMUM WEATHER EXPOSURE FOR WOOD SHAKES AND SHINGLES ON EXTERIOR WALLS[a,b,c]
(Dimensions are in inches)

LENGTH	EXPOSURE FOR SINGLE COURSE	EXPOSURE FOR DOUBLE COURSE
Shingles[a]		
16	~~7 ½~~ 7	12[b]
18	~~8 ½~~ 8	14[c]
24	~~11 ½~~ 10 ½	16[d]
Shakes[a]		
18	~~8 ½~~ 8	14
24	~~11 ½~~ 10 ½	18

For SI: 1 inch = 25.4 mm.

a. Dimensions given are for No. 1 grade.
b. A maximum ~~10-inch~~ 9-inch exposure is permitted for No. 2 grade.
c. A maximum ~~11-inch~~ 10inch exposure is permitted for No. 2 grade.
d. A maximum 14-inch exposure is permitted for No. 2 grade.

~~**R703.5.3 Attachment.** Each shake or shingle shall be held in place by two hot-dipped zinc-coated, stainless steel, or aluminum nails or staples. The fasteners shall be long enough to penetrate the sheathing or furring strips by a minimum of $^1/_2$ inch (13 mm) and shall not be overdriven.~~

703.5.3 Attachment. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Each shake or shingle shall be held in place by two~~.~~ stainless steel Type 304 , Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) corrosion resistant box nails in accordance with Table R703.5.1(2) or R703.5.1 (3). Alternatively, 16 gauge stainless steel Type 304 or Type 316 staples with crown widths 7/16 inch (11 mm) minimum, ¾ inch (19 mm) maximum shall be used and the crown of the staple shall be placed parallel with the butt of the shake or the shingle. In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25 mm) above the butt line of the succeeding course and ¾" (19 mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two fasteners, driven approximately 2 inches (51 mm) above the butt line and 3/4 inch (19 mm) from each edge. Fasteners installed within 15 miles 24 km) of salt water coastal areas shall be stainless steel Type 316. Fasteners for fire-retardant-treated in accordance with Section R902 or pressure-impregnated-preservative-treated shakes or shingles in accordance with AWPA U1 shall be, stainless steel Type 316. The fasteners shall be long enough to penetrate and shall penetrate the sheathing or furring strips by a minimum of ½ inch (13mm) and shall not be overdriven. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

~~**R703.5.3.1 Staple attachment.** Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Staples for untreated (natural) wood shakes or wood shingles shall be 16 gauge Stainless Steel Type 304,Type 316 (Fasteners installed within 15 miles of salt water coastal areas shall be stainless steel Type 316.) Staples shall not be less than 16 gauge and shall have a crown width of not less than minimum 7/16 inch (11mm), maximum of ¾" and the crown of the staples shall be parallel with the butt of the shake or shingle.~~
~~In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25mm) above the butt line of the succeeding course and ¾" (19mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two casing nails~~ ~~staples~~~~, driven approximately 2 inches (51mm) above the butt line and 3/4" inch (19mm) from each edge. In all application, staples shall be concealed by the course above. With shingles wider than 810 inches (203254mm) two additional nails~~ ~~staples~~ ~~shall be required and shall be nailed driven approximately 1 inch (25mm) apart near the center of the shingle. Fasteners for fire-retardant-treated (as defined in section R902.2) shingles, shakes or pressure-impregnated-preservative-treated shingles or shakes in accordance with AWPA U1 shall be Stainless Steel Type 316, applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~

Revise as follows:

R905.7.5 Application. Wood shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shingles shall be laid with a side lap not less than 1 ½" (38mm) between joints in courses, and no two joints in any three adjacent courses shall be in direct alignment. Spacing between shingles shall not be less than ¼" to 3/8" (6mm to 10mm). Weather exposures for wood shingles shall not exceed those set in Table R905.7.5. Fasteners for untreated (naturally durable) wood shingles shall be ~~corrosion resistant with a minimum penetration of ½ inch (13mm) into the sheathing~~. ~~For sheathing less than ½ inch (13mm) in thickness, the fasteners shall extend through the sheathing.~~ stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) box nails in accordance with table R905.7.5 (2). Alternatively, 16 gauge stainless steel Type 304, or Type 316 staples with crown widths 7/16" (11mm) minimum, ¾" (19 mm) maximum shall be used. Fasteners installed within 15 miles (24km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾ inch (19 mm). For roof sheathing less than ~~½"~~ ¾" in (19 mm) thickness, each fastener shall ~~extend~~ penetrate through the sheathing. Wood shingles shall be attached to the roof with two fasteners per shingle positioned ~~no more than ¾" from each edge and no more than 1 inch (25mm) above the exposure line.~~ in accordance with the manufacturers installation instructions. Fasteners for fire-retardant-treated shingles in accordance with Section R902 or pressure-impregnated-preservative-treated shingles of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

TABLE R905.7.5 (2)
NAIL REQUIREMENTS FOR WOOD SHAKES AND WOOD SHINGLES

Shakes	**ASTM F 1667 Nail Type and Minimum Length**
18" Straight-Split	5d Box 1 ¾"
18" and 24" Handsplit and Resawn	6d Box 2
24" Tapersplit	5d Box 1 ¾"
18" and 24" Tapersawn	6d Box 2
Shingles	**ASTM F 1667 Nail Type and Minimum Length**
16" and 18"	3d Box 1 ¼"
24"	4d Box 1 ½"

R905.8.6 Application. Wood shakes shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes shall be laid with a side lap not less than 1 ½" (38mm) between joints in adjacent courses. Spacing between shakes in the same course shall be 3/8 inch to 5/8 inch (9.5mm to 15.9mm) for shakes ~~and~~ including tapersawn shakes ~~of naturally durable wood shall be 3/8 inch to 5/8 inch (9.5 mm to 15.9 mm) for preservative-treated taper sawn shakes.~~ Weather exposures for wood shakes shall not exceed those set in Table R905.8.6. Fasteners for untreated (naturally durable) wood shakes shall be ~~corrosion resistant with a minimum penetration of ½ inch (12.7mm) into the sheathing~~. ~~For sheathing less than ½ inch (13mm) thick, the fasteners shall extend through the sheathing.~~ stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) corrosion resistant box nails in accordance with Table R905.7.5.(2). Alternatively, 16 gauge Type 304 or Type 316 stainless steel staples, with crowns width 7/16" minimum, ¾" maximum shall be used. Fasteners installed within 15 miles (24 km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾" inch (19 mm). Where the roof is less than ¾" (19 mm) thick, each fastener shall penetrate through the sheathing. Wood shakes shall be attached to the roof with two fasteners per shake positioned ~~no more than 1 inch (25mm) no more than 2inches (25 mm) above the exposure line.~~ in accordance with the manufacturer's installation instructions Fasteners for fire-retardant-treated (as defined in section R902) shakes or pressure-impregnated-preservative-treated shakes of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

Reason: There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners and rather than waiting for these incidents to include wall applications it is a proactive measure to increase the specifics of the fasteners used.

Specifying “corrosion resistant” is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product types. Increased specifics will improve wall system integrity and lifespan.

Shakes and shingles shall not be applied with the vertical edges tight together as doing this does not leave room for expansion. Defining the spacing requirements further will eliminate this incorrect application method which causes fish-mouthing, cupping and curling.

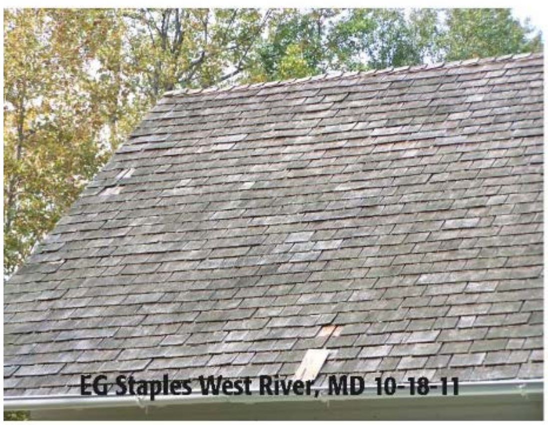
There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners. Specifying “corrosion resistant” is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product type. Increased specifics will improve roof system integrity and lifespan.

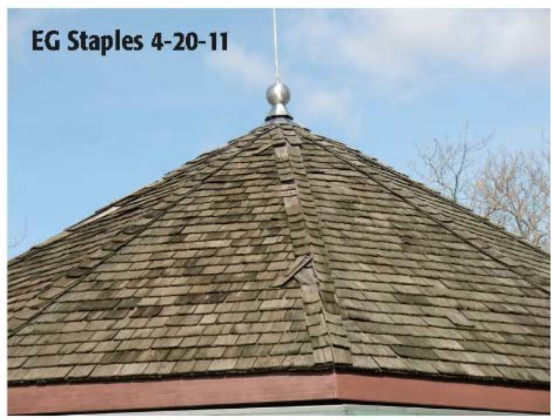
Penetration into sheathing more than ½” thick must be at minimum ¾” or all the way through the sheathing in order to attach the product strongly enough to hold in place and prevent loosening of the fastener.

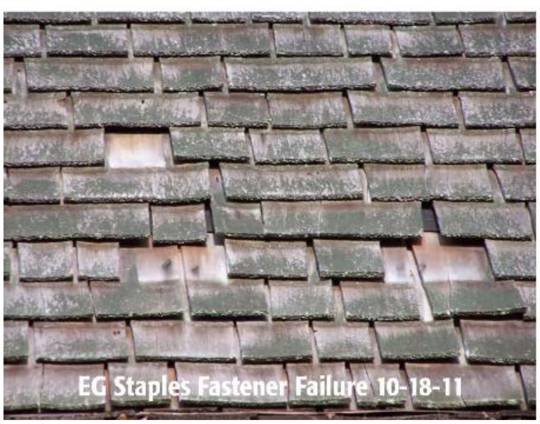
This change simplifies the code.

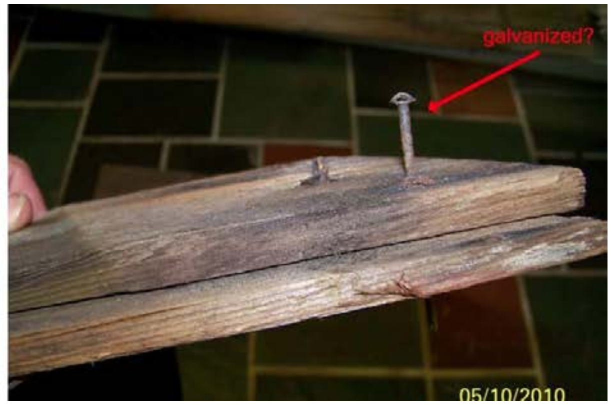
Following are examples of the failures that this code change is designed to prevent:

Shingles falling off buildings because of corroded fasteners or fasteners that did not adequately penetrate the substrate.









Cost Impact: The increased cost of these changes in comparison to the cost of the entire wall application is negligible.

R703.5.1-RB-ROODVOETS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal provides little or no substantiation. There is no substantiation for the cost impact that was provided. This should be reworked with the modification that was ruled out of order and brought back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.5.1 Application. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes or shingles shall be applied either single-course or double course over nominal ½ -inch (13mm) wood-based sheathing, or to furring strips over 1/2-inch (13mm) nominal non-wood sheathing. A ~~permeable~~ water-resistive barrier shall be provided over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51mm) and vertical overlaps of not less than 6 inches (152mm). Where horizontal furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25mm by 76mm or 25mm by 102 mm) and shall be fastened ~~horizontally~~ to the studs with minimum 7d box nails spaced a distance on center equal to the actual weather exposure of the shake or shingle, not to exceed the maximum exposure specified in Table R703.5.2. When installing shakes or shingles over a non-permeable water resistive barrier, furring strips shall be placed first vertically over the barrier and, in addition horizontal furring strips shall be fastened to the vertical furring strips prior to attaching the shakes or shingles to the horizontal furring strips. The spacing between adjacent shingles to allow for expansion shall be 1/8" (3) mm to ¼" (6mm) apart ~~and~~ between adjacent shakes shall be 3/8" (10 mm) to ½" (13mm) apart. The offset spacing between joints in adjacent courses shall be a minimum 1½inches (38mm).

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In response to testimony at the committee hearing the requirement for a permeable water-resistive barrier (WRB) is deleted. If a non-permeable water-resistive barrier is installed, continued durability and functionality requires that the shakes or shingles be spaced away from the WRB with furring strips. Literature and experience show that wood based exterior sidings perform best when there is a vertical channel behind the siding, but since the shakes and shingles must be nailed on horizontal furring there is a need for vertical furring to create the vertical air channel and the horizontal furring to create a nailing support. This is supported in "Reroofing and Residing to Save Energy", Building and Construction Technology Program, Department of Environmental Conservation, University of Massachusetts at Amherst.

Historically Cedar Sakes & Shingles have performed well when vapor permeable WRB's are used over wood. This is supported by the APA publication "Build Energy Efficient Walls" Form J440 The Engineered Wood Association.

The change requiring adding vertical and horizontal furring over WRB's will add cost to the construction, however it will also make the use of continuous insulation and non-permeable WRB's practical and durable. In fact the entire wall is expected to have superior moisture performance.
Other changes have eliminated redundant references not required in this section. Wording changes to clarify that 7d box nails are minimal and larger nails can be used where required for increased strength.

- Table 703.5.2 is unchanged from the original public proposal, however there were questions about the effect of the proposed changes on the cost of construction. This proposed code change reduces the exposure length of the shingles and shakes. The change is required as the longer exposure lengths allowed in the code are no longer considered practical. Exposure lengths have been decreased in accordance with manufacturers installation requirements that have been in installation manuals since 2002, and in practice in most areas long before that. Although the changes in size as proposed in this code change will theoretically increase costs, no practical change in cost is implicated as products installed according to manufacturers' requirements complied with this table. This change will increase the cost of construction over the costs if the current minimum code requirements are followed.

Public Comment 2:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R703.5.1(2)
Nail Requirements for Wood Shakes and Wood Shingles

Single Course Sidewall Fasteners			
Product Type	**Nail Type & Minimum length**	**Minimum Head Diameter**	**Minimum Shank Thickness**
R & R and Sanded Shingles			
16" and 18" shingles	3d box - 1 ¼"	0.19"	0.08"
24" Shingles	4d box - 1 ½"	0.19"	0.08"
Grooved Shingles			
16" and 18" shingles	3d box - 1 ¼"	0.19"	0.08"
24" shingles	4d box - 1 ½"	0.19"	0.08
Split and Sawn Shakes			
18" Straight-Split Shakes	5d box - 1 ¾"	0.19"	0.08"
18" and 24" Handsplit Shakes	6d box - 2"	0.19"	0.0915"
24" Tapersplit Shakes	5d Box-1 3/4	0.19"	0.08"
18" and 24" Tapersawn Shakes	6d Box- 2	0.19"	0.0915"

TableR703.5.1 (3)
Nail Requirements for Wood Shakes and Wood Shingles

Double Course Sidewall Fasteners			
Product Type	**Nail Type & Minimum length**	**Minimum Head Diameter**	**Minimum Shank Thickness**
R & R and Sanded Shingles			
16" and 18" and 24" shingles	5d box - 1 ¾" Or same size casing nail	0.19"	0.08"
Grooved Shingles			
16" and 18" and 24"shingles	5d box - 1 ¾"	0.19"	0.08"
Split and Sawn Shakes			
18" Straight-Split Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"
18" and 24" Handsplit Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"
24" Tapersplit Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"
18" and 24" Tapersawn Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In accordance with comments made at the public hearing the Tables now prescribe minimum length, head diameter and thickness of the fasteners to be used.

Public Comment 3:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R 905.7.5 (2)
Nail Requirements for Wood Shakes and Wood Shingles

Shakes	**~~ASTM F1667~~ Nail Type and Minimum Length**	**Minimum Head Size**	**Minimum Shank Diameter**
18" Straight-Split	5d Box 1 ¾"	0.19'	.080"
18" and 24" Handsplit and Resawn	6d Box 2	0.19"	.0915"
24" Tapersplit	5d Box 1 ¾"	0.19"	.080"
18" and 24" Tapersawn	6d Box 2	0.19"	.0915"
Shingles	**~~ASTM F1667~~ Nail Type and Minimum Length**		
16" and 18"	3d Box 1 ¼"	0.19"	.080"
24"	4d Box 1 ½"	0.19"	.080"

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In accordance with comments made at the public hearing the Tables now prescribe minimum length, head diameter and thickness of the fasteners to be used.

Public Comment 4:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.5.3 Attachment. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Each shake or shingle shall be held in place by two~~. stainless steel Type 304 , Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) corrosion resistant~~ box nails in accordance with Table R703.5.1(2) or R703.5.1 (3). Nails shall be ~~-~~stainless steel Type 304 or Type 316 or hot-dipped ~~-~~galvanized, with a coating weight of ASTM A 153 Class D (1.0 oz/ft^2) Alternatively, two 16 gauge stainless steel Type 304 or Type 316 staples with crown widths 7/16 inch (11 mm) minimum, ¾ inch (19 mm) maximum shall be used and the crown of the staple shall be placed parallel with the butt of the shake or the shingle. In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25 mm) above the butt line of the succeeding course and ¾" (19 mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two fasteners, driven approximately 2 inches (51 mm) above the butt line and 3/4 inch (19 mm) from each edge. Fasteners installed within 15 miles 24 km) of salt water coastal areas shall be stainless steel Type 316. Fasteners for fire-retardant-treated in accordance with Section R902 or pressure-impregnated-preservative-treated shakes or shingles in accordance with AWPA U1 shall be, stainless steel Type 316. The fasteners shall be long enough to penetrate and shall penetrate the sheathing or furring strips by a minimum of ½ inch (13mm) and shall not be overdriven. ~~Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~ . Fastener packaging shall bear a label indicating the appropriate grade material or coating weight,

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The primary reason for this proposed code change is to better clarify the corrosion resistance of the fasteners.

Corroded wall fasteners have been noted in several areas, with the expectation that the corrosion will progress, resulting in shingles falling off walls. It is a proactive measure to increase the specifics of the fasteners used. Wall fastener corrosion similar to that of roofs fasteners has been noted where there are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners.

Specifying "corrosion resistant" is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product types. Increased specifics will improve wall system integrity and lifespan. The code currently requires more corrosion resistant fasteners in several applications as noted in **R402.1.1 Fasteners. (**Fasteners used below *grade*----shall be of Type 304 or 316 stainless steel.)

(From Randall Shackelford committee approved proposed code change RB176-13) "There has been a lot of work done on fasteners and connectors in contact with treated wood in the last 8-10 years. All the testing and historical performance of stainless steel were based on the traditional use of 300 series stainless steel. Yet there are many types of stainless steel, and some are much less corrosion resistant than others. By limiting the types of stainless steel to these specific series types, it ensures that the stainless steel fasteners will be corrosion resistant when exposed to treated wood."

Use of stainless steel or hot dipped galvanized fasteners will result in a very small increase the cost of construction over inferior fasteners previously allowed.

In response to testimony at the committee hearings the reference to ASTM F1667 was removed and replaced with specific minimum fastener length, diameter and head sizes in new table 703.5.1 in accordance with current industry practice. No added cost is expected from this better definition of the fasteners required.

Public Comment 5:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R905.7.5 Application. Wood shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shingles shall be laid with a side lap not less than 1 ½" (38mm) between joints in courses, and no two joints in any three adjacent courses shall be in direct alignment. Spacing between shingles shall not be less than ¼" to 3/8" (6mm to 10mm). Weather exposures for wood shingles shall not exceed those set in Table R905.7.5. Fasteners for untreated (naturally durable) wood shingles shall be ~~stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft²))~~ box nails in accordance with table R905.7.5 (2). <u>Nails shall be stainless steel Type 304 or Type 316 or hot-dipped galvanized, with a coating weight of ASTM A 153 Class D (1.0 oz/ft²)</u> Alternatively, <u>two</u> 16 gauge stainless steel Type 304, or Type 316 staples with crown widths 7/16" (11mm) minimum, ¾" (19 mm) maximum shall be used. Fasteners installed within 15 miles (24km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾ inch (19 mm). For roof sheathing less than ¾" in (19 mm) thickness, each fastener shall penetrate through the sheathing. Wood shingles shall be attached to the roof with two fasteners per shingle positioned in accordance with the manufacturers installation instructions. Fasteners for fire-retardant-treated shingles in accordance with Section R902 or pressure-impregnated-preservative-treated shingles of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. ~~Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~ . <u>Fastener packaging shall bear a label indicating the appropriate grade material or coating weight,</u>

R905.8.6 Application. Wood shakes shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes shall be laid with a side lap not less than 1 ½" (38mm) between joints in adjacent courses. Spacing between shakes in the same course shall be 3/8 inch to 5/8 inch (9.5mm to 15.9mm) for shakes including tapersawn shakes Weather exposures for wood shakes shall not exceed those set in Table R905.8.6. Fasteners for untreated (naturally durable) wood shakes shall be ~~stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft²)) corrosion resistant~~ box nails in accordance with Table R905.7.5.(2). <u>Nails shall be stainless steel Type 304 or Type 316 or hot-dipped galvanized, with a coating weight of ASTM A 153 Class D (1.0 oz/ft²)</u> Alternatively, <u>two</u> 16 gauge Type 304 or Type 316 stainless steel staples, with crowns width 7/16" minimum, ¾" maximum shall be used. Fasteners installed within 15 miles (24 km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾" inch (19 mm). Where the roof is less than ¾" (19 mm) thick, each fastener shall penetrate through the sheathing. Wood shakes shall be attached to the roof with two fasteners per shake positioned in accordance with the manufacturer's installation instructions Fasteners for fire-retardant-treated (as defined in section R902) shakes or pressure-impregnated-preservative-treated shakes of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. ~~Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~ . <u>Fastener packaging shall bear a label indicating the appropriate grade material or coating weight.</u>

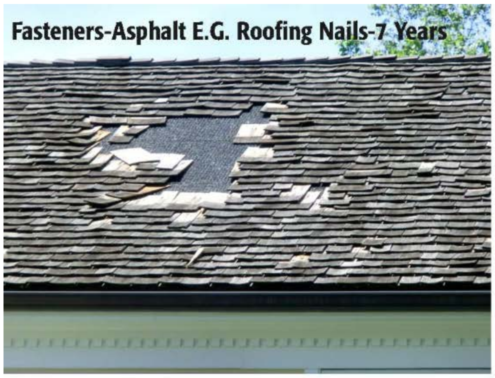
(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This modification is to clean up difficult language in the original proposal, and require labeling of the fasteners.

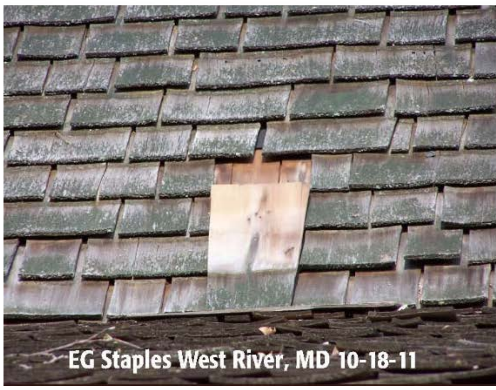
The primary reason for these code changes is the need to more clearly define the fasteners required.
There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners. Specifying "corrosion resistant" is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product type. Increased specifics will improve roof system integrity and lifespan. The code currently requires more corrosion resistant fasteners in several applications as noted in **R402.1.1 Fasteners. (**Fasteners used *below grade*----shall be of Type 304 or 316 stainless steel.

(From Randall Shackelford in committee approved proposed code change RB176-13)"There has been a lot of work done on fasteners and connectors in contact with treated wood in the last 8-10 years. All the testing and historical performance of stainless steel were based on the traditional use of 300 series stainless steel. Yet there are many types of stainless steel, and some are much less corrosion resistant than others. By limiting the types of stainless steel to these specific series, it ensures that the stainless steel fasteners will be corrosion resistant when exposed to treated wood."

Corrosion of fasteners has been found relatively far inland, the 15 mile requirement reduces the possibility of fastener corrosion. It is supported by the Stainless Steel Institutes recommendations.
Penetration into sheathing more than ½" thick must be at minimum ¾" or all the way through the sheathing in order to attach the product strongly enough to hold in place and prevent loosening of the fastener.


Fasteners-Asphalt E.G. Roofing Nails-7 Years


Mechanically Glavanized -2 yrs.
Saddle River, New Jersey 4-4-08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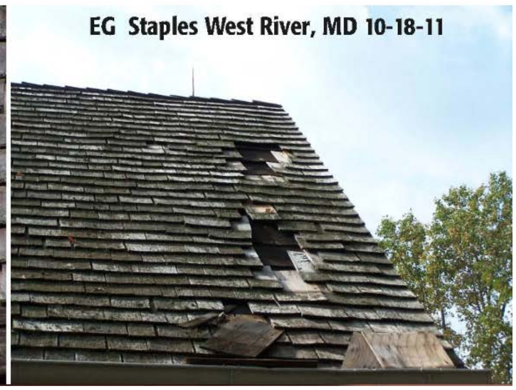
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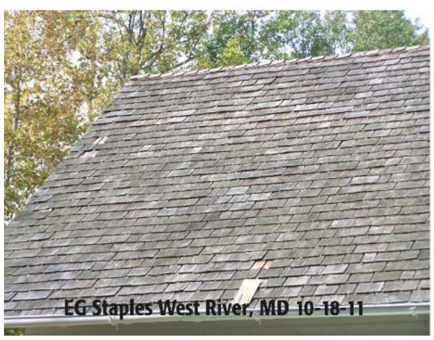
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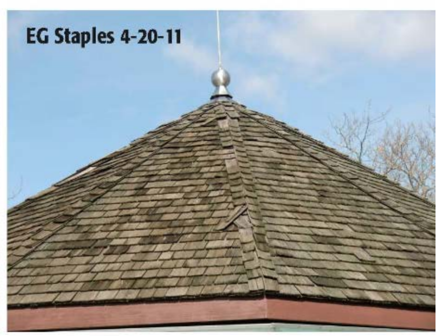
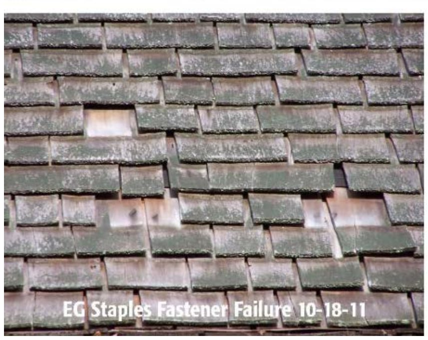

EG Staples 4-20-11


EG Staples Fastener Failure 10-18-11


EG Staples Ridge Installation 1

Public Comment 6:

Jay H. Crandell, ARES Consulting, Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.5.1 Application. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes or shingles shall be applied either single-course or double-course over nominal 1/2-inch (13 mm) wood-based sheathing or to furring strips over 1/2-inch (13 mm) nominal nonwood sheathing . A permeable water-resistive barrier shall be provided in accordance with Section R703.2~~.~~ ~~over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51 mm) and vertical overlaps of not less than 6 inches (152 mm).~~ A non-permeable water-resistive barrier shall be permitted where horizontal furring strips are used. Where horizontal furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25 mm by 76 mm or 25 mm by 102 mm), placed over the water-resistive barrier, and ~~shall be~~ fastened horizontally to the studs with minimum 7d or 8d box nails. Horizontal furring ~~and~~ shall be spaced a distance on center equal to the actual weather exposure of the shakes or shingles, not to exceed the maximum exposure specified in Table R703.5.2. The spacing between adjacent shingles to allow for expansion shall be 1/8 inch (3 mm) to ¼ inch (6 mm) apart and between adjacent shakes shall be 3/8 inch (10 mm) to ½ inch (13 mm) apart. The offset spacing between joints in adjacent courses shall be a minimum of ½ inches (38 mm).

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This public comment makes the following technical improvements:

1. References water-resistive barrier requirements in Section R703.2 and removes redundant installation information in Section R703.5.1.
2. With furring strips creating a ¾-inch air-space behind the shake or shingle installation (which is an air-permeable cladding), it is unnecessary and overly restrictive to also require use of a "permeable" water-resistive barrier.
3. The furring nails should be specified as a minimum size. Larger fasteners can be necessary for adequate wind resistance and also to attach furring when installed over foam sheathing or other non-wood sheathings, especially when greater than 1/2-inch thick (for example, see separate committee-approved proposals RB389 and RB390).

RB369-13

Final Action: AS AM AMPC____ D

RB370-13
R703.6.3. Chapter 44

Proposed Change as Submitted

Proponent: Theresa Weston, DuPont Building Innovations (Theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.6.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers of ~~Grade D paper~~ water-resistive barrier complying with ASTM E 2556 Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section R703.8) intended to drain to the water-resistive barrier is directed between the layers.

> **Exception:** Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of ~~60 minute Grade D paper~~ a water-resistive barrier complying with ASTM E 2556 Type II and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space.

Add new standard to Chapter 44 as follows:

ASTM

E 2556 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

Reason: The proposal updates the water-resistive barrier reference to the most recent consensus standard. ASTM E2556 includes housewrap materials, building papers and felt, instead of just building paper and therefore is more representative of the state of the industry. Within ASTM E2556 Grade D paper is a Type I WRB and 60 minute Grade D paper is a Type II WRB. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers (AC-38) and therefore should not limit the use of current WRBs.

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

Analysis: A review of the standard proposed for inclusion in the code, ASTM E 2556 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB370-13

R703.6.3-RB-WESTON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM E2556 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee is concerned about the equivalency of ASTM E2556 to two layers of Grade D under stucco. Also, the standard covers products other than Grade D.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Theresa A. Weston, PhD., DuPont Building Innovations, requests Approval as Submitted.

Commenter's Reason: The proposal updates the water-resistive barrier reference to the most recent consensus standard. ASTM E2556 includes housewrap materials, building papers and felt, instead of just building paper and includes practices that are have been used for the last two decades and is therefore is more representative of the state of the industry than the current code language. Within ASTM E2556 Grade D paper is a Type I WRB and 60 minute Grade D paper is a Type II WRB. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers (AC-38) and therefore should not limit or change the use of current WRBs. In the committee's reason statement concern "about the equivalency of ASTM E2556 to two layers of Grade D under stucco" was expressed. However, this proposal makes does not allow a single layer of E2556 material to replace two layers of Grade D Paper, and in fact, clarifies that two layers of water-resistive barrier are required over wood based sheathing.

ASTM E2556 was included in the correlated section in the IBC-2015 by approval of S310-12 and so this proposal will provide consistency between the two codes.

RB370-13
Final Action: AS AM AMPC____ D

RB382-13
R703.10.1, Chapter 44

Proposed Change as Submitted

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and self

Revise as follows:

R703.10.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C 1186, Type A, minimum Grade II <u>or ISO 8336, Category A, minimum Class 2</u>. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be sealed with caulking, covered with battens or shall be designed to comply with Section R703.1. Panel siding shall be installed with fasteners according to Table R703.4 or *approved* manufacturer's installation instructions.

Add new standard to Chapter 44 as follows:

ISO

<u>8336 – Fibre-Cement Flat Sheets – Product Specification and Test Methods</u>

Reason: Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1186, *Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets*. Fiber-cement siding producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement siding products for compliance with ISO 8336. The inclusion of this Standard reference in the IBC will permit manufacturers worldwide to demonstrate product compliance to IBC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade. Additional editorial changes are proposed to clarify the nature of the required vertical and/or horizontal joint protection to include reference to *approved* caulking and the recognition of both vertical or horizontal shiplap joints as a means of protecting the joints as is also common with wood panel siding.

IBC Section 1405.16.1 has, as a result of the IBC Group A Code Hearings, been revised to adopt this additional Standards reference (see attached Committee Action). This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment.

Cost Impact: The code change proposal will not increase the cost of construction because the product is already recognized for use in the Code. Reference to compliance with this alternative standard, an International Standard requiring the same performance as the ASTM Standard, will reduce barriers to trade by allowing foreign products complying with ISO 8336, Category A, minimum Class 2, market access to the United States without the need for additional product compliance documentation.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB382-13

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

R703.10.1-RB-MULDER.doc

Committee Action Hearing Results

For staff analysis of the content of ISO 8336 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The committee feels this is consistent with the action for the IBC in Group A but would urge the proponent to submit a public comment to bring it closer to alignment with 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:

John Mulder, Intertek Testing Services NA, Inc., representing James Hardie Building Products, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.10.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C 1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be ~~sealed~~ protected with caulking, or ~~covered~~ with battens, or flashing, or be vertical or horizontal shiplap, or otherwise ~~shall be~~ designed to comply with Section R703.1. Panel siding shall be installed with fasteners according to Table R703.4 or *approved* manufacturer's installation instructions.

Commenter's Reason: The proposed additional revisions bring this section of the IRC in to alignment with the equivalent section of the IBC, Section1405.16.1, previously approved during the April 2012 IBC Committee Hearings (see below action)

As approved for 2015 IBC:

FS170-12

For staff analysis of the content of ISO 8336-2009 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-13cycle/Proposed-A/2012ProposedStandards.pdf.

Committee Action: **Approved as Modified**

Modify proposal as follows:

1405.16.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be protected with ~~*approved*~~ caulking, or with battens, or flashing, or be vertical or horizontal shiplap, or otherwise designed to comply with Section 1403.2. Panel siding shall be installed with fasteners in accordance with the *approved* manufacturer's instructions.

RB382-13

Final Action: AS AM AMPC____ D

RB384-13
R703.11.2, R703.11.2.1, R703.11.2.2

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R703.11.2 Vinyl siding used with ~~F~~foam plastic sheathing. Vinyl siding used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

R703.11.2.1 ~~**Exception:**~~ Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other *approved* backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Section R703.11.1.

~~**R703.11.2.1 Basic wind speed not exceeding 90 miles per hour and Exposure Category B.** Where the basic wind speed does not exceed 90 miles per hour (40 m/s), the Exposure Category is B and gypsum wall board or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 11/4 inches (32 mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, 16 inches on center. The foam plastic sheathing shall be minimum 1/2-inch-thick (12.7 mm) (nominal) extruded polystyrene per ASTM C 578, 1/2-inch-thick (12.7 mm) (nominal) polyisocyanurate per ASTM C 1289, or 1-inch-thick (25 mm) (nominal) expanded polystyrene per ASTM C 578.~~

~~**R703.11.2.2 Basic wind speed exceeding 90 miles per hour or Exposure Categories C and D.** Where the basic wind speed exceeds 90 miles per hour (40 m/s) or the Exposure Category is C or D, or all conditions of Section R703.11.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Tables R301.2(2) adjusted for height and exposure using Table R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:~~

1. ~~For wall assemblies with foam plastic sheathing on the exterior side and gypsum wall board or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.~~
2. ~~For wall assemblies with foam plastic sheathing on the exterior side and no gypsum wall board or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.~~

R703.11.2.2 Where the foam plastic sheathing is installed directly over studs and the foam plastic sheathing attachment is not designed to separately resist 100% of the wind load, the design wind pressure rating of the vinyl siding shall be multiplied by 0.27 and the result shall not be less than the design wind pressure load as determined in Section 703.1.2. The vinyl siding shall be installed in accordance with the manufacturer's instructions for the design wind pressure resistance rating.

> **Exception:** For conditions where the design wind suction load as determined in Section 703.1.2 does not exceed 30 psf and the interior surface of the wall is sheathed with 1/2-in gypsum wallboard or equivalent, the design wind pressure rating of the vinyl siding shall be permitted to be multiplied by 0.30 rather than 0.27.

Reason: The proposed revisions intend to bring provisions for use of vinyl siding to secure foam plastic sheathing to resist wind suction loads more in line with requirements for sheathing products used structurally for wind resistance. Specifically, revisions are based on an assumption that the same wind suction loads applicable for securing exterior structural sheathing products to wall studs (i.e. either 100% or 90% of the wind suction loads) are also applicable for vinyl siding securing foam plastic sheathing to studs.

The following revisions are implemented: 1) removal of the 90 mph and less wind speed provisions of 703.11.2 due to inadequate wind resistance provided by the requirements when judged against standard requirements for wind design; and 2) reduction of the 0.39 wind pressure rating adjustment factor to 0.30 based on an assumption that the vinyl siding used to secure exterior foam plastic sheathing to wall studs should resist the same loads as required for design of the foam plastic sheathing to resist wind loads (i.e. 90% of the wind loads versus 70% of the wind loads associated with the 0.39 factor). Two options for use of vinyl to secure foam plastic sheathing to studs are unchanged by this proposal: the 0.27 factor in R703.11.2.2 for cases where vinyl siding secures foam plastic sheathing to studs and interior gypsum is not present; and R703.11.2.3 which relies on availability and approval of vinyl siding manufacturer's instructions specifically for use over foam plastic sheathing for wind resistance.

Proposed revisions are summarized in Table 1. Additional details on revised wind pressure rating adjustment factors, wind load requirements for other structural sheathing products, and elimination of the 90 mph and less wind speed provisions are provided below.

Table 1.Summary of proposed change

			2012 IRC Factors			Proposed Factors			
Current Section Number	**Proposed Section Number**	**Vinyl Siding Installed over:**	**PEF**	**SF**	**WPR**	**PEF**	**SF**	**WPR**	**Summary**
R703.11.2 Exception	R703.11.2.1	Foam sheathing backed by materials designed to resist 100% of wind loads	0.36	1.5	1.00	0.36	1.5	1.00	*(No Change)*
R703.11.2.1	---	Foam sheathing with Interior GWB (90 mph, Exposure B)	0.36	1.5	1.00	-	-	-	*(Deleted)*
R703.11.2.2(1)	R703.11.2.2	Foam sheathing without interior GWB	1.00	2.0	0.27	1.00	2.0	0.27	*(No Change)*
R703.11.2.2(2)	R703.11.2.2 Exception	Foam sheathing with interior GWB (limited to design pressure not exceeding 30 psf)	0.70	2.0	0.39	0.90	2.0	0.30	*(Revised)*
R703.11.2.3	R703.11.2.3	Manufacturer specification for installation over foam sheathing approved to resist 100% of wind loads	*Proprietary Systems*						*(No Change)*
PEF - Pressure Equalization Factor SF - Safety Factor WPR - Wind Pressure Rating adjustment factor WPR = 0.36*1.5/PEF/SF									

Basis of vinyl siding wind rating adjustment factors

Vinyl siding wind pressure ratings are established using provisions in ASTM D 3679 Annex 1 and assume that the vinyl siding is installed over a backing material capable of resisting 100% of the wind suction loads (i.e. PEF=1.0). In those provisions, the test pressure of 15.73 psf is established as a minimum requirement based on an assumption that the vinyl siding resists only 36% of the wind suction loads (i.e. PEF=0.36) and a safety factor of 1.5. These assumptions, referred to herein as the reference case assumptions for vinyl siding wind pressure rating, are shown in Equation 1. Equation 1 can be found in ASTM D 3679 and relates test pressure, P_t, to design pressure, D_p:

$$P_t = D_p \times 0.36 \times 1.5 \qquad \text{Eq. 1}$$

For a design suction pressure, D_p, of 29.12 lb/ft^2 associated with 110 mph wind speed, Exposure B and 30 ft mean roof height, the required test pressure, P_t, is 15.73 lb/ft^2.

In 2006, changes were brought forward to address how to use these ASTM D 3679 design wind pressure ratings when vinyl siding is installed over a backing material that can't independently resist 100% of the wind loads, such as when used over many of the foam plastic sheathing products which rely on vinyl siding and its fastening to studs to secure the foam plastic sheathing to the wall studs. At that time, a wind pressure rating adjustment factor of 0.39 was approved for applications where vinyl siding was used to secure foam plastic sheathing to wall studs based on the assumption that it was securing the foam plastic sheathing for 70% of the wind suction loads (i.e. PEF = 0.70) acting on the exterior foam plastic sheathing while the remaining 30% was assumed to be resisted by interior gypsum wallboard. In addition to accounting for increased wind loads resisted by the vinyl siding (from 36% to 70%), the 0.39 factor also accounted for an increase in safety factor from 1.5 to 2.0 in recognition of the increased importance of vinyl siding when used to structurally secure foam plastic sheathing to wall studs.

Rationale for use 0.30 adjustment factor in lieu of the 0.39 factor in R703.11.2.

Since the original code change that introduced wind pressure rating adjustment factors, progress has been made to standardize the wind resistance of foam plastic sheathing with the development of ANSI/SBCA FS 100-12 *Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies*. Notably, for applications where gypsum wallboard or equivalent material is provided as an interior finish, design of the foam plastic sheathing layer for 90% of the wind suction loads (i.e. PEF=0.90) is permitted per SBCA FS 100-12 Section 6.4 as follows:

"6.4 Pressure Equalization Factor (PEF). A PEF of 1.0 shall be required for *exterior wall sheathing* applications.

Exceptions:

1. For conditions where the design negative wind pressure load determined in accordance with Section 4.0 does not exceed 30 psf, a PEF of 0.9 shall be permitted to determine negative wind pressure resistance only for *exterior wall sheathing* on wall assemblies having an interior finish of at least 0.5-inch-thick gypsum wall board (ASTM C1396) or any material of at least equivalent bending strength, rigidity and air permeability."

Design using a PEF value of 0.9, or 90% of the wind suction loads, represents an approximate 29 percent increase in loads in the foam plastic sheathing layer relative to the 70% wind load assumption used in derivation of the 0.39 factor. Consistent with the original derivation, the vinyl siding used to secure the foam plastic sheathing to the wall studs must also be designed to resist the load for which the sheathing is designed. As a result, the 0.39 factor is reduced to 0.30 in recognition of the increase from 70% to 90% of wind loads on the foam plastic sheathing layer and resisted by the vinyl siding: 0.39 x (0.7/0.9) = 0.30. Additional information on the derivation of the 0.30 factor, consistent with assumptions in derivation of existing factors in the IRC, is provided below as additional background.

For the reference case where vinyl siding wind pressure resistance is based on installation over structural sheathing capable of resisting 100% of the wind loads, test pressure, P_t, and design pressure, D_p, are related as previously shown in Equation 1 and repeated in Equation 2 for ease of reference. In this case, vinyl siding is assumed to resist 36% of the wind loads and a safety factor of 1.5 is applicable.

$P_t = D_p(\text{reference}) \times 0.36 \times 1.5$ Eq. 2

For the structural case where vinyl siding is used to secure foam plastic sheathing to wall studs for resistance to wind suction loads, test pressure, P_t, and design pressure, D_p, are related as shown in Equation 3. In this case, vinyl siding is assumed to resist 90% of the wind loads (the same loads as used for design of the foam plastic sheathing) and a safety factor of 2 is applicable.

$P_t = D_p(\text{structural}) \times 0.90 \times 2.0$ Eq. 3

Equating P_t from Equation 2 and 3 and solving for D_p(structural) results in a factor of 0.30 as follows:

$D_p(\text{structural}) = 0.30\ D_p(\text{reference})$ Eq. 4

The PEF of 0.9 recognizes that gypsum wallboard on the interior face of the wall has been shown to resist a portion of the full wind load. It is important to note; however, that the amount resisted by the gypsum wallboard continues to be studied since the contribution is a function of the relative air permeability of the exterior wall sheathing and the interior gypsum wallboard and the relative strength and stiffness of the exterior wall sheathing and the interior gypsum wallboard to name a few variables, many of which are difficult to quantify and control at time of fabrication and over time. These are among some of the reasons why the PEF of 0.7 previously assumed for development of the 0.39 factor was increased to a PEF of 0.9 resulting in a 0.30 factor. Given the sensitivity of pressure equalization to level of pressure, relative porosity of the inside wall layer to the outside wall layer, pressures used in PEF testing, and in recognition of use of gypsum wallboard in much of the underlying PEF testing, the 0.30 adjustment is only applicable when the design wind suction load does not exceed 30 psf.

The adjustment factor of 0.27 in R703.11.2.2 remains unchanged by this proposal

Where vinyl siding is used to hold the foam plastic sheathing onto the wall studs and gypsum wallboard or equivalent interior finish is not present, the default condition in SBCA FS 100-12 applies and PEF of 1.0 is used (i.e. 100% of wind load resisted by exterior foam plastic sheathing). In this case, the vinyl siding used to secure the foam plastic sheathing to the wall studs must also be designed to resist 100% of the load, equal to the load for which the sheathing is designed. The resulting wind pressure rating factor is 0.27 and remains unchanged in the proposed revisions.

Basis for removal of the 90 mph and less wind speed provisions of current R703.11.2.1

The current provisions of R703.11.2.1 have been proposed for deletion. These provisions exempt the user from checking the wind resistance of the vinyl siding if the building is located in an area where the wind speed is 90 mph or less, Wind Exposure B, and the interior finish is gypsum wallboard. These provisions result in significantly lower wind resistance than required by section R703.1.2. For example, the wind loads associated with 90 mph Exposure B is a maximum suction (negative) pressure of 19.5 psf for a 30' mean roof height (see Table 2). The minimum required test pressure for vinyl siding in accordance with ASTM D 3679 is only 15.73 psf. In this example, the minimum required test pressure is only 80% of the design pressure. It is important to note that the minimum test pressure should substantially exceed the design pressure to provide a margin of safety.

Table 2. Design wind pressure for wall claddings and cladding attachments (psf)

Wind exposure category	Mean roof height (ft)	BASIC WIND SPEED, V_{ASD} (mph-3-second gust)							
		85		90		100		110	
		max +	max -	max +	max -	max +	max -	max +	max -
B	0-15	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	-29.1
	20	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	-29.1
	25	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	-29.1
	30	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	**-29.1**
	35	13.6	-18.2	15.2	**-20.4**	18.8	-25.2	22.7	-30.5
C	0-15	15.7	-21.1	17.7	-23.6	21.8	-29.2	26.4	-35.3
	20	16.7	-22.4	18.8	-25.1	23.2	-31.0	28.0	-37.5
	25	17.5	-23.5	19.7	-26.3	24.3	-32.5	29.4	-39.3
	30	18.2	-24.4	20.4	-27.4	25.2	-33.8	30.5	-40.9
	35	18.8	-25.2	21.1	-28.3	26.1	-34.9	31.5	-42.2

Note: Design wind pressures calculated by combining wall cladding loads (for effective wind area of 10 ft^2) in Table R301.2(2) and height and exposure coefficients in Table R301.2(3). Negative (-) wind pressures represent wind suction pressures.

The extent of under-design of the vinyl siding is exacerbated when considering that 15.73 psf represents an average of 3-4 test results and does not reflect minimum values. Application of the wind pressure resistance rating described above demonstrates the extent of under-design. For the case where interior gypsum finish is present, the adjusted wind pressure resistance for the minimum vinyl siding per ASTM D 3679 becomes 0.30 x 29.1 = 8.7 psf. The value of 8.7 psf is less than half of the 19.5 psf value required for 90 mph wind speeds, Exposure B at a 30'mean roof height.

In summary, this proposal deletes the current R703.11.2.1 provisions that exempt the user from checking the wind resistance of the vinyl siding in a 90 mph Exposure B area. Both the revised section R703.11.2.2 and existing section R703.11.2.3 still remain and allow the proper installation of vinyl siding installed over foam sheathing in accordance with the vinyl siding manufacturer's installation instructions.

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

RB384-13

R703.11.2-RB-PITTS.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt there was no compelling reason to change what is in the code. The proposal seemed overreaching.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Submitted.

Commenter's Reason: Vinyl siding per ASTM D3679 has its wind resistance rating established from testing over sheathing that is independently attached to studs for 100% of the wind load without the need for the siding to hold the underlying sheathing on to the studs. However, per Section R703.11.2.1 and R203.11.2.2, the vinyl siding per ASTM D3679 is used to secure foam plastic sheathing direct to wall studs for resistance to wind suction loads. The code has permitted this mis-application (when judged against requirements of ASTM D3679) of vinyl siding for some time and with wind resistance far lower than design wind pressures required by the code.

Testimony during the IRC Committee hearing was highly technical and strayed in many different directions. The primary issue, however, is that the current installation provisions in R703.11.2.1 permit attachment of exterior foam plastic sheathing with vinyl siding that has significantly lower wind resistance than is required by R703.1.2 and R602.3. Current Section R703.11.2.1 allows the securing of exterior foam plastic sheathing to wall studs with vinyl siding that has test pressure resistance that is 20% less than the minimum design wind loads (see Figure 1). Proposed revisions in RB384 would require test pressures to exceed the design wind loads with a factor of safety consistent with that provided by Section R703.11.2.2(2). A slight 10% reduction in required test pressure permitted by RB384 recognizes a load sharing effect with gypsum wallboard on the inside face of the wall assembly – consistent with the 0.90 PEF factor for design of foam plastic sheathing in *ANSI/SBCA FS100-12 Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies.*

For applications where vinyl siding is used to secure foam plastic sheathing to wall studs not sheathed on the interior with gypsum wallboard, RB384 proposes no change in test pressure requirements (e.g. 39 psf test pressure remains unchanged by RB384), and that a minimum safety factor of 2.0 is maintained (see Figure 1). RB384 also proposes no change to requirements of R703.11.2.3 where use of an approved design wind pressure rating for installation over foam plastic sheathing in accordance with the vinyl siding manufacturer's product specifications is permitted.

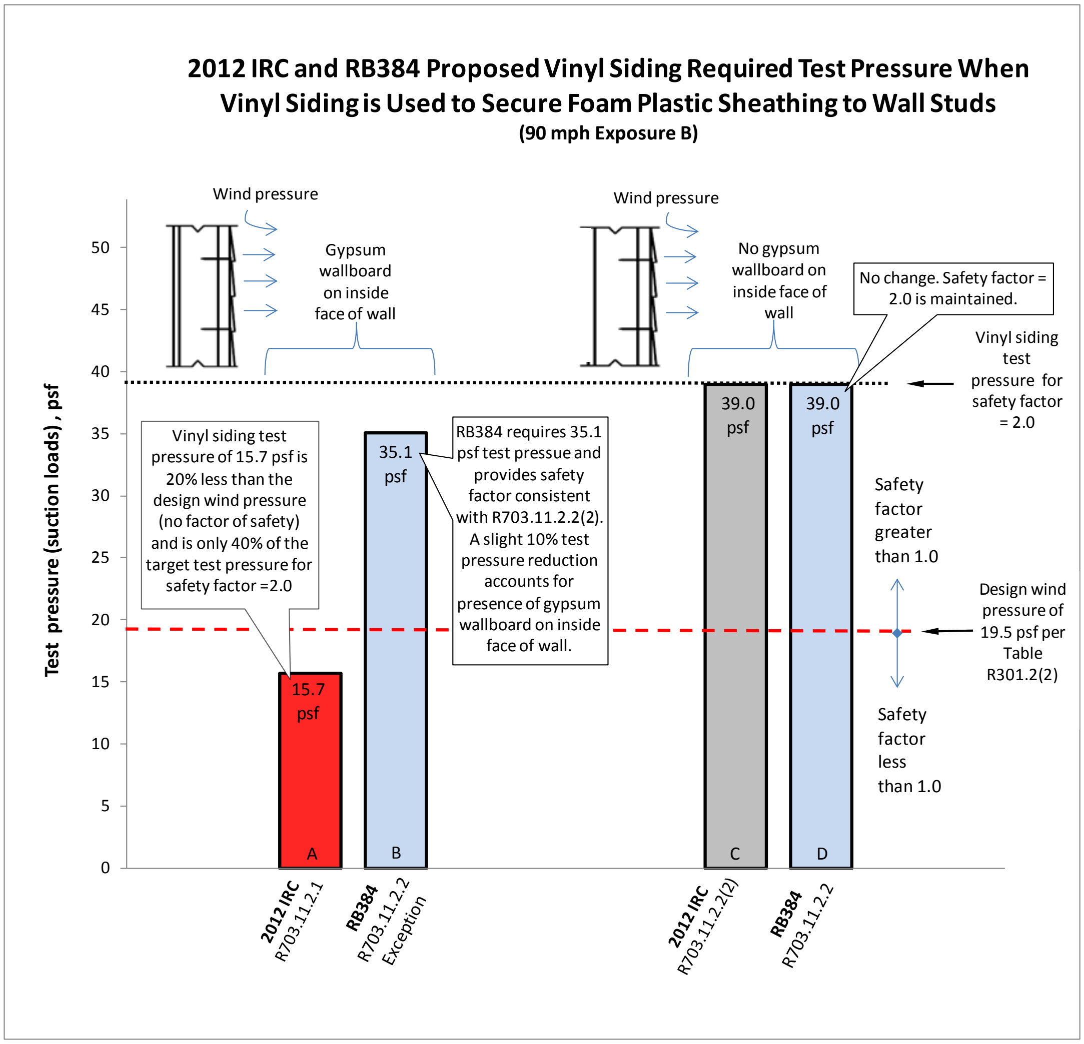


Figure 1. Comparison of vinyl siding required test pressure to design pressure under 2012 IRC and RB384.

Also, in the Reason statement provided with the original proposal, there was a typo in the section numbers in the first column of Table 1 and the description of the 30 psf limit (associated with proposed R703.11.2.2 Exception) could be incorrectly interpreted as being applicable to both the 2012 IRC and RB384. A corrected Table 1 is provided below.

Table 1. Summary of proposed change (corrected)

Current Section Number	Proposed Section Number	Vinyl Siding Installed ove	2012 IRC Factors PEF	SF	WPR	Proposed Factors PEF	SF	WPR	Summary
R703.11.2 Exception	R703.11.2.1	Foam sheathing backed by materials designed to resist 10C of wind loads	0.36	1.5	1.00	0.36	1.5	1.00	*(No Change)*
R703.11.2.1	---	Foam sheathing with interior GV (90 mph, Exposure B)	0.36	1.5	1.00	-	-	-	*(Deleted)*
R703.11.2.2(2)	R703.11.2.2	Foam sheathing without interior GWB	1.00	2.0	0.27	1.00	2.0	0.27	*(No Change)*
R703.11.2.2(1)	R703.11.2.2 Exception	Foam sheathing with interior GWB	0.70	2.0	0.39	0.90[1]	2.0	0.30	*(Revised)*
R703.11.2.3	R703.11.2.3	Manufacturer specification for installation over foam sheathing approved to resist 100% of wind loads	*Proprietary Systems*						*(No Change)*

[1] Application of this PEF is limited to cases where the limited to design pressure does not exceed 30 psf

PEF - Pressure Equalization Factor SF - Safety Factor WPR - Wind Pressure Rating adjustment factor WPR = 0.36*1.5/PEF/SF

RB384-13

Final Action: AS AM AMPC____ D

RB385-13
Table R703.4, R703.11.2

Proposed Change as Submitted

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Revise as follows:

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Insulated Vinyl Siding[aa]	035 (vinyl siding layer only)	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y,z]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not Allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code.

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
c. Staples shall have a minimum crown width of $^{7}/_{16}$-inch outside diameter and be manufactured of minimum 16-gage wire.
d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
e. Aluminum nails shall be used to attach aluminum siding.
f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
g. All attachments shall be coated with a corrosion-resistant coating.
h. Shall be of approved type.
i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $^{1}/_{2}$-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1^{1}/_{2}$ inches into studs, studs and wood sheathing combined or blocking.
k. Hardboard siding shall comply with CPA/ANSI A135.6.
l. Vinyl siding shall comply with ASTM D 3679.
m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
Q . See Section R703.10.1.
r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
s. See Section R703.10.2.
t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1^{1}/_{2}$ inch long galv. roofing nail through the top edge of each plank at each stud.

u. See Section R703.2 exceptions.
v. Minimum nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.
w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners.
aa. Insulated vinyl siding shall comply with ASTM D 7793.

R703.11.2 Foam plastic sheathing. Vinyl siding and insulated vinyl siding used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

Reason: There is general consensus among manufacturers on the installation practices for insulated vinyl siding, including several requirements the can be integrated into the installation requirements in Table R703.4. Installation specifications are very similar to vinyl siding.

These include:

- Minimum thickness requirement from ASTM D7793
- That the siding must be installed over a water-resistive Barrier
- Size of nail and/or staple and penetration depth into the stud
- Provision for how it should be installed over foam sheathing
- Fastener spacing
- Installation over foam sheathing should be treated the same as vinyl siding, the principals of section R703.11.2 will apply

Additional footnotes "aa", "y" and "z" refer to the ASTM standard for insulated vinyl siding, ASTM D7793, and fastening prescriptions similar to vinyl siding involving penetration into the stud 0.75 inches and an allowance for variation to this requirement when approved by the manufacturer.

An additional reference was added to the use of vinyl siding with foam plastic sheathing to include insulated vinyl siding. The application of insulated vinyl siding with foam sheathing is the same as vinyl siding, therefore the provision can simply apply.

For more information, go to www.insulatedsiding.info.

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

RB385-13

R703.4T-RB-DOBSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. Consistent with the committee action on RB386-13

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dennis Pitts, American Wood Council, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

R703.11.2 Foam plastic sheathing. Vinyl siding ~~and insulated vinyl siding~~ used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Insulated Vinyl Siding[aa]	035 (vinyl siding layer only)	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y,z]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	~~0.120 nail (shank) with a 0.313 head per Section R703.11.2~~ <u>Not Allowed</u>	Not Allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code.

(Portions of code proposal and Table not shown remain unchanged)

Commenter's Reason: Insulated vinyl siding is proposed to be added to R703.11.2 which would allow it to be used to structurally secure exterior foam sheathing to wall studs; however, no justification has been provided to demonstrate that it provides adequate wind resistance. Note that if RB384 is approved, then this public comment is not necessary because the required wind resistance will be increased to a more acceptable level in that proposal.

RB385-13
Final Action: AS AM AMPC____ D

RB386-13

R202 (New), R703.13 (New), R703.13.1 (Neq), Chapter 44

Proposed Change as Submitted

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Add new text as follows:

<u>**703.13 Insulated vinyl siding.** Insulated vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D7793 by an approved quality control agency.</u>

<u>**703.13.1 Insulated vinyl siding and accessories.** Insulated vinyl siding and accessories shall be installed in accordance with manufacturer's installation instructions.</u>

Add new definition as follows:

<u>**INSULATED VINYL SIDING.** A vinyl cladding product with manufacturer-installed foam plastic insulating material as an integral part of the cladding product, having a minimum thermal resistance of R-2.</u>

Add new standard to Chapter 44 as follows:

ASTM

<u>D 7793 – 12 Standard Specification for Insulated Vinyl Siding</u>

Reason: This definition is based on the current ASTM standard for insulated vinyl siding, ASTM D7793. Insulated vinyl siding has been available for over ten years and is now certified to an ASTM standard by an approved quality control agency. Therefore, it makes sense to introduce the standard and third party certification into the code as insulated vinyl siding grows and is embraced as a form of a cladding and home insulation. Performance requirements are specified by ASTM, ensuring that insulated vinyl siding can meet the necessary demands as a cladding and home insulation.

This change also provides a method for building officials to verify that insulated vinyl siding is code compliant, since there are separate standards for vinyl siding and insulated vinyl siding.

- Insulated vinyl siding is vinyl siding with rigid foam insulation laminated or permanently attached to the panel.
- In energy codes and energy efficiency programs, insulated siding is recognized as a form of "continuous insulation," or insulation installed on the exterior of the building that helps reduce energy loss through framing or other building material.
- Insulated siding products that bear the Certified Insulated Siding Label and are found on VSI's *Official List of Certified Products and Colors* have been independently certified by a third-party, accredited quality control agency to meet or exceed ASTM D7793.

Certified insulated vinyl siding**:**

- Meets or exceeds the industry standard for quality and performance (ASTM D7793), as verified by an independent, accredited quality control agency through twice yearly, unannounced plant inspections, product testing and quality review.
- Has demonstrated a minimum thermal resistance, or R-value, of at least R-2.0, as verified by an independent quality control agency.
- Withstands the impacts of recommended installation procedures.
- Lies straight on a flat wall and does not buckle under normal conditions.
- Weathers the effects of sunshine, rain and heavy winds of at least 110 mph.
- Meets manufacturer's advertised specifications for length, width, thickness and gloss.
- Can be identified by a variety of program logos and/or labels.
- Meets or exceeds the industry standard for performance (ASTM D7793), as verified by an independent, accredited quality control agency through twice yearly, unannounced plant inspections, product testing and quality review.

Fire Performance

Due to vinyl's chlorine base, the siding portion of insulated siding does not readily ignite and burn and resists flame spread. Vinyl siding routinely demonstrates a Class A flame spread rating (that is, a flame spread index of 25 or less when tested under ASTM E84). Rigid vinyl will not sustain combustion without an external source of heat and will tend to self-extinguish if that heat is removed. Foam plastics used in the insulation portion contain a flame retardant designed to limit rapid flame spread. Foam plastic insulation products are tested and classified for flame spread and smoke-development under ASTM E84/UL 723 by Underwriters Laboratories and other certified agencies.

Moisture Performance

Insulated siding provides a supplemental rain screen that reduces the amount of water that reaches the underlying water-resistive barrier. With a properly applied water-resistive barrier, insulated siding minimizes moisture penetration from the exterior into the wall assembly and provides a way for moisture to readily drain and dry. The presence of a layer of thermal insulation filling the space between the insulated siding and the wall sheathing also aids in the moisture management system.

For more information, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will increase the cost of construction. This change will have minimal cost impact as there are products on the market certified.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7793 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R703.13 (NEW) #2-RB-DOBSON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM D7793-12 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Matthew Dobson, representing Vinyl Siding Institute, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

D 7793 – ~~12~~13 Standard Specification for Insulated Vinyl Siding

Commenter's Reason: This change simply modifies the approved change to ensure the code has most up to date version of this standard. Over the course of the past few months the standard has been updated to include refinement of certain testing protocols necessary to ensure proper product evaluation including: 1) alternative test methods for demonstrating adhesive qualification; 2) the effect of differential thermal expansion is handled through distortion testing rather than through thermal expansion coefficient; and 3) evaluation of laps for siding that does not include laps, such as vertical siding, is eliminated. By referencing this 13 standard vs. the 12 standard these important refinements will be included and certified products will be consistent with the code requirements.

RB386-13
Final Action: AS AM AMPC____ D

RB387-13

R202 (NEW), Table R703.4, R703.13 (NEW), R703.13.1 (NEW), R703.13.1.1 (NEW), R703.13.1.2 (NEW), R703.13.2 (NEW), R703.13.2.1 (NEW), Chapter 44

Proposed Change as Submitted

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Revise as follows:

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Polypropylene Siding[aa]	Not applicable.	Lap	Yes	Section 703.13.1	Not Allowed	As specified by the manufacturer instructions, test report or other sections of this code.	Polypropylene Siding[aa]	Not applicable.	Lap

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
c. Staples shall have a minimum crown width of $^{7}/_{16}$-inch outside diameter and be manufactured of minimum 16-gage wire.
d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
e. Aluminum nails shall be used to attach aluminum siding.
f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
g. All attachments shall be coated with a corrosion-resistant coating.
h. Shall be of approved type.
i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $^{1}/_{2}$-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1^{1}/_{2}$ inches into studs, studs and wood sheathing combined or blocking.
k. Hardboard siding shall comply with CPA/ANSI A135.6.
l. Vinyl siding shall comply with ASTM D 3679.
m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
q. See Section R703.10.1.
r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
s. See Section R703.10.2.

t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1^1/_2$ inch long galv. roofing nail through the top edge of each plank at each stud.
u. See Section R703.2 exceptions.
v. Minimum nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.
w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.
aa. Polypropylene siding shall comply with ASTM D7254.

703.13 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 by an approved quality control agency.

703.13.1 Polypropylene siding and accessories shall be installed in accordance with manufacturer's installation instructions.

703.13.1.1 Polypropylene siding shall be installed over and attached to sheathing or other substrate, composed of wood or wood-based material with minimum thickness of 7/16 -inch, or other materials and fasteners having equivalent withdrawal resistance.

703.13.1.2 Fastener requirements. Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120 shank and minimum 0.313 head diameter and fully penetrate sheathing or penetrate the substrate a minimum 3/4 inch. The end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing or nailable sheathing. Staples are not permitted.

703.13.2 Polypropylene siding shall comply with section 703.13.2.1

703.13.2.1 Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls not closer than 10 feet to a building on another lot.

> **Exception:** Walls perpendicular to the line used to determine the *fire separation distance*.

Add new definition as follow:

POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases contains fillers or reinforcements, that is used to clad *exterior walls* or buildings.

Add new standard to Chapter 44 as follows:

ASTM

D 7254 Standard Specification for Polypropylene (PP) Siding

Reason: This change mirrors requirements for polypropylene siding in the 2012/2015 International Building Code (IBC), by adding them to the International Residential Code.
This provision sets minimum performance requirements for polypropylene siding and requires a third party quality control agency to verify compliance to an internationally accepted ASTM standard. Additionally, confusion in the marketplace and by building officials on use of polypropylene siding vs. vinyl siding is removed, as appropriate installation and use of polypropylene siding are detailed. The proposed definition conforms to the definition in the IBC and ASTM D7254 standard. Use of polypropylene siding is also limited on walls that face each other in high density settings, similar to the intent of the requirement in the IBC.
Not all polypropylene siding products on the market today are third party certified to internationally accepted standards which set minimum performance; our industry believes there should be minimum performance requirements for compliance with the building code.

The *VSI Product Certification Program* added certification of polypropylene siding in 2010. Additionally, several manufacturers have code compliant evaluation reports for their products. The *VSI Product Certification Program* allows manufacturers to certify, with independent third-party verification by an approved quality control agency, that certain polypropylene siding meets or exceeds the ASTM D7254 Standard Specification for Polypropylene (PP) Siding. The program is not exclusive to VSI members and any manufacturer can participate. It has been in place since 1998 when vinyl siding certification began.
Polypropylene siding certified through the program is verified by a third-party, approved quality control agency to meet or exceed the ASTM D7254 Standard Specification for Polypropylene (PP) Siding. Certified polypropylene siding is tested to:

- Weather the elements over time without cracking, chipping, flaking, pitting, or peeling.
- Meet impact resistance requirements.
- Withstand wind pressures equivalent to 110 mph or more.
- Demonstrate flame spread performance equivalent to or better than wood materials commonly used in building construction.

Although polypropylene siding panels are specific to each manufacturer, there is general consensus among manufacturers on several installation requirements. These include:

- Use of a water-resistive barrier
- Substrate installed with polypropylene siding panels, typically OSB or plywood, must have a minimum fastener withdrawal resistance because fastener spacing varies from 5 inches to 12 inches. The fasteners must have a substrate to penetrate because they will not penetrate studs in most cases because of the typical 16 inch on center spacing.
- No attachment directly over studs
- Fastener size and length are specified; staples are not allowed
- Manufacturer specified fastener spacing

Specifications for installation, including underlayment and fasteners, are necessary for polypropylene siding, so building officials and specifiers recognize the differences between installation of vinyl siding and polypropylene siding.
For more information on polypropylene siding, go to http://www.polypropylenesiding.org/.

Cost Impact: This change will have minimal cost impact as many products on the market are already certified.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7254 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

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R703.13 (NEW) #1-RB-DOBSON.doc

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

For staff analysis of the content of ASTM D7254-07 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Approved as Modified

Modify the proposal as follows:

R703.13 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 by an approved quality control agency.

R703.13.1 Polypropylene siding and accessories shall be installed in accordance with manufacturer's installation instructions.

R703.13.1.1 Polypropylene siding shall be installed over and attached to wood structural panel sheathing ~~or other substrate, composed of wood or wood-based material~~ with minimum thickness of 7/16 -inch~~,~~ or other substrate, composed of wood or wood-based material ~~materials~~ and fasteners having equivalent withdrawal resistance.

R703.13.1.2 Fastener requirements. Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120 shank and minimum 0.313 head diameter. Nails shall be a minimum of 1 1/4'" long or as necessary to ~~and fully~~ penetrate sheathing or ~~penetrate the~~ substrate a minimum 3/4 inch. Where the nail fully penetrates the sheathing or nailable substrate, the ~~The~~ end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing or ~~nailable sheathing~~. Substrate. Staples are not permitted.

~~**703.13.2** Polypropylene siding shall comply with section 703.13.2.1~~

~~**703.13.2.1**~~ **R703.13.2** Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls ~~not~~ closer than 10 feet to a building on another lot.

Exception: Walls perpendicular to the line used to determine the *fire separation distance*.

Committee Reason: This change introduces a new product and a new standard into the code. The modification clarifies the text and adds a minimum length for the nails.

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, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.13.2 Polypropylene siding shall comply with section 703.13.2.1 or section 703.13.2.2.

~~**R703.13.2**~~ **R703.13.2.1** Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls not closer than 10 feet to a building on another lot.

Exception: Walls perpendicular to the line used to determine the *fire separation distance*.

R703.13.2.2 The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This change is essential for 2 reasons: (a) this brings the IRC into consistency with the IBC and (b) this will provide the necessary incentive for manufacturers to develop a polypropylene (PP) siding product that is actually safe in the case of fire.

In the absence of this section the IRC would introduce a dangerous product with some protection (10 feet separation) but no incentive for manufacturers to make an alternate product that has a lower flame spread index.

This proposed language is consistent not only with the IBC (2012) but also with requirements in the IBC (2015) for plastic composite decking and proposed language in the IRC (2015), accepted by the committee, for the same type of material.

Some data showing the problems associated with the polypropylene siding that meets the ASTM E84 200 flame spread index while melting ahead of the flame front were presented at the proposal stage in proposal RB388 and are repeated here. Further new information is added also.

A key issue continues to be the fact that polypropylene, unless properly modified, melts and causes flames that generate a pool fire from which the material can radiate heat energy to neighboring buildings. Since PP generates extremely high heat release when it burns (much higher than the vast majority of plastics and certainly than any plastic used exposed in construction), the probability of it causing ignition of siding in nearby buildings cannot be excluded. Note that PP is not allowed to be used exposed inside buildings (section 803.12 of the IBC 2012) unless it passes a test much more severe than the one recommended here: NFPA 286.

It is easy for the consumer to confuse PP siding with vinyl siding, especially since most retailers carry them together. However, PP siding is very different in fire performance than either vinyl siding or wood (cedar) siding. The table below shows recent fire tests on two different PP siding materials and on a wood (cedar) siding using the cone calorimeter, ASTM E1354, at an incident heat flux of 25 kW/m^2, as well as some material tests on vinyl (PVC) and on a fire retarded polypropylene.

Cone Calorimeter (ASTM E1354) Tests at 25 kW/m^2 incident heat flux		
	Peak Heat Release Rate (in kW/m^2)	**Effective Heat of Combustion (in MJ/kg)**
Siding Tests		
Cedar siding	309	13
PP siding	546	25
PP siding 2	878	32
Material Tests		
Vinyl (PVC)	190	9
FR Polypropylene	200	25

The table below shows that polypropylene can be made so that it meets the requirements indicated above, in the ASTM E84 test without melting, and perform just like PVC (vinyl) or wood products.

ASTM E84 (Steiner tunnel) tests on some exemplar materials		
Material	**Flame Spread Index**	**Flaming on Floor Ahead of Flame Front**
PVC (vinyl)	10	None
FR Polypropylene	50	None
Western red cedar	70	None
Douglas fir	70-100	None
Western white pine	75	None

The data below is a table from NFPA 556 (Guide on Methods for Evaluating Fire Hazard to Occupants of Passenger Road Vehicles) showing that PP can be made with better fire properties with a variety of systems, but the industry needs incentives to manufacture such safer polypropylene siding.

Table 11.2.4.2(b) Cone Calorimeter Data for Nine Fire-Retarded Polypropylene Materials at Heat Flux Indicated (in kW/m^2)

	t_{ig} (sec)	$PHRR_a$ (kW/m^2)	FPI (sec m^2/kW)	$HRR_{180\ sec}$ (kW/m^2)	$H_{c,\ eff}$ (MJ/kg)	Mass Loss (percent)
At 20 kW/m^2						
# 1	382	236	1.62	183	23.6	68
# 2	325	168	1.93	136	29.8	64
# 3	377	207	1.82	173	24.4	65
# 4	384	195	1.97	157	25.3	65
# 5	396	301	1.32	199	24.3	63
# 6	387	215	1.80	131	25.9	64
# 7	402	228	1.76	185	27.1	61
# 8	377	207	1.82	173	26.8	61
# 9	386	202	1.91	173	27.8	61
At 40 kW/m^2						
# 1	80	243	0.33	170	23.9	68
# 2	63	206	0.31	144	28.6	66
# 3	62	209	0.30	167	25.2	68
# 4	72	206	0.35	144	25.4	67
# 5	74	231	0.32	160	25.2	65
# 6	70	193	0.36	155	26.1	66
# 7	75	193	0.39	138	25.9	66
# 8	71	188	0.38	139	25.8	66
# 9	67	172	0.39	127	25.7	66

The IBC (2012) reads as follows:

IBC 1404.12 Polypropylene siding. *Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 and those of Section 1404.12.1 or 1404.12.2 by an approved quality control agency. Polypropylene siding shall be installed in accordance with the requirements of Section 1405.18 and in accordance with the manufacturer's installation instructions. Polypropylene siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.*

IBC 1404.12.1 Flame spread index. *The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.*

IBC 1404.12.2 Fire separation distance. *The fire separation distance between a building with polypropylene siding and the adjacent building shall be no less than 10 feet (3048 mm).*

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Final Action: AS AM AMPC____ D

RB392-13

R703.2, R703.3, Table R703.3 (New), R703.3.1, R703.3.2, R703.4, Table R703.4, R703.3.1, R703.3.2, R703.3.3 (New), R703.5.1 (New), R703.8, R703.12, R703.12.3 (New)

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

> **Exception:** Omission of the water-resistive barrier is permitted in the following situations:
>
> 1. In detached accessory buildings.
> ~~2. Under exterior wall finish materials as permitted in Table R703.4.~~
> ~~3~~ 2. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

~~R703.4~~ R703.3 Nominal thickness and attachments. ~~Unless specified otherwise, all~~ The nominal thickness and attachment of exterior wall coverings shall be ~~securely fastened~~ in accordance with Table ~~R703.4~~ R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions ~~or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners~~. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings shall be in accordance with Section R703.3.2

R703.3.1 Wind limitations. Where the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R703.3.2 Fasteners. Exterior wall coverings shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3 or with other *approved* corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F 1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of 7/16-inch outside diameter and be manufactured of minimum 16 gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.

R703.3.3 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table R703.3 or as required to provide a minimum penetration into framing as follows:

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding per ANSI/APA-PRP 210, fiber-cement panel siding, and fiber-cement lap siding installed over foam plastic sheathing shall penetrate a minimum of 1-1/2 inches into framing or shall be in accordance with the manufacturer's installation instructions.
2. Fasteners for hardboard panel and lap siding shall penetrate a minimum of 1-1/2 inches into framing.
3. Fasteners for vinyl siding installed over wood or wood structural panel sheathing shall penetrate a minimum of 1-1/4 inches into sheathing and framing combined. Where approved by the manufacturer's instructions or test report, vinyl siding shall be permitted to be installed with fasteners penetrating not less than .75 inches through wood or wood structural sheathing with or without penetration into the framing. Fasteners for vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding installed over fiberboard or gypsum sheathing or direct to studs shall penetrate a minimum of 1-1/4 inches into framing.
4. Fasteners for vertical or horizontal wood siding shall penetrate a minimum of 1-1/2 inches into studs, studs and wood sheathing combined, or blocking.
5. Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined as specified above.

~~R703.8~~ R703.4 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
   - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
   - 1.2. In accordance with the flashing design or method of a registered design professional.
   - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

~~R703.3~~ R703.5 Wood, hardboard and wood structural panel siding. Wood, hardboard, and wood structural panel siding shall be installed in accordance with this section and Table R703.3. Hardboard siding shall comply with CPA/ANSI A135.6.

R703.5.1 Vertical wood siding. Wood siding applied vertically shall be nailed to horizontal nailing strips or blocking set no more than 24 inches on center.

~~R703.3.1~~ **R703.5.2 Panel siding.** 3/8” wood structural panel siding shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. 7/16” wood structural panel siding or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.

Joints in wood, hardboard or wood structural panel siding shall be made as follows unless otherwise approved. Vertical joints in panel siding shall occur over framing members, unless wood or wood structural panel sheathing is used, and shall be shiplapped or covered with a batten. Horizontal joints in panel siding shall be lapped a minimum of 1 inch (25 mm) or shall be shiplapped or shall be flashed with Z-flashing and occur over solid blocking, wood or wood structural panel sheathing.

~~R703.3.2~~ **R703.5.3 Horizontal wood siding.** Horizontal lap siding shall be installed in accordance with the manufacturer’s recommendations. Where there are no recommendations the siding shall be lapped a minimum of 1 inch (25 mm), or 1/2 inch (13 mm) if rabbeted, and shall have the ends caulked, covered with a batten or sealed and installed over a strip of flashing.

R703.12 Adhered masonry veneer installation. Adhered masonry veneer shall comply with the requirements of Section R703.6.3. Adhered masonry veneer shall be attached in accordance with Section R703.6.1 or the manufacturer’s instructions. Adhered masonry veneer shall be installed in accordance with Sections 6.1 and 6.3 of TMS 402/ACI 530/ASCE 5 or the manufacturer’s instructions.

R703.12.3 Water-resistive barrier. ~~The~~ A water-resistive barrier shall be installed~~,~~ as required by Section R703.2 and shall comply with the requirements of Section R703.6.3. The water-resistive barrier ~~Table R703.4, Footnote w,~~ shall lap over the exterior of the attachment flange of the screed or flashing provided in accordance with Section R703.12.2.

TABLE R703.3
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL		NOMINAL THICKNESS(inches)	JOINT TREAT-MENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Anchored veneer: brick, concrete, masonry or stone (See Section R703.7)		2	Per Section R703.7	Per Section R703.7					
Adhered veneer: concrete, stone or masonry (See Section R703.12)		—	Per Section R703.12	Per Section R703.12					
Fiber-cement siding	Panel siding (See Section R703.10.1)	5/16	(Per Section R703.10.1)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	4d common (1½” x 0.099”)	6” panel edges 12” inter. sup.
Fiber-cement siding	Lap siding (See Section R703.10.2)	5/16	(Per Section R703.10.2)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”) or 11 gage roofing nail	Note f
Hardboard panel		7/16	—	0.120”	0.120” nail	0.120”	0.120”	0.120” nail	6” panel

SIDING MATERIAL		NOMINAL THICKNESS(inches)	JOINT TREAT-MENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
siding (See Section R703.3)				nail (shank) with 0.225” head	(shank) with 0.225” head	nail (shank) with 0.225” head	nail (shank) with 0.225” head	(shank) with 0.225” head	edges 12” inter. sup.[d]
Hardboard lap siding (See Section R703.3)		7/16	Note e	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	Same as stud spacing 2 per bearing
Horizontal aluminum[a]	Without insulation	0.019[b]	Lap	Siding nail 1½” x 0.120”	Siding nail 2” x 0.120”	Siding nail 2” x 0.120”	Siding nail 1½” x 0.120”	Not allowed	Same as stud spacing
		0.024	Lap	Siding nail 1½” x 0.120”	Siding nail 2” x 0.120”	Siding nail 2” x 0.120”	Siding nail 1½” x 0.120”	Not Allowed	
	With insulation	0.019	Lap	Siding nail 1½” x 0.120”	Siding nail 2½” x 0.120”	Siding nail 2½” x 0.120”	Siding nail 1½” x 0.120”	Siding nail 1½” x 0.120”	
Particleboard panels		3/8	—	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	Not allowed	6” panel edges 12” inter. sup.
		1/2	—	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	
		5/8	—	6d box nail (2” x 0.099”)	8d box nail (2½” x 0.113”)	8d box nail (2½” x 0.113”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	
Steel[c]		29 ga.	Lap	Siding nail (1¾” x 0.113”) Staple–1¾”	Siding nail (2¾” x 0.113”) Staple–2½”	Siding nail (2½” x 0.113”) Staple–2¼”	Siding nail (1¾” x 0.113”) Staple–1¾”	Not allowed	Same as stud spacing
Vinyl siding (See Section R703.11)		0.035	Lap	0.120” nail (shank) with a 0.313” head or 16 gauge staple with	0.120” nail (shank) with a 0.313” head or 16 gauge staple with 3/8 to ½-inch crown	0.120” nail (shank) with a 0.313” head or 16 gauge staple with 3/8	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not allowed	16 inches on center or specified by the manufacturer instructions or test report

SIDING MATERIAL		NOMINAL THICKNESS(inches)	JOINT TREAT-MENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS: Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
				3/8 to ½-inch crown		to ½-inch crown			
Wood siding (See Section R703.3)	Wood rustic, drop	3/8 Min	Lap	6d box or siding nail (2” x 0.099”)	6d box or siding nail (2” x 0.099”)	6d box or siding nail (2” x 0.099”)	6d box or siding nail (2” x 0.099”)	8d box or siding nail (2½” x 0.113”) Staple–2”	Face nailing up to 6” widths, 1 nail per bearing; 8” widths and over, 2 nails per bearing
	Shiplap	19/32 Average	Lap						
	Bevel	7/16							
	Butt tip	3/16	Lap						
Wood structural panel ANSI/APA PRP-210 siding (exterior grade) (See Section R703.3)		3/8 – 1/2	Note e	2” x 0.099” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2” x 0.099” siding nail	6” panel edges 12” inter. sup.
Wood structural panel lapsiding (See Section R703.3)		3/8 – 1/2	Note e Note g	2” x 0.099” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2” x 0.099” siding nail	8” along bottom edge

For SI: 1 inch = 25.4 mm.

a. Aluminum nails shall be used to attach aluminum siding.
b. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
c. Shall be of approved type.
d. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
e. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
f. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 11 gage 1½ inch long galv. roofing nail through the top edge of each plank at each stud in accordance with the manufacturer's installation instruction.
g. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.

~~TABLE R703.4~~
~~WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS~~

~~SIDING MATERIAL~~		~~NOMINAL THICKNESS[a] (inches)~~	~~JOINT TREATMENT~~	~~WATER-RESISTIVE BARRIER REQUIRED~~	~~TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]: Wood or wood structural panel sheathing into stud~~	~~Fiberboard sheathing into stud~~	~~Gypsum sheathing into stud~~	~~Foam plastic sheathing into stud~~	~~Direct to studs~~	~~Number or spacing of fasteners~~
~~Horizonal aluminum[e]~~	~~Without insulation~~	~~0.019[f]~~	~~Lap~~	~~Yes~~	~~0.120 nail 1 1/2□long~~	~~0.120 nail 2□long~~	~~0.120 nail 2□long~~	~~0.120 nail[y]~~	~~Not allowed~~	~~Same as stud spacing~~
		~~0.024~~	~~Lap~~	~~Yes~~	~~0.120 nail 1 1/2□long~~	~~0.120 nail 2□long~~	~~0.120 nail 2□long~~	~~0.120 nail[y]~~	~~Not allowed~~	
	~~With insulation~~	~~0.019~~	~~Lap~~	~~Yes~~	~~0.120 nail 1 1/2□long~~	~~0.120 nail 2 1/2□ long~~	~~0.120 nail 2 1/2□ long~~	~~0.120 nail[y]~~	~~0.120 nail 1 1/2□long~~	
~~Anchored veneer: brick, concrete, masonry or stone~~		~~2~~	~~Section R703~~	~~Yes~~	~~See Section R703 and Figure R703.7[g]~~					

~~SIDING MATERIAL~~	~~NOMINAL THICKNESS[a] (inches)~~	~~JOINT TREATMENT~~	~~WATER-RESISTIVE BARRIER REQUIRED~~	~~TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]~~					
				~~Wood or wood structural panel sheathing into stud~~	~~Fiberboard sheathing into stud~~	~~Gypsum sheathing into stud~~	~~Foam plastic sheathing into stud~~	~~Direct to studs~~	~~Number or spacing of fasteners~~
~~Adhered veneer: concrete, stone or masonry[w]~~	—	~~Section R703~~	~~Yes Note w~~	~~See Section R703.6.1[g] or in accordance with the manufacturer's instructions.~~					
~~Hardboard[k] Panel siding-vertical~~	~~$^{7}/_{16}$~~	—	~~Yes~~	~~Note m~~	~~Note m~~	~~Note m~~	~~Note m~~	~~Note m~~	~~6□panel edges 12□ inter. sup.[n]~~
~~Hardboard[k] Lap-siding-horizontal~~	~~$^{7}/_{16}$~~	~~Note p~~	~~Yes~~	~~Note o~~	~~Note o~~	~~Note o~~	~~Note o~~	~~Note o~~	~~Same as stud spacing 2 per bearing~~
~~Steel[h]~~	~~29 ga.~~	~~Lap~~	~~Yes~~	~~0.113 nail $1^{3}/_{4}$□ Staple-$1^{3}/_{4}$□~~	~~0.113 nail $2^{3}/_{4}$□ Staple-$2^{1}/_{2}$□~~	~~0.113 nail $2^{1}/_{2}$□ Staple-$2^{1}/_{4}$□~~	~~0.113 nail[v] Staple[v]~~	~~Not allowed~~	~~Same as stud spacing~~
~~Particleboard panels~~	~~$^{3}/_{8}$ – $^{1}/_{2}$~~	—	~~Yes~~	~~6d box nail (2□× 0.099□)~~	~~6d box nail (2□× 0.099□)~~	~~6d box nail (2□× 0.099□)~~	~~box nail[v]~~	~~6d box nail (2□× 0.099□), $^{3}/_{8}$ not allowed~~	~~6□panel edge, 12" inter. sup.~~
	~~$^{5}/_{8}$~~	—	~~Yes~~	~~6d box nail (2□× 0.099□)~~	~~8d box nail ($2^{1}/_{2}$□× 0.113□)~~	~~8d box nail ($2^{1}/_{2}$□× 0.113□)~~	~~box nail[v]~~	~~6d box nail (2□" × 0.099□)~~	
~~Wood structural panel[i] ANSI/APA-PRP 210 siding[i] (exterior grade)~~	~~$^{3}/_{8}$—$^{1}/_{2}$~~	~~Note p~~	~~Yes~~	~~0.099 nail-2□~~	~~0.113 nail-$2^{1}/_{2}$□~~	~~0.113 nail-2 $^{1}/_{2}$□~~	~~0.113 nail[v]~~	~~0.099 nail-2□~~	~~6□panel edges, 12□ inter. sup.~~
~~Wood structural panel lapsiding~~	~~$^{3}/_{8}$—$^{1}/_{2}$~~	~~Note p Note x~~	~~Yes~~	~~0.099 nail-2□~~	~~0.113 nail-$2^{1}/_{2}$□~~	~~0.113 nail-2 $^{1}/_{2}$□~~	~~0.113 nail[x]~~	~~0.099 nail-2□~~	~~8□along bottom edge~~
~~Vinyl siding[l]~~	~~0.035~~	~~Lap~~	~~Yes~~	~~0.120 nail (shank) with a 0.313 head or 16-gage staple with $^{3}/_{8}$ to $^{1}/_{2}$-inch crown[y, z]~~	~~0.120 nail (shank) with a 0.313 head or 16-gage staple with $^{3}/_{8}$ to $^{1}/_{2}$-inch crown[y]~~	~~0.120 nail (shank) with a 0.313 head or 16-gage staple with $^{3}/_{8}$ to $^{1}/_{2}$-inch crown[y]~~	~~0.120 nail (shank) with a 0.313 head per Section R703.11.2~~	~~Not allowed~~	~~16 inches on center or specified by the manufacturer instructions or test report~~
~~Wood[j] rustic, drop~~	~~$^{3}/_{8}$ Min~~	~~Lap~~	~~Yes~~	~~Fastener penetration into stud-1□~~				~~0.113 nail-$2^{1}/_{2}$□ Staple-2□~~	~~Face nailing up to 6□ widths, 1 nail per bearing; 8□widths and over, 2 nails per~~

~~SIDING MATERIAL~~		~~NOMINAL THICKNESS~~[a] ~~(inches)~~	~~JOINT TREATMENT~~	~~WATER-RESISTIVE BARRIER REQUIRED~~	~~TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS~~[b, c, d]					
					~~Wood or wood structural panel sheathing into stud~~	~~Fiberboard sheathing into stud~~	~~Gypsum sheathing into stud~~	~~Foam plastic sheathing into stud~~	~~Direct to studs~~	~~Number or spacing of fasteners~~
										~~bearing~~
~~Shiplap~~	~~19/32 Average~~	~~Lap~~	~~Yes~~	~~Fastener penetration into stud-1□~~					~~0.113 nail-2 1/2□ Staple-2□~~	~~Face nailing up to 6□ widths, 1 nail per bearing; 8□widths and over, 2 nails per bearing~~
~~Bevel~~	~~7/16~~									
~~Butt tip~~	~~3/16~~	~~Lap~~	~~Yes~~							
~~Fiber cement panel siding~~[q]	~~5/16~~	~~Note q~~	~~Yes Note u~~		~~6d common corrosion-resistant nail~~[r]	~~6d common corrosion-resistant nail~~[r]	~~6d common corrosion-resistant nail~~[r]	~~6d common corrosion-resistant nail~~[r, v]	~~4d common corrosion-resistant nail~~[r]	~~6□o.c. on edges, 12□ o.c. on intermed. studs~~
~~Fiber cement lap siding~~[s]	~~5/16~~	~~Note s~~	~~Yes Note u~~		~~6d common corrosion-resistant nail~~[r]	~~6d common corrosion-resistant nail~~[r]	~~6d common corrosion-resistant nail~~[r]	~~6d common corrosion-resistant nail~~[r, v]	~~6d common corrosion-resistant nail or 11-gage roofing nail~~[r]	~~Note t~~

~~For SI: 1 inch = 25.4 mm.~~

a. ~~Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.~~

b. ~~Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.~~

c. ~~Staples shall have a minimum crown width of 7/16-inch outside diameter and be manufactured of minimum 16-gage wire.~~

d. ~~Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.~~

e. ~~Aluminum nails shall be used to attach aluminum siding.~~

f. ~~Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.~~

g. ~~All attachments shall be coated with a corrosion-resistant coating.~~

h. ~~Shall be of approved type.~~

i. ~~Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood 1/2-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.~~

j. ~~Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate 1 1/2 inches into studs, studs and wood sheathing combined or blocking.~~

k. ~~Hardboard siding shall comply with CPA/ANSI A135.6.~~

l. ~~Vinyl siding shall comply with ASTM D 3679.~~

m. ~~Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing 1 1/2 inches.~~

~~n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.~~
~~o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.~~
~~p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.~~
~~q. See Section R703.10.1.~~
~~r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.~~
~~s. See Section R703.10.2.~~
~~t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1^1/_2$ inch long galv. roofing nail through the top edge of each plank at each stud.~~
~~u. See Section R703.2 exceptions.~~
~~v. Minimum nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.~~
~~w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.~~
~~x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.~~
~~y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.~~

Reason: The purpose of this code change is to replace the existing Table R703.4 with a revised and simplified version and improve the code text relating to siding attachment. While reviewing several code change proposals last cycle dealing with siding attachment, we identified a number of conflicts between the table and code text, as well as discovering several errata. Additionally, we found the 2009 IRC version of the table hard to work with because of the small font and the extensive footnotes. The 2012 version of the table was printed in a larger font in an effort to improve readability, but this has not fixed all of the issues and we have identified new errata. This code change replaces the table with a new version and introduces new charging language and additional code revisions to move material from footnotes to the main body of the code where they can be more easily located. The key changes are as follows:

(1) Existing Section R703.4 is clarified and revised. The nail requirement is relocated to a new subsection. Footnote (a) is moved to the section. The entire section is moved to become R703.3, placing it immediately following the WRB section ahead of the wood siding section.
(2) To the extent possible, nail specifications are formatted to match the standard used in Table R602.3(1) and elsewhere, where the nail type is specified, followed by the length x shank diameter.
(3) A new Section R703.3.2 on fasteners combines existing footnotes (b), (c), (d), (g) and (r). It is noted all nails and staples need to comply with ASTM F 1667, not just those for fiber-cement siding.
(4) Footnotes (i) and (j) are moved to the existing section on wood, hardboard and wood structural panel siding. Separate subsections are created for the requirements relevant to horizontal wood siding, vertical wood siding, and panel siding products. Minimum fastener size and minimum penetration requirements, along with other installation details, are coordinated with current installation guides such as those available from WRCLA or WWPA.
(5) The existing footnote (k) reference to the hardboard siding standard is moved to Section R703.5 (formerly Section R703.3).
(6) The existing footnote (l) reference to the vinyl siding standard is not needed as the standard is called out in Section R703.11. A pointer is added under the material listing.
(7) A new Section R703.3.3 is created dealing with fastener length and penetration. The penetration requirements from footnotes (m) and (o) for hardboard siding and footnotes (v), (y), and (z) are moved to items under this new section.
(8) The shank and head diameters in footnotes (m) and (o) for hardboard siding are moved into Table.R703.3.
(9) The fiber-cement section references from existing footnotes (q) and (s) are provided under the respective material listings. The shank diameter and length for the 6d common nail is provided. The "corrosion-resistant nail" language is removed since it is already required by the charging language for Table R703.3 (formerly Table R703.4).
(10) The "water-resistive barrier required" column is deleted. As of the 2012 IRC, all the products in Table R703.4 required a WRB unless covered by the exceptions under Section R703.2 for detached accessory buildings and for certain paper-backed stucco lath products. Since Section R703.2 always applies, existing footnote (u) is redundant.
(11) The existing footnote (w) reference to TMS 402 is relocated to the adhered veneer section.

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

R703.2-RB-EHRLICH.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

R703.3 Nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings <u>attached to wood framing</u> shall be in accordance with Section R703.3.2. <u>Exterior wall coverings shall be attached to cold-formed steel light framing in accordance with the cladding manufacturer's installation instructions or an approved design.</u>

R703.3.3 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table R703.3 or as required to provide a minimum penetration into framing as follows:

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding per ANSI/APA-PRP 210, fiber-cement panel siding, and fiber-cement lap siding installed over foam plastic sheathing shall penetrate a minimum of 1-1/2 inches into framing or shall be in accordance with the manufacturer's installation instructions.
2. Fasteners for hardboard panel and lap siding shall penetrate a minimum of 1-1/2 inches into framing.
3. Fasteners for vinyl siding installed over wood or wood structural panel sheathing shall penetrate a minimum of 1-1/4 inches into sheathing and framing combined. ~~Where approved by the manufacturer's instructions or test report,~~ vinyl siding shall be permitted to be installed with fasteners penetrating ~~not less than .75 inches~~ into or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer's instructions or test report, with or without penetration into the framing. Where3 the fastener penetrates fully through the sheathing, the end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing. Fasteners for vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding installed over fiberboard or gypsum sheathing ~~or direct to studs~~ shall penetrate a minimum of 1-1/4 inches into framing.
4. Fasteners for vertical or horizontal wood siding shall penetrate a minimum of 1-1/2 inches into studs, studs and wood sheathing combined, or blocking.
5. Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined as specified above.

(Portions of proposal not shown remain unchanged)

Committee Reason: Approval was based upon the proponent's published reason. The modification addresses fastening to cold-formed steel framing and clarifies the fastener penetration for wood structural panels.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Jay H. Crandell, d/b/a ARES Consulting, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3 Nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section R703.3.2. Exterior wall coverings shall be attached to cold-formed steel light ~~framing~~ frame construction in accordance with the cladding manufacturer's installation instructions, the requirements of Table R703.3 using screw fasteners substituted for the nails specified in accordance with Table R703.4, or an approved design.

TABLE R703.3(1)
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS
(portions of table not shown remain unchanged)

TABLE R703.3(2)
SCREW FASTENER SUBSTITUTION FOR SIDING ATTACHMENT TO COLD-FORMED STEEL LIGHT FRAME CONSTRUCTION[a,b,c,d,e]

Nail Diameter per Table R703.3	Minimum Screw Fastener Size
0.099"	#6
0.113"	#7
0.120"	#8

For SI: 1 inch = 25.4 mm

a. Screws shall comply with ASTM C1513 and shall penetrate a minimum of three threads through minimum 33 mil (20 gauge) cold-formed steel frame construction.
b. Screw head diameter shall not be less than the nail head diameter required by Table R703.3(1).

c. Number and spacing of screw fasteners shall comply with Table R703.3(1).
d. Pan head, hex washer head, modified truss head, or other screw head types with a flat attachment surface under the head shall be used for vinyl siding attachment.
e. Aluminum siding shall not be fastened directly to cold-formed steel light frame construction.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: At the committee action hearing, the committee realized the need to address siding connections to cold-formed steel framing. The code currently includes prescriptive fastening solutions for wood framing, but nothing for steel framing. This public comment builds on the committee's action and adds a simple prescriptive solution that makes use of and is based on equivalence to the nail fastening requirements already in the code.

Public Comment 2:

Matthew Dobson, Vinyl Siding Institute, Inc., requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3 Nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section R703.3.2 and Table 703.3. Exterior wall coverings shall be attached to cold-formed steel light framing in accordance with the cladding manufacturer's installation instructions or an approved design.

R703.3.3 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table R703.3 or as required to provide a minimum penetration into framing as follows:

3. Fasteners for vinyl siding and insulated vinyl siding installed over wood or wood structural panel sheathing shall penetrate a minimum of 1-1/4 inches into sheathing and framing combined. Vinyl siding and insulated vinyl siding shall be permitted to be installed with fasteners penetrating not less than .75 inches into or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer's instructions or test report, with or without penetration into the framing. Where the fastener penetrates fully through the sheathing, the end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing. Fasteners for vinyl siding and insulated vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding and insulated vinyl siding installed over fiberboard or gypsum sheathing shall penetrate a minimum of 1-1/4 inches into framing.

(Portions of code change proposal not shown remain unchanged)

TABLE R703.3
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS (inches)	Joint Treatment	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
			Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Editorial Note: Insert after Hardboard lap siding in new table. Insulated Vinyl Siding (See Section R703.X)	0.035 (vinyl siding layer only)	Lap	0.120 nail (shank) with a 0.313 head or 16 gauge crown	0.120 nail (shank) with a 0.313 head or 16 gauge crown	0.120 nail (shank) with a 0.313 head or 16 gauge crown	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not Allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code.

Editorial Note: Insert after Particleboard panels in new table. Polypropylene Siding (See Section R703.X)	Not Applicable.	Lap	See section 703.13.1	See section 703.13.1	See section 703.13.1	See section 703.13.1	Not Allowed	As specified by the manufacturer instructions, test report or other sections of this code.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This change brings approved changes on installation from RB385 and RB387 into the new accepted formatting of RB392. The installation specifications were accepted but because of the changes in RB392 it is necessary to bring them along with this change.

Public Comment 3:

David Johnston, Vinyl Siding Institute, Inc., requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3.1 Wind limitations. Where ~~the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher,~~ the design wind pressure exceeds 30 psf, or where the limits of Table R703.3.1 are exceeded, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.3.1
LIMITS FOR ATTACHMENT PER TABLE R703.3

Maximum Mean Roof Height

Ultimate Wind Speed (mph-3-second gust)	Exposure		
	B	C	D
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR
140	35'	DR	DR

NL = not limited by Table R703.3.1, DR = Design Required
For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This public comment will merge the results of committee action on RB366 and RB367 into the committee action on RB392, and satisfy the intent of all proponents. The committee action on RB366 was to update the wind speed in the first sentence of the paragraph from the old 110 mph ASD basis to the new 140 mph Ultimate basis. This sentence states the maximum wind speed for which the attachment methods in Table 703.4 are applicable.
Committee action on RB367 was to delete this sentence but substitute similar criteria for the use of current Table R703.4 based on wind pressure rather than wind speed. The 30 psf threshold pressure matches the threshold for required design in ICC 600 and is slightly higher than the pressure that would result from either the previous 110 mph nominal (ASD) wind or a 140 mph (ultimate) wind in Exposure Category B with a mean roof height of 30 feet. RB367 also provides a table with maximum roof heights in different combinations of wind speed and exposure category that would produce 30 psf, so that use of the attachments table would also be limited to those roof heights.

Meanwhile, RB392 relocated section R703.4 and Table R703.4 to R703.3, and broke out a separate section R703.3.1 to state the wind limitation on the use of the table attachments. It makes sense to incorporate the changes made in RB366 and RB367 into this comprehensive proposal. This public comment thus would delete the sentence in R703.3.1 related to the wind *speed* limitation and substitute the wind *pressure* limitations, consistent with committee action on RB367. The roof height limitation table from RB367 would also be carried over and be designated Table R703.3.1.

The effect of all these changes would be to make the limitations of the attachment methods in Table R703.3 clearer and more complete, and consistent with ICC 600 and the other upgrades to the wind speed provisions being made to the IRC during this cycle.

Public Comment 4:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3.2 Fasteners. Exterior wall coverings shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3 or with other *approved* corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F 1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of 7/16-inch outside diameter and be manufactured of minimum 16 gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into the studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions or in accordance with the Table R703.3.2.

Table R703.3.2
Optional Siding Attachment Schedule For Fasteners Where No Stud Penetration Necessary

APPLICATION	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS[b]
Exterior wall covering (weighing less than 11 psf) attachment to wood structural panel sheathing, either direct or over foam sheathing a maximum of 2 inches thick.[a] Note: Does not apply to vertical siding.	Ring shank roofing nail (0.120" min. dia.)	12" o.c.
	Ring shank nail (0.148" min. dia.)	15" o.c.
	#6 screw (0.138" min. dia.)	12" o.c.
	#8 screw (0.164" min. dia.)	16" o.c.

a. Fastener length shall be sufficient to penetrate back side of the wood structural panel sheathing by at least 1/4". The wood structural panel sheathing shall be 7/16" or thicker in thickness.

b. Spacing of fasteners is per 12" of siding width. For other siding widths, multiply SPACING OF FASTENERS above by a factor of 12/s, where s is the siding width in inches. For example, if 8" lap siding, multiply SPACING OF FASTENERS above by 12/8 or 1.5. Fastener spacing shall never be greater than the manufacturer's minimum recommendations.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: APA attempted to work with other industries while developing this code change proposal. There was, however, not sufficient time to fully resolve some of the outstanding issues with the Vinyl Siding Institute (VSI) in December 2012. This PC reflects the resolution between APA and the VSI. We also took this opportunity to make some adjustments to the original proposal that we were unable to make through the Floor Modification procedure.

The most compelling of the arguments received from the other industries was that this information would fit better in Chapter 7 and that the changes proposed and accepted as modified during the Committee Action Hearing to proposal RB392 provided the ideal location in Chapter 7. As such APA has submitted this Public Comment to RB392 and has submitted a similar Public Comment to RB277 where this proposal originally appeared. We will ask for RB277 to be heard after RB392 so that if we are successful with this public comment we will request denial for RB277.

Additional proposal adjustments – The below discusses the various modifications made to the table originally proposed for RB277.

1. The format of the able was changed slightly to account for the fact that the original proposal, RB277, was part of an existing table. In this Public Comment to RB392 the proposed is a free-standing table.
2. Recent research conducted by the foam industry suggests that limiting the thickness of the foam sheathing to 2 inches or less will minimize the potential for long term sagging of the siding material. With thicker foam sheathing the fasteners used to attach the foam are essentially cantilevered through the foam away from the main member of the connection. For smaller diameter fasteners the cantilevered fasteners can bend over time causing the water-resistant barrier to sag downward. Even though the use of the wall sheathing alone to anchor the siding requires a closer fastener spacing than that tested by the foam industry and should result in greater resistance to long term sagging of the siding, we have chosen to be conservative in our proposal to ensure good performance of the siding and its attachment to the wood structural panel sheathing.
3. We also changed the term "foam insulation" to "foam sheathing" to be consistent with the code definition.
4. Footnote "a" was rewritten separating the requirements of the footnote into two separate sentences to ensure correct interpretation of the provisions. The requirements are:
   a. Full penetration of the wood structural panel sheathing by at least ¼ inch to ensure that the pyramidal tip of the fastener is not considered in the "depth of penetration" of the fastener, as the tip contributes nothing to the withdrawal capacity of the fastener. We want the nail to penetrate the wood structural panel sheathing, *regardless of thickness* to provide a visual indication of the nails' presence, adequate length and penetration of the wood structural panel sheathing.
   b. The second separate requirement is the minimum thickness of the wood structural panel sheathing. The tables are based on the use of 7/16" minimum thickness sheathing.

5. The ring-shank roofing nail was added to the table as they have been used in part of the country.

RB392-13

Final Action: AS AM AMPC____ D

RB395-13
Table R602.3(1), R802.3.1, Figure 802.5.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

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

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a,b,c]	SPACING OF FASTENERS
Roof			
4	~~Collar tie to rafter, face nail or 1 ¼” x 20 gage ridge strap~~	~~3-10d (3” x 0.128”)~~	~~-~~

(Portions of Table not shown remain unchanged)

Revise as follows:

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9)~~,~~ to provide a continuous tie across the building. ~~and the rafter~~ Rafters and ceiling joists shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or ~~securely~~ joined in accordance with Table R802.5.1(9). ~~where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building when such joists are parallel to the rafters.~~ Laps or butts of ceiling joists shall be in accordance with Section R802.3.2.

~~Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the *attic* shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie. Where ceiling joists are not parallel to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal), installed in accordance with the connection requirements in Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.~~

~~Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the *attic* space in accordance with Table R602.3(1).~~

~~Collar ties shall be a minimum of 1 inch by 4 inches (25 mm by 102 mm) (nominal), spaced not more than 4 feet (1219 mm) on center.~~

Where ceiling joists are connected to rafters above the top wall plate, they shall also meet the requirements for rafter ties. Where ceiling joists run perpendicular to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal) and be installed in accordance with Figure R802.5.1 and the connection requirements in Table R802.5.1(9).

Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.

Delete without substitution:

Delete references to “collar tie” in Figure R802.5.1

Reason: The current language is confusing to read. It contains unnecessary repetition.

In the first paragraph, the first and last sentences are combined. Language is inserted to address the connection of ceiling joists to the top plate. The word "securely" is being deleted as ceiling joists joined per the code are presumed to be secure. Laps or butts are already regulated in R802.3.2.

Specific direction on rafter ties has been editorially revised so it is more easily understood.

References to "collar ties" are being deleted because there is no place in the IRC that makes collars ties a requirement. The sentences says "Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the attic space in accordance with Table R602.3(1)." The code says where they are to be connected, not when they are required. Something is missing. This text first appeared in the 2006 IRC but there isn't a valid explanation in ICC guides or manuals. Collar ties were not part of any previous I-Code. Why have rules for components that are not required? Such rules are unenforceable.

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

R802.3.1-RB-DAVIDSON.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Based upon the proponent's request for disapproval. This would eliminate a design option without any technical justification.

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, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

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

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a,b,c]	SPACING OF FASTENERS
		Roof	
4	Collar tie to rafter, face nail or 1 ¼" x 20 gage ridge strap	3-10d (3" x 0.128")	-

(Portions of Table not shown remain unchanged)

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9) to provide a continuous tie across the building. Rafters and ceiling joists shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or joined in accordance with Table R802.5.1(9). Laps or butts of ceiling joists shall be in accordance with Section R802.3.2.

Collar ties or ridge straps shall be installed in the upper third of the rafters in accordance with Table R602.3(1). Ridge straps shall be a minimum of 1 ¼" X 20 gage. Collar ties shall be a minimum of 1 inch by 4 inches (25 mm by 102 mm) (nominal) and spaced not more than 4 feet (1219 mm) on center.

Where ceiling joists are connected to rafters above the top wall plate, they shall also meet the requirements for rafter ties. Where ceiling joists run perpendicular to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal) and be installed in accordance with Figure R802.5.1 and the connection requirements in Table R802.5.1(9).

Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.

~~Delete references to "collar tie" in Figure R802.5.1~~

Commenter's Reason: The original proposal was requested to be denied to correct problems.

The current text in the IRC regarding ceiling joist and rafter connections is confusing to read.

The proposal intends to clarify the application of the code.

The modification revises the text for collar ties into mandatory language which is the intent. This had been omitted from the original submittal.

RB395-13

Final Action: AS AM AMPC____ D

RB396-13
R802.10.2.1, R802.11.1, Table R802.11

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not more than three stories above grade plane in height, and roof slopes not smaller than 3:12 (25 percent slope) or greater than 12:12 (100 percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 140 ~~110~~ miles per hour (63~~49~~ m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 p_g.

R802.11.1 Uplift resistance. Roof assemblies shall have uplift resistance in accordance with Sections R802.11.1.2 and R802.11.1.3.

Where the uplift force does not exceed 200 pounds, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

Where the basic wind speed does not exceed 115 mph ~~90 mph~~, the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is 32 feet (9754 mm) or less, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

~~TABLE R802.11~~
~~RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (POUNDS PER CONNECTION)~~~~[a, b, c, d, e, f, g, h]~~

~~RAFTER OR TRUSS SPACING~~	~~ROOF SPAN (feet)~~	~~EXPOSURE B~~							
		~~Basic Wind Speed (mph)~~							
		~~85~~		~~90~~		~~100~~		~~110~~	
		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~	
		~~< 5:12~~	~~≥ 5:12~~	~~< 5:12~~	~~≥ 5:12~~	~~< 5:12~~	~~≥ 5:12~~	~~< 5:12~~	~~≥ 5:12~~
~~12″ o.c.~~	~~12~~	~~47~~	~~41~~	~~62~~	~~54~~	~~93~~	~~81~~	~~127~~	~~110~~
	~~18~~	~~59~~	~~51~~	~~78~~	~~68~~	~~119~~	~~104~~	~~165~~	~~144~~
	~~24~~	~~70~~	~~61~~	~~93~~	~~81~~	~~145~~	~~126~~	~~202~~	~~176~~
	~~28~~	~~77~~	~~67~~	~~104~~	~~90~~	~~163~~	~~142~~	~~227~~	~~197~~
	~~32~~	~~85~~	~~74~~	~~115~~	~~100~~	~~180~~	~~157~~	~~252~~	~~219~~
	~~36~~	~~93~~	~~81~~	~~126~~	~~110~~	~~198~~	~~172~~	~~277~~	~~241~~
	~~42~~	~~105~~	~~91~~	~~143~~	~~124~~	~~225~~	~~196~~	~~315~~	~~274~~
	~~48~~	~~116~~	~~101~~	~~159~~	~~138~~	~~251~~	~~218~~	~~353~~	~~307~~

~~16″ o.c.~~	~~12~~	~~63~~	~~55~~	~~83~~	~~72~~	~~124~~	~~108~~	~~169~~	~~147~~
	~~18~~	~~78~~	~~68~~	~~103~~	~~90~~	~~159~~	~~138~~	~~219~~	~~191~~
	~~24~~	~~93~~	~~81~~	~~124~~	~~108~~	~~193~~	~~168~~	~~269~~	~~234~~
	~~28~~	~~102~~	~~89~~	~~138~~	~~120~~	~~217~~	~~189~~	~~302~~	~~263~~
	~~32~~	~~113~~	~~98~~	~~153~~	~~133~~	~~239~~	~~208~~	~~335~~	~~291~~
	~~36~~	~~124~~	~~108~~	~~168~~	~~146~~	~~264~~	~~230~~	~~369~~	~~321~~
	~~42~~	~~139~~	~~121~~	~~190~~	~~165~~	~~299~~	~~260~~	~~420~~	~~365~~
	~~48~~	~~155~~	~~135~~	~~212~~	~~184~~	~~335~~	~~291~~	~~471~~	~~410~~
~~24″ o.c.~~	~~12~~	~~94~~	~~82~~	~~124~~	~~108~~	~~186~~	~~162~~	~~254~~	~~221~~
	~~18~~	~~117~~	~~102~~	~~155~~	~~135~~	~~238~~	~~207~~	~~329~~	~~286~~
	~~24~~	~~140~~	~~122~~	~~186~~	~~162~~	~~290~~	~~252~~	~~404~~	~~351~~
	~~28~~	~~154~~	~~134~~	~~208~~	~~181~~	~~326~~	~~284~~	~~454~~	~~395~~
	~~32~~	~~170~~	~~148~~	~~230~~	~~200~~	~~360~~	~~313~~	~~504~~	~~438~~
	~~36~~	~~186~~	~~162~~	~~252~~	~~219~~	~~396~~	~~345~~	~~554~~	~~482~~
	~~42~~	~~209~~	~~182~~	~~285~~	~~248~~	~~449~~	~~391~~	~~630~~	~~548~~
	~~48~~	~~232~~	~~202~~	~~318~~	~~277~~	~~502~~	~~437~~	~~706~~	~~614~~
~~RAFTER OR TRUSS SPACING~~	**~~ROOF SPAN (feet)~~**	**~~EXPOSURE C~~**							
		~~Basic Wind Speed (mph)~~							
		~~85~~		**~~90~~**		**~~100~~**		**~~110~~**	
		~~Roof Pitch~~		**~~Roof Pitch~~**		**~~Roof Pitch~~**		**~~Roof Pitch~~**	
		~~< 5:12~~	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**
~~12″ o.c.~~	~~12~~	~~94~~	~~82~~	~~114~~	~~99~~	~~157~~	~~137~~	~~206~~	~~179~~
	~~18~~	~~120~~	~~104~~	~~146~~	~~127~~	~~204~~	~~177~~	~~268~~	~~233~~
	~~24~~	~~146~~	~~127~~	~~179~~	~~156~~	~~251~~	~~218~~	~~330~~	~~287~~
	~~28~~	~~164~~	~~143~~	~~201~~	~~175~~	~~283~~	~~246~~	~~372~~	~~324~~
	~~32~~	~~182~~	~~158~~	~~224~~	~~195~~	~~314~~	~~273~~	~~414~~	~~360~~
	~~36~~	~~200~~	~~174~~	~~246~~	~~214~~	~~346~~	~~301~~	~~456~~	~~397~~
	~~42~~	~~227~~	~~197~~	~~279~~	~~243~~	~~394~~	~~343~~	~~520~~	~~452~~
	~~48~~	~~254~~	~~221~~	~~313~~	~~272~~	~~441~~	~~384~~	~~583~~	~~507~~
~~RAFTER OR TRUSS SPACING~~	**~~ROOF SPAN (feet)~~**	**~~EXPOSURE C~~**							
		~~Basic Wind Speed (mph)~~							
		~~85~~		**~~90~~**		**~~100~~**		**~~110~~**	
		~~Roof Pitch~~		**~~Roof Pitch~~**		**~~Roof Pitch~~**		**~~Roof Pitch~~**	
		~~< 5:12~~	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**

~~16″ o.c.~~	~~12~~	~~125~~	~~109~~	~~152~~	~~132~~	~~209~~	~~182~~	~~274~~	~~238~~
	~~18~~	~~160~~	~~139~~	~~194~~	~~169~~	~~271~~	~~236~~	~~356~~	~~310~~
	~~24~~	~~194~~	~~169~~	~~238~~	~~207~~	~~334~~	~~291~~	~~439~~	~~382~~
	~~28~~	~~218~~	~~190~~	~~267~~	~~232~~	~~376~~	~~327~~	~~495~~	~~431~~
	~~32~~	~~242~~	~~211~~	~~298~~	~~259~~	~~418~~	~~364~~	~~551~~	~~479~~
	~~36~~	~~266~~	~~231~~	~~327~~	~~284~~	~~460~~	~~400~~	~~606~~	~~527~~
	~~42~~	~~302~~	~~263~~	~~372~~	~~324~~	~~524~~	~~456~~	~~691~~	~~601~~
	~~48~~	~~338~~	~~294~~	~~416~~	~~362~~	~~587~~	~~511~~	~~775~~	~~674~~
~~24″ o.c.~~	~~12~~	~~188~~	~~164~~	~~228~~	~~198~~	~~314~~	~~273~~	~~412~~	~~358~~
	~~18~~	~~240~~	~~209~~	~~292~~	~~254~~	~~408~~	~~355~~	~~536~~	~~466~~
	~~24~~	~~292~~	~~254~~	~~358~~	~~311~~	~~502~~	~~437~~	~~660~~	~~574~~
	~~28~~	~~328~~	~~285~~	~~402~~	~~350~~	~~566~~	~~492~~	~~744~~	~~647~~
	~~32~~	~~364~~	~~317~~	~~448~~	~~390~~	~~628~~	~~546~~	~~828~~	~~720~~
	~~36~~	~~400~~	~~348~~	~~492~~	~~428~~	~~692~~	~~602~~	~~912~~	~~793~~
	~~42~~	~~454~~	~~395~~	~~558~~	~~485~~	~~786~~	~~684~~	~~1040~~	~~905~~
	~~48~~	~~508~~	~~442~~	~~626~~	~~545~~	~~882~~	~~767~~	~~1166~~	~~1014~~

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 0.454 kg, 1 pound per linear foot = 14.5 N/m.~~

a. ~~The uplift connection forces are based on a maximum 33-foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated basic wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.~~

b. ~~The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.~~

c. ~~The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.~~

d. ~~The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.~~

e. ~~For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.~~

f. ~~For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.~~

g. ~~Linear interpolation between tabulated roof spans and wind speeds shall be permitted.~~

h. ~~The tabulated forces for a 12-inch on-center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.~~

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)(POUNDS PER CONNECTION) [a, b, c, d, e, f, g, h]

RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE B**									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		**115**		**120**		**130**		**140**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		<5:12	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**
12" o.c.	12	48	32	59	42	70	52	95	73	122	97
	18	59	42	74	55	89	69	122	98	157	129
	24	71	52	89	69	108	86	149	123	192	162
	28	79	59	99	78	121	97	167	139	216	184
	32	86	66	109	87	134	109	185	156	240	206

	36	94	72	120	96	146	120	203	172	264	229
	42	106	83	135	109	166	138	230	197	300	262
	48	118	93	151	123	185	155	258	222	336	295
16" o.c.	12	64	43	78	56	93	69	126	97	162	129
	18	78	56	98	73	118	92	162	130	209	172
	24	94	69	118	92	144	114	198	164	255	215
	28	105	78	132	104	161	129	222	185	287	245
	32	114	88	145	116	178	145	246	207	319	274
	36	125	96	160	128	194	160	270	229	351	305
	42	141	110	180	145	221	184	306	262	399	348
	48	157	124	201	164	246	206	343	295	447	392
24" o.c.	12	96	64	118	84	140	104	190	146	244	194
	18	118	84	148	110	178	138	244	196	314	258
	24	142	104	178	138	216	172	298	246	384	324
	28	158	118	198	156	242	194	334	278	432	368
	32	172	132	218	174	268	218	370	312	480	412
	36	188	144	240	192	292	240	406	344	528	458
	42	212	166	270	218	332	276	460	394	600	524
	48	236	186	302	246	370	310	516	444	672	590

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		<5:12	≥5:12	<5:12	<5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12
12" o.c.	12	95	73	110	86	126	100	161	130	198	163
	18	121	97	141	115	163	135	208	175	257	219
	24	148	122	173	145	200	169	256	220	317	275
	28	166	138	195	164	225	192	289	250	358	313
	32	184	155	216	184	249	215	321	280	398	351
	36	202	171	237	204	274	238	353	310	438	389
	42	229	196	269	233	312	273	402	356	499	446
	48	256	221	302	263	349	307	450	401	560	503
16" o.c.	12	126	97	146	114	168	133	214	173	263	217
	18	161	129	188	153	217	180	277	233	342	291
	24	197	162	230	193	266	225	340	293	422	366
	28	221	184	259	218	299	255	384	333	476	416
	32	245	206	287	245	331	286	427	372	529	467
	36	269	227	315	271	364	317	469	412	583	517
	42	305	261	358	310	415	363	535	473	664	593
	48	340	294	402	350	464	408	599	533	745	669
24" o.c.	12	190	146	220	172	252	200	322	260	396	326
	18	242	194	282	230	326	270	416	350	514	438
	24	296	244	346	290	400	338	512	440	634	550
	28	332	276	390	328	450	384	578	500	716	626
	32	368	310	432	368	498	430	642	560	796	702
	36	404	342	474	408	548	476	706	620	876	778
	42	458	392	538	466	624	546	804	712	998	892
	48	512	442	604	526	698	614	900	802	1120	1006

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 0.454 kg.

a. The uplift connection forces are based on a maximum 33 foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.
b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.
c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.
d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.
e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.
f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.
g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.
h. The tabulated forces for a 12” on center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates Chapter 8, including wood truss applicability limits and roof uplift connection provisions. It is noted that the changes necessary to update the appropriate Section R804 cold-formed steel provisions are contained in a separate AISI proposal which comprehensively revises the cold-formed steel provisions.

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

RB396-13

R802.10.2.1-RB-EHRLICH.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (POUNDS PER CONNECTION)[a, b, c, d, e, f, g, h]

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B							
		Nominal Design Windspeed V_{ASD} (mph)							
		85		90		100		110	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥5:12	< 5:12	≥5:12	< 5:12	≥5:12	≥5:12	≥5:12
12” o.c.	12	47	41	62	54	93	81	127	110
	18	59	51	78	68	119	104	165	144
	24	70	61	93	81	145	126	202	176
	28	77	67	104	90	163	142	227	197
	32	85	74	115	100	180	157	252	219
	36	93	81	126	110	198	172	277	241
	42	105	91	143	124	225	196	315	274
	48	116	101	159	138	251	218	353	307

16" o.c.	12	63	55	83	72	124	108	169	147
	18	78	68	103	90	159	138	219	191
	24	93	81	124	108	193	168	269	234
	28	102	89	138	120	217	189	302	263
	32	113	98	153	133	239	208	335	291
	36	124	108	168	146	264	230	369	321
	42	139	121	190	165	299	260	420	365
	48	155	135	212	184	335	291	471	410
24" o.c.	12	94	82	124	108	186	162	254	221
	18	117	102	155	135	238	207	329	286
	24	140	122	186	162	290	252	404	351
	28	154	134	208	181	326	284	454	395
	32	170	148	230	200	360	313	504	438
	36	186	162	252	219	396	345	554	482
	42	209	182	285	248	449	391	630	548
	48	232	202	318	277	502	437	706	614
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**							
		Nominal Design Windspeed V_{ASD} (mph)							
		85		**90**		**100**		**110**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		< 5:12	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**
12" o.c.	12	94	82	114	99	157	137	206	179
	18	120	104	146	127	204	177	268	233
	24	146	127	179	156	251	218	330	287
	28	164	143	201	175	283	246	372	324
	32	182	158	224	195	314	273	414	360
	36	200	174	246	214	346	301	456	397
	42	227	197	279	243	394	343	520	452
	48	254	221	313	272	441	384	583	507
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**							
		Nominal Design Windspeed V_{ASD} (mph)							
		85		**90**		**100**		**110**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		< 5:12	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**

16” o.c.	12	125	109	152	132	209	182	274	238
	18	160	139	194	169	271	236	356	310
	24	194	169	238	207	334	291	439	382
	28	218	190	267	232	376	327	495	431
	32	242	211	298	259	418	364	551	479
	36	266	231	327	284	460	400	606	527
	42	302	263	372	324	524	456	691	601
	48	338	294	416	362	587	511	775	674
24” o.c.	12	188	164	228	198	314	273	412	358
	18	240	209	292	254	408	355	536	466
	24	292	254	358	311	502	437	660	574
	28	328	285	402	350	566	492	744	647
	32	364	317	448	390	628	546	828	720
	36	400	348	492	428	692	602	912	793
	42	454	395	558	485	786	684	1040	905
	48	508	442	626	545	882	767	1166	1014

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 0.454 kg, 1 pound per linear foot = 14.5 N/m.

a. The uplift connection forces are based on a maximum 33-foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated basic wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.

b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.

c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.

d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.

e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.

f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.

g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.

h. The tabulated forces for a 12-inch on-center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

~~TABLE R802.11~~

~~RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)(POUNDS PER CONNECTION)~~ ~~[a, b, c, d, e, f, g, h]~~

~~RAFTER OR TRUSS SPACING~~	~~ROOF SPAN (feet)~~	~~EXPOSURE B~~									
		~~Ultimate Design Wind Speed, V_{ULT} (mph)~~									
		~~110~~		~~115~~		~~120~~		~~130~~		~~140~~	
		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~	
		~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~
~~12" o.c.~~	~~12~~	~~48~~	~~32~~	~~59~~	~~42~~	~~70~~	~~52~~	~~95~~	~~73~~	~~122~~	~~97~~
	~~18~~	~~59~~	~~42~~	~~74~~	~~55~~	~~89~~	~~69~~	~~122~~	~~98~~	~~157~~	~~129~~
	~~24~~	~~71~~	~~52~~	~~89~~	~~69~~	~~108~~	~~86~~	~~149~~	~~123~~	~~192~~	~~162~~
	~~28~~	~~79~~	~~59~~	~~99~~	~~78~~	~~121~~	~~97~~	~~167~~	~~139~~	~~216~~	~~184~~

	32	86	66	109	87	134	109	185	156	240	206
	36	94	72	120	96	146	120	203	172	264	229
	42	106	83	135	109	166	138	230	197	300	262
	48	118	93	151	123	185	155	258	222	336	295
16" o.c.	12	64	43	78	56	93	69	126	97	162	129
	18	78	56	98	73	118	92	162	130	209	172
	24	94	69	118	92	144	114	198	164	255	215
	28	105	78	132	104	161	129	222	185	287	245
	32	114	88	145	116	178	145	246	207	319	274
	36	125	96	160	128	194	160	270	229	351	305
	42	141	110	180	145	221	184	306	262	399	348
	48	157	124	201	164	246	206	343	295	447	392
24" o.c.	12	96	64	118	84	140	104	190	146	244	194
	18	118	84	148	110	178	138	244	196	314	258
	24	142	104	178	138	216	172	298	246	384	324
	28	158	118	198	156	242	194	334	278	432	368
	32	172	132	218	174	268	218	370	312	480	412
	36	188	144	240	192	292	240	406	344	528	458
	42	212	166	270	218	332	276	460	394	600	524
	48	236	186	302	246	370	310	516	444	672	590
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		**115**		**120**		**130**		**140**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		<5:12	**≥5:12**	**<5:12**	**<5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**
12" o.c.	12	95	73	110	86	126	100	161	130	198	163
	18	121	97	141	115	163	135	208	175	257	219
	24	148	122	173	145	200	169	256	220	317	275
	28	166	138	195	164	225	192	289	250	358	313
	32	184	155	216	184	249	215	321	280	398	351
	36	202	171	237	204	274	238	353	310	438	389
	42	229	196	269	233	312	273	402	356	499	446
	48	256	221	302	263	349	307	450	401	560	503
16" o.c.	12	126	97	146	114	168	133	214	173	263	217
	18	161	129	188	153	217	180	277	233	342	291
	24	197	162	230	193	266	225	340	293	422	366
	28	221	184	259	218	299	255	384	333	476	416
	32	245	206	287	245	331	286	427	372	529	467
	36	269	227	315	271	364	317	469	412	583	517
	42	305	261	358	310	415	363	535	473	664	593
	48	340	294	402	350	464	408	599	533	745	669
24" o.c.	12	190	146	220	172	252	200	322	260	396	326
	18	242	194	282	230	326	270	416	350	514	438
	24	296	244	346	290	400	338	512	440	634	550
	28	332	276	390	328	450	384	578	500	716	626
	32	368	310	432	368	498	430	642	560	796	702
	36	404	342	474	408	548	476	706	620	876	778
	42	458	392	538	466	624	546	804	712	998	892

	~~48~~	~~512~~	~~442~~	~~604~~	~~526~~	~~698~~	~~614~~	~~900~~	~~802~~	~~1120~~	~~1006~~

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 0.454 kg.~~

~~a. The uplift connection forces are based on a maximum 33 foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.~~

~~b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.~~

~~c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.~~

~~d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.~~

~~e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.~~

~~f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.~~

~~g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.~~

~~h. The tabulated forces for a 12" on center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.~~

Committee Reason: This change provides the basis for calculating the appropriate wind load in accordance with ASCE 7-10. The modification deletes the proposed revised table and restores the original table in order to allow to bring back as a corrected table.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**TABLE R802.11**~~
~~**RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (POUNDS PER CONNECTION)**~~ ~~[a, b, c, d, e, f, g, h]~~

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)(POUNDS PER CONNECTION) [a, b, c, d, e, f, g, h]

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12
12" o.c.	12	48	43	59	53	70	64	95	88	122	113
	18	59	52	74	66	89	81	122	112	157	146
	24	71	62	89	79	108	98	149	137	192	178
	28	79	69	99	88	121	109	167	153	216	200
	32	86	75	109	97	134	120	185	170	240	222
	36	94	82	120	106	146	132	203	186	264	244
	42	106	92	135	120	166	149	230	211	300	278
	48	118	102	151	134	185	166	258	236	336	311
16" o.c.	12	64	57	78	70	93	85	126	117	162	150
	18	78	69	98	88	118	108	162	149	209	194
	24	94	82	118	105	144	130	198	182	255	237
	28	105	92	132	117	161	145	222	203	287	266
	32	114	100	145	129	178	160	246	226	319	295

	36	125	109	160	141	194	176	270	247	351	325
	42	141	122	180	160	221	198	306	281	399	370
	48	157	136	201	178	246	221	343	314	447	414
24" o.c.	12	96	86	118	106	140	128	190	176	244	226
	18	118	104	148	132	178	162	244	224	314	292
	24	142	124	178	158	216	196	298	274	384	356
	28	158	138	198	176	242	218	334	306	432	400
	32	172	150	218	194	268	240	370	340	480	444
	36	188	164	240	212	292	264	406	372	528	488
	42	212	184	270	240	332	298	460	422	600	556
	48	236	204	302	268	370	332	516	472	672	622
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		**115**		**120**		**130**		**140**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		<5:12	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**
12" o.c.	12	95	88	110	102	126	118	161	151	198	186
	18	121	111	141	131	163	151	208	195	257	242
	24	148	136	173	160	200	185	256	239	317	298
	28	166	152	195	179	225	208	289	269	358	335
	32	184	168	216	199	249	231	321	299	398	373
	36	202	185	237	219	274	254	353	329	438	411
	42	229	210	269	248	312	289	402	375	499	468
	48	256	234	302	278	349	323	450	420	560	524
16" o.c.	12	126	117	146	136	168	157	214	201	263	247
	18	161	148	188	174	217	201	277	259	342	322
	24	197	181	230	213	266	246	340	318	422	396
	28	221	202	259	238	299	277	384	358	476	446
	32	245	223	287	265	331	307	427	398	529	496
	36	269	246	315	291	364	338	469	438	583	547
	42	305	279	358	330	415	384	535	499	664	622
	48	340	311	402	370	464	430	599	559	745	697
24" o.c.	12	190	176	220	204	252	236	322	302	396	372
	18	242	222	282	262	326	302	416	390	514	484
	24	296	272	346	320	400	370	512	478	634	596
	28	332	304	390	358	450	416	578	538	716	670
	32	368	336	432	398	498	462	642	598	796	746
	36	404	370	474	438	548	508	706	658	876	822
	42	458	420	538	496	624	578	804	750	998	936
	48	512	468	604	556	698	646	900	840	1120	1048

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 0.454 kg.

a. The uplift connection forces are based on a maximum 33 foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.

b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.

c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.

d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.

e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.

f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.
g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.
h. The tabulated forces for a 12" on center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The purpose of this public comment is to complete the updating of the IRC Chapter 8 provisions to correlate with the ultimate wind speed basis of the 2012 IBC and ASCE 7-10. A review of the new roof uplift load table by AWC shortly before the Committee Action Hearings uncovered an error in the calculations for 5:12 roof slopes and greater. (The values for roof slopes less than 5:12 were correct.) Since there was not time to track down the error and prepare an amended table in time for the hearings, and we did not want to ask for disapproval given the remaining portions of the wind update heard up to that point had passed, we opted to maintain the original table but identify the wind speeds as "nominal design wind speeds" using the V_{ASD} term introduced in the 2012 IBC.

The error in the calculations has now been identified and corrected and a new version of Table R802.11 generated using ultimate design wind speeds. This public comment supplies the new table and values to replace the existing V_{ASD} table and complete the updating of the IRC wind provisions. It is noted the values proposed here have been checked against AWC's calculations and confirmed.

RB396-13

Final Action: AS AM AMPC____ D

RB397-13
R802.11.1.2

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R802.11.1.2 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings for the basic wind speed as determined by Figure R301.2(4)A and listed in Table R301.2(1). Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

Reason: The purpose of this code change is to clarify the requirements for determining uplift loads for trusses. The proposal adds a pointer to the Climatic and Geographic Design Criteria table and the Basic Wind Speed figure. This emphasizes the need for the Truss Designer to correctly select the proper wind speed and other criteria for the site and building in the truss design software and not just pick the highest wind speed applicable in a state or the highest mean roof height permitted. It is critical the Truss Design Drawings reflect the correct uplift reactions for the site and building in question and not a more conservative reaction. Otherwise, the builder (and homeowner) would be required to install extra (or larger) uplift connectors than would normally be necessary for the loads anticipated at the site.

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

RB397-13

R802.11.1.2-RB-EHRLICH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R802.11.1.2 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings for the ~~basic~~ ultimate design wind speed as determined by Figure R301.2(4) and listed in Table R301.2(1). Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

Commenter's Reason: The purpose of this public comment is to correlate the original proposal with the update of the IRC wind provisions to the ultimate wind speed basis of the 2012 IBC and ASCE 7-10. The term "basic wind speed" is amended to "ultimate design wind speed" in keeping with the set of approved code changes which comprehensively implement the new wind provisions.

Public Comment 2:

Larry Wainright, Qualtim, representing Structural Building Components Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R802.11.1.2 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings for the basic wind speed as determined by Figure R301.2(4)A and listed in Table R301.2(1) <u>or as shown on the construction documents</u>. Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

Commenter's Reason: While SBCA agrees in concept that that trusses should be designed at a minimum to the wind speeds determined by Figure R301.2(4) and listed in Table R301.2(1), truss designers are not building designers. In accordance with ANSI/TPI 1, chapter 2 (the truss design standard referenced by the IRC) truss designers must design the trusses in accordance with the construction documents provided. It is the prerogative of the building designer to specify design parameters above the minimum code requirements. As written, the code would not allow the truss designer to do truss design in accordance with the building designer's specification if it is greater than the minimum requirements.

RB397-13

Final Action: AS AM AMPC____ D

RB401-13
R806.1

Proposed Change as Submitted

Proponent: Michael D. Fischer, Kellen Company, representing the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

R806.1 Ventilation required. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum.
Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

> ~~**Exception:** Attic ventilation shall not be required when determined not necessary by the code official due to atmospheric or climatic conditions.~~

Reason: With recent revisions to the IRC roof ventilation requirements, and an IBC change approved last year, both codes now contain specific details on both vented and unvented attics with detailed requirements related to the use of vapor retarders and climate specific instructions on the use of air-impermeable insulation. Now that the IRC contains these provisions, the current exception creates a conflict and an unnecessary alternative. Additionally, since the exception is based on climatic conditions, with no direction to the code official on matters related to construction methods or details, it cannot be applied on a project-by-project basis.

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

RB401-13

R806.1-RB-FISCHER.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Disapproved

Commenter's Reason: The purpose of this public comment is to restore the language permitting the building official to waive attic ventilation requirements. With the increasing complexity of today's houses, building tightness requirements, and energy efficiency requirements, the proper construction of enclosed attic and rafter spaces is critical. The code needs to give building officials clear flexibility to work with builders in cases where local climate conditions (microclimates), complex roof shapes, or other challenges (e.g. PV systems taking up a large area of the roof) make complying either with traditional ventilation requirements for enclosed attic and rafter spaces or the unvented roof provisions of the IRC difficult. Restoring this provision will provide building officials with the discretion to accommodate these unusual cases.

Examples of conditions where this exception is used include occupied roof decks, low slope (flat) roofs or vaulted ceilings using rafters with drywall attached to directly to the underside of the solid combination rafter-ceiling joist. In many cases it is not possible to provide the 3 ft elevation difference between the high and low vents on low slope roofs and where low slope roofs include parapets and therefore no eave vents. These types of roof assemblies are particularly popular in the hot, dry, desert climates of the Southwest. Building officials in that region have been allowing exemptions to ventilated roof assemblies (without requiring the type of unvented roof required by the IRC) going back to when the UBC was in force. In fact, it was a building official from San Diego who reintroduced the current exception to the code, based on the good performance of unvented roof assemblies in that region.

Another example of a condition where flexibility is needed is in wildland-urban regions. In areas at higher risk of wildfires and/or where water supplies for firefighting are insufficient, the IWUIC imposes stringent requirements on construction. Eaves and soffits must be constructed of ignition-resistant materials or materials providing a 1-hour fire rating. Eave and soffit vents prohibited, and other vents are limited to a total area of 144 square inches. These requirements could have the effect of leaving builders in these areas with little choice but to construct an unvented rafter or roof assembly, even if such an assembly is not recommended for their particular climate. The exception will provide builders and building officials flexibility to deal with these areas.

It is noted a similar code change deleting this exception for the 2015 IBC was disapproved by the IBC-FS Committee and the final assembly in Portland.

RB401-13

Final Action: AS AM AMPC____ D

RB402-13
R806.1, R806.2, R806.3, R806.4, R806.5

<u>Proposed Change as Submitted</u>

Proponent: Charles S. Bajnai, Chesterfield County, VA,, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov), Joseph Lstiburek, Building Science Corporation

Revise as follows:

SECTION R806
ROOF VENTILATION

~~**R806.1 Ventilation required.** Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.~~

> ~~**Exception:** Attic ventilation shall not be required when determined not necessary by the code official due to atmospheric or climatic conditions.~~

~~**R806.2 Minimum vent area.** The minimum net free ventilating area shall be 1/150 of the area of the vented space.~~

> ~~**Exception:** The minimum net free ventilation area shall be 1/300 of the vented space provided one or more of the following conditions are met:~~
>
> 1. ~~In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.~~
> 2. ~~At least 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located no more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.~~

<u>**R806.1 Ventilation.** The requirements for vented and unvented attic space and enclosed rafter space shall be in accordance with this section.</u>

<u>**R806.2 Vented attics.** Vented attics shall have a minimum net free ventilation area at least 1/300 of the area of the vented space. Between half and two thirds of the provided ventilation shall be installed at the eaves. The ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.</u>

~~**R806.3 Vent and insulation clearance.**~~ Where eave or cornice vents are installed, insulation shall not block the free flow of air. A minimum of a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

~~**R806.4**~~ **R806.2.1 Installation and weather protection.** Ventilators shall be installed in accordance with manufacturer's installation instructions. Installation of ventilators in roof systems shall be in accordance with the requirements of Section R903. Installation of ventilators in wall systems shall be in accordance with the requirements of Section R703.1.

~~**R806.5**~~ **R806.3 Unvented attic and unvented enclosed rafter assemblies**. Unvented *attic* assemblies (spaces between the ceiling joists of the top *story* and the roof rafters) and unvented enclosed rafter assemblies (spaces between ceilings that are applied directly to the underside of roof framing members/rafters and the structural roof sheathing at the top of the roof framing members/rafters) shall be permitted if all the following conditions are met:

1. The unvented *attic* space is completely contained within the *building thermal envelope.*
2. No interior Class I vapor retarders are installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed rafter assembly.
3. Where wood shingles or shakes are used, a minimum $^1/_4$-inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any *air-impermeable insulation* shall be a Class II vapor retarder, or shall have a Class III vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Either Items 5.1, 5.2 or 5.3 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
   5.1. *Air-impermeable insulation* only. Insulation shall be applied in direct contact with the underside of the structural roof sheathing.
   5.2. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.5 for condensation control.
   5.3. Air-impermeable and air-permeable insulation. The *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing as specified in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the *air-impermeable insulation.*
   5.4. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

1. This section was rewritten to clarify vented and unvented attics. The current charging language in the first sentence of Section R806.1 says that all attics shall have cross ventilation, and yet Section R806.5 acknowledges unvented attics. The new Section R806.1 offers charging language for both conditions.
2. More importantly however, Section 806.2 now incorporates the concepts that were passed in Portland for the IBC, namely that more than half of the incoming ventilation for attics should come from low sources (eaves) and exit up high (roof vent, mechanical vents, gable end vents, etc.). A range is provided: ½ to 2/3 should be low at the eaves for proper chimney effect. Currently the code would allow 100% of the attic ventilation to be from ridge vents…where would the cross ventilation come from?

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

RB402-13

R806.1-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This change would eliminate some venting configurations, such as gable end vents that have proved reliable for years. Also, there are some situations where eave vents cannot be installed. The committee likes the proposed reorganization and the proponent should rework and bring back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R806.2 Vented attics. Vented attics shall have a minimum net free ventilation area at least 1/300 of the area of the vented space. ~~Between half and two thirds of the provided ventilation shall be installed at the eaves.~~ A minimum of 50 percent and a maximum of 60 percent of the provided ventilation shall be served by eave, gable or cornice vents. The remaining ventilation shall be located no more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically. The ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committees concerns.

1. Working with opponents, the BCAC further reduced the amount of ventilation area required at the eaves to a maximum of 60% of the total required ventilation area;
2. added optional methods of venting at the lowest portions of attics: gable and cornice vents; and
3. clarified where the upper ventilation shall be measured from: 3' *measured vertically*.

RB402-13

Final Action: AS AM AMPC____ D

RB406-13
R807.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R807.1 Attic Access. ~~Buildings~~ Dwellings with concealed ~~combustible ceilings or roof construction~~ attics shall have an attic access opening to attic areas that ~~exceed 30 square feet and~~ have a vertical height of 30 inches or more. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) ~~and shall be located in a hallway or other readily accessible location~~. When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics.*

Exception: An attic access is not required:

1. for attics above unconditioned space or
2. where the area of the attic is less than 300 square feet

Reason: The ICC Commentary for the IRC states: *The requirement for an attic access is predicated on the likelihood that during the life of the structure, access to an attic space for repair of piping, electrical and mechanical systems will be required.*

If this is true, then language in the section that states *"Buildings with combustible ceilings or roof construction shall have…."* is misleading because attics of non-combustible construction are just as likely to have piping, electrical and mechanical systems. The ***IBC*** makes no mention of combustibility in its attic access requirements. And, the mechanical code (M1305.1.3) already requires access for equipment in an attic. It is less obvious why access is need for piping or electrical systems that would never need service. So the purpose of the access is universally poorly understood.

If it is believed that access should be provided regardless of equipment, a more realistic approach would be to require access to any attic that contains concealed spaces and without regard to construction materials used. Furthermore, direction on the location of the access needs to be more useful. Currently the code says the access must be "in a hallway or other readily accessible location". There are a number of problems with this language. It leads one to believe that the access must be interior to the dwelling. Why couldn't the access be via a gable end hatch, through a knee wall, or via a garage attic? Eliminating the access within the dwelling solves a problem involving heat loss and air infiltration.

Another confusing component is that the term "readily accessible" is somewhat defined in the code as follows:

> *Ready Access (to). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door, or similar obstruction, and without requiring the use of portable access equipment.*

This poses another dilemma. It states that "ready access" may not require removal of a panel or movement of a door and must be accessed by means other than a portable device such as a ladder. So interpreted literally would mean that the access could not be in a room accessed by a door, swinging or sliding, and it must be accessed by means of a stair or fixed ladder. This is not the norm practiced in the industry.

Then there is the issue of providing access to spaces as small as 30 square feet which means even some small porch attics would require access. 30 square feet is just too small an area to regulate.

The IBC provides no direction on where the access must be. It only requires that there be one and stipulates the size.

To alleviate these issues, this proposal would require an access for all attics in dwellings that have concealed spaces, would not dictate where the access must be consistent with the IBC, and provides two exceptions where access would typically serve no useful purpose such as a garage attic or areas with very small attics.

It should also be remembered that an access can be provided even if the code does not require one and that creating an opening in a ceiling or wall that does not contain an opening is a very simple operation.

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

R807.1-RB-DAVIDSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels the 30 square feet criteria should be retained and prefers RB407-13.

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, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R807.1 Attic Access. Buildings ~~Dwellings~~ with concealed attics shall have an attic access opening to attic areas that exceed 30 square feet and have a vertical height of 30 inches or more. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm). When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics.*

~~**Exception:** An attic access is not required:~~

~~1. for attics above unconditioned space or~~
~~2. where the area of the attic is less than 300 square feet~~

Commenter's Reason: In denying this proposal, the committee objected to the deletion of the 30 square foot trigger for access. This modification reinserts that phrase. The committee also expressed concern about the deletion of attic access created by the exceptions so the modification deletes the exceptions. The committee also expressed concern that attic access would only apply to dwellings so the term "buildings" has been reinserted in the first sentence.

The committee did agree on two points. First, they agreed that access to an attic should be provided whether or not the roof construction was combustible because of the potential for mechanical equipment to be serviced and for other inspection or maintenance purposes so the modification retains that revision. The committee also agreed that the access requirements should be consistent with the IBC so the location requirement is retained.

RB406-13

Final Action: AS AM AMPC____ D

RB425-13
R905.2.7.1

<u>Proposed Change as Submitted</u>

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception<u>s</u>:

<u>1.</u> Detached *accessory structures* that contain no *conditioned floor area*.
<u>2.</u> <u>Roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.</u>

Reason: In steep slope applications in climates where ice forms at the eave edge of roofs, ice melts due to heat from below, then freezes where the water meets roof surfaces that are over unheated areas, making a buildup of ice. This buildup becomes a 'dam' that backs water up under the roof covering and underlayment leaking into the building.

The purpose of this proposal is to bring the Code into alignment with the practical application of the ice barrier underlayment products in the field. Since gravity stops water from backing up very far on super steep slopes greater than 8" in 12" there needs to be a limit to the amount of ice barrier underlayment applied.

On very steep sloped roofs, the ice dams will still occur. However, buildup of ice cannot build far beyond the ball that forms at the gutter edge on slopes greater than 8" in 12" due to the slope. Secondly, the water will not defy gravity and move very far upward, when the physics of the application are that the water will drip over the dam first.

For very high sloped roofs where the vertical surface never intersects the heated wall, complete coverage of underlayment is needed. In short, the way the current code is written, ice barrier material may be needed on the complete 'high sloped' roof deck rather than protect just the eave edges and 3' up slope. The intent of 3' of underlayment applied past the warm vertical wall intersection up slope is met with this change.

Through clarifying this requirement with the second exception, the intent of the code is met while not burdening the building official with a variance request on a very small cost item.

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

RB425-13

R905.2.7.1 #1-RB-MCHUGH.doc

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building. <u>Roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.</u>

Exception~~s~~:

~~1.~~ Detached *accessory structures* that contain no *conditioned floor area*.

2. ~~Roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.~~

Committee Reason: Approval was based upon the proponent's published reason. The modification adds clarity by moving the exception into the body of the text.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Approved as Modified by this Public Comment.

Further modify the proposal as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building~~. Roofs~~ <u>On roofs</u> with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall <u>also</u> be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.

Exception: Detached *accessory structures* that contain no *conditioned floor area*.

Commenter's Reason: The purpose of this public comment is to further amend RB425 as it was modified at the IRC Building hearings. The approved floor modification is an improvement to the original proposal, however it still leaves a potential issue with the application of ice barriers. The critical dimension for applying ice barriers to reduce the risk of ice dams is the 24" horizontal measurement inward from the exterior wall line of the building. This applies regardless of the length of the overhang. The language approved in Dallas has the potential to result in the ice barrier not extending inward 24" horizontally from the exterior wall line if a steep overhang is sufficiently long, thus increasing the risk of ice dams. This public comment makes a further modification to insure that both requirements apply and the proper length of ice barrier is provided.

RB425-13

Final Action: AS AM AMPC____ D

RB426-13
R905.2.7.1

Proposed Change as Submitted

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend <u>2 inches (51 mm) down the fascia and under the drip edge and</u> from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Reason: In steep slope applications in climates where ice forms at the eave edge of roofs, ice melts due to heat from below, then freezes where the water meets roof surfaces that are over unheated areas. The frozen water builds, resulting in a dam that blocks water flow of water that continues to flow due to heat. That 'dam' blocks water flow causing water to stand on the roof, even when it has slope. The result is that the 'dam' buildup forces water upslope under roof covering causing leaks.

Studies show that roof recover applications typically fail at flashings on all roof slopes. The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing water back up the slope of the structure.

According to CRCA roofing contractors, if the code required underlayment is applied to the top of the metal drip edge, a seal may be difficult and the water will leak into the structure where a void exists. Voids form due to joints in the metal, uneven or dirty surfaces before application of the underlayment. Further, if underlayment is applied to these flashings, water can be pushed by the ice dam working on the 'back water lap' up slope possibly causing leaks. The leak(s) may be difficult to detect in the concealed space location.

In new construction, tear off and roof replacement situations, the roofing underlayment is easily installed before the drip edges at the eave edge. In reroofing and roof-recover applications, it does mean removing edge metal and reapplication.

We believe this will provide needed guidance to both new construction, reroofing, roof recover and roof replacements providing better service to the residential building owner.

Cost Impact: This may slightly increase cost of reroofing, roof recover. There is a very small increase in cost for new construction.

RB426-13

R905.2.7.1 #2-RB-MCHUGH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The method described is contrary to building science. The method should be shingle fashion which would require the lap to be over not under.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Bill McHugh, Chicago Roofing Contractors Association, requests Approved as Submitted.

Commenter's Reason: At the Committee Action Hearings in Dallas, the committee may have misunderstood previous testimony regarding water flow over shingles in varied conditions. On siding, water flow is still downward due to the vertical orientation of siding.

The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing ice and water to lay on the roof. The ice forms a dam, driving water back up the slope of the structure opposite it's normal flow. The behavior of water that is running down a typical roof slope in a ice dam condition is not down the shingle, but instead up and under the shingle due to backup from the ice dam. That's why ice barrier is required in these applications…a material that self seals around nail holes making a continuous membrane that does not leak. This is unlike shingles that are laid and nailed.

If the ice barrier is installed on top of the metal, a 'back water lap' is created where water is driving at the lap in the opposite direction of the normal downward shingle fashion. This common practice is in manufacturer's literature and needs to be codified to provide protection from an important code requirement to consumers.

We believe this will provide needed guidance in new construction, reroofing, roof recover and roof replacements providing better service and less leaks to the residential building owner.

RB426-13
Final Action: AS AM AMPC____ D

RB436-13
R905.2.8.3

Proposed Change as Submitted

Proponent: Kirk Nagle, City of Arvada, CO, representing self (knagle@arvada.org)

Revise as follows:

R905.2.8.3 Sidewall flashing. Base flashing against a vertical sidewall shall be ~~continuous or~~ step flashing and shall be a minimum of 4 inches (102 mm) in height and 4 inches (102 mm) in width and shall direct water away from the vertical sidewall onto the roof and/or into the gutter. Where siding is provided on the vertical sidewall, the vertical leg of the flashing shall be continuous under the siding. Where anchored masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and counterflashing shall be provided in accordance with Section R703.7.2.2. Where exterior plaster or adhered masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and Section R703.6.3.

Reason: Step flashing is the approved method of installation by the asphalt roofing manufacturers for sidewall intersections. The method of continuous flashing was removed from the codes in the late 90's because it was a serious problem for leaking, deteriorated roof sheathing and mold. The step flashing moves the water from each layer onto the top of the shingle below so it can move to the gutter and not under the roofing material. If a continuous piece of flashing is used the water can continue under the shingles and eventually onto the underlayment where it can leak and keep the underside of the roofing material wet for long periods of time causing the growth of mold. This installation was used by roofing contractors and was continuous problem for the owners of buildings/homes. The problem was initially thought to be solved by allowing continuous flashing with a kick back (a piece of the metal bent back at over 45 degrees approximately ½ inch of metal) that would keep the water on the continuous flashing and eventually to the gutter, however this created water under the roofing material which would allow for mold growth and leaking. Proper step flashing applied to each shingle puts the water on the upper part of the shingle below and onto the exposed roofing material, which will prevent mold growth and leaking, by having the water under the shingles. I have repaired this problem on many roofs in the past and as a roofing inspector diagnosed the problem of leaks and observed roofing material destroyed by water, roof sheathing destroyed by mold and leaking because water go under the shingles. The water behaves like a funnel one it has a place to go it moves in that direction, just like a siphon. The water moves under the shingles, builds up hydrostatic pressure and forces its way into the tiniest of holes to leak or just keep the underside of the roofing material wet. The continuous flashing was removed from the codes for these reasons and should be removed from the codes today to have proper water resistive systems in place for all buildings/homes.

Cost Impact: The code change proposal will not increase the cost of construction, but will reduce the cost of building maintenance.

RB436-13

R905.2.8.3-RB-NAGLE.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Continuous flashing is not a problem when installed properly. The committee feels this change is not needed.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Kirk Nagle, City of Arvada, CO, representing self, requests Approval as Submitted.

Commenter's Reason: Step flashing is the approved method of installation by the asphalt roofing manufacturers for side wall intersections. The method of continuous flashing was removed from the codes in the 90's because it was a serious problem for leaking, deteriorated roof sheathing and mold. The step flashing moves the water from each layer onto the top of the shingle below so it can move to the gutter and not under the roofing material. If a continuous piece of flashing is used the water can continue under the shingles and eventually onto the underlayment where it can leak and keep the underside of the roofing material wet for long periods of time causing the growth of mold. This installation was used by roofing contractors and was a continuous problem for the owners of buildings/homes. The problem was initially thought to be solved by allowing continuous with a kick back(a piece of metal bent back at over 45 degrees approximately ½ inch of material) that would keep the water on the continuous flashing and eventually into the gutter. However this created water under the roofing material which would allow for mold growth and leaking. by having the water under the shingles. I have repaired this problem on many roofs in the past and as a roofing inspector diagnosed the problem of leaks and observed roofing material destroyed by water, roof sheathing destroyed by mold and leaking because water got under the shingles. The water behaves like a funnel once it has a place to go it moves in that direction, like a siphon. The water moves under the shingles, builds up hydrostatic pressure and forces its way into the tiniest of holes to leak or just keep the underside of the roofing material wet. Continuous flashing was removed from the codes for these reasons and should be removed from the codes today to have proper water resistive systems in place for all buildings.

Cost Impact: This will not impact the cost of construction but will reduce the cost of building maintenance.

RB436-13

Final Action: AS AM AMPC____ D

RB438-13
R905.2.8.5

Proposed Change as Submitted

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed ~~over~~ under the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.

Reason: The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing water to lay on the roof driving water back up the slope of the structure.

According to CRCA roofing contractors, if the code required underlayment is applied to the top of the metal drip edge, a seal may be difficult and the water will leak into the structure where a void exists. Voids form due to joints in the metal, uneven or dirty surfaces before application of the underlayment. Further, if underlayment is applied to these flashings, water can be pushed by the ice dam working on the 'back water lap' up slope possibly causing leaks. The leak(s) may be difficult to detect in the concealed space location.

We believe this will provide needed guidance in new construction, reroofing, roof recover and roof replacements providing better service and less leaks to the residential building owner.

Cost Impact: This proposal will not increase the cost of construction.

R905.2.8.5-RB-MCHUGH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based on the committee's previous action on RB426-13.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Bill McHugh, Chicago Roofing Contractors Association, requests Approved as Submitted.

Commenter's Reason: At the Committee Action Hearings in Dallas, the committee may have misunderstood previous testimony regarding water flow over shingles in varied conditions on both this and RB 426. Therefore, the public comments and reason statements are the same.

On siding, water flow is still downward due to the vertical orientation of siding. The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing ice and water to lay on the roof. The ice forms a dam, driving water back up the slope of the structure opposite it's normal flow. The behavior of water that is running down a typical roof slope in a ice dam condition is not down the shingle, but instead up and under the shingle due to backup from the ice dam. That's why ice barrier is required in these applications…a material that self seals around nail holes making a continuous membrane that does not leak. This is unlike shingles that are laid and nailed.

If the ice barrier is installed on top of the metal, a 'back water lap' is created where water is driving at the lap in the opposite direction of the normal downward shingle fashion. This common practice is in manufacturer's literature and needs to be codified to provide protection from an important code requirement to consumers.

We believe this will provide needed guidance in new construction, reroofing, roof recover and roof replacements providing better service and less leaks to the residential building owner.

RB438-13

Final Action: AS AM AMPC____ D

RB440-13
R905.2.8.5

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Delete without substitution as follows:

~~**R905.2.8.5 Drip edge.** A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.~~

Reason: The requirement for drip edge was placed in the code during the past cycle. Following is the reason given by the proponent for the change:

> **Reason:** Unlike the IBC, the IRC does not include drip edge requirements for shingle roofs. This new text brings the IRC into uniformity with the IBC, reflects manufacturers' requirements for shingle roof installations, and uses identical wording and placement as found in IBC 1507.2.9.3.
>
> **Cost Impact:** The code change proposal will not increase the cost of construction.

The proponent's arguments are somewhat conflicted. Although the IBC does require drip edge, the solution for consistency should have been to remove it from the IBC rather than add it to the IRC. The proponent stated that it reflects manufacturer's requirements for shingle roof installations. The proponent provided no evidence of this in support of the statement and, if manufacturers do require drip edge, it would be required by existing language in the IRC (see end of section). In fact, the Asphalt Roofing Manufacturer's Association only ***recommends*** the use of drip edge; they do not say it is required. Then the proponent stated that requiring drip edge where it wasn't previously required would ***not*** increase the cost of construction. Clearly this will increase the cost of construction.

While the committee approved this proposal, their reason statement makes little sense. They state that the drip edge "will provide protection of the shingles and give(s) rigidity to the shingle edges". I'm not sure how drip edge protects the shingles and the projection of the shingles over the roof edge is governed by the manufacturer's installation instructions. Sometimes finding a good reason to approve something is a struggle.

> **Committee Reason:** This is a good change that will provide protection of the shingles and gives rigidity to the shingle edges. This is consistent with the IBC.

The code language also creates a number or problems that need to be considered. The 2012 IRC has been amended to permit overlays (again). The question that comes up is how drip edge can or should be installed in an overlay situation. The Asphalt Roofing Manufacture's Association and drip edge manufacturers don't address that problem. Also, installing drip edge on existing homes with gutters creates another unique problem. Many of the attachment methods for gutters make it virtually impossible to install drip edge along an eave without cutting the drip edge to pieces or removing and reinstalling the gutters which drives up the cost. And there are sure to be roofing contractors who will use the new rules to increase installation costs on their customers and blame the increase on the local building department.

SECTION R905
REQUIREMENTS FOR ROOF COVERINGS

> ***R905.1 Roof covering application.*** *Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions. Unless otherwise specified in this section, roof coverings shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).*

It is reasonable that this proposal be approved because the current language in the IRC is not well thought out, will create conflicts for reroofing, was not shown to be necessary or to serve any useful purpose, and will increase the cost of construction.

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

R905.2.8.5-RB-DAVIDSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this needs to remain in the code. The drip edge does a good job of breaking the capillary action. The drip edge is not a problem for new construction.

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, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.

Exception: Reroofing in accordance with Section R907.

Commenter's Reason: The original proposal was to delete drip edge in its entirety for consistency with manufacturer's installation instructions. The IRC Committee, in disapproving the proposal, stated that it isn't a problem installing drip edge in new construction. The modification leaves the drip edge requirement in place but provides an exception for reroofing.

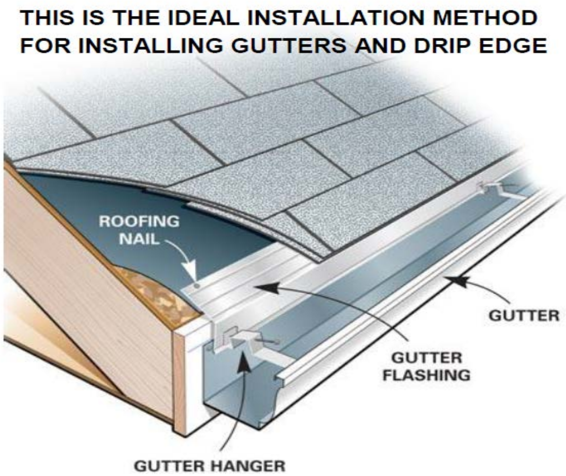
While drip edge can be incorporated in the design of new buildings, existing buildings often have roof details and gutters that make installation of drip edge very expensive to install.

Remember that many thousands if not millions of homes have been constructed and reroofed without drip edge. They exist with all of the existing flashings, gutters, and leaf guards in place. In almost every case, homes with gutters would need to have them removed and then reinstalled to accommodate a drip edge. This creates a significant expense which may include compete replacement of the gutter system if it is damaged upon removal or is not compatible with the drip edge.

In many locales, devices to keep debris out of gutters is a necessity and makes installing drip edge difficult or impossible or at the very least leaves an undesirable visual. Eliminating the ability to have debris guards on gutters increases maintenance costs and increases the likelihood of falls while homeowners clean gutters of leaves and other debris.

Furthermore, the change in the code to permit overlays creates another installation concern that is not addressed in roofing manufacturer's installation instructions.

Does the benefit of a device not required by the manufacturer warrant the cost to install when gutters have to be removed or other expensive steps must be taken? Of course not. Following are some illustrations that depict some of the issues.


THIS IS THE IDEAL INSTALLATION METHOD
FOR INSTALLING GUTTERS AND DRIP EDGE
ROOFING
NAIL
GUTTER
GUTTER
FLASHING
GUTTER HANGER

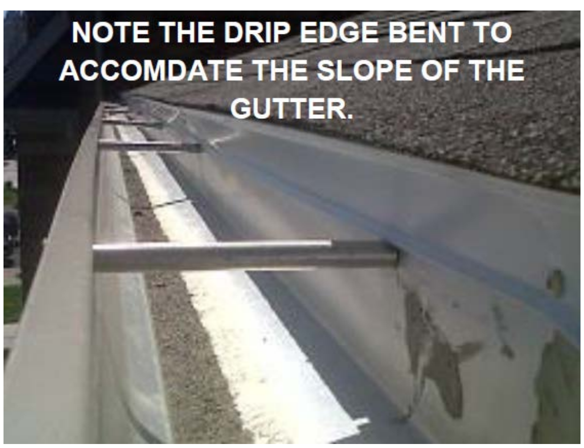

ANOTHER EXAMPLE OF GUTTERS INSTALLED
AFTER DRIP EDGE


HOW DO YOU INSTALL DRIP EDGE ON THIS
ROOF WITHOUT REMOVING THE GUTTERS?


HOW DO YOU INSTALL DRIP EDGE ON THIS
ROOF WITHOUT REMOVING THE GUTTERS?


WILL YOU STILL BE ABLE TO USE
THESE DEVICES WITH DRIP EDGE?


WILL YOU STILL BE ABLE TO USE
THESE DEVICES WITH DRIP EDGE?



RB440-13

Final Action: AS AM AMPC____ D

RB446-13
R905.16, R905.16.1, R905.16.2, R905.16.3, R905.16.4, R905.16.4.1, R905.16.4.2

Proposed Change as Submitted

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.16 Photovoltaic ~~modules/~~shingles. The installation of photovoltaic ~~modules/~~shingles shall comply with the provisions of this section, Section M2302 and NFPA 70.

R905.16.1 Deck requirements. Photovoltaic shingles shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.

R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of three units vertical in 12 units horizontal (3:12) or greater.

R905.16.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 4869 or ASTM D6757.

R905.16.4 Underlayment application. Underlayment shall be applied shingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.

R905.16.4.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

> **Exception:** Detached *accessory structures* that contain no *conditioned floor area*.

R905.16.4.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

> **Exception:** As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

~~**R905.16.1**~~ **R905.16.5 Material standards.** Photovoltaic ~~modules/~~shingles shall be listed and labeled in accordance with UL 1703.

~~**R905.16.2**~~ **R905.16.6 Attachment.** Photovoltaic ~~modules/~~shingles shall be attached in accordance with the manufacturer's installation instructions.

~~R905.16.3~~ R905.16.7 **Wind resistance.** Photovoltaic ~~modules/~~shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic ~~modules/~~shingles shall comply with the classification requirements of Table R905.2.4.1(2) for the appropriate maximum basic wind speed. Photovoltaic ~~modules/~~shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1(2).

Reason: This code change proposal adds specific requirements for roof decks, roof deck slope, underlayment, underlayment application, ice barrier, and underlayment for high wind areas to Section R905.16.

The specific requirements being added are consistent with similar attributes for other steep-slope, shingle-type roof coverings.

Reference to IRC Section M2302-Photovoltaic Solar Energy Systems and NFPA 70 is added.

This same code change proposal was submitted for consideration as S47-12 for Group A of the International Building Code and was Approved as Modified; the modifications are included as a part of this text here

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

R905.16-RB-GRAHAM.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels the PV requirement should be in an appendix and this proposal does not fix all the issues.

Assembly Action: **Approved as Modified**

Modify the proposal as follows:

R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of ~~three~~ two units vertical in 12 units horizontal (~~3~~ 2:12) or greater.

(Portions of proposal not shown remain unchanged)

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified and a Public Comment was submitted.

Modify the proposal as follows:

R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of ~~three~~ two units vertical in 12 units horizontal (~~3~~ 2:12) or greater.

(Portions of proposal not shown remain unchanged

Public Comment:

Mark S. Graham, National Roofing Contractors Association, requests Approved as Modified by Assembly Floor Action.

Commenter's Reason: Seeking approval of proposal as approved by assembly floor action as published in the ROH.

RB446-13

Final Action: AS AM AMPC____ D

RB447-13
R907 (NEW)

Proposed Change as Submitted

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Add new text as follows:

SECTION R907
ROOFTOP-MOUNTED PHOTVOLTAIC SYSTEMS

R907.1 Rooftop-mounted photovoltaic systems. Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section M2302 and NFPA 70.

R907.2 Wind resistance. Rooftop-mounted photovoltaic panel or modules systems shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R907.3 Fire classification. Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.

R907.4 Installation. Rooftop mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's installation instructions.

R907.5 Photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed installation instructions.

Reason: : This code change proposal is intended to add specific requirements applicable to rooftop-mounted photovoltaic panels and modules, and complement the already existing requirements for photovoltaic solar energy systems in Section M2302.

The roofing-specific requirements proposed here are adapted from IBC Section 1509.7-Photovoltaic Systems, which address rooftop-mounted panel and rack systems.

Building-integrated photovoltaic systems, such as photovoltaic shingles, are already addressed in IRC Section 905.16.

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

RB447-13

R907 (NEW)-RB-GRAHAM.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

John Smirnow and Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA), request Approved as Modified by this Public Comment.

Modify the proposal as follows:

~~SECTION R907~~
~~ROOFTOP-MOUNTED PHOTVOLTAIC SYSTEMS~~

~~**R907.1 Rooftop-mounted photovoltaic systems.** Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section M2302 and NFPA 70.~~

R907.2 Wind resistance. Rooftop-mounted photovoltaic panel or modules systems shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

~~**R907.3 Fire classification.** Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.~~

~~**R907.4 Installation.** Rooftop mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's installation instructions.~~

~~**R907.5 Photovoltaic panels and modules.** Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed installation instructions.~~

Commenter's Reason: Sections referenced as R907.1 and R907.3 through R907.5 are duplicative of language approved by the IRC-Building Committee under RM98-13 Part II, and are no longer needed. This proposal will eliminate conflicts with language approved under RM98 Part II.

Public Comment 2:

John Smirnow and Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA), request Approved as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R907
ROOFTOP-MOUNTED PHOTVOLTAIC SYSTEMS

R907.1 Rooftop-mounted photovoltaic systems. Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section M2302 and NFPA 70.

~~**R907.2**~~ **R908.1.2.1 Wind resistance.** Rooftop-mounted photovoltaic panel or modules systems shall be designed and installed to resist ~~the~~ component and cladding loads. Component and cladding wind pressures shall be as specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3), or determined according to accepted engineering practice.

R907.3 Fire classification. Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.

R907.4 Installation. Rooftop mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's installation instructions.

R907.5 Photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed installation instructions.

Commenter's Reason: Proposed Section R907.2 is revised to Section R908.1.2.1 to correlate with RM98-13, as approved by the ICC Building Committee.

Determination of applicable wind pressure in Section R908.1.2.1 should not be limited to use of Table R301.2(2) only, as Table R301.2(2) is overly restrictive in most cases. Accepted engineering practice should be specifically referenced, as it is also appropriate to determine wind pressures by more accurate methods. For example, systems conforming to the simple constraints in ICC Evaluation Services Acceptance Criteria AC 428 should be allowed to be designed according to the wind calculation method found in AC 428.

RB447-13

Final Action: AS AM AMPC____ D

RB450-13
R202 (NEW), R907 (NEW), Chapter 44

Proposed Change as Submitted

Proponent: Vickie Lovell, InterCode Incorporated, representing the Reflective Insulation Manufacturers Association International (Vickie@intercodeinc.com)

Revise as follows:

SECTION R907
RADIANT BARRIER-ABOVE DECK

R907.1 General. A radiant barrier installed above a deck shall comply with Sections R907.2 through R907.4.

R907.2 Fire Testing. Radiant barriers shall be permitted for use above decks where the radiant barrier is covered with an *approved* roof covering and the system consisting of the radiant barrier and the roof covering complies with the requirements of either FM 4550 or UL 1256.

R907.3 Installation. The low emittance surface of the radiant barrier shall face the continuous air space between the barrier and the roof covering.

R907.4 Material standards. A radiant barrier installed above a deck shall comply with ASTM C1313/C1313M.

Add new definition as follows:

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

Add new standard to Chapter 44 as follows:

ASTM

C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

Reason: The IBC understood this and accepted S51-12, which introduced a new section 1509, following section 1508 on Roof Insulation, associated with Radiant barriers above deck. The present proposal uses the same language accepted into the IBC and proposes it for the IRC, once more following the section on roof insulation (R906) and not as another part of that section.

The new text is necessary for the following reasons:

(1) An important issue that needs to be addressed in the new proposed section R907 is how the fire testing of the system is to be done. The fire testing (FM 4550 or 1256) must be done using the combination of the radiant barrier **and** the approved roof covering and the total system needs to pass the fire test.
(2) A definition is needed for radiant barriers, and one is being proposed, which is identical to the one adopted by the IBC.
(3) A standard specification needs to be referenced, and the same specification (ASTM C1313) is being proposed as was adopted by the IBC.
(4) A key requirement for the installation of radiant barrier products is that there needs to be an air space or air gap between the radiant barrier and the roof covering. This is explained in the proposed section on installation. There is confusion in the market place concerning this "air space" or "air gap". All radiant barrier applications require an air space on at least one low emittance side of the material. Installations that do not to include an air space do not provide the desired radiant barrier benefit.

Radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements [building codes in Hawaii, Austin, Texas, Florida and I California's Title 24] and are included in the Energy Star Homes Guidelines.

For information, ASTM has issued separate specifications for radiant barriers used in buildings ASTM C1313, “Standard Specification for Sheet Radiant Barriers for Building Construction Applications” and for reflective insulations used in buildings ASTM C1224, “Standard Specification for Reflective Insulation for Building Applications”. This proposal includes a reference to the appropriate specification, ASTM C1313. The scope of ASTM C1313 reads as follows. “This specification covers the general physical property requirements of radiant barrier materials for use in building construction. The scope is specifically limited to requirements for radiant barrier sheet materials that consist of at least one surface, such as metallic foils or metallic deposits mounted or unmounted on substrates. Sheet radiant barrier materials shall consist of low emittance surface(s) that may be in combination with any substrates and adhesives required to meet the specified physical material properties. The following test methods shall be performed: surface emittance; water vapor transmission; surface burning characteristics; corrosivity; tear resistance; and adhesive performance.”

Cost Impact: This proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM C 1313/ C1313M with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB450-13

R907 (NEW)-RB-LOVELL.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM C1313/C1313M-12 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee feels this application is for commercial buildings and is not needed in the IRC. The proponent will rework and bring it back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Vickie Lovell, Intercode, Inc., representing Reflective Insulation Manufacturers Association – International, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R907
RADIANT BARRIER-~~ABOVE DECK~~

R907.1 General. ~~A~~ Where provided, radiant barriers ~~installed above a deck~~ shall comply with Sections R907.2 through R907.4.

R907.2 Fire Testing. ~~Radiant barriers shall be permitted for use above decks where the radiant barrier is covered with an *approved* roof covering and the system consisting of the radiant barrier and the roof covering complies with the requirements of either FM 4550 or UL 1256.~~ Radiant barriers shall be tested in accordance with ASTM E84.

R907.3 Installation. Radiant barrier shall be installed in accordance with the manufacturer’s installation instructions. The low emittance surface of the radiant barrier shall face ~~the~~ a continuous air space.~~between the barrier and the roof covering.~~

R907.4 Material standards. ~~A r~~ Radiant barriers ~~installed above a deck~~ shall comply with ASTM C1313/C1313M.

Add new definition as follows:

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

ASTM

C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

Commenter's Reason: There was very valuable feedback that has been taken into account in the revisions included within this public comment. The revision of this proposal appropriately gears this section towards the elements that are important for a residential application for this product type. Those key elements include:

- Fire testing per E84
- All radiant barriers must have a continuous air space on the low emittance (shiny) side of the product
- The Public Comment provides an ASTM reference – ASTM C1313

This language is important to be included in the code because it clarifies important product fire testing and the key installation requirement, that the product must face a continuous air space – this primary feature is important for Code Officials to be aware of.

Some roofers will install the product as felt – between the deck and shingles – this installation is improper and does not provide a radiant barrier benefit.

Radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements [building codes in Hawaii, Austin, Texas, Florida and I California's Title 24] and are included in the Energy Star Homes Guidelines.

RB450-13

Final Action: AS AM AMPC____ D

RB452-13
R907.3, R907.4, R907.5, R907.6

Proposed Change as Submitted

Proponent: Andy Williams, Metal Construction Association (afwilliams@metalconstruction.org)

Revise as follows:

<u>**R907.3 Fire classification.** The roof covering fire classification shall not be reduced due to repairs from the fire classification required when installed. The roof covering fire classification for a recovering shall comply with the fire classification in Section R902.</u>

~~R907.3~~ <u>R907.4</u> Recovering versus replacement. New roof coverings shall not be installed without first removing all existing layers of roof coverings where any of the following conditions exist:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

Exceptions:

1. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
2. Installation of metal panel, metal shingle and concrete and clay tile roof coverings over existing wood shake roofs shall be permitted when the application is in accordance with Section <u>R907.5</u>.
3. The application of new protective coating over existing spray polyurethane foam roofing systems shall be permitted without tear-off of existing roof coverings.
4. Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section R905.

~~R907.4~~ <u>R907.5</u> Roof recovering. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other *approved* materials securely fastened in place.

~~R907.5~~ <u>R907.6</u> Reinstallation of materials. Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Any existing flashings, edgings, outlets, vents or similar devices that are a part of the assembly shall be replaced when rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

~~R907.6~~ <u>R907.7</u> Flashings. Flashings shall be reconstructed in accordance with *approved* manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.

Reason: Section R907.3 is added to clarify that the roof covering is required to comply with the fire classification mandated by the IRC. For repairs to a roof covering, the repairs are required to maintain the roof covering fire classification required by the IRC when the roof covering was initially installed. For a recovering, the roof covering is required to have the fire classification required by the IRC adopted at the time of the recovering.

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

RB452-13

R907.3 (NEW)-RB-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this is already covered in the code and this would introduce redundant language.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

J. William Degnan, President, National Association of State Fire Marshals, requests Approved as Submitted.

Commenter's Reason: This change represents an important concept for the continued protection of roof covering fire classifications where roofs have been recovered or repaired, and bears repeated reference in this Section of the IRC. In addition, the Committee Reason Statement has provided no technical justification for the Disapproval of this concept to be included as a part of the IRC requirements for roof covering repairs or replacements.

RB452-13

Final Action: AS AM AMPC____ D

RB458-13
R1003.18

Proposed Change as Submitted

Proponent: Jim Buckley, Buckley Rumford Co. representing Masonry Alliance for Codes and Standards and Clay Lining Institute (buckley@rumford.com)

Revise as follows:

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

Exceptions:

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

Reason: Tests have shown that the currently required 12" chimney wall thickness for the chimney to be in contact with combustible trim is overly restrictive. Chimneys with enclosing walls of 8" in contact with combustible material are at least as safe as the current basic code requiring chimneys to have 4" thick solid masonry walls two inches clear of combustibles. This change would provide for timber frame or wood ceilings to safely abut a masonry chimney.

Eight Inch Chimney Wall Test
In support of Buckley Code Change Proposal R1003.18 - 9/20/12

Purpose of test: To determine if a chimney built so that the clay flue liner is enclosed with 8" of solid masonry in contact with combustible materials is as safe as the current code requirement that the clay flue liner be enclosed with 4" of solid masonry plus 2" of air space to combustible materials.

We conclude that building chimney walls 8" thick in contact with combustible materials is at least as safe as building chimneys with 4" thick walls 2" clear of combustible materials which is current code.

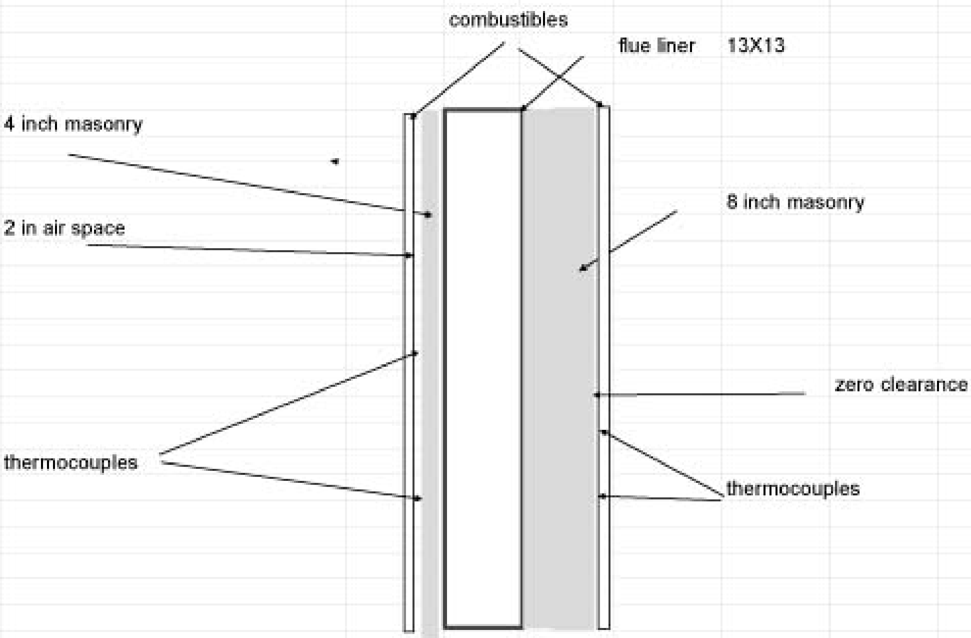
Method: To build a masonry chimney with one side built to code - 4" thick wall plus 2" of air space to combustibles - and the opposite side built 8" thick in contact with combustibles and subject the chimney to flue gas temperatures representing an over fire or chimney fire condition. If the combustibles in contact with the 8" thick masonry did not become as hot as the combustibles 2" clear of a 4" thick masonry chimney wall (the code compliant condition) we can conclude that a chimney with 8" thick walls in contact with combustibles is at least as safe as the code compliant chimney with 4" walls plus a 2" air space to combustibles.

Results:

The combustibles on the code compliant side - 4" thick wall plus 2" of air space to combustibles - reached 90 deg.F above ambient temperature after four hours at a flue gas temperature of 1,000 deg. F while the combustibles in contact with the 8" thick side made it to five hours before reaching 90 degrees above ambient. By that time the combustibles on the code compliant side had reached 45 deg.F above the 90 deg.F above ambient failure temperature.

sept 14 2012 chimney test

4 inch brick with 2 inch air space versus 8 inch brick zero clearance



Time	flue	flue	zero	zero	zero	2 inch	2 inch	2 inch	ambient
start	71	71	66	66	66	66	66	66	56
1 hour	1000	1008	66	66	66	66	71	74	56
2 hr	1000	1005	85	78	79	94	102	111	56
3 hr	1001	992	111	102	104	127	132	137	58
4 hr	1001	993	147	142	142	168	165	175	57
5 hr	1002	995	144	160	168	200	201	197	74
6 hr	1000	992	167	170	170	220	226	227	78
7 hr	1000	992	191	194	197	230	232	236	83
8 hr	1002	995	203	202	205	231	231	240	83
1 hour of cooling time	387	423	217	220	220	211	215	214	85
temps declined after this point									

Test #2 Sept 19, 2012
1 Hr to heat chimney to 1400 then held for 3 hrs at 1400 then spiked to 2100 for 10 min cooled 1 hr and repeated twice

Time									
start	47	49	52	49	51	51	52	49	47
1 hour	1400	1338	52	53	53	71	71	76	52
2 hour	1403	1358	61	62	65	137	142	143	55
3 hour	1403	1355	87	94	101	208	215	218	61
4 hour	1401	1357	127	125	119	243	236	222	60
10 min hold at 2100	2100	1911	107	113	114	236	242	221	61
after 1 hour cool	702	693	136	143	147	235	241	248	64
10 min hold at 2100	2100	1928	131	135	137	239	241	248	62
after 1 hr cool	637	714	135	138	143	229	268	270	64
10 min hold at 2100	2073	1962	127	127	136	218	257	255	64
peak temp during2 1/2 hr cooling	329	406	139	139	180	206	287	288	63

Cost Impact: The code change proposal will not increase the cost of construction, it would reduce the cost.

RB458-13

R1003.18-RB-BUCKLEY.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

J. William Degnan, President, National Association of State Fire Marshals, requests Disapproved

Commenter's Reason: This Code change has been made without acceptable technical justification. Very limited descriptive information has been provided regarding the methodology and substantiation of tests used to justify these reductions in clearances from masonry chimneys to exposed combustible trim and the edges of sheathing materials. Such changes should be reserved pending the use of more widely known or recognized testing criteria.

RB458-13

Final Action: AS AM AMPC____ D

RB460-13
R1005.2

<u>Proposed Change as Submitted</u>

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards and Clay Lining Institute (buckley@rumford.com)

Revise as follows:

R1005.2 Decorative shrouds. Decorative shrouds shall not be installed at the termination of factory-built chimneys except where the shrouds are *listed* and *labeled* for use with the specific factory-built chimney system and installed in accordance with the manufacturer's installation instructions <u>or comply with Section R1003.9</u>.

Reason: It is impractical to test each custom decorative shroud with every listed chimney system so the manufacturers of the various UL listed chimney systems have added "supplementary instructions" to provide minimum dimensions and construction guidelines that are written in prescriptive language that is similar to that already in Section R1003.9 of the code. Individual home builders and manufacturers of chimney rain caps, spark arrestors, chimney caps or shrouds should not have to list their decorative shrouds as long as they meet the requirements set forth in Section R1003.9. This change would not prevent the use of listed decorative shrouds but it would provide for a safe way to install custom decorative shrouds - unlisted by complying with code.

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

RB460-13

R1005.2-RB-BUCKLEY.doc

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The proposed referenced section is for masonry chimneys and is not appropriate for factory built chimneys. This could have the effect of violating the listing.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

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

Public Comment 1:

Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards and Clay Lining Institute, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

~~**R1005.2 Decorative shrouds.** Decorative shrouds shall not be installed at the termination of factory-built chimneys except where the shrouds are listed and labeled for use with the specific factory-built chimney system and installed in accordance with the manufacturer's installation instructions or comply with Section R1003.9.~~

Commenter's Reason: We had sought to add a prescriptive option as an alternative to the requirement for a listing for decorative shrouds by referencing Section R1003.9. One member of the IRC Committee said that would be "inappropriate because it cited a masonry section of code."

So now we would like to propose eliminating the whole section R1005.2. Builders would still have to comply with the requirements of R1003.9 which applies to all chimneys - not just listed chimneys - and would still have to use decorative shrouds listed and labeled for use with the specific factory-built chimney system if that is required by the listing for the specific chimney.

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

Public Comment 2:

Gregg Achman, Hearth & Home Technologies, requests Disapproved.

Commenter's Reason: Section R1003.9 is for masonry chimneys and cannot be applied to factory built chimney systems. Factory built chimney system chases are built with combustible materials and any decorative shroud needs to be tested with the factory built chimney system to ensure that it will not create a fire hazard. Most factory built chimney system shrouds employ added heat shielding, or other design feature requirements, to ensure there is not a fire hazard, since masonry chimneys are made of non-combustible materials there is not a fire hazard concern and the requirements of R1003.9 can be applied safely. The addition of section R1003.9 would likely cause a fire hazard condition if applied to factory built chimney systems, therefore, this comment must be disapproved.

RB460-13

Final Action: AS AM AMPC____ D

RB462-13
Appendix F

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

APPENDIX F
~~RADON CONTROL METHODS~~
PASSIVE RADON GAS CONTROLS
(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION AF101
SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques where approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102
DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is not less than 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is not less than 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

RADON GAS. A naturally occurring, chemically inert, radioactive gas ~~that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.~~

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene ~~or other equivalent material~~ used to retard the flow of soil gases into a ~~building~~ dwelling.

SUBMEMBRANE DEPRESSURIZATION SYSTEM <u>(Passive)</u>. A system designed to achieve lower submembrane air pressure relative to <u>basement or</u> crawl space air pressure by use of a vent <u>pipe</u> drawing air from beneath the soil-gas-retarder membrane.

~~**SUBSLAB DEPRESSURIZATION SYSTEM (Active).** A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.~~

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe ~~routed through the *conditioned space* of a building and connecting the subslab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab~~ <u>drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground</u>.

<u>**VENT PIPE.** Not less than a 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.</u>

SECTION AF103
~~REQUIREMENTS~~
<u>PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS</u>

AF103.1 General. ~~The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF102). These techniques are required in areas where designated by the *jurisdiction*.~~ <u>The following components of a passive submembrane or subslab depressurization system shall be installed during construction.</u>

~~**AF103.2 Subfloor preparation.** A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:~~

1. ~~A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.~~
2. ~~A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.~~
3. ~~Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.~~

~~**AF103.3 Soil-gas-retarder.** A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly, and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.~~

~~AF103.4~~ <u>AF103.2</u> Entry routes. Potential radon entry routes shall be closed in accordance with Sections ~~AF103.4.1~~ <u>AF103.2.1</u> through ~~AF103.4.10~~ <u>AF103.2.8</u>.

~~AF103.4.1~~ <u>AF103.2.1</u> Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs~~,~~ or other floor assemblies~~,~~ shall be filled with a polyurethane caulk~~,~~ <u>or expanding foam</u> ~~or equivalent sealant~~ applied in accordance with the manufacturer's ~~recommendations~~ <u>installation instructions</u>.

~~**AF103.4.2 Concrete joints.** All control joints, isolation joints, construction joints, and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.~~

~~**AF103.4.3 Condensate drains.** Condensate drains shall be trapped or routed through nonperforated pipe to daylight.~~

~~AF103.4.4~~ <u>AF103.2.2</u> Sumps. Sump<u>s</u> ~~pits~~ open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or ~~otherwise~~ sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

~~AF103.4.5~~ <u>AF103.2.3</u> Foundation walls. Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above ~~finished ground surface~~ <u>grade</u> ~~to prevent the passage of air from the interior of the wall into the living space~~. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be ~~sealed~~ <u>solid masonry, one course of masonry grouted solid, or a solid concrete beam</u>. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of ~~masonry block or wood~~ foundation walls below ~~the ground surface~~ <u>grade</u> shall be filled with polyurethane caulk ~~or equivalent sealant~~. ~~Penetrations of concrete walls shall be filled.~~

~~AF103.4.6~~ <u>AF103.2.4</u> Dampproofing. The exterior surfaces of ~~portions of~~ ~~concrete and masonry block~~ <u>foundation</u> walls below ~~the ground surface~~ <u>grade</u> shall be dampproofed in accordance with Section R406.

~~AF103.4.7~~ <u>AF103.2.5</u> ~~Air-handling units~~ <u>Air-conditioning systems</u>. ~~Air-handling units~~ <u>Entry points, joints, or other openings into air conditioning systems</u> in <u>enclosed</u> crawl spaces shall be sealed ~~to prevent air from being drawn into the unit~~.

> **Exception:** ~~Units~~ <u>Systems</u> with gasketed seams or ~~units~~ that are otherwise sealed by the manufacturer ~~to prevent leakage~~.

~~AF103.4.8~~ <u>AF103.2.6</u> Ducts. Ductwork passing through or beneath a slab <u>within a dwelling</u> shall be of seamless material unless the ~~air-handling~~ <u>air-conditioning</u> system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed ~~to prevent air leakage~~.

Ductwork located in <u>enclosed</u> crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

~~**AF103.4.9 Crawl space floors.** Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.~~

~~AF103.4.10~~ <u>AF103.2.7</u> Crawl space access. Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or ~~otherwise filled to prevent air leakage~~ <u>sealed</u>.

~~AF103.5 Passive submembrane depressurization system~~ <u>AF103.3 Basements or enclosed crawl spaces with soil floors</u>. In ~~buildings~~ <u>dwellings</u> with <u>basements or enclosed</u> crawl space<u>s</u> ~~foundations~~ <u>with soil floors</u>, the following components of a passive submembrane depressurization system shall be installed during construction.

> **Exception:** ~~Buildings in which an *approved* mechanical crawl space ventilation system or other equivalent system is installed.~~ <u>Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with Section R408.3.</u>

~~**AF103.5.1 Ventilation.** Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.~~

~~AF103.5.2~~ AF103.3.1 Soil-gas-retarder. The soil in basements and enclosed crawl spaces shall be covered with a ~~continuous layer of minimum 6- mil (0.15 mm) polyethylene~~ soil-gas-retarder. The ~~ground cover~~ soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space ~~area~~. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

~~AF103.5.3 Vent pipe~~ AF103.3.2 "T" fitting and vent pipe. ~~A plumbing tee or other *approved* connection~~ A 3- or 4-inch "T" fitting shall be inserted ~~horizontally~~ beneath the ~~sheeting~~ soil gas retarder ~~and connected to a 3- or 4-inch-diameter (76 or 102 mm) fitting with a vertical vent pipe installed through the sheeting~~ and be connected to a vent pipe. The vent pipe shall ~~be extended up through the building floors,~~ extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point~~, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings~~.

~~AF103.6~~ AF103.4 ~~Passive subslab depressurization system~~ Basements or enclosed crawl spaces with concrete floors or other floor systems and slab on grade dwellings. ~~In *basement* or slab-on-grade buildings, the~~ The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces with concrete or other floor systems.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

~~AF103.6.1~~ AF103.4.3 ~~Vent pipe~~ "T" fitting and vent pipe. ~~A minimum 3-inch-diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the subslab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains within the subslab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the subslab aggregate or connected to it through a drainage system.~~

~~The pipe shall be extended up through the building floors, and terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.~~ Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate not less than 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe shall be permitted to be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

~~AF103.6.2~~ <u>AF103.6</u> Multiple vent pipes. In ~~buildings~~ <u>dwellings</u> where interior footings or other barriers separate the ~~subslab aggregate or other~~ gas-permeable ~~material~~ <u>layer</u>, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

<u>**AF103.7 Combination foundations.** Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.</u>

~~AF103.7~~ <u>AF103.8</u> Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the ~~slab or~~ soil-gas-retarder.

~~**AF103.8 Vent pipe accessibility.** Radon vent pipes shall be accessible for future fan installation through an *attic* or other area outside the *habitable space*.~~

> ~~**Exception:** The radon vent pipe need not be accessible in an *attic* space where an *approved* roof-top electrical supply is provided for future use.~~

AF103.9 Vent pipe identification. All exposed and visible interior ~~radon~~ vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."

~~**AF103.10 Combination foundations.** Combination *basement*/ crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.~~

~~**AF103.11 Building depressurization.** Joints in air ducts and plenums in un*conditioned spaces* shall meet the requirements of Section M1601. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in Chapter 11. Fireblocking shall meet the requirements contained in Section R302.11.~~

~~AF103.12~~ <u>AF103.10</u> Power source <u>and access for future radon fan</u>. To provide for future installation of ~~an active submembrane or subslab depressurization system~~ <u>a radon fan</u>, an electrical circuit terminated in an *approved* box shall be installed during construction in the ~~*attic* or other~~ anticipated location of ~~vent pipe~~ <u>the radon</u> fans. ~~An electrical supply shall also be accessible in anticipated locations of system failure alarms.~~ <u>An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.</u>

Reason: First is it important to point out that the current radon rules only require a "passive" system. The current rules do not require a radon fan and do not regulate fans or "active" systems when they are installed. This proposal does not change that.

Second, there may be flaws in the existing language other than what are pointed out here. For example, current code language does not address some of the fine points of installing a soil-gas-retarder. Someone with greater expertise will need to correct those problems in subsequent code changes if they believe it is necessary.

And third, these rules have gone unchanged since being placed in the appendix of the 2000 IRC. Because they are in the appendix and because they are very infrequently adopted, they have not received the attention they might otherwise have had if they had been in the main body of the code. For those jurisdictions that have had the misfortune of having to enforce radon rules, they have proven problematic because the current rules are not well written and include conflicts, repetitive language, and vagaries. This proposal is intended to rearrange the sections in a more logical manner, create new definitions, delete unnecessary and repetitive language, and eliminate conflicts.

What follows is a section by section explanation of the revisions that are proposed.

APPENDIX F
~~RADON CONTROL METHODS~~
<u>PASSIVE RADON GAS CONTROLS</u>

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

Reason: *The proposed title revision is intended to make clear that this appendix chapter only requires "passive radon controls".*

SECTION AF101
SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques when approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

> ***Reason:*** *The language added to the Scope has been relocated from AF103.1. It seems more appropriate to have this explanatory language in the scope. It further explains that "Active" systems are permitted when approved. There is no attempt here to provide any direction on an appropriate active system since there is none in the current rule.*

SECTION AF102
DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

> ***Reason:*** *This definition is necessary because the term "crawl space" is frequently used in the section but there is no differentiation between an enclosed and unenclosed crawl space. The presumption here is that a crawl space that is open to the exterior (ex. dwelling constructed on piers) does not pose a risk from radon gas. The application proposed in this revision is that we are only concerned with enclosed crawl spaces.*

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is a minimum of 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

> ***Reason:*** *Rather than frequent repetition of what constitutes a gas-permeable layer, a definition is proposed. This language is taken from AF103.2. Furthermore, the term "geotextile drainage matting" is replaced with "soil gas collection mat or soil gas matting" which is the term found in the EPA handbook entitled "Build Radon Out". An internet search of those terms will result in many "hits".*

A. Gas Permeable Layer

Usually a 4-inch layer of clean, coarse gravel is used beneath the slab to allow the soil gas to move freely underneath the house. Other options are to install a loop of perforated pipe or soil gas collection mat (also known as drainage mat or soil gas matting).

Additionally, it is proposed that soil gas collection mats be installed in accordance with the manufacturer's installation instructions. The following link is an example of the installation instructions for this particular product indicating that there is significant detail and direction given.
http://www.radon.biz/soilgascollectormattingpriceperrollcomesin45footrolls.aspx

Placing the Mat

1. Lay out the Soil Gas Collector (SGC) on the sub grade after the final preparation and before the concrete is poured. It is typically laid out in a rectangular loop in the largest area with branches or legs into the smaller areas.
2. Position the "T-Riser" in appropriate location and nail down with a 12-inch spike through hole in center.
3. Slide the SGC into openings in "T-Riser" with a portion of the fabric around the outside. Tape the fabric to the outside of the "T-Riser" with duct tape and staple the SGC to the ground with a landscaping staple near the "T-Riser"

4. Roll out the SGC, smooth it onto the ground. To avoid wrinkles and buckling, work away from the "'T-Riser", stapling it to the ground as you go. The SGC should be stapled to the ground every three to four feet, in addition to the corners, "tee's" and ends.
5. Corners are constructed by peeling back the filter fabric, cutting the two ends of the SGC matrix at 45 angles and butting (or overlap no more than 1\2 inch) the matrix together. Pull the filter fabric back and tape into place. Staple across the joint of the matrix and each leg of the corner. Use a minimum of four staples at each corner - two across the joint and one on each leg.
6. The "tees" for branches or legs are constructed by slitting the fabric of the main loop at the location desired. Cut the fabric of branch at the edges and expose 2 inches of the matrix. Cut off the exposed matrix and butt the matrix of the branch (or overlap no more than 1\2 inch) to the matrix of the main loop. Pull the filter fabric of the branch back over the main loop and tape into place. Staple across the joint of the matrix with two staples and one each on the branch and the main loop. Use a minimum of four staples at each "tee"- two across the joint and one on each on the loop and branch
7. All openings in the fabric at joints, "tee's and ends of the branches should be taped to keep out the concrete.
8. When the building is ready for the soil gas vent pipe to be installed, the top of the "T-Riser" is cut off and a four-inch pipe is inserted, caulked with polyurethane and secured with screws. The vent pipe should be labeled to avoid confusion with the plumbing pipes.

Note: The openings in the riser are laid out at 180 to accommodate straight runs of the SGC only. If the riser is to be located in a corner, which is Not uncommon, the front of the "tee" can be cut off and the SGC inserted into the new opening. The side of the "tee" which will not be used should be sealed with duct tape. This creates a "90 tee" which will allow the riser to be placed in a corner with either end of the SGC loop running into the "tee" at a 90 angle.

Pouring Concrete:
The filter fabric that comes sewn around the soil gas collector prevents the wet concrete from entering the mat and reducing its air collection capacity. The only precaution that needs to be taken is that the fabric is duct tape closed at seams of splices and corners sufficiently to keep the uncured concrete from entering.
The mat also needs to be secured to the soil with landscape staples to prevent the concrete from lifting it off the soil while it is being applied. Reinforcing bars and wire can be laid right on top of the mat.
Note that the mat is strong enough to withstand concrete workers and their wheelbarrows as they cross over it during the course of installing the slab.
Riser has special hole and spike for securing it in place.
Making Corners and Splices
The mat should be routed around the inside perimeter of the foundation. This will require an occasional corner. Furthermore, splices will have to be made to join two lengths of mat together. Corners and splices are very easy to make, and do not require any special fittings. Cut back the filter fabric to expose the core material. In the case of a splice merely overlap the core by at least one corrugation replace the cloth and tape it. Use two landscape staples to hold the splice in place. In the case of a corner slice the core of two adjoining legs of the mat at 45-degree angles, overlap the edges by one corrugation, tape the cloth and landscape staple together. The corner is illustrated below:
Cut back the cloth. Cut the core at a 45 degree angle. Overlap corrugations
Replace filter cloth. Duct tape edges to keep out concrete. Staple in place.
Connecting The Mat To The Riser
A convenient riser with a dual entry allows for either end of the loop of mat to be secured to the soil gas vent riser. Slide the mat into either end of the riser and tape the edge to prevent wet concrete from entering.
The riser comes with a molded cap to keep out concrete Later this cap can be cut off and the 4" Sch. 40 PVC riser can be inserted, screwed and caulked into place
Risers are often placed in corners for convenience of later pipe routing. The plastic riser "tee" can be cut to allow for such situations.

RADON GAS. A naturally occurring, chemically inert, radioactive gas ~~that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.~~

Reason: *There is a significant amount of commentary and unnecessary language in this definition that is proposed for deletion.*

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene ~~or other equivalent material~~ used to retard the flow of soil gases into a ~~building~~ dwelling.

Reason: *There are two editorial revisions in this definition. The first deletes the reference to equivalencies which is frequently found in the section. Equivalencies are always permitted by R104.11. The second revision replaces the term "building" with "dwelling" here and throughout the section. This is to help make clear that the rules apply only to the dwelling and not an accessory building such as a garage.*

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

Reason: *The term "basement or" is added to avoid conflicts where an underfloor space that meets the definition of a basement does not have a concrete or other floor system but only a soil floor.*

~~**SUBSLAB DEPRESSURIZATION SYSTEM (Active).** A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.~~

__Reason:__ It is necessary that code language be easily understood by the public and code enforcement. Including language in the code that references non-required systems conflicts with that goal and can mislead the use and interpretation of the rule simply because the extra language exists. The feeling is that it must somehow apply because it is there. Users of the code may confuse the definition for active systems with passive systems and misapply the rule. The IRC language only requires a __passive__ system. While it is necessary to define a passive system, it is not necessary to define an active system. It is therefore reasonable to delete this language as it serves no purpose.

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe ~~routed through the *conditioned space* of a building and connecting the subslab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab~~ drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

Reason: *It is not necessary to repeat language in the definition that is found elsewhere. Furthermore, a definition is proposed for the term "vent pipe" that contains the deleted language. The added language is for clarification and consistency with the definition of submembrane depressurization system.*

VENT PIPE. A minimum 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

Reason: *Again this definition is proposed to avoid the need to frequently repeat what a vent pipe is.*

SECTION AF103
~~REQUIREMENTS~~
PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. ~~The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF102). These techniques are required in areas where designated by the *jurisdiction*.~~ The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

Reason: *The sentence deleted has been moved to the Scope as that is a more appropriate location.*

~~**AF103.2 Subfloor preparation.** A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:~~

1. ~~A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.~~
2. ~~A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.~~
3. ~~Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.~~

~~**AF103.3 Soil-gas-retarder.** A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly, and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.~~

Reason: *The two previous sections have been relocated to the subslab and submembrane sections below so that they are located more appropriately. Also, a new definition for "gas-permeable layer" has been added to the definitions that incorporates much of the language in AF103.3.*

~~AF103.4~~ AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections ~~AF103.4.1~~ AF103.2.1 through ~~AF103.4.10~~ AF103.2.7.

~~AF103.4.1~~ AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs~~,~~ or other floor assemblies~~,~~ shall be filled with a polyurethane caulk~~,~~ or expanding foam ~~or equivalent sealant~~ applied in accordance with the manufacturer's ~~recommendations~~ installation instructions.

Reason: *These are largely editorial revisions but also provide for the use of expanding foam in larger spaces where caulking is not appropriate.*

~~**AF103.4.2 Concrete joints.** All control joints, isolation joints, construction joints, and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.~~

Reason: *This section requires that various joints in the floor slab be "sealed". The EPA booklet "Build Radon Out" gives some perspective on the need to "seal" these joints. The text found on page 51 follows:*

> ### Seal control joints
>
> Control joints in the concrete slab, whether they are saw cut or made with grooving tools, should be cleaned and filled with caulk. Even if they are not cracked initially, they will likely develop cracks in the future and caulking them before the floor finishes are in place makes sense. A gun-grade polyurethane or a flowable polyurethane can be used. This seal does not interfere with the expansion of the control joint, but does block radon entry.

The presumption advanced by the EPA booklet is that these joints, even if not initially cracked, will eventually crack and "caulking them before the floor finishes are in place makes sense".

However, the EPA booklet also states that one purpose for installing the soil gas membrane (plastic sheeting), is that it can bridge cracks that develop in the floor. This is stated on page 42 of the booklet.

> Laying plastic sheeting between the gas permeable layer and the concrete slab or floor assembly serves several important purposes. The sheeting can prevent concrete from flowing down and clogging the gas permeable layer. It can also bridge any cracks that may develop in the slab or floor assembly, thereby reducing soil gas entry. Finally, the plastic sheeting can act as a vapor barrier to reduce moisture and other soil gas entry into the home.

If the plastic serves to bridge cracks, installing a sealant in the joints at the time of construction is redundant and unnecessary. The plastic will always be there. My argument is that the radon doesn't know what kind of crack it is trying to penetrate so that it cannot be more aggressive with a construction joint than it can with a crack due to shrinkage or expansion.

Also, I have received complaints from new homeowners that the sealant used in the joints in basement floors is slow to cure and that it gets on shoes and is tracked all over the new home. Clearly this is not an acceptable situation.

Also, flooring contractors complain about the caulking joint causing visible ridges in some flooring products and they almost always scrape the floors before installation removing most, if not all, of the caulking.

If the home has a crawl space, the plastic sheeting only need be overlapped by twelve inches. It is not required to be sealed. It is therefore unreasonable to seal a joint in a concrete floor over a plastic sheet when laps in the sheet do not need any special treatment when there is no floor. There just is no reasonable explanation that can be given.

Therefore, it is necessary that this section of the rule be deleted. This proposal is reasonable because sealing the joints is redundant given the language in the EPA booklet and laps in plastic sheeting need not be sealed when there is no floor.

~~**AF103.4.3 Condensate drains.** Condensate drains shall be trapped or routed through nonperforated pipe to daylight.~~

Reason: *Why can't condensate drains discharge to a floor drain or a sump? Why must they be trapped? This is already regulated by M1411.3.*

~~**AF103.4.4**~~ **<u>AF103.2.2</u> Sumps.** Sump<u>s</u> ~~pits~~ open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or ~~otherwise~~ sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

~~**AF103.4.5**~~ **<u>AF103.2.3</u> Foundation walls.** Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above ~~finished ground surface~~ <u>grade</u> ~~to prevent the passage of air from the interior of the wall into the living space~~. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be ~~sealed~~ <u>solid masonry, one course of masonry grouted solid, or a solid concrete beam</u>. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of ~~masonry block or wood~~ foundation walls below ~~the ground surface~~ <u>grade</u> shall be filled with polyurethane caulk ~~or equivalent sealant~~. ~~Penetrations of concrete walls shall be filled.~~

Reason: *Revisions are editorial to eliminate repetition, commentary language, and for clarity.*

~~**AF103.4.6**~~ **<u>AF103.2.4</u> Dampproofing.** The exterior surfaces of ~~portions of concrete and masonry block~~ <u>foundation</u> walls below ~~the ground surface~~ <u>grade</u> shall be dampproofed in accordance with Section R406.

Reason: *Editorial revisions.*

~~**AF103.4.7**~~ **<u>AF103.2.5</u>** ~~**Air-handling units**~~ **<u>Air-conditioning systems</u>.** ~~Air-handling units~~ <u>Entry points, joints, or other openings into air conditioning systems</u> in <u>enclosed</u> crawl spaces shall be sealed ~~to prevent air from being drawn into the unit~~.

Exception: ~~Units~~ <u>Systems</u> with gasketed seams or ~~units~~ that are otherwise sealed by the manufacturer ~~to prevent leakage~~.

Reason: *The term "air-handling units" is not defined. "Air-conditioning systems" is defined in the IRC as: A system that consists of heat exchangers, blowers, filters, supply, exhaust and return-air systems, and shall include any apparatus installed in connection therewith." It is best to use a defined term to avoid confusion.*

~~**AF103.4.8**~~ **<u>AF103.2.6</u> Ducts.** Ductwork passing through or beneath a slab <u>within a dwelling</u> shall be of seamless material unless the ~~air-handling~~ <u>air-conditioning</u> system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed ~~to prevent air leakage~~.

Ductwork located in <u>enclosed</u> crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

Reason: *Editorial revisions. Additionally, when the code includes language such as "to prevent air leakage", some code officials will interpret that to create a standard and that some testing is undertaken to illustrate that the standard is met. Some code officials will require a pressure test of the space to demonstrate that there is no air leakage. The presumption here is that such a standard was not intended.*

~~**AF103.4.9 Crawl space floors.** Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.~~

Reason: *These openings are already required to be sealed for purposes of fireblocking in section R302.11.*

~~**AF103.4.10**~~ **<u>AF103.2.7</u> Crawl space access.** Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or ~~otherwise filled to prevent air leakage~~ <u>sealed</u>.

Reason: *Elimination of commentary language. Additionally, when the code includes language such as "to prevent air leakage", some code officials will interpret that to create a standard and that some testing is undertaken to illustrate that the standard is met. Some code officials will require a pressure test of the space to demonstrate that there is no air leakage. The presumption here is that such a standard was not intended.*

~~**AF103.5 Passive submembrane depressurization system**~~ **<u>AF103.3 Basements or enclosed crawl spaces having soil floors</u>.** In ~~buildings~~ <u>dwellings</u> with <u>basements or enclosed</u> crawl space<u>s</u> ~~foundations~~ <u>with soil floors</u>, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: ~~Buildings in which an *approved* mechanical crawl space ventilation system or other equivalent system is installed.~~ <u>Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with R408.3.</u>

Reason: *Editorial revisions. Revisions also recognize any underfloor space with a soil floor regardless of what the space is called. Also, the exception references an "approved mechanical crawl space ventilation system or other equivalent system." It is not clear what the criteria might be for approving such a system or an equivalent system to that approved. So what is proposed here is the continuous mechanical exhaust system identified in R408.3.*

~~**AF103.5.1 Ventilation.** Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.~~

Reason: *Crawl spaces are already required to be ventilated by R408.1. It isn't necessary to repeat that language here.*

~~**AF103.5.2**~~ **AF103.3.1 Soil-gas-retarder.** The soil in basements and enclosed crawl spaces shall be covered with a ~~continuous layer of minimum 6- mil (0.15 mm) polyethylene~~ soil-gas-retarder. The ~~ground cover~~ soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space ~~area~~. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

Reason: *Editorial revisions. The last two sentences are taken from AF103.3 as the rules are applicable at this location.*

~~**AF103.5.3 Vent pipe**~~ **AF103.3.2 "T" fitting and vent pipe.** ~~A plumbing tee or other *approved* connection~~ A 3- or 4-inch "T" fitting shall be inserted ~~horizontally~~ beneath the ~~sheeting~~ soil gas retarder ~~and connected to a 3- or 4-inch-diameter (76 or 102 mm) fitting with a vertical vent pipe installed through the sheeting~~ and be connected to a vent pipe. The vent pipe shall ~~be extended up through the building floors,~~ extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point~~, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings~~.

Reason: *Largely editorial but also recognizing that definitions address the deleted language.*

~~**AF103.6**~~ **AF103.4** ~~**Passive subslab depressurization system**~~ **Basements or enclosed crawl spaces having concrete floors or other floor systems and slab on grade dwellings.** ~~In *basement* or slab-on-grade buildings, the~~ The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces having concrete or other floor systems.

Reason: *Editorial revisions. Revisions also recognize any underfloor space with a concrete or other floor system regardless of what the space is called. It is not uncommon for crawl spaces to have concrete floors.*

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

Reason: *This is text that has been relocated from AF103.2.*

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

Reason: *This text has been relocated from AF103.3.*

~~**AF103.6.1**~~ **AF103.4.3** ~~**Vent pipe**~~ **"T" fitting and vent pipe.** ~~A minimum 3-inch-diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the subslab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains within the subslab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the subslab aggregate or connected to it through a drainage system. The pipe shall be extended up through the building floors, and terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.~~ Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

Reason: *Largely editorial but also recognizing that definitions address the deleted language. A portion of the new text came from AF103.3.*

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe may be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

__Reason:__ This is new text that recognizes that a sump or drain tile can be used in a passive radon system.

~~AF103.6.2~~ **AF103.5 Multiple vent pipes.** In ~~buildings~~ dwellings where interior footings or other barriers separate the ~~subslab aggregate or other~~ gas-permeable ~~material~~ layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

__Reason:__ Editorial revisions.

AF103.5 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

__Reason:__ This section has been relocated from later in the section to group like requirements. It has also been editorially revised for clarity.

~~AF103.7~~ **AF103.8 Vent pipe drainage.** All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the ~~slab or~~ soil-gas-retarder.

~~**AF103.8 Vent pipe accessibility.** Radon vent pipes shall be accessible for future fan installation through an *attic* or other area outside the *habitable space*.~~

~~**Exception:** The radon vent pipe need not be accessible in an *attic* space where an *approved* roof-top electrical supply is provided for future use.~~

__Reason:__ This section has been moved to the end of the section to group like requirements.

~~AF103.9~~ **AF103.9 Vent pipe identification.** All exposed and visible interior ~~radon~~ vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: “Radon Reduction System.”

~~**AF103.10 Combination foundations.** Combination *basement*/ crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.~~

__Reason:__ This section has been moved up to group like requirements.

~~**AF103.11 Building depressurization.** Joints in air ducts and plenums in un*conditioned spaces* shall meet the requirements of Section M1601. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in Chapter 11. Fireblocking shall meet the requirements contained in Section R302.11.~~

__Reason:__ It seems unnecessary to repeat requirements that are found elsewhere in the code.

~~AF103.12~~ **AF103.10 Power source and access for future radon fan.** To provide for future installation of ~~an active submembrane or subslab depressurization system~~ a radon fan, an electrical circuit terminated in an *approved* box shall be installed during construction in the ~~*attic* or other~~ anticipated location of ~~vent pipe~~ the radon fan~~s~~. ~~An electrical supply shall also be accessible in anticipated locations of system failure alarms.~~ An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

__Reason:__ This text applies to providing a space and power source for the future installation of a radon fan. The term “attic” has been deleted as it unnecessarily confuses where the placement of the electrical termination should be. The term “other anticipated location” implies that the fan could be placed anywhere, not just an attic. And since active systems aren’t regulated, there will be no oversight to the final location of a fan anyway. The reference to “system failure alarms” is deleted as there are non-electrical ways of monitoring active systems and it would seem that the same box used to power the fan could power the alarm.

To aid in understanding the impact of these changes, what follows is the revised text minus the cross-outs and underlines.

APPENDIX F
PASSIVE RADON GAS CONTROLS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION AF101
SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques when approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102
DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is a minimum of 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

RADON GAS. A naturally occurring, chemically inert, radioactive gas.

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene used to retard the flow of soil gases into a dwelling.

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

VENT PIPE. A minimum 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

SECTION AF103
PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections AF103.2.1 through AF103.2.8.

AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or expanding foam applied in accordance with the manufacturer's installation instructions.

AF103.2.2 Sumps. Sumps open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

AF103.2.3 Foundation walls. Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above grade. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be solid masonry, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of foundation walls below grade shall be filled with polyurethane caulk.

AF103.2.4 Dampproofing. The exterior surfaces of foundation walls below grade shall be dampproofed in accordance with Section R406.

AF103.2.5 Air-conditioning systems. Entry points, joints, or other openings into air conditioning systems in enclosed crawl spaces shall be sealed.

Exception: Systems with gasketed seams or that are otherwise sealed by the manufacturer.

AF103.2.6 Ducts. Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed.

Ductwork located in enclosed crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

AF103.2.7 Crawl space access. Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or sealed.

AF103.3 Basements or enclosed crawl spaces having soil floors. In dwellings with basements or enclosed crawl spaces with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with R408.3.

AF103.3.1 Soil-gas-retarder. The soil in basements and enclosed crawl spaces shall be covered with a soil-gas-retarder. The soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

AF103.3.2 "T" fitting and vent pipe. A 3- or 4-inch "T" fitting shall be inserted beneath the soil gas retarder and be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.4 Basements or enclosed crawl spaces having concrete floors or other floor systems and slab on grade dwellings. The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces having concrete or other floor systems.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

AF103.4.3 "T" fitting and vent pipe. Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe may be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

AF103.6 Multiple vent pipes. In dwellings where interior footings or other barriers separate the gas-permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

AF103.7 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

AF103.8 Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the soil-gas-retarder.

AF103.9 Vent pipe identification. All exposed and visible interior vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."

AF103.10 Power source and access for future radon fan. To provide for future installation of a radon fan, an electrical circuit terminated in an *approved* box shall be installed during construction in the anticipated location of the radon fan. An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

Cost Impact: None

APPENDIX F-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a good and needed update and reorganization of the appendix. The proponent should reach out to the radon experts and resolve the technical issues and bring back a public comment.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

David Kapturowski, Spruce Environmental Technologies, Inc, representing American Association of Radon Scientists and Technologists (AARST), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Delete Appendix F in its entirety and substitute as follows:

~~APPENDIX F~~
~~RADON CONTROL METHODS~~

APPENDIX F
RADON REDUCTION

SECTION AF101
SCOPE

AF101.1 This appendix contains requirements for new construction in *jurisdictions* where significant potential for elevated indoor *radon* exists. Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of *radon* zone 1 & 2 designation in accordance with section AF103.42.

SECTION AF102
DEFINITIONS

ACCESS (limited). For the purpose of Appendix F, the point of entry to a fan location that allows service personnel to reach an *ASD fan* or intended fan location for the purpose of installing or replacing an *ASD fan*. Such access does not require walkways, service platforms, level working spaces, receptacle and lighting outlets or clear and unobstructed passageways with continuous solid flooring such as are typically required for appliances that require periodic maintenance, servicing and inspection.

ACTIVE SOIL DEPRESSURIZATION (ASD). A family of *radon mitigation systems* involving fan-powered soil depressurization, including but not limited to *sub-slab depressurization* and *sub-membrane depressurization*.

ASD FAN. A particular type of fan that is designed and rated by the manufacturer for continuous duty and for use in an *ASD* system.

CERTIFIED. For the purpose of Appendix F, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals are those of the National Radon Proficiency Program (NRPP) and the National Radon Safety Board (NRSB). Also see LICENSED.

CHECK VALVE. For the purpose of Appendix F, a mechanical device that will allow water to flow in one direction while preventing airflow in the opposite direction.

DEPRESSURIZATION. A negative pressure induced in one area relative to another.

DIAGNOSTIC TESTS. Procedures, including Communication Tests and other tests, used to identify or characterize conditions under, beside and within buildings that could contribute to *radon* entry or elevated *radon* levels or that could provide information regarding the performance of a *radon mitigation system*.

GEOTEXTILE MATTING. A product suitable for soil contact, that provides a void space laterally through the material to allow air movement. The void space is created through a matrix of woven mesh, "egg crate" support of a fabric enclosure or similar means. Also referred to as "Vent Strip".

LICENSED. For the purpose of Appendix F, a designation applied to individuals or companies that are qualified and specifically authorized as *radon* laboratories, measurement or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

MITIGATOR. For the purpose of Appendix F, a *certified* or *licensed* individual who designs, installs or directly supervises the installation of the *radon ASD mitigation systems*.

MITIGATION SYSTEM. Any system or steps designed to reduce *radon* concentrations in the indoor air of a building.

NATIONAL RADON ACTION LEVEL (NRAL). The indoor *radon* concentration at which mitigation is recommended. The *NRAL* is defined as the US Environmental Protection Agency's Action Level of 4 *pCi/L* [148 Bq/m^3].

PIPE LOOP. For the purpose of Appendix F, a continuous length of perforated pipe extending around the inside perimeter of the foundation.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

ROUGH-IN. For the purpose of Section AF103, the installation of all parts and materials of an *ASD* system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials are gas permeable layers, *soil gas retarders*, plenums, membranes, piping, *suction points*, discharge points and wiring.

SOIL GAS. The gas mixture present in soil, which could contain *radon* and water vapor.

SOIL GAS COLLECTION PLENUM. A constructed enclosure for collecting *radon* and other *soil gases* from under a foundation.

SOIL GAS COLLECTOR. A gas permeable conduit constructed of *gravel*, perforated pipe or *geotextile matting* for collecting *radon* and other *soil gases* from within a *soil gas collection plenum* and connecting the plenum to the *ASD* pipe system.

SOIL GAS RETARDER. A continuous membrane or other comparable material laid over a *soil gas* plenum or earthen floor area that is used to retard the flow of *soil gases* into a building.

SUB-MEMBRANE DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure in the space under a *soil gas retarder* membrane than above it by use of an *ASD fan* drawing air from beneath the membrane.

SUB-SLAB DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure under a floor slab than above it. An *ASD fan* is installed in the *radon* system piping that draws air from below the floor slab.

SUCTION POINT. For the purpose of Appendix F, the location where the *soil gas collector* is connected to the *ASD* system piping.

SECTION AF103
RADON REDUCTION

AF103.1 General. This Section applies to *radon* control methods for buildings and structures within EPA *radon* zones 1 & 2, as defined in Section AF103.42. *Rough-Ins* or complete *Active Soil Depressurization (ASD)* systems shall be installed as necessary to reduce soil gas entry and vapor intrusion so as to establish indoor *radon* levels below the *National Radon Action Level (NRAL*).

AF103.2 Mitigation system required. A *mitigation system Rough-In* shall be installed in dwellings located in *radon* potential zones 1 and 2 in accordance with Section AF103.5. The *radon* potential zones shall be determined in accordance with Section AF103.42.

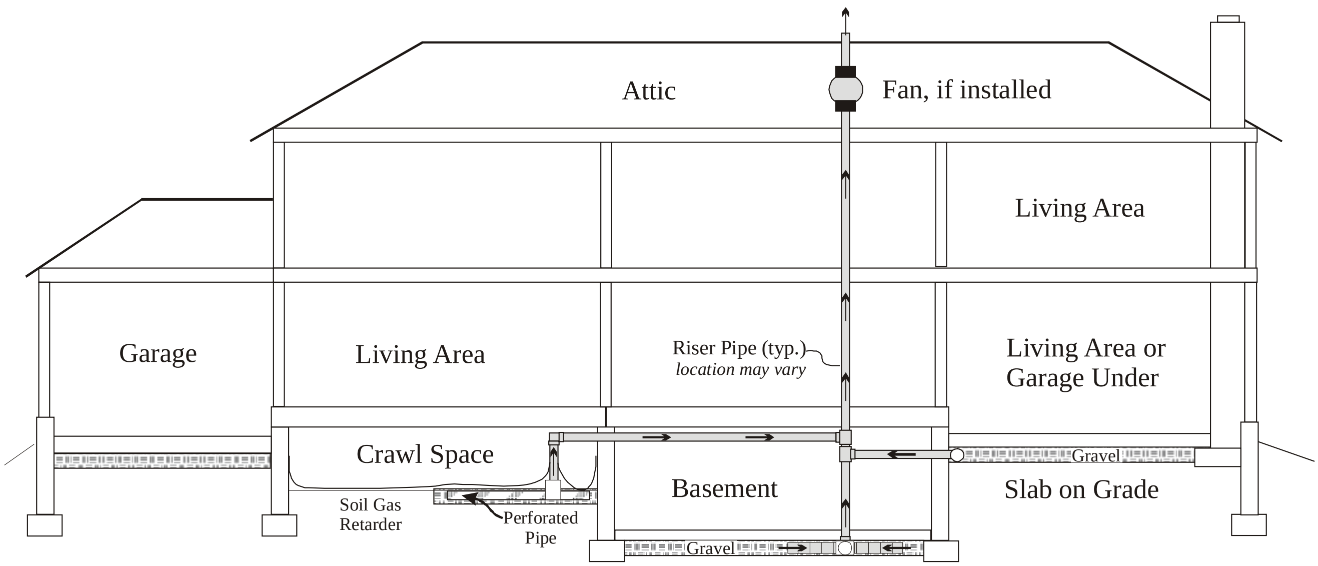
> **Exception:** Where the foundation system does not have any enclosed area of soil contact and where prior to occupancy, testing in accordance with Section AF103.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*).

AF103.3 Design. The design of *radon mitigation systems* shall comply with Section AF103 and for buildings having a total foundation area of greater than 2500 square feet [232 sq. m], shall be performed by a *mitigator* that is *certified* or *licensed* to design such systems. Designs of *radon mitigation systems* for foundation types other than those specified herein shall be performed by a *mitigator* that is *certified* or *licensed* to design such systems.

AF103.4 Foundation area. The foundation area shall be calculated from the inside perimeter dimensions of the foundation walls.

AF103.5 Mitigation system rough-in required. The *rough-in* installation of a *mitigation system* shall be required for all foundations and combination foundations types, including crawl space, basement, slab-on-grade and slab-on-grade garage located below a living area. The installation shall be in accordance with Sections AF103.6 through AF103.28. Figure AF103.5 illustrates the four foundation types.

FIGURE AF103.5
FOUNDATION TYPES



AF103.6 Soil gas collection plenums. Foundation areas shall be constructed so as to create sealed *soil gas collection plenums* in accordance with Sections AF103.7 through AF103.9.6.

AF103.7 Submembrane soil gas collection plenums in crawl spaces with earthen floors. For each *suction point*, a *soil gas collector* shall be installed in accordance with Sections AF103.7.1 through AF103.7.7 and Section AF103.9.

AF103.7.1 Soil gas collector. One *soil gas collector* for each *suction point* (AF103.7.2) shall be installed in accordance with Section AF103.7.1.1, AF103.7.1.2 or AF103.7.1.3.

AF103.7.1.1 Pipe soil gas collector. The *soil gas collector* shall consist of a perforated pipe with a nominal diameter of not less than 4 inches [102 mm]. The pipe shall be not less than 10 feet [3048 mm] in length. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section AF103.8.1.1.1 such that the pipe is completely surrounded by not less than 4 inches [102 mm] of aggregate.

AF103.7.1.1.2 Geotextile soil gas collector. The *soil gas collector* shall consist of a strip of geotextile drain matting not less than 10 feet [3048 mm] in length and having a cross sectional area of not less than 12 square inches [7742 sq. mm]. The strip of matting shall be placed on top of the soil or in a trench.

AF103.7.1.1.3 Gravel soil gas collector. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

AF103.7.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. *Suction points* shall be installed in accordance with Section AF103.7.2.1, AF103.7.2.2 or AF103.7.2.3, as applicable for the type of plenum installed.

AF103.7.2.1 Suction point for pipe soil gas collector. The *suction point* for a pipe *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The perforated pipe plenum shall be inserted into both of the horizontal openings of the pipe fitting or device. One opening of the fitting or device shall be oriented in a vertical “up” position. Alternatively, the sub-membrane area and the other foundation types shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section AF103.8.1.1.3 and served by one or more *suction points*.

AF103.7.2.2 Suction point for geotextile soil gas collector. The *suction point* for a geotextile *soil gas collector* shall consist of a pipe fitting or other device having not less three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be connected to the matting in a manner to facilitate airflow from the collector. One opening of the fitting or device shall be oriented in a vertical “up” position.

AF103.7.2.3 Suction point for gravel soil gas collector. The *suction point* for a gravel *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be provided with not less than 5 feet [1524 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Such perforated pipe shall provide not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe.

AF103.7.3 Suction points not permitted. *Suction points* shall not be permitted on sump lids

AF103.7.4 Fasten suction points. *Suction point* fittings and devices shall be fixed in place to prevent dislocation.

AF103.7.5 Seal top of the soil gas collection plenum. A *soil gas retarder* shall cover the top of the *soil gas collection plenum* and all exposed soil. The installation of the *soil gas retarder* shall be in accordance with Sections AF103.7.5.1 through AF103.7.5.4.

AF103.7.5.1 Sheeting. The *soil gas retarder* membrane shall comply withASTM E1745
Class A, B or C.

AF103.7.5.2 Seams. The seams between adjacent membrane sheets shall be overlapped not less than 12 inches [305 mm] and shall be sealed by one of the following methods:

1. A tape recommended by the membrane manufacturer.
2. Caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

AF103.7.5.3 Repairs. Tears or punctures in the membrane shall be sealed by one or more of the following methods:

1. A tape recommended by the membrane manufacturer.
2. An additional sheet of the membrane material that covers and overlaps the tear or puncture not less than 12 inches [305 mm] on all sides and that is sealed with a caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

AF103.7.5.4 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural supports or similar penetrations shall be sealed.

AF103.7.6 Seal sides of the soil gas collection plenum. The *soil gas retarder* membrane shall turn up onto foundation walls not less than 6 inches [152 mm] and shall be continuously sealed to the wall along the full perimeter with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

AF103.7.7 Membrane label required. *Soil gas retarder* membranes shall be marked in a conspicuous place with a label to identify that the membrane is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast with the color of the background on which the lettering is applied.

AF103.8.1 Subslab soil gas collection plenums for concrete floors. The floors of basement, concrete crawlspace and slab-on-grade foundation systems shall be provided with a *soil gas collection plenum* installed in accordance with Sections AF103.8.1.1 through AF103.9.6.

AF103.8.1.1 Soil gas collector. A *soil gas collector* shall be installed in accordance with Section AF103.8.1.1.1, AF103.8.1.1.2 or AF103.8.1.1.3.

AF103.8.1.1.1 Gravel. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified in accordance with ASTM C33.

AF103.8.1.1.2 Geotextile. A layer of geotextile drainage matting shall be placed over a uniform layer of either soil or sand. The geotextile drainage matting shall be designed to allow the lateral flow of *soil gases* to the system's *suction point* fitting. The *geotextile matting* shall have a cross-sectional area of not less than 12 square inches [7742 sq. mm] and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the foundation wall to the edge of the drainage matting. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

AF103.8.1.1.3 Pipe loop. A loop of not less than 4 inch [102 mm] diameter perforated pipe shall be placed along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the centerline of the pipe to the foundation walls. Such piping shall be placed in a trench backfilled with clean aggregate that complies with Section AF103.8.1.1.1 and surrounds the pipe on not less than 2 sides. The cross-sectional area of the aggregate and pipe *soil gas collector* shall be not less than 50 square inches [32,258 sq. mm]. The piping shall form a continuous loop and pipe sections shall be joined with a connector device or a method recommended by the manufacturer. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

AF103.8.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. Not less than one *suction point* shall be provided for each foundation type. Alternatively, each *soil gas collector* shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section AF103.8.3 and served by one or more *suction points*. *Suction points* shall be installed in accordance with Sections AF103.8.2.1, AF103.8.2.2 or AF103.8.2.3 as applicable for the type of *soil gas collector* installed.

AF103.8.2.1 Gravel layer soil gas collector. A *suction point* for a *gravel* type *soil gas collector* shall consist of a pipe fitting or other device having not less than two openings oriented so as to create multiple horizontal intake openings within the gravel layer. The horizontal openings shall be provided with not less than 5 feet [1534 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Such perforated pipe shall provide a not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

AF103.8.2.2 Geotextile layer soil gas collector. A *suction point* for a geotextile type *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two oriented so as to create multiple horizontal intake openings connected to the geotextile mat in a manner that maintains airflow capacity from the plenum. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

AF103.8.2.3 Pipe loop soil gas collector. A *suction point* for a *pipe loop* type collector shall consist of a pipe tee fitting or pipe saddle device installed in the loop piping. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

AF103.8.3 Multiple soil gas collection plenums. Where interior footings divide a *soil gas collector* into two or more areas, each such area shall be provided with the required *suction points* and joined with *mitigation system* piping in accordance with Section AF103.10. Alternatively, each area so created by the interior footings shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section AF103.8.1.1.3 and is served by not less than one *suction point*.

AF103.8.4 Suction points not permitted. *Suction points* shall not be permitted on sump lids.

AF103.8.5 Fasten suction points. *Suction point* fittings and piping shall be fastened in place to prevent dislocation during placement of the gas permeable layer, *soil gas retarder* and concrete.

AF103.8.6 Seal top of the soil gas plenum. The *soil gas collector* and all exposed soil shall be covered with a *soil gas retarder* installed in accordance with Section AF103.8.6.1.

AF103.8.6.1 Sheeting. Polyethylene sheeting not less than 6 *mils* [0.152 mm] thick, or cross-laminated polyethylene sheeting not less than 3 *mils* [0.076 mm] thick shall be installed on top of the *soil gas collector*, shall completely cover the area under the concrete floor and shall be sealed in accordance with Sections AF103.8.6.1.1 through AF103.8.6.1.3. Where sheet foam board insulation is installed on top of the *soil gas collector*, the polyethylene sheeting shall be installed below the foam board insulation.

AF103.8.6.1.1 Seams. Seams between adjacent polyethylene sheets shall be overlapped not less than 12 inches [305 mm] and sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

AF103.8.6.1.2 Repairs. Tears or punctures in the polyethylene sheeting shall be sealed or an additional sheet of polyethylene shall cover the tear or puncture with an overlap of not less than 12 inches [305 mm] on all sides. Such additional sheet shall be sealed and fixed in place to prevent displacement during slab casting.

AF103.8.6.1.3 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural posts and similar penetrations shall be sealed.

AF103.8.7 Concrete floors. The concrete floor shall be cast directly upon the *soil gas retarder,* or upon the sheet foam board insulation where it is installed on top of the *soil gas retarder*.

AF103.8.8 Penetrations. Penetrations through the concrete slab and *soil gas retarder* shall be sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

AF103.8.9 Block-outs. Where openings are cast or constructed in the concrete slab under plumbing fixtures, the openings shall be filled with expanding foam or a non-shrink grout or an approved equivalent method. Exposed openings shall be sealed with non-shrink grout or an approved equivalent method.

AF103.8.10 Seal sides of the soil gas collection plenum. The intersection of floors and foundation walls shall be sealed with a caulk complying with ASTM C920 class 25 or higher or an approved equivalent method. Sealing shall be performed in accordance with Section AF103.8.10.1, AF103.8.10.2 or AF103.8.10.3.

AF103.8.10.1 Seal floor to wall. The intersection of floors and foundation walls shall be sealed.

AF103.8.10.2 Seal soil gas retarder to footing or wall. Where foundation walls are solid concrete, the *soil gas retarder* shall be sealed to the footing or to the foundation wall.

AF103.8.10.3 Seal soil gas retarder to wall. Where foundation walls are masonry block, the *soil gas retarder* shall be sealed to the foundation wall.

AF103.9 General sealing of soil gas collection plenums. Sealing of potential *soil gas* pathways shall be in accordance with Sections AF103.9.1 through AF103.9.6.

AF103.9.1 Sumps in floors. Sumps in interior floors shall have a rigid lid that is sealed with a gasket or silicone caulk and mechanically fastened in a manner that facilitates removal for maintenance. Pipe and wiring penetrations through the lid shall be sealed. The intersection of the floor and sump basin shall be sealed with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

AF103.9.2 Hollow masonry unit walls. The top course of hollow block masonry walls shall be made of solid masonry units or shall be fully grouted. The top course under the full width of door and window openings shall be made of solid masonry units or the hollow masonry units shall be fully grouted. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be made of solid masonry units or the top course shall be fully grouted**.** Other penetrations through foundation walls shall be sealed**.**

AF103.9.3 Floor drains. Floor drains and condensate drains shall not allow *soil gas* entry.

AF103.9.4 Air ducts. Air ducts located below concrete slabs shall be sealed to prevent *radon* entry and constructed in accordance with Chapter 16.

AF103.9.5 Foundation drains. Gravity foundation drainage systems shall include a *check valve* or other mechanical means to isolate the *soil gas collection plenum* from any exterior drain piping. Access shall be provided for maintenance.

AF103.9.6 Access openings. Access openings in the floor provided for drain maintenance shall not allow *soil gas* entry.

AF103.10 Mitigation system piping. The *mitigation system* piping that extends from the *soil gas* plenum to the point of discharge shall be rigid, non-perforated pipe in accordance with Sections AF103.11 through AF103.19.

AF103.11 Pipe size. *Mitigation system* pipe shall be not less than 3 inch [76 mm] nominal inside diameter.

AF103.12 ABS piping. ABS pipe shall comply with ASTM D2661, F628 or F1488. The pipe wall thickness shall be Schedule 40.

AF103.13 PVC piping. PVC pipe shall comply with ASTM D2665, F891, or F1488. The pipe wall thickness shall be Schedule 40.

> **Exception:** Rigid, non-perforated PVC pipe complying with ASTM D2949 shall be an alternative to the material specified herein, where installed vertically within enclosed wall cavities.

AF103.14 Slope. Above ground piping shall have a slope of not less than 1/8 inch [3.2 mm] per foot [305 mm]. Piping shall slope downwards towards the *suction point*. Piping arrangements that allow water to collect shall be prohibited.

AF103.15 Joints. Plastic pipe joints shall be solvent welded in accordance with Sections AF103.15.1 and AF103.15.2. Where disassembly of piping is required such as for removal of a fan, the joints shall be made with flexible couplings complying with ASTM D5926 or ASTM C1173 or an approved equivalent method.

AF103.15.1 ABS plastic pipe joints. ABS plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2235.

AF103.15.2 PVC plastic pipe joints. The joint surfaces for PVC plastic pipe and fittings to be solvent welded shall be prepared with a primer conforming to ASTM F 656. PVC plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2564.

AF103.16 Support. Above ground piping shall be supported by the structure of the building using hangers or strapping designed for piping support. Supports for horizontal piping shall be installed at intervals not exceeding 4 feet [1219 mm] and supports for vertical piping shall be installed at intervals not exceeding 10 feet [3048 mm].

AF103.17 Protection against physical damage. Where pipes penetrate top or bottom plates of stud walls and the nearest edge of the hole is within 1 ½ inches [38 mm] of the face of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inches [1.463 mm] (No. 16 gage). Such plates shall cover the area of the pipe where the plate is bored, and shall extend not less than 2 inches [51 mm] above bottom plates and not less than 2 inches [51 mm] below top plates.

AF103.18 Insulation required. In spaces where *mitigation system* piping is subject to freezing temperatures and in spaces where the exterior of *mitigation system* piping is subject to the formation of condensation, such piping shall be provided with insulation having an external vapor barrier and an R-value of not less than 1.8.

AF103.19 Labels required (piping). *Mitigation system* piping shall be marked prior to the closing of wall cavities with not less than one label at each floor level and at intervals not greater than 10 feet [3048 mm] along the developed length of the piping. The label shall identify that the item is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that contrasts with the color of the background on which the lettering is applied.

AF103.20 Mitigation system termination. The discharge point of a *mitigation system* shall be to the outdoors and shall be directed vertically upward.

AF103.21 Elevation and vertical walls. The point of discharge of a *mitigation system* shall comply with all of the following:

1. It shall be not less than 1 foot [305 mm] above the roof at the point penetrated.
2. It shall be not less than 10 feet [3048 mm] above grade nearest the point of discharge.
3. It shall be not less than 10 feet [3048 mm] horizontally from a vertical wall that extends above the roof penetrated.

AF103.22 Windows and doors. The discharge point of a *mitigation system* shall be not less than 2 feet [610 mm] above or not less than 10 feet [3048 mm] from windows, doors or other gravity intake openings into the structure or an adjacent structure excluding attic ventilation openings. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

AF103.23 Equipment air intake. The discharge point of a *mitigation system* shall be not less than 3 feet [914 mm] above or 10 feet [3048 mm] away from mechanical air intake openings such, but not limited to, those for evaporative coolers, make-up air, and heat energy recovery ventilators. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

AF103.24 Provision for Active Soil Depressurization (ASD) fan. A space having a vertical height of not less than 48 inches [1219 mm] and a diameter of not less than 21 inches [533 mm] shall be provided in the area where a required *ASD fan* will be installed. The space provided for the *ASD fan* shall be located in accordance with AF103.35. The *ASD* pipe shall be centered in this space.

AF103.25 Electrical. A receptacle outlet supplied by branch circuit conductors shall be located within 6 feet [1.8 m] of an interior *ASD fan* location

AF103.25.1 Label. The over-current device for the branch circuit supplying *ASD fans* shall be labeled to indicate that it supplies the *radon* fan.

AF103.25.2 Disconnect required. Where the fan is not cord and plug connected, a means of electrical disconnect shall be provided for and in sight of the *ASD fan*. The electrical disconnect shall be labeled to indicate its purpose.

AF103.26 Fan access. Limited *access* shall be provided for each *ASD fan* location to allow installation of *ASD fans* and replacement of same. *Access* entry shall be located not more than 20 feet [6096 mm] from the *ASD fan* location.

AF103.27 Radon test kit required. Not less than one long term *radon*-in-air test kit from a *certified* or *licensed* laboratory shall be provided for the occupants of each dwelling unit.

AF103.28 Completion of ASD system. Prior to occupancy, the *ASD* system shall be completed and activated in accordance with Sections AF103.30 through AF103.41.

> **Exception:** Where prior to occupancy, testing in accordance with Section AF103.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*) and the *Rough-In* piping is labeled in accordance with Section AF103.29.

AF103.29 Labels required, system *Rough-In*. *Mitigation system* piping shall be marked with not less than one label in a conspicuous location. An additional label shall be placed on or within 12 inches [305 mm] of the electrical service panel. The labels shall state the following: **"**This radon system is nonfunctional because the system has NOT been activated with a radon fan. The building should be tested for radon at least every 2 years or as recommended by the state or USEPA." The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color that contrasts with the color of the background on which the lettering is applied.

AF103.30 Fan selection. Fans installed in the *ASD* system shall be recommended by the manufacturer for *radon* mitigation. Such fans shall be designed and sealed by the manufacturer to minimize leakage of water or *soil gas* from the fan housing and shall be sized in accordance with Table AF103.33 or as specified by a *certified* or *licensed radon mitigator*.

TABLE AF103.30
FAN SIZING

PIPE SIZE Nominal (I.D.)	TOTAL FOUNDATION AREA		
	Less Than 1600 sq. feet	**1600 to 2500 sq. feet**	**Greater than 2500 sq. feet**
	Less Than 149 sq. meters	**149 to 232 sq. meters**	**Greater than 232 sq. meters**
(3 inch) [76 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF2** RF2 Minimum rating:[a] 75 cfm @ 1.0 in. WC [127m^3/hr @ 250 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*
(4 inch) [102 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*

a. Radon Fan Types RF1 & RF2 minimum flow and pressure ratings are manufacturer specifications.

AF103.31 Orientation. *ASD* inline fans shall be installed only on vertical *ASD* piping.

AF103.32 Installation. *ASD fans* shall be installed in accordance with the manufacturer's instructions.

AF103.33 Flexible connectors required. *ASD fans* shall be connected to the *ASD* piping using flexible unshielded couplings complying with ASTM D5926 or ASTM C1173 or an equivalent method. Connections shall be air and water-tight.

AF103.34 Fan start-up. *ASD fans* shall be electrically energized upon installation on the *ASD* system piping.

AF103.35 Fan location. *ASD fans* shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. *ASD fans* shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in any basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. *ASD fans* shall not be mounted in any location where pipe that is positively pressurized by the fan is located inside of conditioned or occupiable space.

AF103.36 System monitor required. Each *ASD* system shall be provided with a system negative pressure monitor such as, but not limited to, a manometer type pressure gauge to indicate system operation. The system monitor shall be located indoors in an area where the monitor is readily observable by the occupants.

AF103.37 Startup marking. *ASD* system monitors shall be clearly marked to indicate the pressure that existed when the system was initially activated. The monitor device shall have a durable label on or in close proximity to it that describes how to interpret the monitor and what to do if the monitor indicates that system performance has degraded.

AF103.38 Automatic reset. Pressure activated electrical *ASD* system monitors, whether visual or audible, shall be supplied by un-switched electrical branch circuits and shall be designed to reset automatically when power is restored after power supply failure. Battery operated monitoring devices shall not be used except where they are equipped with a low power warning feature.

AF103.39 Labels required (system and sump). System description labels made of durable material shall be placed on or within 12 inches [30 cm] of the electric service panel and also on the *ASD* system or other prominent location. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that contrasts with the color of the background on which the lettering is applied. The label shall state the following: "Radon Reduction System;" the installer's name, phone number, and applicable certification identification; date of installation, an advisory stating that the building should be tested for *radon* at least every 2 years or as required or recommended by state or federal agencies. and shall include notice of additional *radon* resources at www.epa.gov/radon and the *radon* hotline 1-800-SOS-RADON (767-7236).

AF103.39.1 Label sump basins. Sump basin covers shall be identified with a durable label that reads as follows: "Component of a Radon Reduction System. Do not tamper with or disconnect." or equivalent wording. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that contrasts with the color of the background on which the lettering is applied.

AF103.40 Documentation package. The occupants of the dwelling shall be provided with a documentation package that includes the following:

1. A description of system operation, such as shown in Exhibit 1 "Understanding a Radon Reduction System".
2. All *radon* test data for the property.
3. The annual energy consumption of the installed *ASD fan*(s), whether estimated or actual, and the projected monetary cost of such energy.

AF103.41 Radon testing prior to occupancy. A *radon* test shall be performed prior to occupancy by a *certified* or *licensed* measurement professional. Testing shall be performed in accordance with applicable state protocols or requirements; or if there are no state protocols or requirements, with accepted Federal protocols or "Protocols for Radon Measurements in Homes", AARST Consortium on National Radon Standards. Where testing results are greater than the *NRAL*, a *certified* or *licensed mitigator* shall be required to perform *diagnostic tests* and remediation action. Further *radon* testing shall be required until *radon* concentrations below the *NRAL* are achieved.

AF103.42 EPA established zones. The *radon* potential of a building site shall be estimated from Figure AF103.42 or from Table AF103.42. Where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure AF103.42 and Table AF103.42.

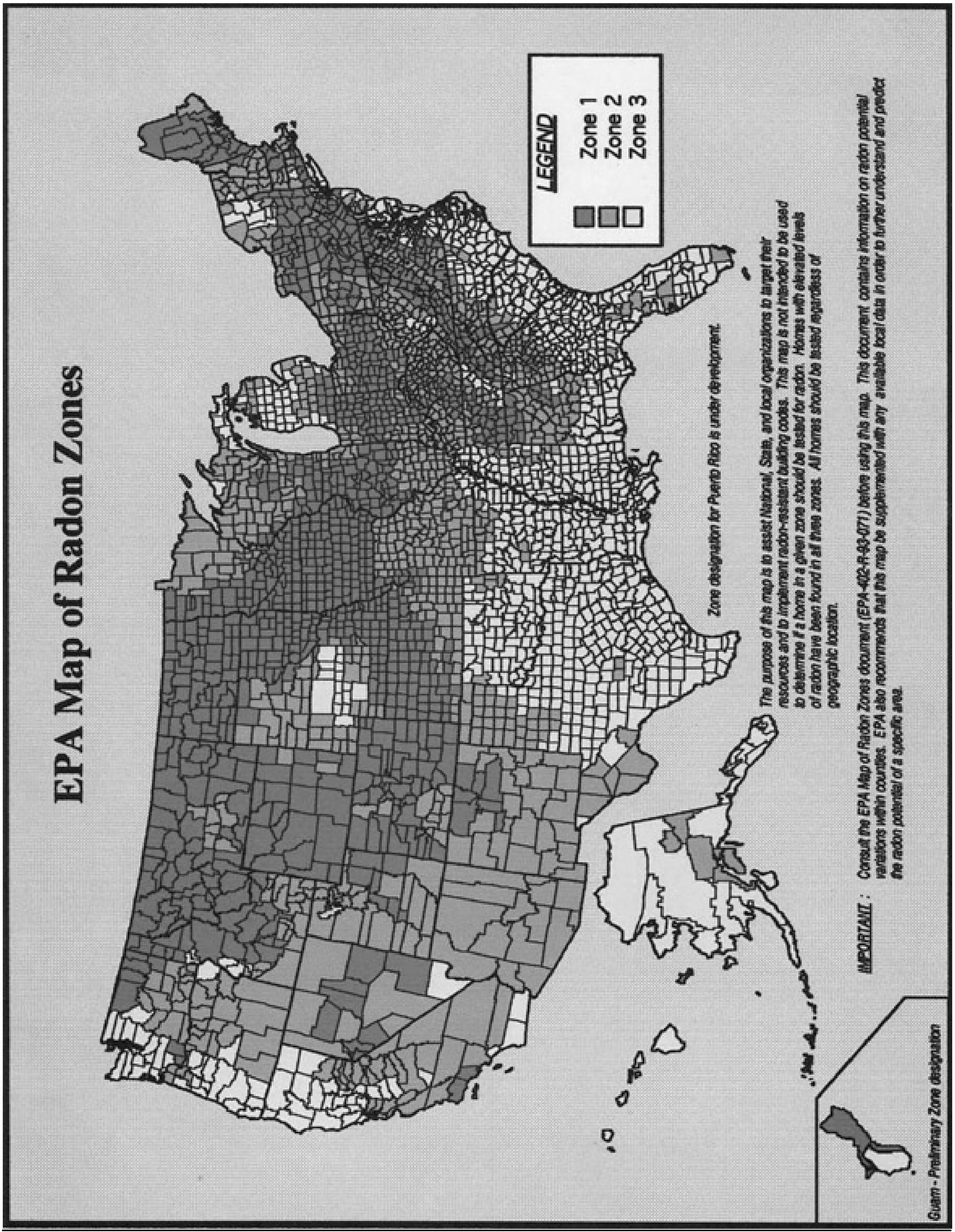


FIGURE AF103.42
RADON POTENTIAL ZONES MAP

TABLE AF103.42 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage
Municipality
Dillingham
Census Area
Fairbanks
North Star
Borough
Kenai Peninsula
Borough
Matanuska-
Susitna
Borough
Southeast
Fairbanks
Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independence
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San Bernardino
San Francisco
San Luis Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London
Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None-----

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary
Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattamie
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington
Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry
Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorency
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the
Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon
Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York
Zone 2
Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2
Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1
Carroll

Zone 2
Belknap
Cheshire

Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1
Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2
Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2
Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union
Valencia

New York

Zone 1
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2
Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga
Zone 2
Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1
Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1
Adams
Allen
Ashland
Auglaize
Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2

Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry
Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe

Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince Edward
Prince William
Rappahannock
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield
Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealeau
Vilas
Washburn
Waushara
Winnebago

Wyoming

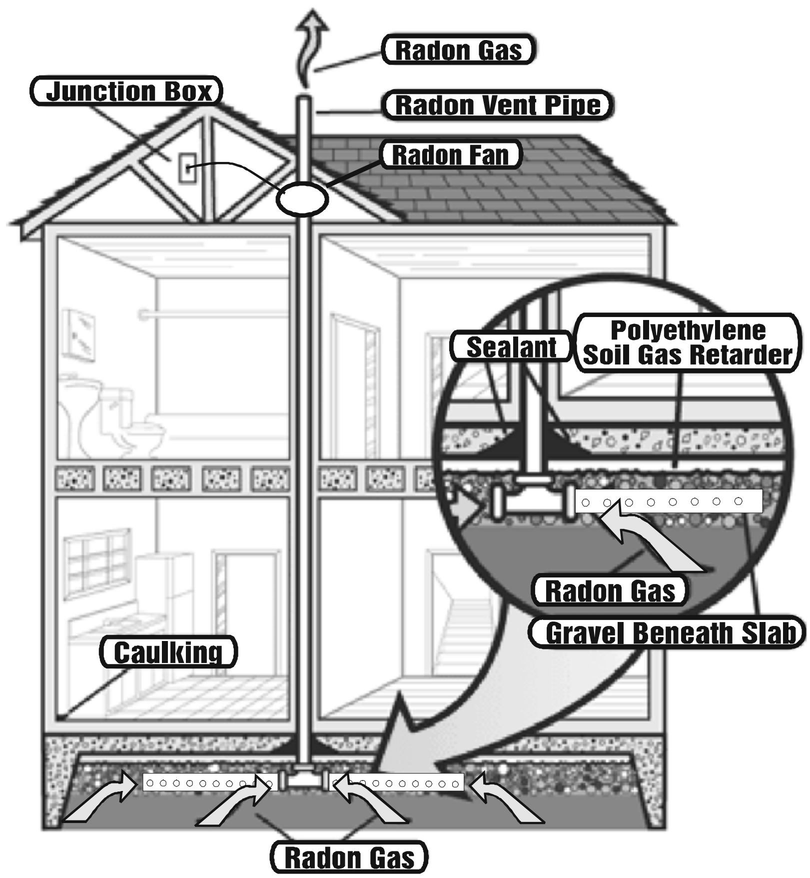
Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

AF103.43: Exhibit 1 - Understanding a Radon Reduction System (Occupants)

General: *Radon* is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock and water and gets into the air you breathe. The *radon* potential of any specific building lot is dependent on whether there is sufficient *radon* source material in the ground below the home and sufficient upward air movement for the *radon* to be near your home's foundation. *Radon* typically moves up through the ground to the air above and into your home through gaps and other holes in the foundation. The primary health concern associated with *radon* is lung cancer. The Environmental Protection Agency (EPA) estimates that 21,000 people die in the US each year from *radon*-induced lung cancer.

Radon Reduction System: Your new home was constructed with an *Active Subslab Depressurization* (*ASD*) System to protect your family's health. The *ASD* system is designed to limit *radon* entry into your home by keeping the soil under your home at a lower pressure than the air in your home. In doing so, *radon* and other *soil gases* from below your home are exhausted above your roof through a specially designed *radon* fan. An *ASD* system is recognized by the EPA as the Best Available Technology for *radon* control because it keeps much of the *radon* from entering your home. The system is designed to run 24 hours a day, 7 days a week. The electrical power required to run the fan, which is the only active component in the system, will typically cost 5 to 25 cents per day depending upon the type of fan and your electrical utility rates. Cost to operate this fan would be less than operating a normal light bulb.



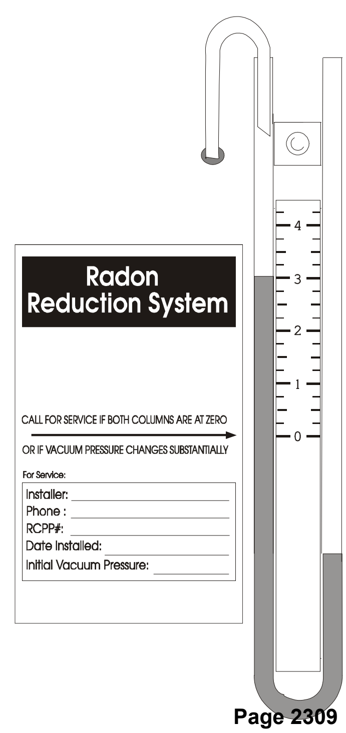
System Maintenance: Your *ASD* System is designed to provide many years of service under normal conditions without significant maintenance. As the occupant of this home, you need to routinely check the system pressure gauge or other system monitor to verify that the fan is operating correctly. There are various labeled components of your *radon* system such as pipe, crawlspace membrane, fan, system pressure monitor and sump basin. DO NOT ALTER OR DISCONNECT any of these components. If the sump basin is opened for required maintenance or repair, restore to the original condition immediately after completing work. You also need to be aware that foundation settling, renovations or additions to your home can change your indoor *radon* concentrations. A *certified/licensed radon mitigator* can provide guidance when changes are to be made to the *dwelling* or provide a routine check-up on the operation of the system.

Understanding the System Pressure Gauge: The pressure gauge shown on the right is typical of a gauge used to monitor the pressure developed in the piping system by the *radon* fan. Your fan pressure should be checked regularly to ensure the fan system continues to operate properly. This gauge measures pressure in Inches Water Column (in. WC). This gauge does NOT measure *radon*.

Call for service if the measure changes substantially (20% or more) or if the gauge reads zero pressure (both columns equal).

Your *ASD* system may have an audible alarm to alert you to call for service in the event of a problem.

Radon Testing: Your builder left behind a long term test kit for you to use to test your home after you move in. The way you and your family live in your new home, how you set heating and cooling controls or use your clothes dryer and other exhaust fans can affect indoor *radon* levels. It is recommended that you test for a minimum of 3 months or preferably longer to determine your actual *radon* exposure in the home. Be sure to check the warranty your builder provides to make certain you complete your testing before the end of the new home warranty period.
Follow the instructions provided by the test laboratory to open, activate and place the test kit to test your *radon* levels.



The USEPA recommends that you retest your home at least every 2 years or if major renovations or additions are made to the *dwelling*.

Other sources of radon: *Radon* can also be found in the water from private wells. Testing can determine if your well contains significant amounts of *radon*.

More Info: For more information on *radon*, *radon* testing or *radon* removal: **www.epa.gov/radon**

NOTE: Exhibit 1 may be reprinted without license.

Add to Chapter 3 Bibliography as follows:

ASTM D5926-11 – "Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems "
ASTM E1745-11 – "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

Commenter's Reason: 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1 & 2. More than 2 million homes being constructed in the US with elevated indoor radon concentrations in the past 25 years. Voluntary adoption of this Appendix can reduce the risk of radon exposure and prevent lung cancer.

The existing Appendix F of the IRC (Radon Control Methods) is inadequate and 20 years old. The proposal presented herein was developed as an ANSI consensus standard by the AARST Radon Standards Consortium. This standard, AARST/ANSI #CCAH-2013 *"Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses,"* was produced by a committee of (27) representing radon professionals, home inspectors, home builders, architects, code officials, consumer advocates and state and federal government.

The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code that address this important life/safety issue.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9

NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

Cost Impact: This change proposal will slightly increase the cost of construction where adopted. Most homes can be built with only a mitigation system Rough-In. If the home tests high for elevated radon then the system can be upgraded with a fan to reduce the indoor radon levels.

Cost of mitigation system Rough-In (passive) =$296*

Cost of fan driven mitigation system = $707* (total cost, not in addition to $296)

Source: Annual Builder Practices Report 2011, NAHB Research Center, Inc.

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

RB462-13

Final Action: AS AM AMPC____ D

RB465-13
Appendix G, R324 (New), R324.1 (New)

Proposed Change as Submitted

Proponent: Kris Bridges, CBO, Chair, ICC Swimming Pool Code Drafting Committee (SPCDC)

Delete Appendix G in its entirety:

~~APPENDIX G~~
~~SWIMMING POOLS, SPAS AND HOT TUBS~~

Add new Section and new text as follows:

SECTION R324
SWIMMING POOLS, SPAS AND HOT TUBS

R324.1 General. The design and construction of aquatic vessels shall comply with the *International Swimming Pool and Spa Code*.

Reason: The drafting of the *International Swimming Pool and Spa Code* (ISPSC) started in October/2010 by the Swimming Pool Code Drafting Committee (SPCDC) which was established by the ICC Board of Directors, with the Association of Pool & Spa Professionals (APSP) as a Cooperating Sponsor. The SPCDC was a broad based committee representing a balance of interests composed of 15 individuals from public, private and nonprofit sectors with expertise in disciplines critical to the topics in the *International Swimming Pool and Spa Code*. The SPCDC was supported by four Work Groups composed of numerous interested parties and stakeholders.
The intent was to develop a comprehensive set of regulations for swimming pools and spas consistent and coordinated with the I-Codes. Technical content was developed from provisions from the International Codes and the applicable APSP standards. The APSP standards considered were:

- ANSI-1 2003 Public Swimming Pools
- ANSI-2 1999 Public Spas
- ANSI-3 1999 Permanent Residential Spas
- ANSI-4 2007 Aboveground/On-ground Residential Swimming Pools
- ANSI-5 2003 Residential In-ground Swimming Pools
- ANSI-6 1999 Portal Spas
- ANSI-7 2006 Suction Entrapment Avoidance
- ANSI-8 2005 Model Barrier Code
- ANSI-9 2005 Aquatic Recreational Facilities
- ANSI-11 2009 Standard for water quality in public swimming pools and spas

The SPCDC and its Work Groups comprehensively reviewed the requirements in the existing 2009 International Codes and the standards noted above in an effort to draft comprehensive language for pool and spa safety while at the same time making sure the language resulted in adoptable and enforceable I-Code language.
The SPCDC held three face-to-face drafting meetings and there were weekly work group conference calls. The drafting effort of the SBCDC culminated in Public Version 1.0 (PV 1.0) which was completed in February/2011.
Public Version 1.0 was then subjected to a full cycle of ICC Code Development in 2011 as follows:

- PV 1.0 posted for code change submittals on February 1, 2011
- 100 code changes were submitted
- The ISPSC code committee comprised of both SBCDC members and new members acted on the code changes at the 2011 Code Development Hearings held May 16, 2011 in Dallas.
- Public comments were submitted on 22 of the code changes and were acted on by the ICC membership at the 2011 Final Action Hearings held October 31, 2011 in Phoenix
- The 2012 International Swimming Pool and Spa Code is published.

The ISPSC uses the term “aquatic vessels” to cover all types of vessels including pools, water parks, spas and hot tubs. This proposal is limited to the use and application of vessels under the IRC, including pools, spas and hot tubs. The ISPSC provisions comprehensively address all aspects of such vessels including;

- Administration and Definitions

- Construction features for pools including size and depth, wall and floor construction, and calculation of bather occupant load
- Safety features such as barriers to pool entry, depth markers and throwing ropes
- Mechanical, plumbing and electrical provisions
- Equipment such as suction entrapment avoidance, circulation, filters, pumps and motors, skimmers, heaters, return and suction fittings
- Appurtenances such as ladders and diving equipment

The ISPSC covers both residential and public aquatic vessels. A similar proposal was submitted to Section 3109 of the IBC in Group A 2012 (G193 Part I). The committee action was AM. The final action was D.

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

APPENDIX G-RB-BRIDGES.doc

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: This change is appropriate and provides a pointer to the ISPSC. The proponent should work with the opponents to resolve the questions about the pool deck interface and bring back a public comment.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment 1:

Matt Archer, City of Lone Tree, representing Colorado Chapter ICC, requests Disapproval.

Commenter's Reason: This proposal broke the most cardinal rule of the IRC, everything you need to build a house is in one book. If the SPCDC wants these requirements in the IRC they should include them individually, not by reference.
Second, this proposal moved an appendix which talks about flood ways and barriers to the body of the code and THEN replaced it with a whole host of new requirements:

Additional administration section
Mechanical, plumbing and electrical provisions
Ladders and diving equipment
Pool construction
Calculation of occupant loads
Throwing ropes
New decking requirements
And on and on….

This change went too far too fast without proper vetting of all the details the SPCDC wanted to add to the IRC.

Public Comment 2:

Glenn Mathewson, MCP, City of Westminster, Colorado, representing North American Deck and Railing Association, requests Disapproval.

Commenter's Reason: Eliminating Appendix G and referencing the Swimming Pool and Spa Code will have negative affects on code administration and the decking industry.

Eliminates the option of separately adopting pool and spa provisions in the appendix from general residential construction provisions in the body of the IRC:

Unlike other common construction features throughout the IRC, swimming pools and spas are specialized, and they're only installed in a limited percentage of homes in many regions of the county. Locally, there can be some controversy over the building code regulating prefabricated and kit pools and spas, as in a consumer protection agenda. Many jurisdictions do not wish to regulate the filling of a 30-inch deep flexible plastic pool with an inflatable ring. If they did, they'd likely only look at the security barrier…the one that can be adopted by choice with Appendix G and found conveniently in the IRC. Maintaining pool and spa provisions in the appendix chapter allows more flexibility in governmental code adoption.

Makes the security barrier provisions most referenced by local code administrators and general contractors much more inaccessible:

Including excerpts from specialized standards within the appendix makes those standards accessible and affordable for widespread use and application. For the average code administrator, they are not capable of enforcing fine details of swimming pool and spa construction, either from a lack of knowledge or lack of resources. Specialized pool contractors and spa manufacturers stay on top of these standards. Where the appendix is adopted, code administrators are able to easily access the information these contractors are not generally knowledgeable in, such as the security barrier. Removing the security barrier provisions from the IRC forces administrators to reference and purchase an additional document, the ISPSC, thus raising the cost to maintain access to provisions they once possessed.

Expanded subject matter in the ISPSC, beyond the standards currently referenced in Appendix G, was not fully vetted by industry and will blindside local jurisdictions and contractors with regulation they were not prepared for or agreeable to:

The ISPSC section 306 provides very specific provisions for wood and composite decks adjacent to pools and spas. These new provisions are not common practice in either the deck industry or code administration. By replacing the provisions and references within Appendix G with a blanket reference to the ISPSC, considerably controversial provisions NOT accepted by or developed with the decking industry, will be newly required. A 15 minute video explaining these provisions is available at www.deckcodes.com. These brand new provisions for decking around pools and hot tubs should not become a reference from the IRC without further industry wide knowledge, contribution and approval. The reference to the pool and spa code is not an even swap with Appendix G. The ISPSC is brand new and is not widely adopted across the nation. This code should be fully vetted and proven successful as a standard before becoming tied to the IRC.

With a disapproval vote, code adoption and enforcement can be flexible to the needs of each jurisdiction. The following are examples of such variety:

1. A jurisdiction **does not** want to regulate pools and spas at the local level: They choose not to adopt Appendix G. Installers and manufacturers are still expected to follow Federal regulations and standards.
2. A jurisdiction **does** want to regulate pools and spas at the local level, and they intend to inspect security barriers: They choose to adopt appendix G. They get easy access to security barrier provisions and the installers and manufacturers are still expected to follow the requirements in the referenced standards and any Federal regulations.
3. A jurisdiction **does** want to regulate pools and spas at the local level and wishes to be very knowledgeable on the subject. They like having lots of codebooks on their shelves and in their budget. They choose not to adopt appendix G but they do adopt the ISPSC and purchase the reference to the security barrier and other information. Prior to adoption of the ISPSC, they will likely review it. At that time, they may decide they do not agree with the heavy-handed provisions for composite and wood decks around pools and hot tubs.

This commenter encourages the proponent of this proposal to consider a future proposal where architectural and general provisions from the ISPSC that are most likely to be administered at the local level are referenced in Appendix G. Perhaps similar to how the IFGC provisions are referenced in brackets.

RB465-13

Final Action: AS AM AMPC____ D

RB467-13
Appendix J

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

AJ102.4 Replacement windows and replacement safety glazing. Regardless of the category of work, when an existing window, including the sash and glazed portion, or safety glazing is replaced, the replacement window or safety glazing shall comply with the following requirements as applicable: ~~of Chapter 11.~~

AJ102.4.1 Energy efficiency. Replacement windows shall comply with the requirements of Chapter 11.

AJ102.4.2 Safety glazing. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.

AJ102.4.3 Emergency escape and rescue openings. Where windows are required to provide *emergency escape and rescue openings*, replacement windows shall be exempt from the maximum sill height requirements of Sections R310.1 and the requirements of Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement window is not part of a change of occupancy.
3. Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings.*

AJ102.4.4 Window control devices. Where window fall prevention devices complying with ASTM F2090 are not provided, window opening control devices complying with ASTM F 2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. The top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and,
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit.

~~**AJ301.3 Safety glazing.** Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.1.~~

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "Child Window Safety". The scope of the activity is noted as:

To evaluate the necessity of developing code proposals for the inclusion of requirements dealing with the conditions, circumstances and devices for window safety which could reduce the number of falls by children to surfaces below.

The purpose of this proposal is to coordinate the existing building provisions of the IRC with the changes approved to the IBC/IEBC in the 2012 Group A cycle. Code changes G225-12 and G227-12 were approved as modified by public comment to revise Section 3407 of the IBC (IEBC Section 406 – see below). In addition, Code change G201-12 last cycle removed the existing building provisions from Chapter 34 of the IBC in favor of a reference to the IEBC. This action was subsequently affirmed by the ICC Board as this was a code change related to I-Code scoping.

The format/terminology of Appendix J in the IRC is a bit different than the approach in the IEBC. However, Section AJ102 stipulates that the provisions of the section are applicable to all categories of work. It is for this reason that the provisions have been comprehensively located in AJ102 versus the sections that deal with the different categories of work (ie repairs in AJ301; renovations in AJ401; and alterations in AJ501.

For reference, the approved IEBC text is as follows:

IEBC SECTION 406
GLASS REPLACEMENT AND REPLACEMENT WINDOWS

406.1 Replacement glass. *The installation or replacement of glass shall be as required for new installations.*

406.2 Replacement Window Opening Control Devices. *In Group R-2 or R-3 buildings containing dwelling units, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:*

1. *The window is operable;*
2. *The window replacement includes replacement of the sash and the frame;*
3. *The top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor;*
4. *The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and*
5. *The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).*

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1029.2.

Exceptions:

1. *Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.*
2. *Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.*

406.3 Replacement Window Emergency Escape and Rescue Openings. *Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 provided the replacement window meets the following conditions:*

1. *The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.*
2. *The replacement of the window is not part of a change of occupancy.*

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG’s are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG’s held over 70 conference calls in 2012.

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

AJ102.4-RB-BALDASSARRA-CTC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. The proponent should bring back a public comment to address the committee's concern about the largest standard window size.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

J. William Degnan, President, representing National Association of State Fire Marshals, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**AJ102.4.3 Emergency escape and rescue openings**. Where windows are required to provide *emergency escape and rescue openings*, replacement windows shall be exempt from the maximum sill height requirements of Sections R310.1 and the requirements of Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 provided the replacement window meets the following conditions:~~

1. ~~The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.~~
2. ~~The replacement window is not part of a change of occupancy.~~
3. ~~Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings.*~~

(Renumber subsequent sections)

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The purpose of this Comment is to delete the Exceptions for increases to maximum sill heights for replacement windows. It is also intended to retain the requirements for maximum sill heights for emergency escape openings as currently stated in other Code provisions.

The sill heights for openings utilized as emergency escape for occupants of residential spaces, as well as for emergency access by first responders, play a critical role in the emergency escape from fires. As stated, AJ 102.4.3 would provide no restriction for the sill heights for replacement windows along emergency escape routes from dwelling units. Even though a size criteria remains, access to the opening by occupants remains a primary consideration for the overall intended use of the escape opening, by both building occupants seeking escape from the fire and for fire service personnel seeking escape from untenable conditions. In addition, the lack of restriction of sill heights could present further restriction of fire department rescue operations from both inside and outside of the dwelling unit.

It is understood that the proponent was directed to address issues concerning the largest standard window size. It is the intent of this Comment that the maximum sill height issue also be considered in the overall approach to the use of these openings for both emergency escape and rescue.

RB467-13

Final Action: AS AM AMPC____ D