

Source: City Manager *bb*

Agenda Item No: Supplemental  
Information  
B243-13

To: City Council  
From: City Manager and Staff *MM*

Council Meeting Date: Sep 16, 2013

Re: EEC recommendations for radon requirements for residential building codes- Supplemental information for Council Bill B243-13

**EXECUTIVE SUMMARY:**

The Environment and Energy Commission (EEC) reviewed data concerning the prevalence of radon in Columbia and Boone County homes. The commission recommend that all new residential homes be required to have a passive radon mitigation system according to Appendix F of the International Residential Building Code.

**DISCUSSION:**

The EEC has reviewed data concerning the prevalence of radon in Columbia and Boone County homes. Radon is a major cause of lung cancer, and high radon levels can cause this disease. New homes with tighter construction may have increased radon levels. A quarter of Columbia homes exceed the EPA action level of 4 pCu/L of radon. Because it is more expensive to retrofit a home with an active radon mitigation system once constructed, the EEC recommends passive radon mitigation systems be required in all new home construction. Estimates obtained by the EEC show such a system to be relatively inexpensive to install in a new home. The EEC voted on November 27, 2012 to recommend that all new Columbia homes be required to have a passive Radon mitigation system according to Appendix F of the International Residential Building Code. The system could be upgraded to an active one if necessary.

**FISCAL IMPACT:**

None

**VISION IMPACT:**

<http://www.gocolumbiamo.com/Council/Meetings/visionimpact.php>

**SUGGESTED COUNCIL ACTIONS:**

The EEC requests that Council make a motion and vote to require all new residential homes have a passive radon mitigation system installed in accordance with the International Residential Building Code Appendix F.

| <b>FISCAL and VISION NOTES:</b>                   |        |   |  |   |  |
|---|--------|---|--|---|--|
| <b>City Fiscal Impact</b><br>Enter all that apply |        | <b>Program Impact</b>                             |  | <b>Mandates</b>                               |  |
| City's current net FY cost                        | \$0.00 | New Program/ Agency?                              |  | Federal or State mandated?                    |  |
| Amount of funds already appropriated              | \$0.00 | Duplicates/Expands an existing program?           |  | <b>Vision Implementation impact</b>           |  |
| Amount of budget amendment needed                 | \$0.00 | Fiscal Impact on any local political subdivision? |  | Enter all that apply:<br>Refer to Web site    |  |
| Estimated 2 year net costs:                       |        | <b>Resources Required</b>                         |  | Vision Impact?                                |  |
| One Time  | \$0.00 | Requires add'l FTE Personnel?                     |  | Primary Vision, Strategy and/or Goal Item #   |  |
| Operating/ Ongoing                                | \$0.00 | Requires add'l facilities?                        |  | Secondary Vision, Strategy and/or Goal Item # |  |
|   |        | Requires add'l capital equipment?                 |  | Fiscal year implementation Task #             |  |

# *ENVIRONMENT AND ENERGY COMMISSION*

*CITY OF COLUMBIA / BOONE COUNTY, MISSOURI*

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Tuesday, January 22, 2013

Mr. Mayor and Council Members,

The Environment & Energy Commission has reviewed data concerning the prevalence of radon in Columbia and Boone County homes.

Radon is a major cause of lung cancer, and high radon levels can cause this disease. It is possible to install equipment that reduces Radon levels. New homes with tighter construction may have increased Radon levels.

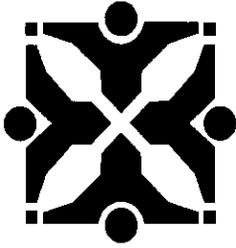
A quarter of Columbia homes exceed the EPA action level of 4 pCu/L of radon. It is more expensive to retrofit a home with an active Radon mitigation system once it is constructed. However, this feature can be built into the house at low cost.

Since it is relatively inexpensive to install a so-called "passive" radon mitigation system in a new home, and it is then inexpensive to upgrade the system to an active one if the radon levels are high, the EEC has voted on November 27, 2012 to recommend that all new Columbia homes be required to have a passive Radon mitigation system, that can be upgraded to an active one if necessary.

Respectfully submitted,

Karl Skala,  
Environment and Energy Commission, Chair

*(cc: Columbia City Clerk & Boone County Commission)*



Source: City Manager *MM*

Agenda Item No: Supplemental  
Information

To: **City Council**  
From: **City Manager and Staff** *MM*

Council Meeting Date: Sep 16, 2013

Re: EEC recommendations for residential building codes corrected letter- Supplemental information for Council

**EXECUTIVE SUMMARY:**

An incorrect letter from the Environment and Energy Commission was mistakenly introduced at the September 3, 2013 City Council meeting. The introduced letter was submitted as supplemental information for Agenda items B239-13 through B246-13. The corrected letter, dated April 17, 2013 is attached here as supplemental information.

**DISCUSSION:**

The Environment and Energy Commission (EEC) was requested by City Council to review changes to the building code in regards to energy efficiency. The commission originally submitted their recommendations to City staff in a letter dated January 17, 2013. Upon further review of their recommendations, the EEC re-submitted their letter to staff and City Council on April 17, 2013. The January 17, 2013 letter to staff was mistakenly submitted as supplemental information to Agenda items B239-13 through B246-13 at the September 3, 2013 City Council meeting.

The recommendations from the April 17, 2013 letter are the recommendations Council heard at their June 17 pre-Council meeting. Those recommendations are to adopt the 2012 energy code as written or accept the three compromises as recommended by the EEC. Those compromises are:

1. The amount of attic insulation
2. The amount of wall insulation
3. Perimeter foundation insulation

Staff apologizes for the confusion and have attached the correct letter, which has been seen by the City Council before, for clarification.

**FISCAL IMPACT:**

None

**VISION IMPACT:**

<http://www.gocolumbiamo.com/Council/Meetings/visionimpact.php>

By adopting the 2012 energy code, newer homes will be more energy efficient

**SUGGESTED COUNCIL ACTIONS:**

**The Environment and Energy Commission requests that Council amend the proposed changes to building codes with the recommendations from the EEC.**

| <b>FISCAL and VISION NOTES:</b>                   |        |   |  |   |            |
|---|--------|---|--|---|------------|
| <b>City Fiscal Impact</b><br>Enter all that apply |        | <b>Program Impact</b>                             |  | <b>Mandates</b>                               |            |
| City's current net FY cost                        | \$0.00 | New Program/ Agency?                              |  | Federal or State mandated?                    |            |
| Amount of funds already appropriated              | \$0.00 | Duplicates/Expands an existing program?           |  | <b>Vision Implementation impact</b>           |            |
| Amount of budget amendment needed                 | \$0.00 | Fiscal Impact on any local political subdivision? |  | Enter all that apply:<br>Refer to Web site    |            |
| Estimated 2 year net costs:                       |        | <b>Resources Required</b>                         |  | Vision Impact?                                | Choose One |
| One Time  | \$0.00 | Requires add'l FTE Personnel?                     |  | Primary Vision, Strategy and/or Goal Item #   |            |
| Operating/ Ongoing                                | \$0.00 | Requires add'l facilities?                        |  | Secondary Vision, Strategy and/or Goal Item # |            |
|   |        | Requires add'l capital equipment?                 |  | Fiscal year implementation Task #             |            |

# ENVIRONMENT & ENERGY COMMISSION

City of Columbia & County of Boone

City Hall, Conference Room 1A

April 17, 2013

Mayor McDavid and Council Members,

The Environment & Energy Commission has reviewed the 2012 Energy Code (Chapter 11 of the International Residential Code), and the recommendations of the Building Code Commission. The BCCC has done extensive research into the energy conservation sections of the residential code, and deserves recognition for this effort. The recommendations of the EEC are as follows:

***Insulation of hot water piping:*** The EEC agrees with the BCCC's proposal of eliminating hot water insulation requirements except in the case of hot water circulating pump piping.

***Wood frame wall insulation:*** The 2012 Energy Code requires R20 or R13+5 (R13 batt and R5 cladding). We agree with the BCCC that this new insulation requirement be kept in force. The BCCC has proposed an exception allowing high density batts to substitute for exterior continuous insulation cladding, however this does not meet the letter of *R402.1.3 U-Factor Alternative*. The EEC does not agree with the BCCC proposal allowing high density batts to substitute for continuous insulation cladding.

***Termite exemption for slab-on-grade and foundation insulation:*** The EEC recommends the retention of section *R402.2.9 Slab-on-grade-floor* insulation requirement in the 2012 International Energy Conservation Code. We suggest using standard termite barrier details which has been allowed as an option by City Authorities for some time. This is not in agreement with the BCCC recommendations for an exemption.

***Ceiling or Attic R-value:*** The 2012 Code recommends an increase in Attic insulation from R-38 to R-49, and in the case of an "Energy Band" truss, reduction to R-38 is allowed. The EEC Recommends that this requirement, which may result in reduced mechanical equipment size if properly implemented, will be cost effective. Contractors using proper "Manual J" Calculations will reduce equipment size, thus reduce overall building cost and energy use compared to the old Code. This reduced HVAC equipment size can directly reduce electric utility demand charges, reaping benefits to the City Utility as well as to the consumer. This is not in agreement with BCCC recommendations which propose to keep 2009 insulation requirements.

***Air leakage:*** The 2012 Code requires a blower door test on all new houses to determine air leakage. The EEC would agree with BCCC that a relaxed standard which requires a visual inspection of air leakage control measures during construction is feasible. The blower door test should be allowed as an option at the discretion of the Building Inspector in questionable or disputed cases.

**Duct leakage:** The 2012 Code requires a duct pressure test on all new houses to determine duct leakage. Mechanical contractors are more aware of leakage requirements, and testimony shows they are taking care to seal ductwork. The EEC would agree with the BCCC that a relaxed standard which requires a visual inspection of duct leakage control measures during construction be allowed. The duct pressure test should be allowed as an option at the discretion of the Building Inspector in questionable or disputed cases.

**Outdoor air duct:** The EEC agrees with the BCCC recommendation of a single outside air duct, with insect screen and damper, routed to the furnace return air intake to satisfy Section R303 and M1507 Mechanical Ventilation requirements. This duct should be 4” for houses less than 1500 square feet, 6” for houses less than 2400 square feet, and 8” for larger houses. If there are multiple furnaces, the requirements may be applied to the area served by the furnace, or to one of the multiple furnaces as long as the furnace is properly sized to handle the additional heating or cooling load imposed by the outside air. The duct should be placed as to discharge into the return air filter, to reduce allergens or dust from outdoors.

**Building cavities as return air** The EEC agrees with the BCCC that building cavities may be used as return air cavities without full duct lining, as long as leakage to outside air, attics, or unconditioned spaces is prevented by visually inspection.

**High efficacy lamps:** The EEC agrees with the BCCC recommending that the 2012 requirement that 75 percent of the *lamps* in light fixtures be high efficacy type, be changed to read 75 percent of the *fixtures shall* be high efficacy. This allows a few multiple bulb fixtures, such as candelabras, to be conventional bulbs, while retaining the requirement for high efficacy bulbs in most areas.

**Programmable thermostats:** The 2012 Code specifies that the initial heating setpoint shall be 70F and the cooling setpoint be 78F. The EEC agrees with the BCCC in recommending that this paragraph be changed from *shall* to *should*, which makes the requirement non-mandatory.

Respectfully Yours,

By:  \_\_\_\_\_  
Signature

Lawrence Lile,

Vice Chair and Acting Chair

Environment and Energy Commission

Introduced by \_\_\_\_\_

First Reading \_\_\_\_\_

Second Reading \_\_\_\_\_

Ordinance No. \_\_\_\_\_

Council Bill No. B 243-13

**AN ORDINANCE**

repealing Article VI of Chapter 6 of the City Code relating to the 2009 Edition of the International Residential Code for One- and Two-Family Dwellings and enacting in lieu thereof a new Article VI adopting the 2012 Edition of the International Residential Code for One- and Two-Family Dwellings; and fixing the time when this ordinance shall become effective.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF COLUMBIA, MISSOURI, AS FOLLOWS:

SECTION 1. Article VI of Chapter 6 of the Code of Ordinances, City of Columbia, Missouri, relating to the 2009 Edition of the International Residential Code for One- and Two-Family Dwellings, is hereby repealed and in lieu thereof a new Article VI, relating to the 2012 Edition of the International Residential Code for One- and Two-Family Dwellings, is hereby enacted reading in words and figures as follows:

CHAPTER 6. BUILDINGS AND BUILDING REGULATIONS

...

ARTICLE VI. ONE- AND TWO-FAMILY DWELLING CODE

Sec. 6-65. Adopted.

The 2012 Edition of the International Residential Code for One- and Two-Family Dwellings, published by the International Code Council, Inc., including Appendices A, B, C, E, G, H, K and N, one copy of which has been on file with the city clerk for a period of ninety (90) days prior to the adoption of this article, is hereby adopted by reference and made a part of the Code of Ordinances, City of Columbia, Missouri as fully as if set forth in its entirety. At least one (1) copy of the 2012 Edition of the International Residential Code for One- and Two-Family Dwellings shall remain on file in the office of the city clerk and shall be kept available for public use, inspection and examination.

Sec. 6-66. - Amendments.

The code adopted by this article is hereby amended by substituting the following sections in lieu of those sections with corresponding numbers in the code, or, where there is no corresponding section in the code, the following sections shall be enacted as additions to the code:

R101.1 Title: These provisions shall be known as the Residential Code for One- and Two-Family Dwellings of the City of Columbia, and shall be cited as such and will be referred to herein as “this code.”

R102.5.1 Appendices A, B, C, E, G, H, K and N are hereby adopted as published.

R103.1 Creation of enforcement agency: Delete in its entirety.

R103.2 General: The building official is hereby authorized and directed to administer and enforce all provisions of this code. The building official shall be the director of community development.

R104.10.1 Flood Hazard Areas: Delete in its entirety.

R105.1 Permits required. Add to paragraph: All building, electrical, plumbing, mechanical and fuel gas permits may be issued to the general contractor, on behalf of master electrical, master mechanical, and master plumbing contractors, for new one- and two-family dwellings and building alteration or building additions to one- and two-family dwellings. All electrical, mechanical, plumbing and fuel gas work must be performed by trade contractors licensed by the City of Columbia for the appropriate trade or as allowed by ordinance.

R105.2, No. 2: Fences not over twelve (12) feet high.

R109.1.6.1 Elevation Documentation: Deleted.

R112.1 General: Any aggrieved person shall have the right to appeal a decision of the building official to the building construction codes commission. Applications for appeal shall be filed in accordance with the procedures set out in Section 113 of the Building Code of Columbia, Missouri.

R112.2.1 Determination of substantial improvements in areas prone to flood: Delete in its entirety.

R112.2.2 Criteria for issuance of a variance for areas prone to flooding: Delete in its entirety.

R112.3 Qualifications: Delete in its entirety.

R113.4 Violation penalties: Any person who shall violate a provision of this code or shall fail to comply with any of the requirements thereof, shall be guilty of a misdemeanor and upon conviction thereof, shall be punished by a fine of not more than one thousand dollars (\$1,000.00) or by imprisonment not exceeding one (1) year, or by both such fine and imprisonment. Each day that a violation continues shall be deemed a separate offense.

R202 Definitions: Accessory Structure. A structure not greater than three thousand (3,000) square feet (279m) in floor area, and not over three (3) stories or exceeding twenty-four (24) feet in height with separate means of egress, and shall not occupy more than thirty percent (30%) of the required rear yard, and shall not exceed the height of the main structure, the use of which is customarily accessory to and incidental to that of the dwelling(s) and which is located on the same lot.

R202: Add: Attic, Habitable. Add: 4. The occupiable space is provided with an egress door in accordance with Section R311.2 or by a ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

Table 301.2 (1): The following values shall be inserted into Table R301.2 (1):

Ground Snow Load – 20; Wind Speed (mph) – 90; Topographic Effects – No, Weathering - Yes Severe; Frost Line Depth – Yes; 30-inches; Termite - Moderate to Heavy; Winter Design Temperature - +4 Degrees Fahrenheit; Ice Barrier Underlayment Required – No; Flood Hazards - As regulated by City of Columbia Ordinance; Air Freezing Index - 0 to 1000; Mean Annual Temperature - 55 degrees Fahrenheit.

Table R301.5: Add note g.4. Must also include a vertical egress component.

R302.1 Exterior walls: Add exception # 6: A detached accessory garage or shed located not less than three (3) feet from any side lot line.

R302.2 Townhouses: Change exception to read: A common two (2) hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UI 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.

R302.5.1 Delete "equipped with a self-closing device."

R302.6 Dwelling/garage fire separation: Replace one-half (1/2) inch gypsum board with five-eighth (5/8) inch gypsum board in referenced Table R302.6 Dwelling/garage fire separation. Add last sentence to paragraph of R302.6: The garage shall be completely separated from the residence and its attic area by means of five-eighth (5/8) inch gypsum board or equivalent applied to the garage side.

R303.4 Mechanical ventilation. The dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3. Alternatively, an insulated duct from the outside connected to the return air or HVAC unit ahead of the filter with balancing damper may be provided. The duct size shall be based on the conditioned area the HVAC unit serves. The duct shall be four (4) inch diameter for areas 1,500 S.F. or less, six (6) inch diameter for areas over 1,500 S.F. and less than or equal to 2,400 S.F., and eight (8) inch diameter for areas over 2,400 S.F.

R303.6 Add Exception: Bathroom exhaust fans may be exhausted into a soffit vent if composed of approved materials as determined by the building official.

R307.3 Water closet: All water closets shall be spaced at least fifteen (15) inches from the centerline of the fixture to any wall or plumbing fixture, except the centerline of the water closet may be spaced twelve (12) inches if located next to a bathtub.

R311.7.5.1 Risers: Change the first sentence to read: The maximum riser height shall be seven and seven-eighth (7-7/8) inches (200mm). The rest of the paragraph remains as stated.

R311.7.5.1 Risers: Add Exception: Closed risers are not required on exterior stairs where the riser is less than ten (10) feet above grade.

R312.1.1 Where Required: Add: Grassed or landscaped areas a minimum of three (3) feet wide behind a retaining wall shall not be deemed a walking surface.

R312.2 Deleted in its entirety.

R313.1 Townhouse automatic fire sprinkler systems. Delete in its entirety.

R313.2 One- and two-family dwelling automatic fire sprinkler systems. Delete in its entirety.

R313.3 Automatic Fire Sprinkler Systems: A builder of a single-family dwelling or residences or multi-unit dwellings of four (4) or fewer units shall offer to any purchaser on or before the time of entering into the purchase contract the option at the purchaser's cost to install or equip an automatic fire sprinkler system in the dwelling, residence, or unit. Notwithstanding any other provision of law to the contrary, no purchaser of such a single-family dwelling, residence, or multi-unit dwelling shall be denied the right to choose or decline to

install an automatic fire sprinkler system in such dwelling or residence being purchased by any code, ordinance, rule, regulation, order or resolution by any county or other political subdivision. Pursuant to Section 67.281 RSMo, the mandatory option for purchasers to have the right to choose and the requirement that the builders offer to purchasers the option to purchase an automatic fire sprinkler system in connection with the purchase of any single-family dwelling, residence, or multi-unit dwelling of four (4) or fewer units is hereby incorporated into the code.

R322.1 General: Section 29-22 of the Code of Ordinances applies. Delete the rest of section R322 Flood-Resistant Construction in its entirety.

R401.1 Application: Add Exception: Foundation repairs for one- and two-family dwellings shall not require geotechnical evaluation or structural calculations.

Table R401.4.1 PRESUMPTIVE LOAD-BEARING VALUES OF FOUNDATION MATERIALS: Load-Bearing pressure (pounds per square foot) column, change value for clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH, and CH) from 1,500 to 2,000 leaving footnote b.

Figure R403.1(1) Concrete and Masonry foundation details: A monolithic slab with integral footing shall have the following: a #4 reinforcement bar spaced a minimum of forty-eight (48) inches on centers to provide connection of footing to slab. The vertical rods shall extend to within four (4) inches of the bottom of the footing and be turned to provide a horizontal leg that extends a minimum of twelve (12) inches into the slab.

R403.3 Frost-protected shallow foundations: Delete in its entirety.

R404.1 Concrete and masonry foundation walls: Add additional paragraph: Drawings showing options labeled as drawing 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 3.1 and 3.2 are intended to be alternative methods to comply with lateral support of foundation walls and subsections for connection of foundation to floor; and option labeled as drawing 4 is intended to be in compliance with subsections for reinforcement in walls and connection of foundation walls to floor.

*NOTE:* Drawings as stated above are on file in the office of the building official.

R404.4 Retaining Walls: Change twenty-four (24) inches (610 mm) to read forty-eight (48) inches (1219 mm); rest of paragraph remains as stated.

R405.1 Concrete or masonry foundations. Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below grade. Drainage tiles, gravel or crushed stone drains, shall be installed at or below the area to be protected and shall discharge by gravity or mechanical means into an approved drainage system. Gravel or crushed stone drains shall extend at least one (1)

foot (305 mm) beyond the outside edge of the footing and six (6) inches (152 mm) above the top of the footing and be covered with an approved filter membrane material and shall include a drain tile pipe surrounded with an approved filter membrane or the filter membrane shall cover the washed gravel or crushed rock covering the drain as shown in figure R405.1. The drain pipe can be placed directly on top of the footing. The top of open joints of the drainage tiles or perforated pipe shall be protected with strips of building paper, and the drainage tiles or perforated pipe shall be placed directly on the top of the footing or placed on a minimum of two (2) inches (51 mm) of washed gravel or crushed rock at least one size larger than the tile joint opening or perforation and covered with not less than six (6) inches (152 mm) of the same material. Foundation Drainage Figure R405.1 as adopted, shall be considered to satisfy the provisions of this subsection.

*NOTE:* Foundation Figure R405.1 as stated above, is on file in the office of the building official.

R802.3.1 Ceiling joist and rafter connections: Add last sentence to second paragraph: Rafter ties shall be spaced not more than four (4) feet (1219 mm) on center.

N1101.1 Scope. Add the following: The figure labeled Residential Energy Code Requirements Diagram is an approved alternative means of compliance.

*NOTE:* Drawing as stated above is on file in the office of the building official

N1101.3 - Delete.

Table N1102.1.1 - Amend the Climate Zone 4 Wood Frame Wall R-value to read: 20 or 13 + 5(note h) or 2 x 4 walls with high density batts (R-15) or filled with blown in insulation or 2x6 walls with the entire cavity filled with insulation.

N1102.2.9 Slab-on-grade floors. All slab on grade with embedded heating systems must have a minimum of R-5 insulation installed beneath the slab. Insulation shall have sufficient compressive strength to bear the weight of the structure and be of a type approved for underground installation. Insulation shall be required under the full heated area of the slab, except where the slab bears on footings, and within twelve (12) inches of any opening in the slab to the interior of the space.

N1102.4.1.2 Add the following: Exception: A visual inspection of the envelope as approved by the building official. The contractor or the building official may require a third party test.

N1103.1.1 - Change "shall" to "should."

N1103.2.1 Insulation. Supply and return ducts in unconditioned space and outdoors shall be insulated to R-19. Return and supply ducts inside conditioned and semi-conditioned

space are not required to be insulated. Ducts located inside conditioned space are not required to be insulated other than as may be necessary for preventing the formation of condensation on the exterior of cooling ducts.

N1103.2.2 - Add the following verification option: 3. Ducts shall be visually examined to verify that all joints and seams are properly sealed.

N1103.2.3 - Building cavities used as ducts shall meet the requirements of IMC paragraph 602.3.

N1103.4 - Delete.

N1104.1 Lighting equipment: A minimum of fifty percent (50%) of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps. A minimum of seventy five percent (75%) of the lamps in permanently installed lighting fixtures should be high-efficacy lamps.  
M1411.3.1 Auxiliary and secondary drain systems: #3 Add sentence to paragraph: Only one water level detection device conforming to UL 508 that will shut off the equipment served prior to overflow of the pan is required by this section.

M1501.1 Outdoor discharge: List first exception as number 1. and add exception number 2.: Air may be exhausted into a soffit vent if composed of approved materials as determined by the building official.

M1507.2 Recirculation of air: Add exception: Air may be exhausted into a soffit vent if composed of approved materials as determined by the building official.

M2103.2.2 Suspended floor installation. Add exception: For direct contact plate systems, no insulation is required as long as space below is habitable.

G2414.5.2 Copper tubing: Replace second paragraph with: Copper pipe and copper tubing shall not be allowed for fuel gas piping systems.

G2415.14 Add to last sentence: Any underground gas piping allowed by this section shall only be approved for gas that is less dense than the atmospheric pressure and shall be installed in accordance with G2415.12.1.

G2415.14.2 Delete in its entirety.

G2417.4.1 Test pressure: The test pressure to be used shall be not less than one and one-half (1.5) times the proposed maximum working pressure, but not less than thirty (30) psig, irrespective of design pressure. (Rest of section remains as stated.)

G2419.4 Sediment trap. Change "any length" to "three and one-half (3½) inch minimum length"

P2602.1.1 Individual water supply: Where a potable public water supply is not available, individual sources of potable water supply shall be utilized.

P2602.1.2 Availability: A potable public water supply system shall be considered available to a building when any portion of the property is located within two hundred twenty-five (225) feet of the public water main.

P2603.2.1 Protection against physical damage: Delete.

P2603.4: Add the following: Alternatively, the sleeve may be sized in accordance with the sealing system manufacturer's published recommendations.

P2603.5 Freezing: A water, soil or waste pipe shall not be installed outside of a building, or concealed in outside walls, or in any place subjected to freezing temperature, unless adequate provision is made to protect such pipe from freezing by insulation, heat or both. Water pipes shall not be installed in an exterior wall cavity in one and two family dwellings. For purposes of this section exterior wall cavities shall mean all walls that rain can fall upon. Water service piping shall be installed below recorded frost penetration but not less than thirty (30) inches below grade.

P2603.5.1 Sewer depth: Is amended to read: Building sewers that connect to private sewage disposal systems shall be a minimum of thirty (30) inches below finished grade at the point of septic tank connection. Building sewers shall be a minimum of thirty (30) inches below grade.

P2604.3 Backfilling: Delete last sentence from section which reads: Loose earth shall be carefully placed in the trench in six (6) inch (152mm) layers and tamped in place.

P2705.1 #5 Water closets, lavatories and bidets: Amend first sentence to read: All water closets shall be spaced fifteen (15) inches from the centerline of the fixture to any wall or plumbing fixture except the centerline of the water closet may be spaced twelve (12) inches is located next to the bathtub. Rest of the paragraph remains as stated.

P2903.5 Water hammer: Add exception: A water-hammer arrestor is not needed in water distribution systems using PEX piping or systems using a combination of PEX and copper.

P2905.4 Water service pipe: Where this section references one hundred sixty (160) pounds per square inch replace with two hundred (200) pounds per square inch.

P2905.9.1.3 PVC plastic pipe. A primer that conforms to ASTM F 656 shall be applied to PVC solvent-cemented joints. Purple primer shall be used below grade. Solvent cement for PVC plastic pipe conforming to ASTM D 2564 shall be applied to all joint surfaces. If purple primer is used, Section P2503 Inspections and Tests shall not be required.

P3005.2.4 Change of direction: Cleanouts shall be installed at each fitting with a change of direction more than 45 degrees (0.79 rad) horizontal to horizontal in the building sewer, (rest of paragraph remains as stated).

P3008.1 Sewage backflow. Delete last sentence.

P3111.1 Type of fixtures: Add exception: Residential food waste grinders shall be allowed to discharge into a combination waste and vent system provided an air admittance valve is installed.

P3113.1 Size of vents: Add sentence to paragraph: At least one (1) vent shall be three (3) inch unreduced in size extending from the main building drain through the roof.

P3201.2 Trap seals and trap seal protection: Delete.

Except as stated in sections E3608.1.1 Exception, E3609.6.1 and E3609.7 of this ordinance, Chapters 34 through 43 of the 2012 International Residential Code are superseded by the requirements as stated in the 2011 National Electrical Code (NFPA 70-2011).

E3608.1.1 Exception: When a concrete-encased electrode and/or ground ring are not available for use in a grounding electrode system, a rod or other electrode as specified in E3608.1.4 Rod and pipe electrodes and 3608.1.5 Plate electrodes can be used as a substitute. The second rod electrode shall not be connected in series with the first rod electrode except where there exists a metal water pipe in contact with earth for ten (10) feet or more, for one- and two-family dwellings a single grounding electrode placed at the outside of the building at the nearest point of the service disconnect shall be permitted to fill the requirements of this section.

E3609.6.1 Water Heater Bonding Jumper: The interior metal water piping bonding shall include a bonding jumper between the hot and cold waterlines at the water heater fixture if the entire system is copper excluding the service.

E3609.7 Bonding other metal piping: Delete "including gas piping" from section.

Appendix G, Swimming Pools, Spas and Hot Tubs, section AG105.2 Outdoor swimming pool: An outdoor swimming pool, including an in-ground, above-ground pool, hot tub or spa shall be surrounded by a barrier which shall comply with the following:

1. The top of the barrier shall be at least seventy-two (72) inches (1836 mm) above finished ground level measured on the side of the barrier which faces away from the swimming pool. The maximum vertical clearance between finished ground level and the barrier shall be two (2) inches (51 mm) measured on the side of the barrier

which faces away from the swimming pool. Where the top of the pool structure is above grade, such as an above ground pool, the barrier may be at ground level, such as the pool structure, or mounted on top of the pool structure. Where the barrier is mounted on top of the pool structure, the maximum vertical clearance between the top of the pool structure and the bottom of the barrier shall be four (4) inches (102mm).

*Exception:* The top of the barrier shall be at least forty-eight (48) inches (1219 mm) above ground level measured on the side of the barrier which faces away from the swimming pool provided the swimming pool is equipped with a rigid safety cover complying with ASTM F 1346.

2. through 10. Same as stated in International Residential Code.

SECTION 2. The repeal of Article II of Chapter 6 of the Code of Ordinances, City of Columbia, Missouri, relating to the 2009 Edition of the International Residential Code for One- and Two-Family Dwellings shall not affect any offense or act committed or done or any penalty or forfeiture incurred before the effective date of this ordinance.

SECTION 3. This ordinance shall be in full force and effect from and after October 1, 2013.

PASSED this \_\_\_\_\_ day of \_\_\_\_\_, 2013.

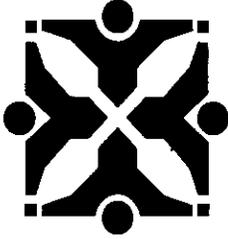
ATTEST:

\_\_\_\_\_  
City Clerk

\_\_\_\_\_  
Mayor and Presiding Officer

APPROVED AS TO FORM:

\_\_\_\_\_  
City Counselor



Source: Community Development - BSD TT

Agenda Item No:

To: City Council  
From: City Manager and Staff MM

Council Meeting Date: Sep 3, 2013

Re: Update of Building Codes

### **EXECUTIVE SUMMARY:**

The Building Construction Codes Commission has completed their review of the 2012 International Code Council Codes and 2011 National Electrical Code for adoption by the city. There are numerous minor changes and several major changes. The new codes provide clarity and enhance the life safety, protection of property, and energy efficiency of buildings. Among the major changes, the cost implications of the energy efficiency chapter of the residential code is the largest concern.

### **DISCUSSION:**

Numerous meetings were held evaluating the effect of the new codes and determining what local addendums would be needed. These meetings were staffed by representatives of the Building and Site Development Division of the Community Development Department and the Fire Department.

Some of the most significant changes deal with the energy conservation requirements of the code. Staff has attached memorandums from both the BCCC and the Environment and Energy Commission (EEC). Members of the BCCC and EEC met to discuss the changes in the code. The BCCC brought forth their suggestions and the EEC agreed with all but three items. Staff supports the BCCC's recommendations on the basis that the codes are specifically designed to be minimum requirements. The EEC has made recommendations for higher standards on the broader basis of long term energy conservation.

The three differences between the BCCC and EEC recommendations are:

1. The amount of attic insulation.
2. The amount of wall insulation (changing from 2x4 framing to 2x6 framing).
3. Perimeter foundation insulation.

If the codes are to continue to be minimum standards, the recommendation of the BCCC should be adopted. Adopting the higher standards of insulation recommended by the EEC, on the other hand, would be in keeping with the City's commitment to conservation of energy resources. It is important that the new codes be adopted even if there is to be further consideration of the energy code requirements.

Below are some of the other significant changes and the BCCC's recommendations. Where no recommendations are listed, the BCCC is in favor of adopting the code as written:

International Residential Code:

1. Manufactured wood I-joists used in floor assemblies will be required to have ½" of gypsum board applied to the underside of the floor framing member. The new code requires a closer on the door between the residence and garage. The BCCC chose not to adopt this provision due to the inconvenience to the home owner.

2. Whole house mechanical ventilation is required (an exhaust fan running intermittently or continuously). The BCCC made provisions to add an exterior opening ducted to the return ductwork to provide additional natural ventilation in lieu of mechanical ventilation.
3. The BCCC has now defined that grass and landscaped areas are not walking surfaces therefore adjacent walls do not require guards.
4. A simplified wall bracing section has been added which is applicable to how homes are constructed in Columbia and will simplify construction and inspection of braced walls.
5. The 2012 code requires additional hold downs are required for long span rafters and trusses.
6. Continuous sidewall flashing is now acceptable in lieu of step flashing only.
7. The 2012 code requires a drip edge is now required at roofs.
8. The BCCC has amended the code so that the use of purple primer on waste and vent piping obviates the need for testing.
9. The BCCC decided to delete the requirement for Arc Fault Circuit Interrupters in one and two family dwellings.
10. The BCCC amended the requirement for sanitary sewer backwater valves that the waste piping does not need to be separated based on the flood rim of the fixture.
11. The BCCC has established a maximum number of receptacles based on the circuit breaker amperage. This simplifies the code requirements.
12. The supplemental electrode (additional grounding rod) requirement was deleted by the BCCC.

#### International Building Code:

1. The 2012 code more clearly defines different types of care facilities.
2. Children's structures (playgrounds) are more broadly regulated.
3. The area of furniture manufacturing and sales where a sprinkler system is required is now defined. The BCCC has accepted the code change and removed our current amendment.
4. Basements with walls or partitions must be sprinklered.
5. Educational occupancies are required to have an Emergency Voice/Alarm Communication System (EV/ACS). The BCCC recommended this requirement only apply to occupancies over 75 people.
6. Reduced exit widths are allowable for buildings equipped with EV/ACS.
7. Carbon monoxide alarms are now required in buildings with residential or institutional occupancies that have fuel burning appliances.
8. Exits may now be arranged to serve a portion of a story instead of the entire story.
9. Retained the reference to the 2009 International Energy Conservation code due to the complexity of the 2012 IECC and the fact that there is no software that meets the 2012 IECC requirements.
10. Firestop system third party inspections are now mandatory in risk category III or IV buildings.
11. No thermal barrier is required on the floor side of a structural insulated panel system floor.
12. Foam plastic meeting certain requirements may be used in plenums.
13. Toilet facilities are no longer required in parking garages.
14. Chapter 34 provisions take precedence over other codes. The BCCC has included an amendment which further clarifies which other codes are applicable.
15. The previous amendment regarding retaining walls has been removed as it is adequately addressed by the code book.

Other changes include the number of members for a quorum and the ability of alternates to sit on the commission for any absent member.

#### **FISCAL IMPACT:**

None.

**VISION IMPACT:**

<http://www.gocolumbiamo.com/Council/Meetings/visionimpact.php>

By adopting the 2012 ICC Codes, new homes will be more energy efficient.

**SUGGESTED COUNCIL ACTIONS:**

**Passage of the ordinances.**

| FISCAL and VISION NOTES:                   |        |   |    |   |       |
|--|--------|---|----|---|-------|
| City Fiscal Impact<br>Enter all that apply |        | Program Impact                                    |    | Mandates                                      |       |
| City's current net FY cost                 | \$0.00 | New Program/Agency?                               | No | Federal or State mandated?                    | No    |
| Amount of funds already appropriated       | \$0.00 | Duplicates/Expands an existing program?           | No | <b>Vision Implementation impact</b>           |       |
| Amount of budget amendment needed          | \$0.00 | Fiscal Impact on any local political subdivision? | No |   |       |
| Estimated 2 year net costs:                |        | <b>Resources Required</b>                         |    | Vision Impact?                                | Yes   |
| One Time                                   | \$0.00 | Requires add'l FTE Personnel?                     | No | Primary Vision, Strategy and/or Goal Item #   | 9.3.3 |
| Operating/Ongoing                          | \$0.00 | Requires add'l facilities?                        | No | Secondary Vision, Strategy and/or Goal Item # |       |
|  |        | Requires add'l capital equipment?                 | No | Fiscal year implementation Task #             |       |

Significant changes from the 2009 to 2012 IRC energy code:

Background:

The BCCC spent eight weeks reviewing the energy code portion of the IRC, far longer than they spent on any other portion of the code. During this period they sought the advice of several experts including:

Terry Freeman, Energy Services Supervisor, Water & Light  
Fred Malicoat, P.E., Malicoat-Winslow Engineers (chairman of the BCCC)  
Guy Ford, Missouri Insulation Supply  
Dan Riepe, Home Performance Experts

The committee also reviewed the following documents:

- North Carolina 2012 Energy Code
- BCAP - Kansas City Residents Buying 2012 IECC Homes Will Save Thousands
- USDoE – Missouri Energy and Cost Savings
- BCAP - Illinois – Your Home, More Affordable with the 2012 IECC
- Alliance for Environmental Sustainability – Comparing IECC in Illinois to Above-Code Programs
- BCAP - Local Energy Code Action Kit for Municipalities in Missouri
- Texas A&M University Energy Systems Laboratory – A Comparison of Building Energy Code Stringency: 2009 IRC Versus 2012 IRC for Single-Family Residences in Texas
- Midwest Energy Efficiency Alliance – 2012 International Energy Conservation Code (Residential)
- Instructions for the Residential Building Data Collection Checklist 2012 IECC – Residential Provisions
- Carroll County Maryland – 2012 IECC Residential Energy Efficiency Code Requirement Flow Chart
- USDoE – Residential Code Change Proposals for the 2015 IECC
- Energy Efficient Codes Coalition – Estimate of Energy and Cost Savings from Proposed IECC Code Changes for 2012
- USDoE – Guide to the Changes between the 2009 and 2012 International Energy Conservation Code
- Testimony Regarding Montgomery County (MD) Department of Permitting Services Proposal to Adopt the 2012 International Residential and Energy Conservation Codes
- USDoE – Air Leakage Guide
- Association of Professional Energy Consultants – Measuring the Baseline Compliance Rate for Residential and Non-Residential Buildings in Illinois Against the 2009 International Energy Conservation Code
- BCAP – True Cost of the 2009 International Energy Conservation Code

The committee members who attended included:

John Page, Owner, J-Bar Construction  
Fred Malicoat, P.E., Owner, Malicoat-Winslow Engineers  
Kas Carlson, Owner, C&C Construction  
Jay Creasy, Benchmark Testing and Inspections  
Doug Muzzy, Owner, Muzzy Builders  
David Weber, P.E., Allstate Consultants  
Phil Clithero, Kliethermes Custom Homes  
Dan McCray, McCray Builders

Others in regular attendance included:

David Forward, Chief Building Inspector, Boone County  
Phil Teeple, P.E., Building Regulations Supervisor, City of Columbia  
Stephen Adair, Building Inspector, City of Columbia  
Shane Creech, P.E., Building and Site Development Manager, City of Columbia

General issues:

The 2012 code allows for a prescriptive based approach and a simulated performance alternative. In the discussions and based on the APEC report, the way to higher compliance is thru having an easy to understand prescriptive compliance option. The BCCC has drafted a one page section of a house that shows what insulation goes where and other important energy considerations. This is based on work done by North Carolina. When dealing with a large number of builders of various size and complexity, the KISS (keep it simple stupid) method should be adopted to achieve a high rate of compliance.

The simulated performance option will still be available however the APEC study showed that both the modelers and code officials did not properly perform or understand the modeling and there were substantial compliance problems.

The Department of Energy plans to achieve 50% better energy performance over the 2006 code by changing the energy code. They are limited to heating, cooling, water heating, and lighting. However they do not get to take credit for increased efficiency of the furnace or air conditioner as it is considered an appliance which falls under the NAECA. The DoE is mandating that furnaces be 90% efficient starting in March of 2013. They are currently required to be 78% efficient. This presents its own unique challenges to the building community. All of the studies reviewed by the committee were based on 78% efficient furnaces. The result of this is the magnitude of savings shown by some studies will be reduced by the required appliance changes.

## Individual Changes

### *Wall Insulation requirements*

The code requires R-20 or R-13+5 for exterior walls. Essentially for most builders this would mean 2x6 framing for exterior walls. BCAP estimates the increased framing cost for their model 2,400 ft<sup>2</sup> house at \$1,404. This does not include additional costs for jamb extensions for windows and doors. The usable area of the home is also reduced. The Texas A&M study found that the increased wall insulation accounted for 3.3% energy savings above the 2009 code. The structural requirements should govern and it is the BCCC's opinion that at a minimum the wall cavity should be filled with insulation. High density batts are also available for 2x4 walls though they are more expensive (approximately 2.5x more expensive than R-13 batts).

**BCCC recommendation:** Walls must meet an R-20, R-13+5, or be completely filled with insulation. On a 2x4 wall, the minimum R-value shall be R-15.

### *Slab-on-grade floors*

The 2012 code requires that for slab on grade floors a minimum of 2' of R-10 insulation be provided either interior or exterior, vertically or horizontally. The code says this insulation is not required in jurisdictions designated by the building official as having a very heavy termite infestation. The committee views adding this insulation as a route and place for termites to enter buildings and live. According to the IRC we are in the "moderate to heavy" termite infestation probability portion of the country.

**BCCC recommendation:** Exempt the requirement for slab-on-grade floor insulation unless it is a heated floor.

### *Air leakage*

The 2012 code requires a blower door test on all new houses to determine the rate of air leakage. Based on testimony by Terry Freeman of the Columbia Water & Light Department and Dan Riepe of Home Performance Experts, the houses currently being constructed and blower door tested meet the code requirements of less than 3 air changes per hour. Texas A&M research found that meeting the air leakage requirements would provide the most substantial cost saving of any of the changes in the 2012 code. Mr. Freeman also stated that walls of current houses are often too tight to meet fresh air requirements. The other issue with blower door tests is that they are performed when construction is near completion and addressing flaws in the building envelope would be difficult and expensive. The test alone costs approximately \$250.

**BCCC recommendation:** Ensure the building envelope is properly sealed at the insulation inspection. Allow the blower door test if a contractor does not agree with the building inspector as an option.

### *Mechanical ventilation*

The proposed code requires mechanical ventilation but this is not mentioned in the Energy Efficiency chapter. It is specified in Section R303 – Light, Ventilation and Heating and is further specified in Section M1507 – Mechanical Ventilation. The code requires for a 1,500 square foot, 3 bedroom home, continuous exhaust of 45 CFM. This is 64,800 ft<sup>3</sup> per day, or for a house with 8' ceilings, 5.4 air changes per day. The report by the Montgomery County Energy and Air Quality Advisory Committee found that the code requirements for air leakage and mechanical ventilation are at odds with each other. Montgomery County, MD is a county of approximately 1 million residents. Two Illinois jurisdictions had concerns about this as well as stated in the APEC report. The tight envelope requires forced mechanical ventilation which increases energy use compared with the natural ventilation thru the walls. Terry Freeman made similar comments. The Montgomery County Energy and Air Quality Advisory Committee proposed to keep houses naturally ventilating. The BCCC has provided a middle of the road solution because they often see combustion air intakes filled with insulation and are also concerned that if there is a fan that runs continuously or intermittently, people could shut it off.

**BCCC recommendation:** Provide a duct from the return air to the outside. A 4" duct for houses < 1,500 ft<sup>2</sup>, a 6" duct for houses < 2,400 ft<sup>2</sup>, and an 8" duct for larger houses. The duct would be insulated to prevent condensation, contain a manual damper to adjust to the required amount of fresh air, and have a screen on the exterior to stop insects and animals.

### *Duct tightness*

The adopted code requires testing if the duct is outside of the building's thermal envelope. Nemow Insulation has done a significant amount of duct testing in Columbia. When Phil Teeple contacted Nemow, they stated they had one failure in over 90 tests. Similar sentiments were echoed by Mr. Freeman and Mr. Riepe. Boone County requires the ducts to be sealed but not tested. Ducts which have been subsequently tested in Boone County have passed. The test costs \$400.

**BCCC recommendation:** Allow a duct test if a contractor does not agree with the visual inspection performed by the building inspector.

### *Building cavities as ducts/plenums*

The energy code does not allow building framing cavities to be used as ducts or plenums. The mechanical code still allows this. This would require all returns to be ducted. BCAP mentions this change but only caught the ducts in floor joists, and not the returns that go up the walls to the grills and estimated this would cost \$172. Ducting the returns in the wall would add substantial costs above and beyond those BCAP figured.

**BCCC recommendation:** Amend the energy code to conform to the mechanical code.

*Hot water pipe insulation*

The code has a list of 9 different instances combined with a table with pipe diameter and run length to determine if hot water pipes should be insulated. Water use in homes is on an intermittent basis. The committee based on their experience with standard and recirculating water systems did not see value in insulating the hot water pipes due to the substantial increase in costs and minimal energy savings.

**BCCC recommendation:** Amend the energy code to remove the hot water pipe insulation requirement.

# ENVIRONMENT & ENERGY COMMISSION

City of Columbia & County of Boone

City Hall, Conference Room 1A

January 17, 2013

Mayor McDavid and Council Members,

The Environment & Energy Commission has reviewed the 2012 Energy Code (Chapter 11 of the International Residential Code), and the recommendations of the Building Code Commission. The BCCC has done extensive research into the energy conservation sections of the residential code, and deserves recognition for this effort. The recommendations of the EEC are as follows:

***Insulation of hot water piping:*** Along with BCCC, the EEC recommends eliminating hot water insulation requirements except in the case of hot water circulating pump piping.

***Wood Frame Wall Insulation:*** The 2012 Energy Code requires R20 or R13+5 (R13 batt and R5 cladding). We agree with the BCCC that this new insulation requirement be kept in force. The Code also allows an overall U-Factor of 0.057, roughly equivalent to an average R-value of R17.5. As this can be achieved with a high-density R-15 batt in a standard 2X4 wall, we recommend that this be an allowable method as it meets the letter of the new code.

***Termite Exemption for slab-on-grade and foundation insulation:*** We recommend that the Columbia jurisdiction continue to exempt houses from slab and foundation insulation requirements as this is a heavy termite infestation area, and these kinds of insulation can allow termites access to walls. This practice has a long history and is consistent with BCCC recommendations.

***Cieling or Attic R-Value:*** The 2012 Code recommends an increase in Attic insulation from R-38 to R-49, and in the case of an "Energy Band" truss, R-38 is allowed. The EEC Recommends that this requirement, which may result in reduced mechanical equipment size if properly implemented, will be cost effective. Contractors using proper "Manual J" Calculations will reduce equipment size, thus reduce overall building cost and energy use compared to the old Code. This reduced HVAC

equipment size can directly reduce electric utility demand charges, reaping benefits to the City Utility as well as to the consumer. This is not in agreement with BCCC recommendations.

**Air Leakage:** The 2012 Code requires a blower door test on all new houses to determine air leakage. The EEC would agree with BCCC that a relaxed standard which requires a visual inspection of air leakage control measures during construction is feasible. The blower door test should be allowed as an option at the discretion of the Building Inspector in questionable or disputed cases.

**Duct Leakage:** The 2012 Code requires a duct pressure test on all new houses to determine duct leakage. Mechanical contractors are more aware of leakage requirements, and testimony shows they are taking care to seal ductwork. The EEC would agree with the BCCC that a relaxed standard which requires a visual inspection of duct leakage control measures during construction be allowed. The duct pressure test should be allowed as an option at the discretion of the Building Inspector in questionable or disputed cases.

**Outdoor Air Duct:** The EEC agrees with the BCCC recommendation of a single outside air duct, with insect screen and damper, routed to the furnace return air intake to satisfy Section R303 and M1507 Mechanical Ventilation requirements. This duct should be 4" for houses less than 1500 square feet, 6" for houses less than 2400 square feet, and 8" for larger houses. If there are multiple furnaces, the requirements may be applied to the area served by the furnace, or to one of the multiple furnaces as long as the furnace is properly sized to handle the additional heating or cooling load imposed by the outside air. The duct should be placed as to discharge into the return air filter, to reduce allergens or dust from outdoors.

**Building Cavities as Return Air** The EEC agrees with the BCCC that building cavities may be used as return air cavities without full duct lining, as long as leakage to outside air, attics, or unconditioned spaces is prevented by visually inspection.

**High Efficacy Lamps:** The EEC recommends that the 2012 requirement that 75 percent of the *lamps* in light fixtures be high efficacy type, be changed to read 75 percent of the *fixtures* be high efficacy. This allows a few multiple bulb fixtures, such as candelabras, to be conventional bulbs, while retaining the requirement for high efficacy bulbs in most areas. Previously the 2009 amendment changed *shall* to *should* in this paragraph.

***Programmable Thermostats:*** The 2012 Code specifies that the initial heating setpoint shall be 70F and the cooling setpoint be 78F. The EEC recommends that this paragraph be changed from *shall* to *should*, which makes the requirement non-mandatory.

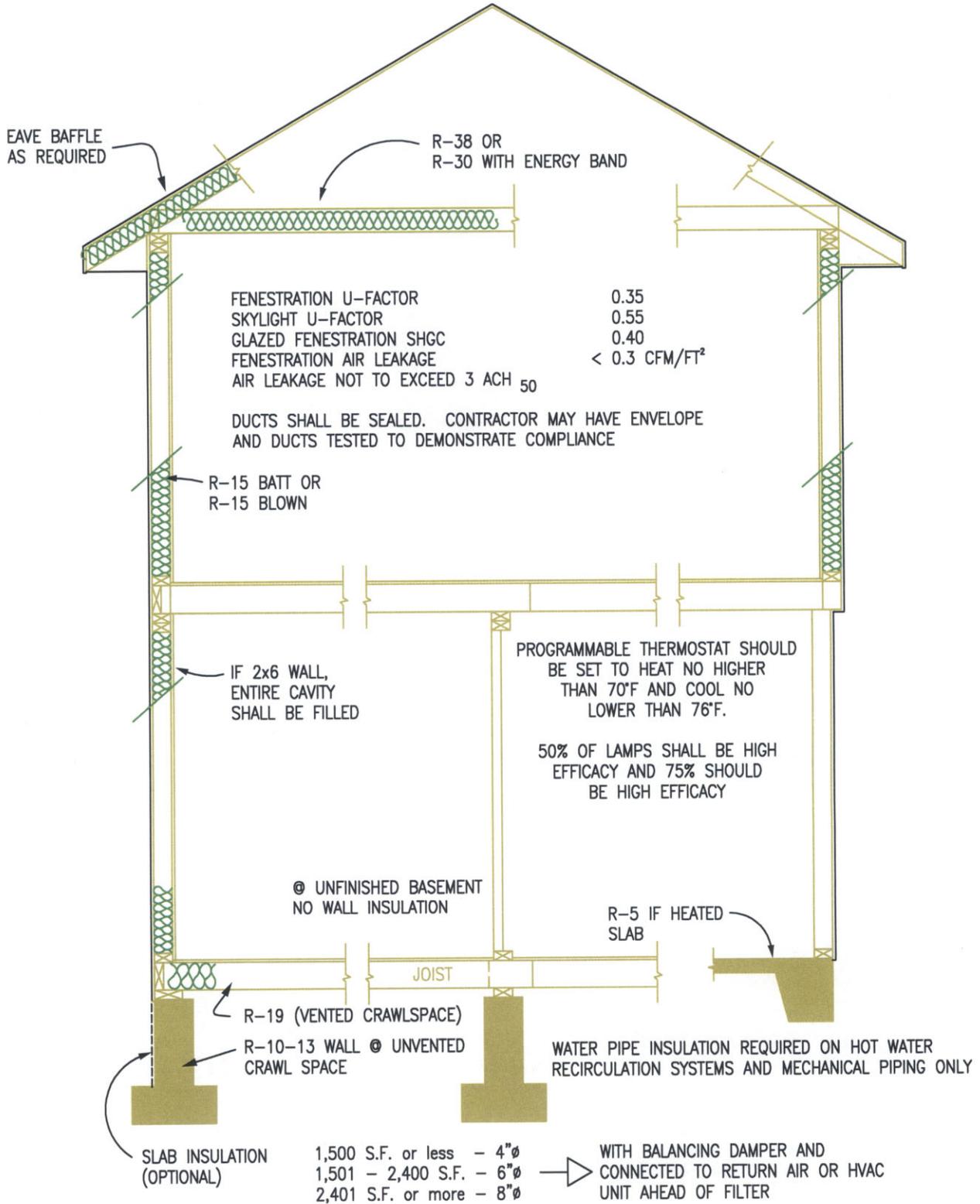
Respectfully Yours,

Karl Skala,

Chair

Environment and Energy Commission

# RESIDENTIAL ENERGY CODE REQUIREMENTS DIAGRAM



THIS SHEET IS NOT AN EXHAUSTIVE LIST. SEE IRC CHAPTER 11 FOR FULL REQUIREMENTS

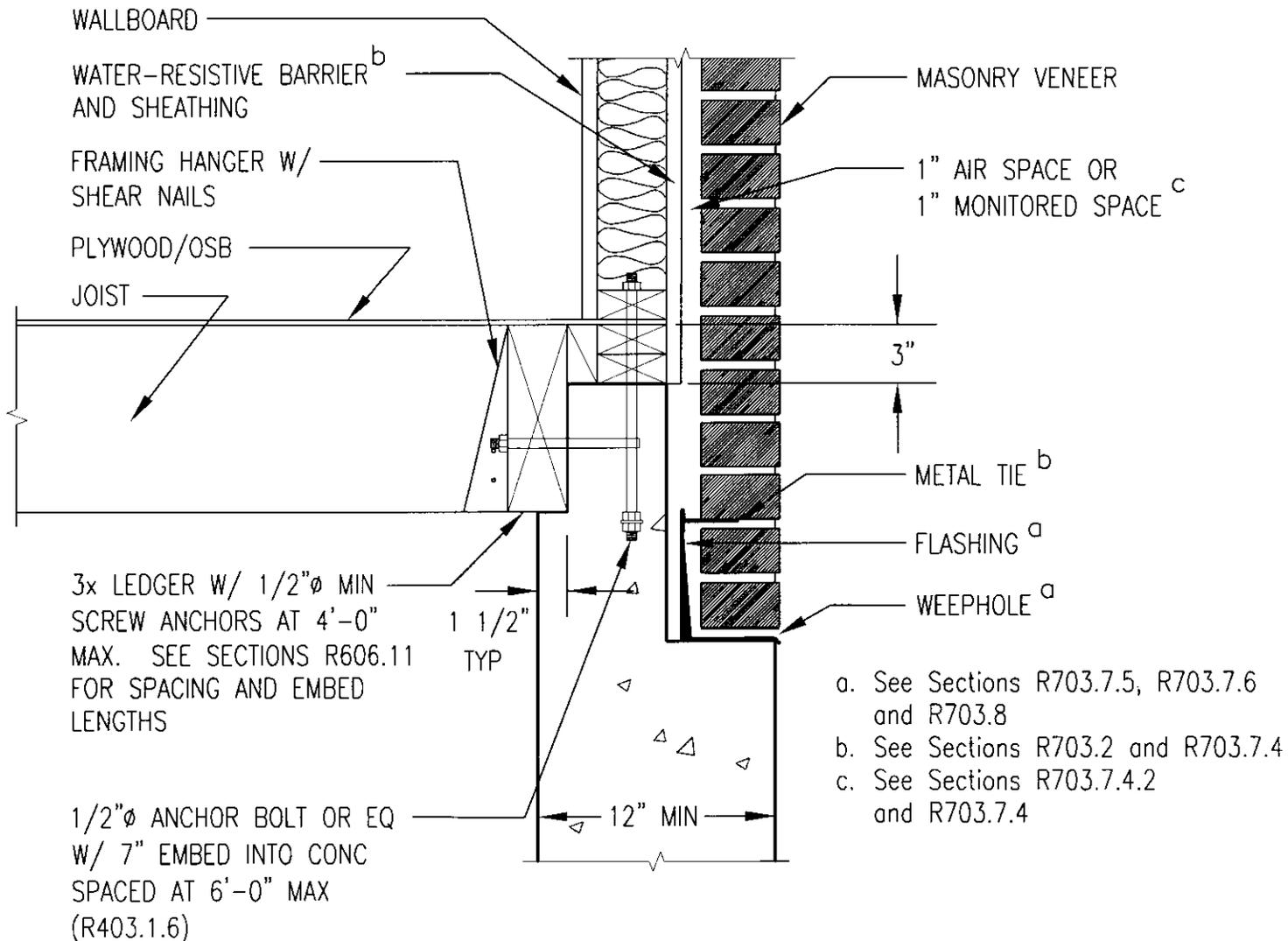
# ALTERNATIVE 1.1

## Joist Perpendicular to Wall W/ Brick

2012 IRC

Section R404 Foundations and Retaining Walls  
Section R404.1 Concrete and Masonry Foundation Walls

\*This figure is provided as an example. This is not an all inclusive list of code requirements.



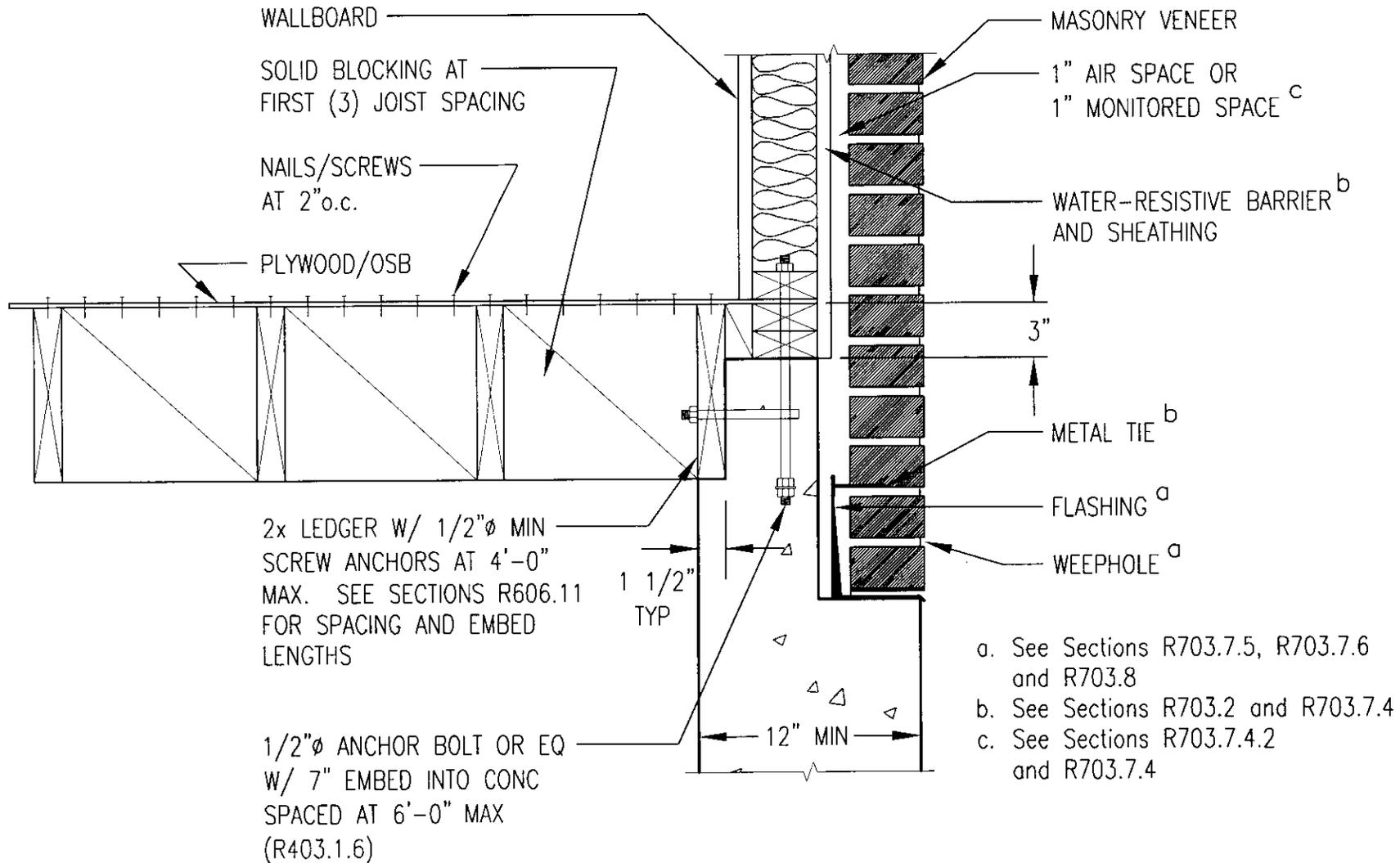
# ALTERNATIVE 1.2

## Joist Parallel to Wall W/ Brick

2012 IRC

Section R404 Foundations and Retaining Walls  
Section R404.1 Concrete and Masonry Foundation Walls

\*This figure is provided as an example. This is not an all inclusive list of code requirements.



# ALTERNATIVE 1.3

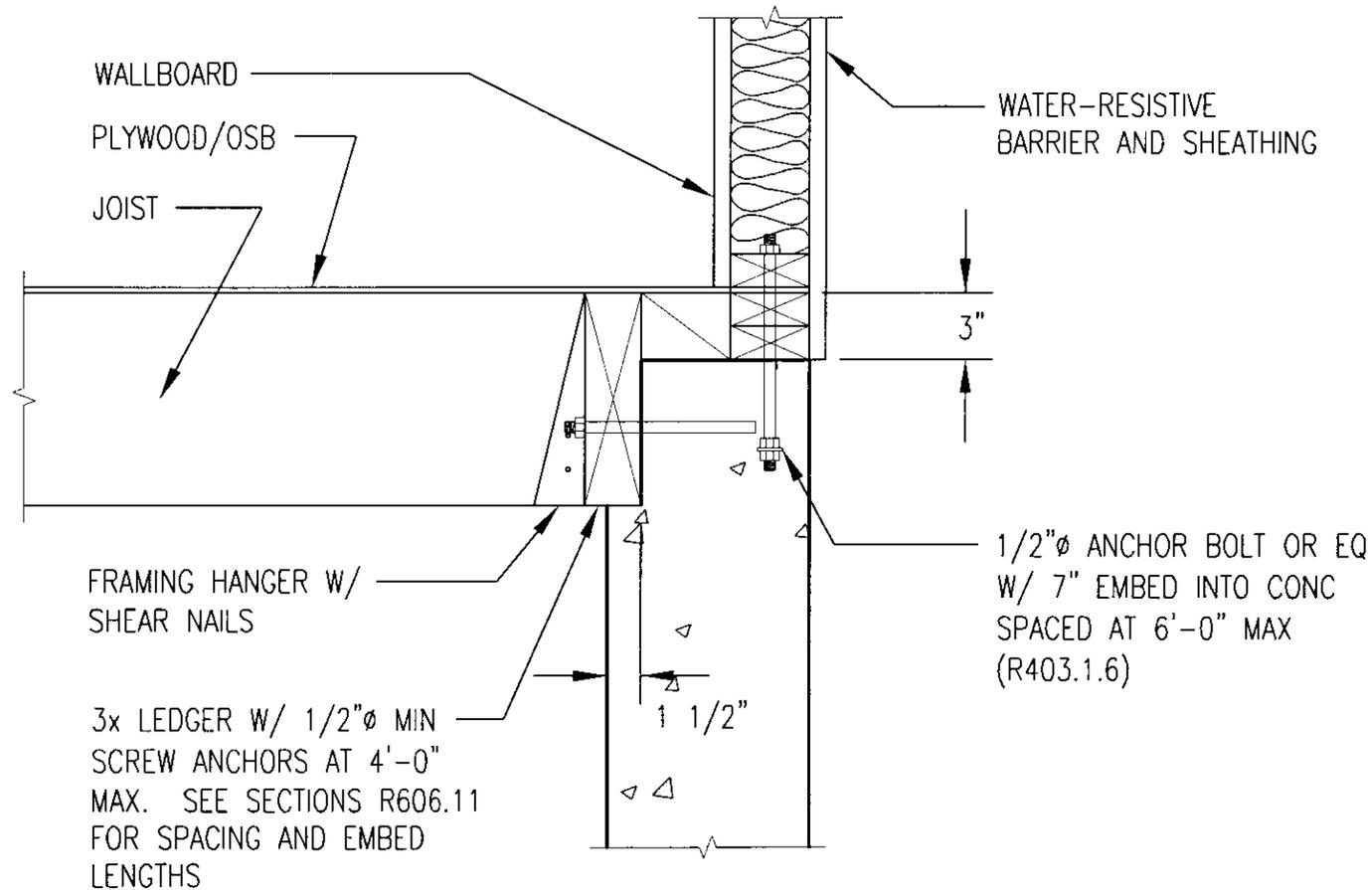
## Joist Perpendicular to Wall W/O Brick

2012 IRC

Section R404 Foundations and Retaining Walls

Section R404.1 Concrete and Masonry Foundation Walls

\* This figure is provided as an example. This is not an all inclusive list of code requirements.



# ALTERNATIVE 1.4

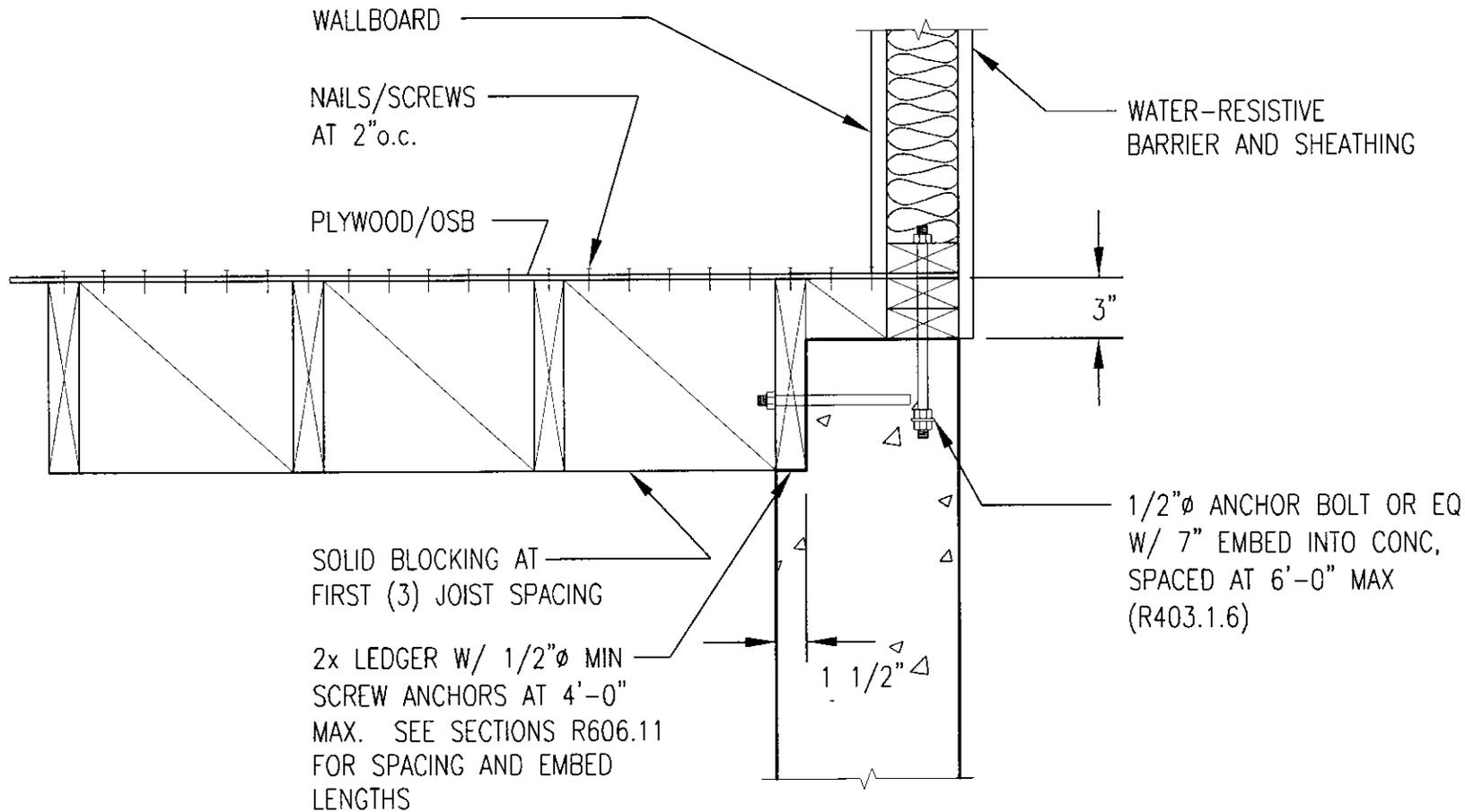
## Joist Parallel to Wall W/O Brick

2012 IRC

Section R404 Foundations and Retaining Walls

Section R404.1 Concrete and Masonry Foundation Walls

\* This figure is provided as an example. This is not an all inclusive list of code requirements.



# ALTERNATIVE 2.1

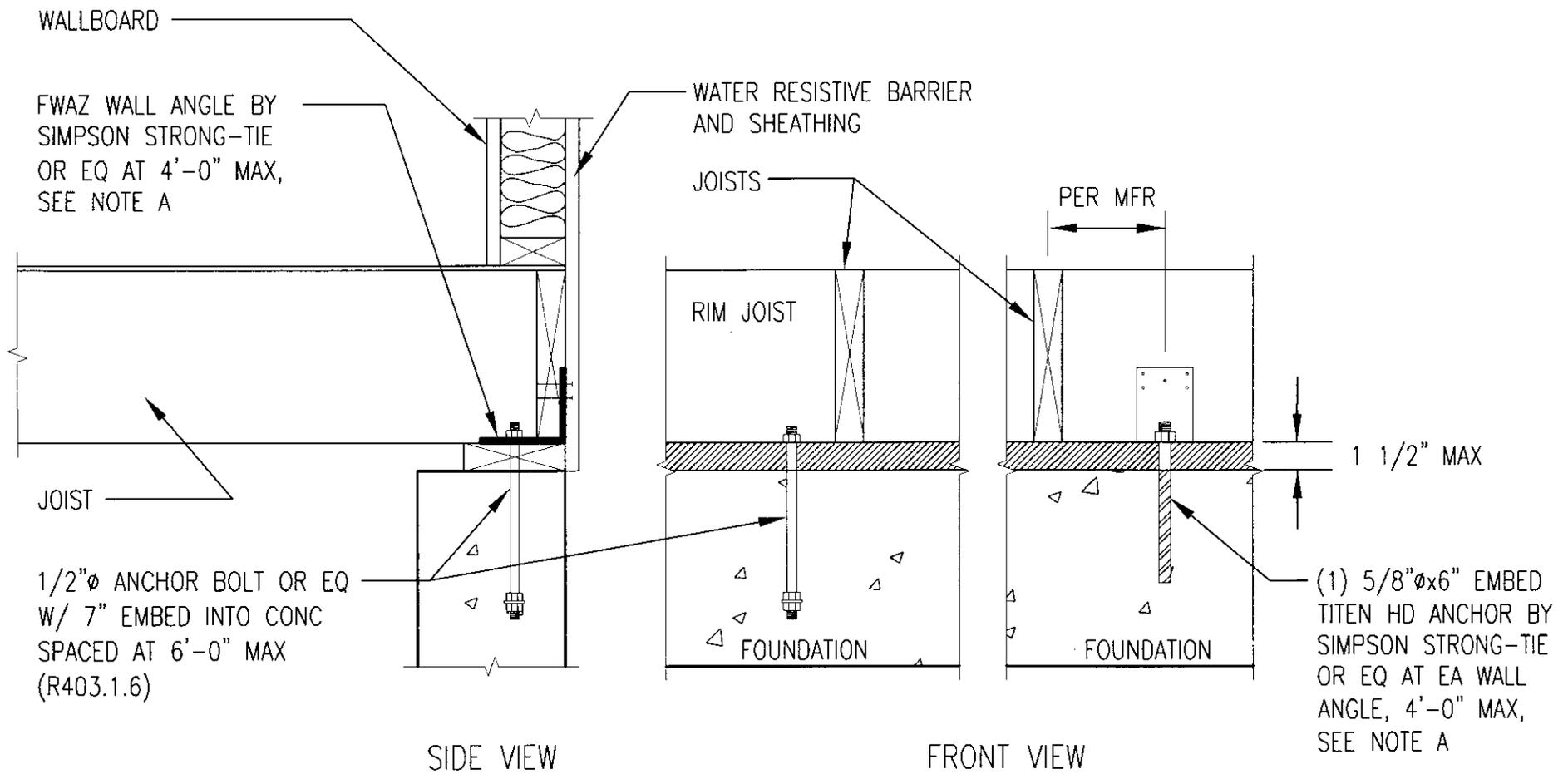
## Joist Perpendicular to Wall

2012 IRC

Section R404 Foundations and Retaining Walls  
Section R404.1 Concrete and Masonry Foundation Walls

\* This figure is provided as an example. This is not an all inclusive list of code requirements.

NOTE A: Refer to the manufacturers tables for required spacing and placement of FWAZ wall angles



# ALTERNATIVE 2.2

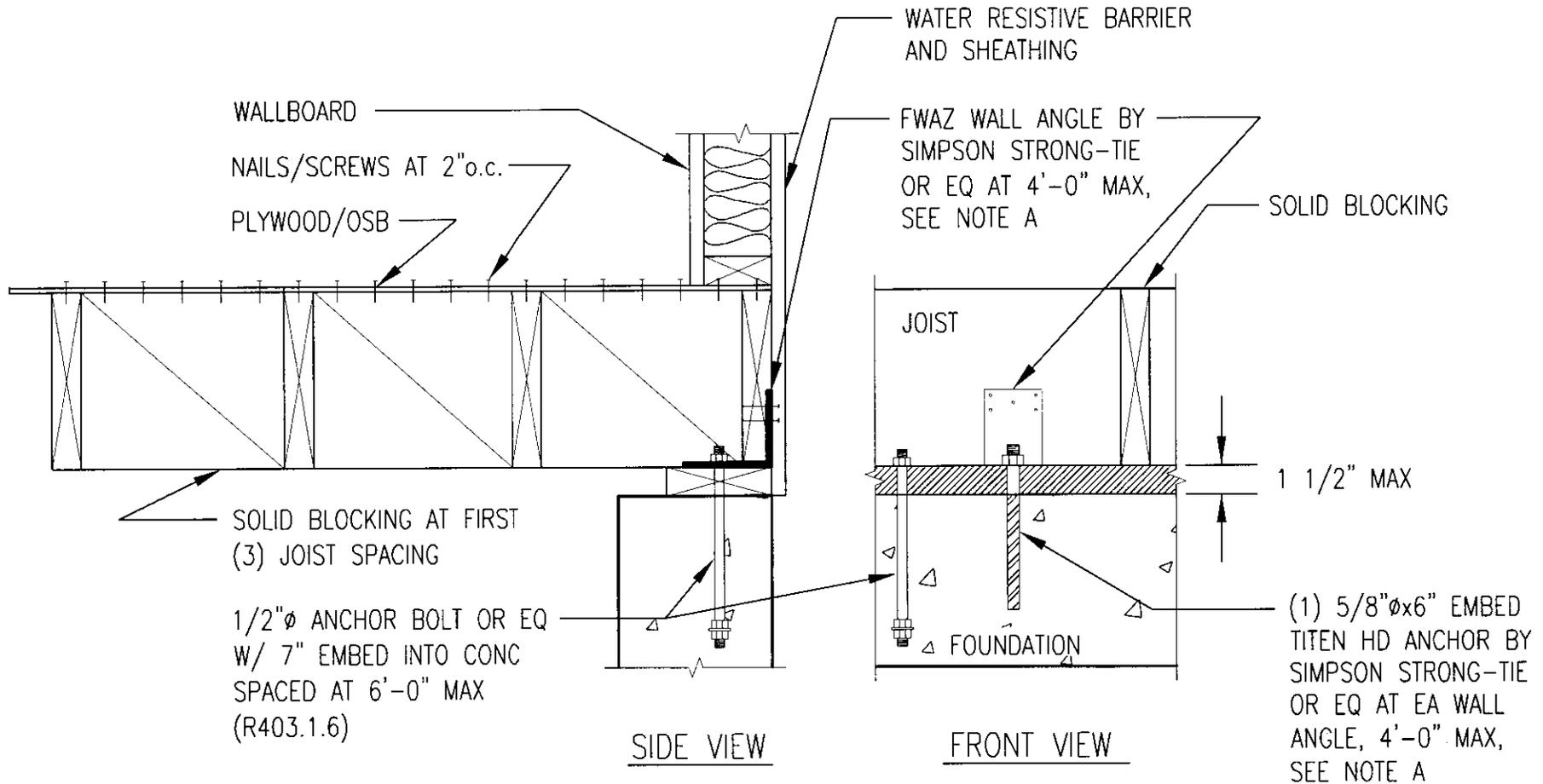
## Joist Parallel to Wall

2012 IRC

Section R404 Foundations and Retaining Walls  
Section R404.1 Concrete and Masonry Foundation Walls

\* This figure is provided as an example. This is not an all inclusive list of code requirements.

NOTE A: Refer to the manufacturers tables for required spacing and placement of FWAZ wall angles



# ALTERNATIVE 3.1

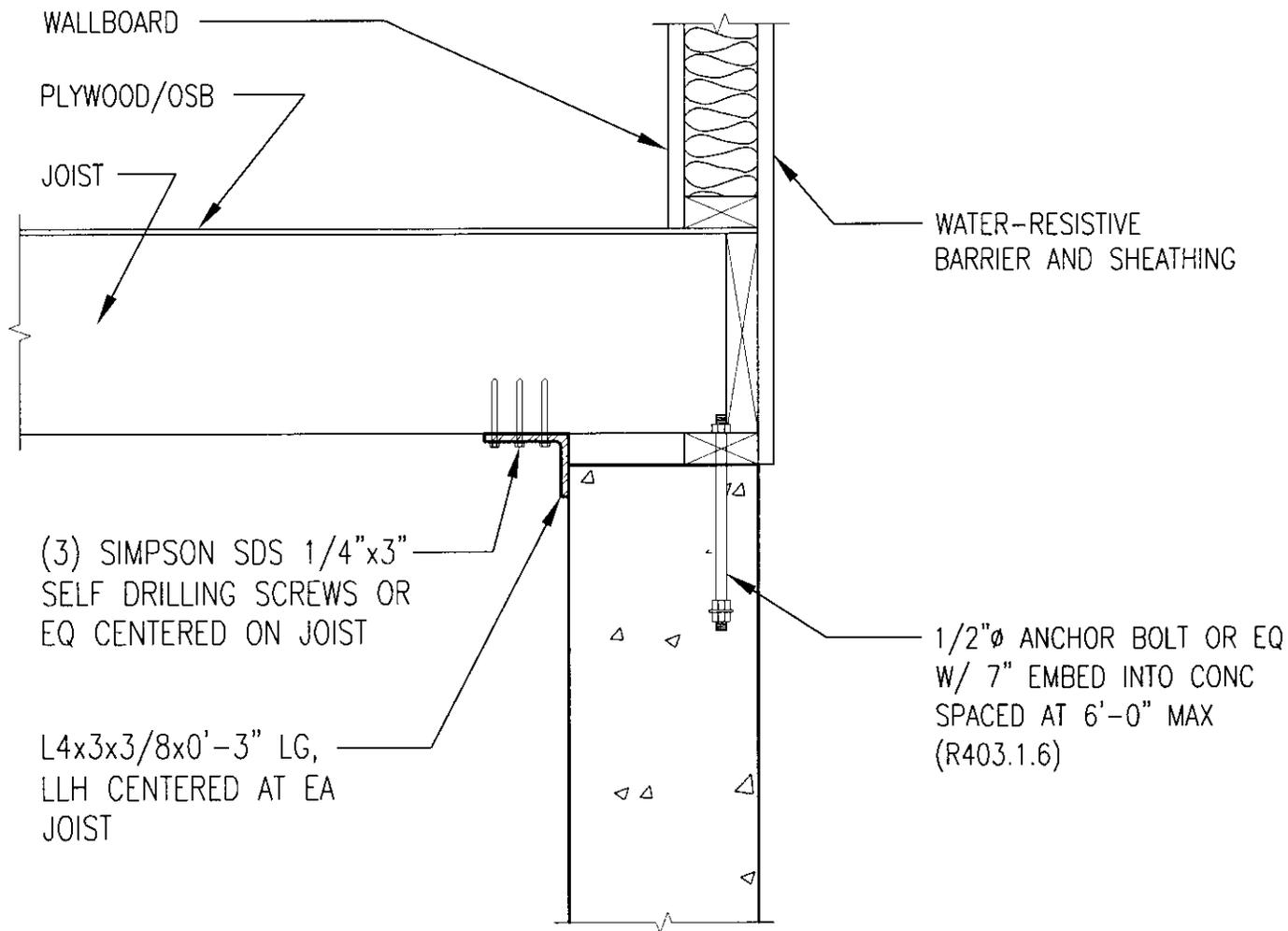
## Joist Perpendicular to Wall W/O Brick

2012 IRC

Section R404 Foundations and Retaining Walls

Section R404.1 Concrete and Masonry Foundation Walls

\* This figure is provided as an example. This is not an all inclusive list of code requirements.



# ALTERNATIVE 3.2

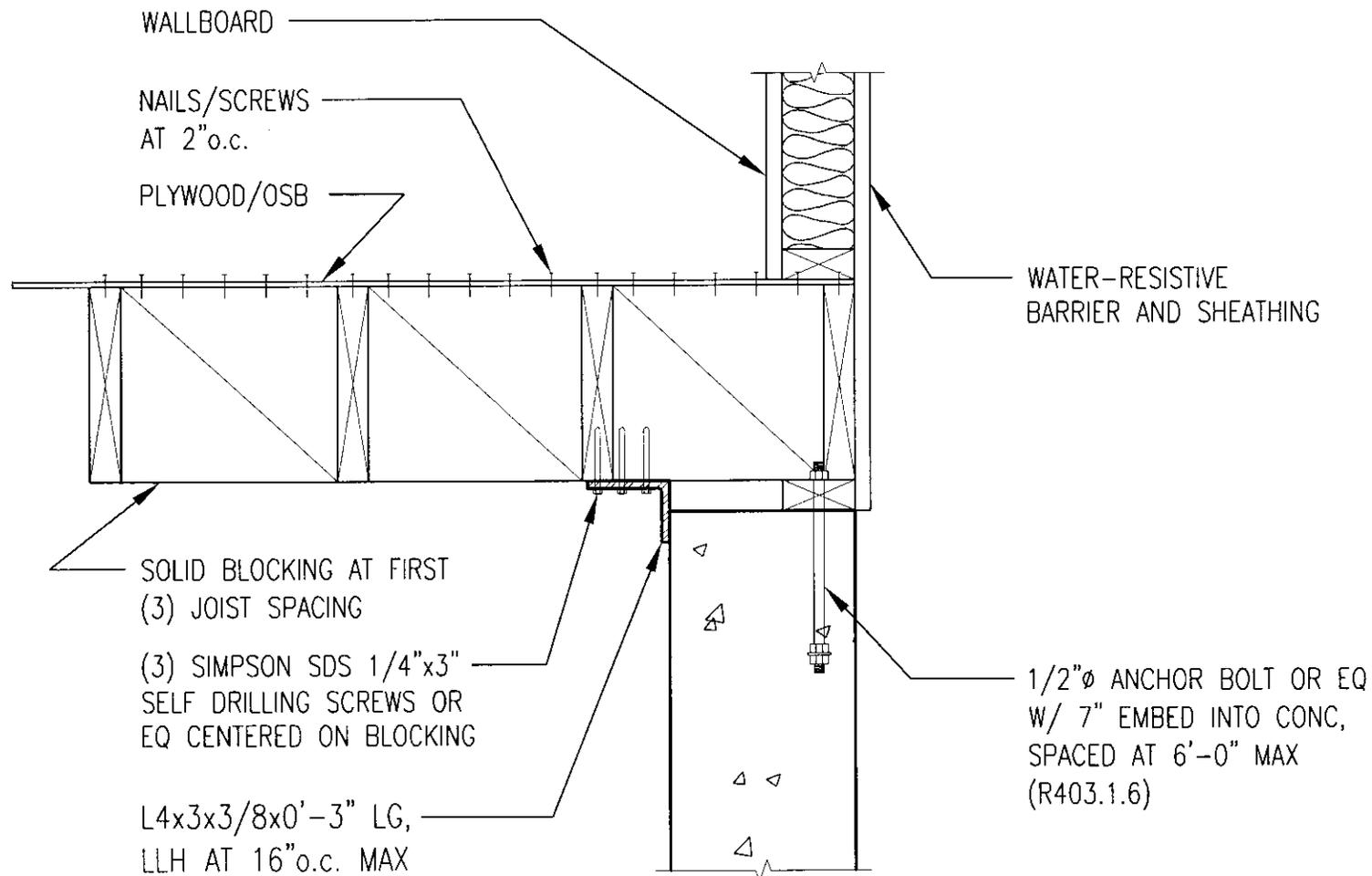
## Joist Parallel to Wall W/O Brick

2012 IRC

Section R404 Foundations and Retaining Walls

Section R404.1 Concrete and Masonry Foundation Walls

\* This figure is provided as an example. This is not an all inclusive list of code requirements.

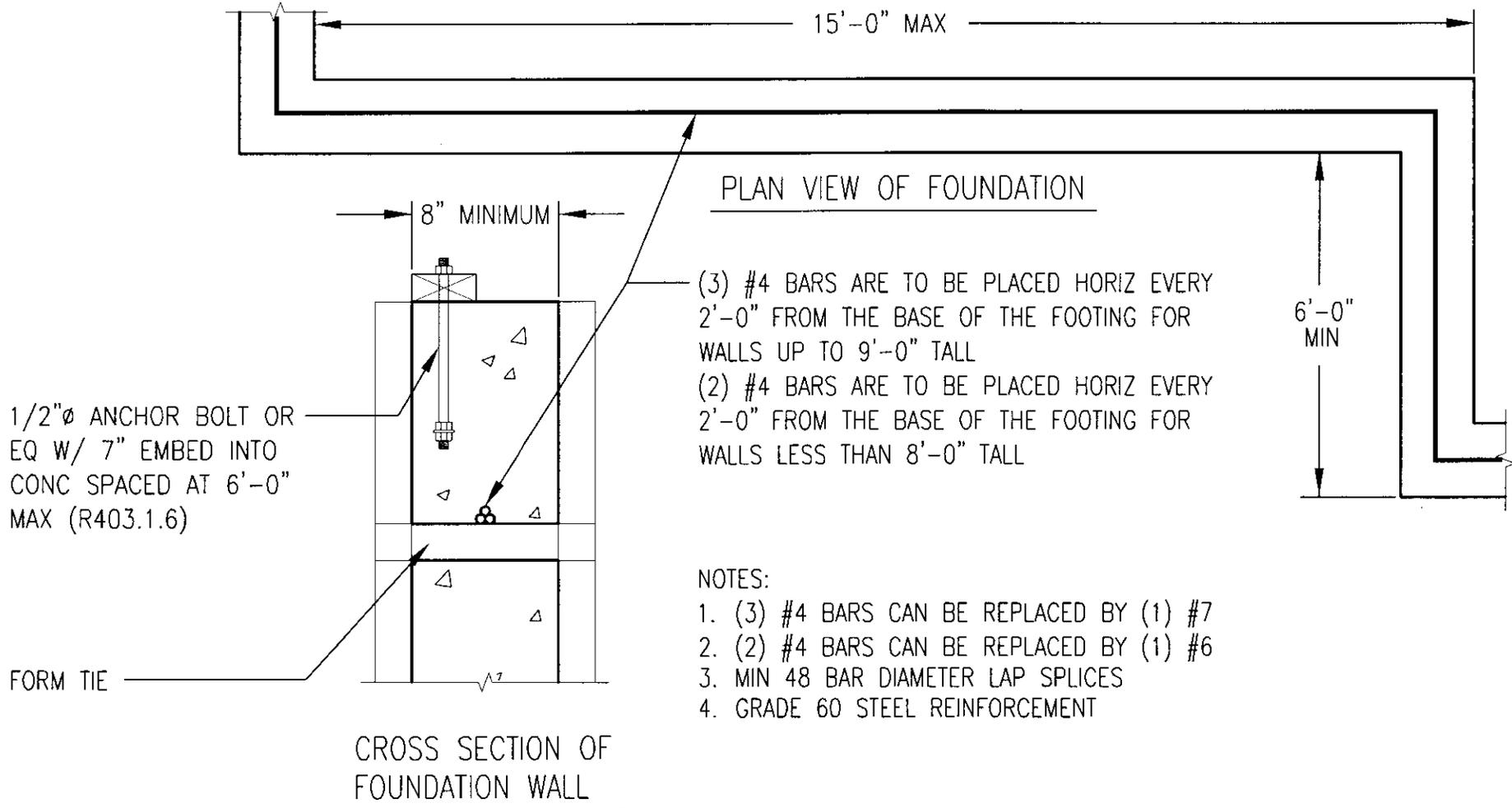


# ALTERNATIVE 4

2012 IRC

Section R404 Foundations and Retaining Walls  
Section R404.1 Concrete and Masonry Foundation Walls

\* This figure is provided as an example. This is not an all inclusive list of code requirements.



# FOUNDATION DRAINAGE

## FIGURE R405.1

2012 IRC

Section R405 Foundation Drainage

Section R406 Foundation Waterproofing and Dampproofing

- \* This figure is provided as an example. This is not an all inclusive list of code requirements.
- \*\* Either a filter fabric sock around draitile or filter fabric on the gravel shall be required, not both unless desired by the contractor.

