Introduced by _____ Council Bill No. _____R 119-13_____

A RESOLUTION

directing the City Clerk to place on file for a period of ninety (90) days certain uniform codes regulating the construction of buildings and continued occupancy thereof; mechanical, plumbing and electrical construction; and fire prevention.

WHEREAS, the City of Columbia desires to consider the adoption by reference of certain uniform codes regulating the construction of buildings and continued occupancy thereof; mechanical, plumbing and electrical construction; and fire prevention; and

WHEREAS, Section 67.280 of the Missouri Statutes requires the City to place such uniform codes on file in the office of the City Clerk for a period of ninety (90) days, prior to consideration of adoption of an ordinance adopting such uniform codes; and

WHEREAS, the City desires to provide notice that such codes are on file and available for public use, inspection and examination at least ninety (90) days prior to consideration of adoption by reference.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COLUMBIA, MISSOURI, AS FOLLOWS:

SECTION 1. The City Clerk is hereby directed to place on file for public use, inspection and examination for a period of at least ninety (90) days, the following codes:

- 2012 International Property Maintenance Code (IPMC)
- 2012 International Fire Code (IFC)
- 2012 International Plumbing Code (IPC)
- 2012 International Mechanical Code (IMC)
- 2012 International Fuel Gas Code (IFGC)
- 2012 International Residential Code (IRC)
- 2012 International Building Code (IBC)
- 2009 International Energy Conservation Code (IECC)
- 2011 National Electric Code (NEC)
- 2012 International Energy Conservation Code (IECC)
- 2012 International Existing Building Code (IEBC)

ADOPTED this _____ day of _____, 2013.

ATTEST:

_____
City Clerk

_____
Mayor and Presiding Officer

APPROVED AS TO FORM:

_____
City Counselor

Source: Community Development - BSD

Agenda Item No:

To: City Council
From: City Manager and Staff

Council Meeting Date: Jun 17, 2013

Re: Update of Building Codes

EXECUTIVE SUMMARY:

The Building Construction Codes Commission (BCCC) 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 to the BCCC.

Attached for Council consideration is a resolution that notifies the public that the these code books have been placed on file with the City Clerk for public use, inspection, and examination. Missouri Statutes require that the City place such code books on file a minimum of ninety (90) days prior to adoption.

DISCUSSION:

The BCCC and its committees held numerous meetings evaluating the effect of the new codes and determined what local addendums would be needed. Representatives of the Building and Site Development Division of the Community Development Department and the Fire Department provided staff support.

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 four items. Staff has supported 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 four differences between the BCCC and EEC recommendations are:

1. The amount of high efficacy lamps required.
2. Requiring insulation of hot water lines.
3. The amount of attic insulation.
4. The amount of wall insulation (a change from 2x4 framing to 2x6 framing).

If the codes are to continue to be minimum standards, the recommendation of the BCCC should be adopted. However, adopting the higher standards of insulation and lamps recommended by the EEC would be in keeping with the City's commitment to preservation 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 (IRC):

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 duct 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 for long span rafters and trusses.
6. Continuous sidewall flashing is now acceptable in lieu of step flashing only.
7. The 2012 code now requires a drip edge 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 compliance with Section P2503 which requires a pressure test on the entire building sewer system.
9. The BCCC decided to delete the requirement for Arc Fault Circuit Interrupters in one and two family dwellings. Ground fault circuit interrupters (GFCIs) still remain a requirement though.
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 (IBC):

Note: These codes apply to multiple family residential, commercial, institutional, and industrial structures.

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 persons.
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 currently meets the 2012 IECC "total building performance" requirements. "Total building performance" is a comparison of the proposed building design to a standard reference design established by the code official.
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 included the number of members for a quorum of the BCCC and that alternates may sit on the board 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:
Approve the resolution placing the referenced International Building Codes on file with the City Clerk for a period of ninety (90) days.

FISCAL and VISION NOTES:					
City Fiscal Impact 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/Epands an existing program?	No	**Vision Implementation impact**	
Amount of budget amendment needed	$0.00	Fiscal Impact on any local political subdivision?	No	Enter all that apply: Refer to Web site	
Estimated 2 year net costs:		**Resources Required**		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 #	

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

ENVIRONMENT AND ENERGY COMMISSION

CITY OF COLUMBIA / BOONE COUNTY, MISSOURI

Tuesday, January 22, 2013

Re: Radon Addendum to the Energy Code Recommendations

Mr. Mayor and Council Members,

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

Passive radon mitigation system: The EEC recommends that all new Columbia homes be required to have a passive radon mitigation system that can be upgraded to an active if necessary. This system is an option in the International Building Code and should be made mandatory in Columbia.

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 ($150-200 per house).

Since it is relatively inexpensive to install a 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.

Respectfully submitted,

Karl Skala
Environment and Energy Commission, Chair

(cc: Columbia City Clerk & Boone County Commission)

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^2 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^3 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^2, a 6" duct for houses < 2,400 ft^2, 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.

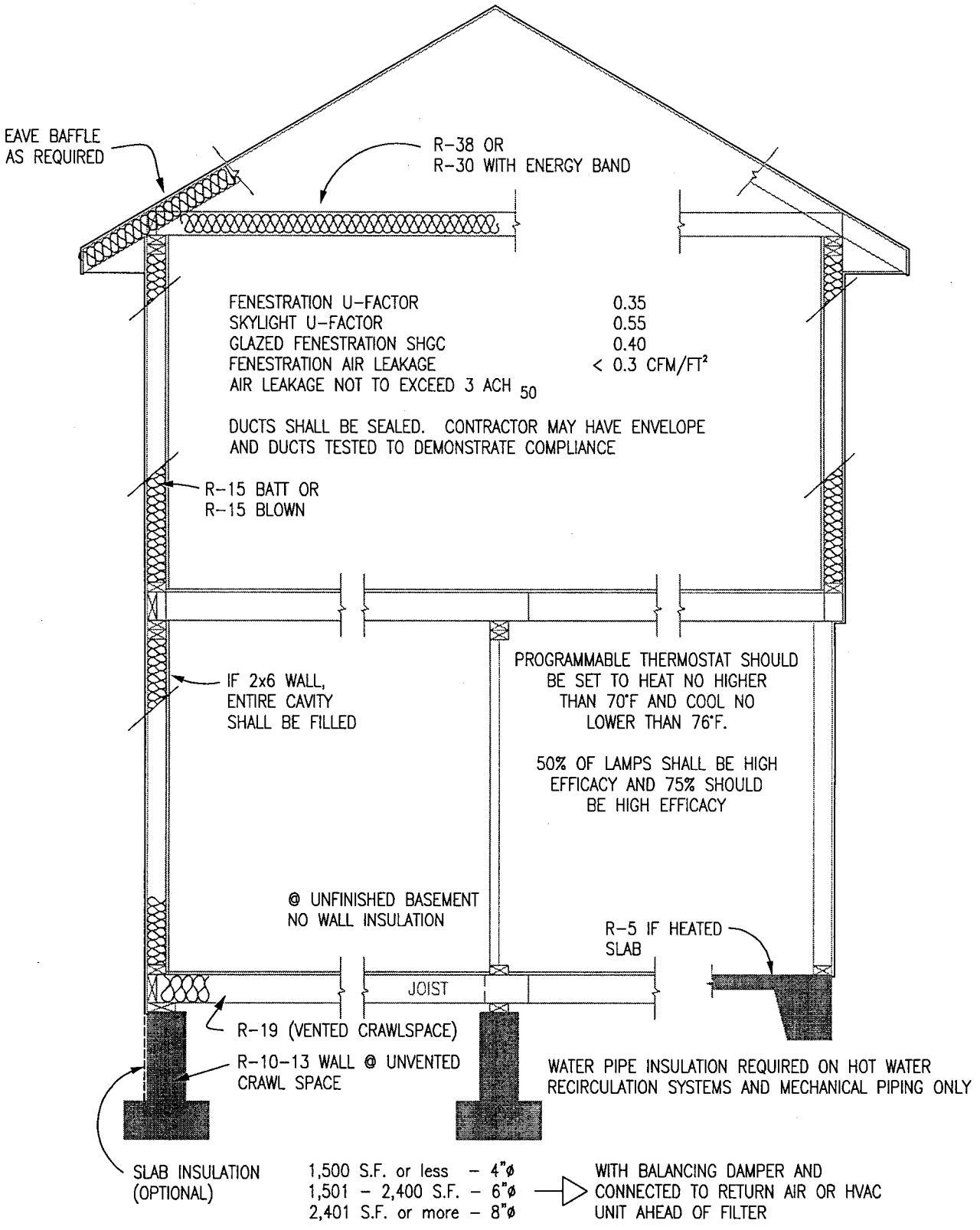
BCCC recommendation: Amend the energy code to conform to the mechanical code.

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.

RESIDENTIAL ENERGY CODE REQUIREMENTS DIAGRAM



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