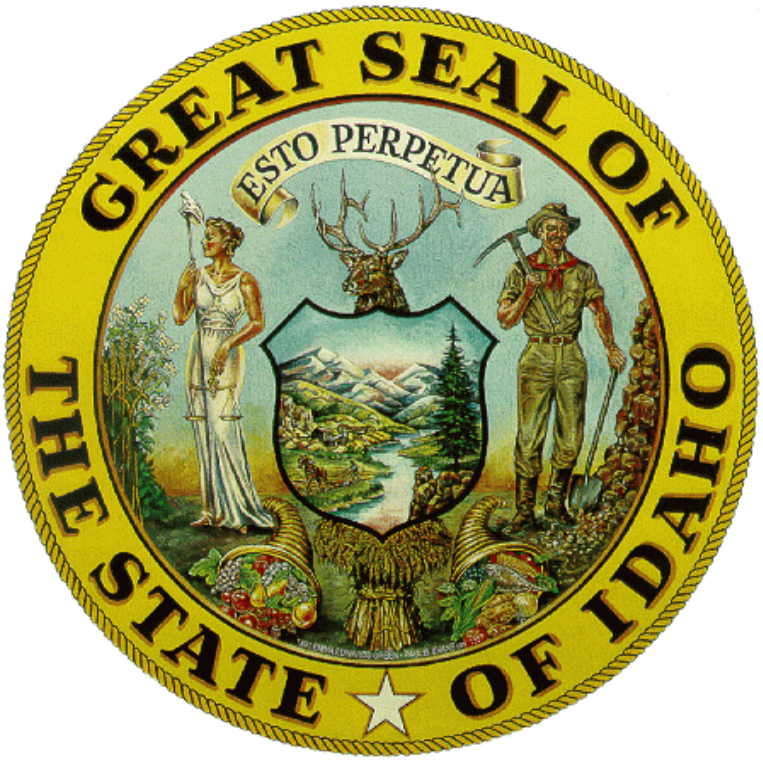
DIVISION OF BUILDING SAFETY

IDAHO BUILDING CODE BOARD
VIDEOCONFERENCE MEETING

APRIL 25, 2017



IDAHO BUILDING CODE BOARD

Agenda Item No. 01 **Agenda**

PRESENTER: Andrew Bick, Chairman

OBJECTIVE: Approve agenda for the April 25, 2017 Idaho Building Code Board meeting.

ACTION: Consent

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: Tentative agenda

TENTATIVE AGENDA

NOTICE OF PUBLIC MEETING/PUBLIC HEARING

IDAHO BUILDING CODE BOARD
VIDEOCONFERENCE MEETING

Division of Building Safety
1090 East Watertower Street, Suite 150, Meridian
1250 Ironwood Drive, Suite 220, Coeur d'Alene
2055 Garrett Way, Building 1, Suite 4, Pocatello

dbs.idaho.gov – (208) 332-7137

Tuesday, April 25, 2017
9:30 a.m. – 12:30 p.m. (MDT)

(Note: North Idaho - Meeting Commences @ 8:30 a.m. PDT)

9:30 a.m. **CALL TO ORDER** – Andrew Bick, Chairman
- Roll Call & Introductions
- Recognition – Travis Beck, Board Member
- Open Forum

CONSENT AGENDA

1. Approval of the April 25, 2017 Agenda – Andrew Bick, Chairman

2. Approval of the February 21, 2017 Board Meeting Minutes – Andrew Bick, Chairman

PUBLIC HEARING

3. Negotiated Rulemaking – Discuss possible amendments to the building and energy codes.

INFORMATIONAL AGENDA

4. Program Manager Report – Arlan Smith, Building Program Manager

5. Administrator Report – Chris L. Jensen, Administrator
   a. Financial Report

12:30 p.m. **ADJOURN**

All times, other than beginning, are approximate unless otherwise noted. Agenda items may shift depending on the Idaho Building Code Board's preference. 03/10/2017r

IDAHO BUILDING CODE BOARD

Agenda Item No. 02 **Minutes**

PRESENTER: Andrew Bick, Chairman

OBJECTIVE: Approve the draft minutes for the February 21, 2017 Idaho Building Code Board meeting.

ACTION: Consent

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: Draft minutes

IDAHO BUILDING CODE BOARD
VIDEOCONFERENCE MEETING

Tuesday – February 21, 2017 – 9:30 a.m. (MST)

Division of Building Safety
1090 East Watertower Street, Suite 150, Meridian
1250 Ironwood Drive, Suite 220, Coeur d'Alene
2055 Garrett Way, Building 1, Suite 4, Pocatello

*DRAFT MINUTES OF THE FEBRUARY 21, 2017 MEETING

NOTE: The following report is not intended to be a verbatim transcript of the discussions at the meeting, but to record the significant features of those discussions.

Chairman Andrew Bick called the meeting to order at 9:37 a.m. (MST)

Board Members Present:
Andrew Bick, Chairman
Michael Arrington
Chuck Bleth, Teleconference
Jason Blais
Dennis Schaffner
Jan Welch, P.E.
Allen Jensen

DBS Staff Members Present:
Chris L. Jensen, Administrator
Patrick Grace, Deputy Attorney General
Arlan Smith, Building Program Manager
Larry Jeffres, Regional Manager, Region 1
Jeff Egan, Regional Manager, Region 3
Shelly Farris, Regional Supervisor, Region 3
Renee Bryant, Administrative Assistant 2

- **Introduction**
  Chairman Bick welcomed Chris L. Jensen as the new Administrator of the Division of Building Safety.

- **Open Forum**
  Tiny Homes – Macy Miller, tiny home homeowner and advocate for tiny homes, distributed a code appendix accepted at the International Code Council (ICC) hearing in December 2016 for adoption into the 2018 International Residential Code (IRC).

  Board members not in attendance at the DBS Meridian office, as well as the DBS Pocatello and Coeur d'Alene offices, will receive Mrs. Miller's documentation.

  ACTION: The DBS Administrative Assistant will provide copies of the code appendix to board members not present at the DBS Meridian office and the Division's Pocatello and Coeur d'Alene offices.

  Mrs. Miller's primary concern is for safety to be more effective and incorporated into the building of tiny homes. The current appendix does not address tiny homes on wheels; however, the topic of wheels will be addressed at a future ICC hearing for the 2021 IRC.

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The appendix offers several exceptions for homes under 400 square feet, with much of the language borrowed from other sections of the codes.

RS25174 (Senate Bill 1067) – Board Member Blais brought forth RS25174. This proposal would allow jurisdictions, by their choice, to exempt homeowners/builders from purchasing building permits. It would also require an engineer for a structure over 2,500 square feet and a stipulation that owners/builders would not be able to build another home for seven (7) years.

Board Member Schaffner stated the Building Contractors Association has taken the position of opposing the proposal.

Chairman Bick suggested this topic be addressed under the informational agenda for further discussion and possible stance by the Board. The Chairman also suggested a statement be sent to the legislature prior to the voting of the bill.

- **Approval of the February 21, 2017 Agenda**
  The Chairman called for a motion on the agenda.

  MOTION: Jan Welch made a motion to add the topic *RS25174* to the agenda as an informational item because a hearing was established at the legislature this week; however, the Board did not have the opportunity to include the topic on the original agenda. Jason Blais seconded. Vote called. All in favor, motion carried.

  Upon further discussion, it was determined the Board may take action as to whether or not to endorse this issue. Board Member Welch amended her motion.

  AMENDED MOTION: Jan Welch amended her motion to change the topic *RS25174* from an informational item to an action item on the February 21, 2017 agenda because a hearing on the topic was established at the legislature after the original agenda had been created and distributed. Jason Blais seconded. Vote called. All in favor, motion carried.

  Chairman Bick called for a motion to amend the agenda.

  MOTION: Allen Jensen made a motion to approve the amended agenda. Jan Welch seconded. Vote called. All in favor, motion carried.

- **Approval of the October 25, 2016 Board Meeting Minutes**
  The Chairman called for a motion to approve the draft minutes.

  MOTION: Jason Blais made a motion to approve the minutes as written. Michael Arrington seconded. Vote called. All in favor, motion carried.

- **RS25174 (Senate Bill 1067)**
  February 21, 2017, was the first the Board and the DBS had "officially" heard of the recently proposed legislation; therefore, the topic was not posted to the agenda prior to the meeting.

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Concerns of the Board was: 1) Health and safety standards for the citizens of Idaho, 2) Potential issues for financing and insurance, 3) Potential impact from the Federal Emergency Management Agency (FEMA) with regard to flood plains and loss of federal funding, and 4) Impact on general funds for disaster from FEMA.

A hearing on S1067 will be Thursday, February 23, 2017, 3:00 p.m., at the Capitol Building.

MOTION: Michael Arrington made a motion the Board take the position to oppose the potential legislation; passing the thoughts of the Board onto the reviewing committee. Jan Welch seconded. Vote called. All in favor, motion carried.

Administrator Jensen offered, and Chairman Bick accepted, for the Division to draft a letter for his signature stating the reasons the Board does not endorse S1067. The Chairman asked to review the letter prior to the hearing on February 23, 2017.

Board Member Welch requested the Division notify the Board of the correct time and place of the hearing.

ACTION: The DBS Administrative Assistant will provide the Board with the hearing schedule on S1067, as well as prepare a letter for the Chairman's signature opposing the bill.

- **Building Code Coalition Resolution**

Board Member Jensen explained his reasons behind the creation of the Building Code Coalition Resolution, included in the Board packet.

As part of the negotiated rulemaking process, the Deputy Attorney General has posted in the March Administrative Bulletin, two public hearings, April 25th and June 27th.

Per discussion, and agreement, at the October 2016 Board meeting, the Administrator has met with IDABO President Jon Laux, as well as has had several meetings with the Idaho Building Contractors Association.

The Administrator offered the Division's facilities; however, stated it is not the function of the DBS to be the facilitator for collaborative meetings.

In the past, Association of Idaho Cities (AIC) Representative Leon Duce was the facilitator. Mr. Duce is no longer with the AIC. Johanna Bell, AIC Policy Analysis, stated they have resources to provide some facilitation toward collaborative efforts, and meeting space at the AIC offices.

On March 1, 2017, 10:00 a.m. (MST), a collaborative meeting will be held via tele/videoconference at the Division's Meridian, Coeur d'Alene and Pocatello offices.

- **Collaborative Meetings – Update**

The Chairman reiterated the pertinent information on the upcoming collaborative meeting.

- **Program Manager Report**

  Legislation – Both the House and Senate Committees have approved the rules to adopt the 2015 International Building Code and commercial provisions of the 2015 International Energy Conservation Code. The effective date will be January 1, 2018.

  Building Code Services – The DBS contracts with certain local governments to provide building code services. Since October 2016, the Division has established contracts with Menan, Ririe, Bellevue and Lava Hot Springs; totaling ten jurisdictions.

  Boise State University (BSU) Project – BSU is working on plans for a new fine arts building. The building is 97,000 square feet and estimated to cost $40 million dollars to build.

  Negotiated Rulemaking – The Division has a page solely on the negotiated rulemaking process. Following is a link to notices, instructions and submittal forms for each board, as well as public comments. https://dbs.idaho.gov/boards/rulemaking.html.

- **Administrator Report**

  Financial Report – The Idaho Building Code Fund FY 2017 financial statement, as of January 31, 2017, was addressed.

  Reorganization – There has been, and continues to be, reorganization within the DBS to better utilize the talents of the staff.

  Plan Reviews – Construction slowed down during the winter months; however, plan reviews were steady. If this is any indication, construction will be booming in Idaho come spring.

  Nuclear Fuel Facility – Construction of a new $1.6 billion facility, to process and store spent nuclear fuel from the nation's nuclear-powered submarines and aircraft carriers, will begin in 2019. The structure will be located on the northeast side of the existing Naval Reactors Facility property east of Idaho Falls, Idaho.

  School Bonds – In March, a number of school bonds, across the state, will be up for election. The Boise School District has a $172.5 million dollar bond that would facility improvements for all 48 schools, plus major building projects for 22 schools.

  Solar Projects – Construction on some solar farms are just finishing, while others are beginning. With the adverse winter, there have been issues with electrical equipment under water.

  Submersible Pumps – The DBS's Electrical Program Manager, Warren Wing, recently sent a notice, via email, to all electrical license holders on the installation of submersible pumps, panels, pivots, etc. As stated under the topic *Solar Projects*, there have been reports of pump panels submerged in water.

  Publication – The Division has a proposal from the ICC to publish, online, the IRC. Currently, the DBS is waiting to see if the Joint Finance-Appropriations Committee will

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authorize the funds. The online publication will be read-only; however, hard copies will be available to purchase. The intent is to have amendments (appendixes) in the body of the code, not in the back of the book.

School Safety and Security – Located within the Division is the Idaho Office of School Safety and Security (OSSS). The new program provides security assessments to Idaho schools and serves as a repository of best practices information for public schools. Every three years the OSSS collaborates with the Division's Industrial Safety program to combine inspections.

Snow Loads – With the recent extreme Idaho winter, the Chairman asked if local jurisdictions have voiced concern to revise snow loads. The DBS has been involved with the Office of Emergency Management to inspect hundreds of facilities. The OSSS sent a winter safety alert to Idaho School Superintendents about snow loads and roof structures. Individuals stated the snow load measurements in their areas did not exceed the minimum requirements.

- **Adjournment**

The Chairman called for a motion to adjourn the meeting.

MOTION: Michael Arrington made a motion to adjourn. Jan Welch seconded. Vote called. All in favor, motion carried.

The meeting adjourned at 11:37 a.m. (MST)

ANDREW BICK, CHAIRMAN IDAHO BUILDING CODE BOARD	CHRIS L. JENSEN, ADMINISTRATOR DIVISION OF BUILDING SAFETY
DATE	DATE

*These DRAFT minutes are subject to possible correction and final approval by the Idaho Building Code Board. 03/13/2017rb

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IDAHO BUILDING CODE BOARD

Agenda Item No. 03 **Negotiated Rulemaking**

PRESENTER: Andrew Bick, Chairman

OBJECTIVE: Discuss possible amendments to the building and energy codes.

ACTION: Informational

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: Proposed amendments

DIVISION OF BUILDING SAFETY
APPLICATION FOR REVIEW OF A PROPOSED STATEWIDE AMENDMENT
TO STATE ADOPTED CODES
2012 Code Adoption Cycle

Log#_____
(Office Use Only)

PLEASE FOLLOW INSTRUCTIONS ON PAGE FIVE

1. State Building Code to be Amended:

☐ International Building Code	☐ International Energy Conservation Code
x International Residential Code	☐ International Mechanical Code
☐ International Fuel Gas Code	☐ National Electrical Code
☐ International Existing Building Code	☐
☐ Idaho State Plumbing Code	☐

Section ____Appendix Q_____ **Page _____**

2. Applicant Name (Specific local government, organization or individual):

Macy Miller, LEED AP BD+C

3. Signed:

Architectural Designer

3/20/17

Proponent **Title** **Date**

4. Designated Contact Person:

Name Macy Miller **Title** Architectural Designer

Address:

870 N. 31st Street
Boise, Idaho 83702

Office Phone N/A **Cell** 208-991-3725 **Fax** N/A

E-mail address: Mizacy@gmail.com

5. Proposed Code Amendment. Use 'legislative format' including both old and new language. **See instructions on page five for specific details.** Please attach a separate sheet for each separate proposal.

IRC	2018 IRC Appendix Q (formerly V)	1-3
Code	**Section**	**Page**

Under 07.03.01, 004., 02. add the following:

q. Add Appendix Q Tiny Houses into the 2012 International Residential Code as follows:

Please note number of additional pages: 3

APPENDIX Q TINY HOUSES

SECTION AV101— GENERAL

AV101.1 Scope. This appendix shall be applicable to tiny houses used as single dwelling units. Tiny houses shall comply with this code except as otherwise stated in this appendix.

SECTION AV102— DEFINITIONS

AV102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

EGRESS ROOF ACCESS WINDOW. A skylight or roof window designed and installed to satisfy the emergency escape and rescue opening requirements in Section R310.2.

LANDING PLATFORM. A landing provided as the top step of a stairway accessing a loft.

LOFT. A floor level located more than 30 inches (762 mm) above the main floor and open to it on at least one side with a ceiling height of less than 6 feet 8 inches (2032 mm), used as a living or sleeping space.

TINY HOUSE. A dwelling that is 400 square feet (37 m) or less in floor area excluding lofts.

SECTION AV103— CEILING HEIGHT

AV103.1 Minimum ceiling height. Habitable space and hallways in tiny houses shall have a ceiling height of not less than 6 feet 8 inches (2032 mm). Bathrooms, toilet rooms, and kitchens shall have a ceiling height of not less than 6 feet 4 inches (1930 mm). Obstructions shall not extend below these minimum ceiling heights including beams, girders, ducts, lighting and other obstructions.

> Exception: Ceiling heights in lofts are permitted to be less than 6 feet 8 inches (2032 mm).

SECTION AV104— LOFTS

AV104.1 Minimum loft area and dimensions. Lofts used as a sleeping or living space shall meet the minimum area and dimension requirements of Sections AV104.1.1 through AV104.1.3.

AV104.1.1 Minimum area. Lofts shall have a floor area of not less than 35 square feet (3.25 m).

AV104.1.2 Minimum dimensions. Lofts shall be not less than 5 feet (1524 mm) in any horizontal dimension.

AV104.1.3 Height effect on loft area. Portions of a loft with a sloping ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.

> **Exception:** Under gable roofs with a minimum slope of 6:12, portions of a loft with a

sloping ceiling measuring less than 16 inches (406 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.

AV104.2 Loft access. The access to and primary egress from lofts shall be any type described in Sections AV104.2.1 through AV104.2.4.

AV104.2.1 Stairways. Stairways accessing lofts shall comply with this code or with Sections AV104.2.1.1 through AV104.2.1.5.

AV104.2.1.1 Width. Stairways accessing a loft shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The minimum width below the handrail shall be not less than 20 inches (508 mm).

AV104.2.1.2 Headroom. The headroom in stairways accessing a loft shall be not less than 6 feet 2 inches (1880 mm), as measured vertically, from a sloped line connecting the tread or landing platform nosings in the middle of their width.

> **Exception**: The headroom for a landing platform, where stairways access lofts, shall be not less than 4 feet 6 inches (1372 mm).

AV104.2.1.3 Treads and risers. Risers for stairs accessing a loft shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:

1. The tread depth shall be 20 inches (508 mm) minus 4/3 of the riser height, or
2. The riser height shall be 15 inches (381 mm) minus 3/4 of the tread depth.

AV104.2.1.4 Landing platforms. The top tread and riser of stairways accessing lofts shall be constructed as a landing platform where the loft ceiling height is less than 6 feet 2 inches (1880 mm) where the stairway meets the loft. The landing platform shall be 18 inches to 22 inches (457 to 559 mm) in depth measured from the nosing of the landing platform to the edge of the loft, and 16 to 18 inches (406 to 457 mm) in height measured from the landing platform to the loft floor.

AV104.2.1.5 Handrails. Handrails shall comply with Section R311.7.8.

AV104.2.1.6 Stairway guards. Guards at open sides of stairways shall comply with Section R312.1.

AV104.2.2 Ladders. Ladders accessing lofts shall comply with Sections AV104.2.1 and AV104.2.2.

AV104.2.2.1 Size and capacity. Ladders accessing lofts shall have a rung width of not less than 12 inches (305 mm) and 10 inches (254 mm) to 14 inches (356 mm) spacing between rungs. Ladders shall be capable of supporting a 200 pound (75 kg) load on any rung. Rung spacing shall

be uniform within 3/8-inch (9.5 mm).

AV104.2.2.2 Incline. Ladders shall be installed at 70 to 80 degrees from horizontal.

AV104.2.3 Alternating tread devices. Alternating tread devices accessing lofts shall comply with Sections R311.7.11.1 and R311.7.11.2. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

AV104.2.4 Ships ladders. Ships ladders accessing lofts shall comply with Sections R311.7.12.1 and R311.7.12.2. The clear width at and below handrails shall be not less than 20 inches (508 mm).

AV104.2.5 Loft Guards. Loft guards shall be located along the open side of lofts. Loft guards shall not be less than 36 inches (914 mm) in height or one-half of the clear height to the ceiling, whichever is less.

SECTION AV105— EMERGENCY ESCAPE AND RESCUE OPENINGS

AV105.1 General. Tiny houses shall meet the requirements of Section R310 for emergency escape and rescue openings.

> **Exception:** Egress roof access windows in lofts used as sleeping rooms shall be deemed to meet three requirements of Section R310 where installed such that the bottom of the opening is not more than 44 inches (1118 mm) above the loft floor, provided the egress roof access window complies with the minimum opening area requirements of Section R310.2.1.

Supporting Data for Statewide Amendment Proposals. This information is required for all statewide amendment proposals. **Attach supporting documentation, as necessary; incomplete proposals will not be accepted.**

The governing boards require supporting data on any amendment proposal to show:

1. **That it meets basic criteria – See Part I to specify how this proposal meets the criteria for code amendment.**
2. **The intended effect – See Part II to describe the purpose of the proposed amendment, including the benefits and the problems addressed.**
3. **The potential impacts or benefits to business – See Part III/Types of Construction, to explain how methods in construction businesses, industries and services would be affected.**
4. **The potential impacts on enforcement procedures, See Part III/Types of Services Required, to provide some analysis of the impacts on code enforcement in local jurisdictions.**
5. **Economic costs and benefits – Use the Table in Part IV of this form to estimate the costs and benefits of the proposal on construction practices, users and/or the public, the enforcement community, and operation and maintenance.**

Part I ♦ Background information on amendment.

Code references: Appendix Q 2018 IRC Title: Tiny Houses

Related Codes: None
(Does this amendment change other related codes?)

Proponent: Macy Miller Phone: 208-991-3725 Date: 3/20/2017

NOTE: Amendments to the state building code must be based on one of the following criteria; please indicate the pertinent rationale for the proposed amendment by selecting from the list below:

X The amendment is needed to address a critical life/safety need.
(2) The amendment is needed to address a specific state policy or statute.
(3) The amendment is needed for consistency with state or federal regulations.
(4) The amendment is needed to address a unique character of the state.
(5) The amendment corrects errors and omissions.

Part II ♦ Amendment Benefit:

PROBLEM(S) ADDRESSED (Describe the intended effect of the proposed code amendment):

The current code does not address the unique nature of tiny houses. While possible for small homes to be built by existing code, national trends are popularizing tiny houses on wheels. While the nationally accepted Appendix V does not include wheeled structures, it does provide a path to build a similar sized house as a ground bound residence. While tiny homes gain in popularity, many of their occupants would prefer to have a permanent structure of an equivalent style which is inhibited by current code requirements. Appendix V allows exceptions for homes under 400 s.f., it was accepted by the International Code Council to meet life safety concerns for the 2018 IRC. Adopting the appendix for this next code cycle will provide a legal and permissible path to tiny homes on foundations ro residents.

PRIMARY REASON FOR AMENDMENT: (Describe how the amendment meets one of the criteria listed above)
Tiny homes are currently being built without a focus on life safety. Without some allowances to enable these desired small structures, legally and with a focus on life safety, occupants are getting comfortable just building 'under the radar'. By allowing a legal path to tiny house occupancy more people will be building to code within their regulatory jurisdiction while also contributing to the community infrastructure which they benefit from. This would likely reduce costs to regulating bodies by providing a path for officials to accepts small dwellings under standard circumstances and limiting code violation matters while also prioritizing life safety.

Part III Amendment Impacts or Benefits:
TYPES OF CONSTRUCTION:
[X] New Construction [] Alteration/Tenant Improvement/Repair [X] Residential-Single Family [ ] Residential-Multi Family [ ] Commercial [ ] Industrial

List businesses/industries affected by amendment:

Manufacturers: _____
Specific Construction Contractors & Trades: _____
Construction Supply Industry: _____
Specialty Trades: ____Tiny Home Manufacturers_____
Types of Buildings: _____Single Family Residences/ADUs _____
Fire Protection Industry: _____

Types of Services Required:
[ ] Reporting: Brief Description_____
[ ] Record Keeping: Brief Description_____
[ ] Other: Brief Description_____
[ ] Indirect Cost to Industry: Indicate whether there are multiple sources to obtain the equipment, material or service required by this proposal. If not, provide a justification of the benefit versus small business impact.

Part IV Amendment Costs and Benefits

Building Types	Construction *1			Enforcement *2			Operations & Maintenance *3		
	Costs	% Impact *4	Benefits	Costs	% Impact	Benefits	Costs	% Impact	Benefits
Residential	N/A	0%	N/A	N/A	0%	achieved	N/A	0%	N/A
Single-Family	N/A	0%	N/A	N/A	0%	achieved	N/A	0%	N/A
Multi-Family	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commercial/Retail	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Industrial	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Institutional	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1 $ / square foot of floor area or other cost. Attach data. Construction costs are costs prior to occupancy, and include both design and direct construction costs that impact the total cost of the construction to the owner/consumer.
2 Cost per project plan. Attach data. Enforcement costs include governmental review of plans, field inspection, and mediated litigation required for enforcement.
3 Cost to building owner/tenants over the life of the project.
4 Cost differential over a specific size project or range of projects as determined by the proponent. Provide sufficient cost and benefit detail to clarify the impact to the Council. All data should be created and referenced to third party reputable sources for verification.
5 Note sectors with measurable benefit from Part II, including benefits to a) the user, b) the public, c) the industry, and/or d) the economy; use e) for all of the above.

APPENDIX G

SWIMMING POOLS, SPAS AND HOT TUBS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordi

SECTION AG101 GENERAL

AG101.1 General. The provisions of this appendix shall control the design and construction of swimming pools, spas and hot tubs installed in or on the *lot* of a one- or two-family dwelling.

AG101.2 Pools in flood hazard areas. Pools that are located in flood hazard areas established by Table R301.2(1), including above-ground pools, on-ground pools and in-ground pools that involve placement of fill, shall comply with Section AG101.2.1 or AG101.2.2.

Exception: Pools located in riverine flood hazard areas which are outside of designated floodways.

AG101.2.1 Pools located in designated floodways. Where pools are located in designated floodways, documentation shall be submitted to the *building official* which demonstrates that the construction of the pool will not increase the design flood elevation at any point within the *jurisdiction*.

AG101.2.2 Pools located where floodways have not been designated. Where pools are located where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed pool will not increase the design flood elevation more than 1 foot (305 mm) at any point within the *jurisdiction*.

SECTION AG102 DEFINITIONS

AG102.1 General. For the purposes of these requirements, the terms used shall be defined as follows and as set forth in Chapter 2.

ABOVE-GROUND/ON-GROUND POOL. See "Swimming pool."

BARRIER. A fence, wall, building wall or combination thereof which completely surrounds the swimming pool and obstructs access to the swimming pool.

HOT TUB. See "Swimming pool."

IN-GROUND POOL. See "Swimming pool."

RESIDENTIAL. That which is situated on the premises of a detached one- or two-family dwelling, or a one-family *townhouse* not more than three stories in height.

SPA, NONPORTABLE. See "Swimming pool."

SPA, PORTABLE. A nonpermanent structure intended for recreational bathing, in which all controls, water-heating and water-circulating *equipment* are an integral part of the product.

SWIMMING POOL. Any structure intended for swimming or recreational bathing that contains water more than 24 inches (610 mm) deep. This includes in-ground, above-ground and on-ground swimming pools, hot tubs and spas.

SWIMMING POOL, INDOOR. A swimming pool which is totally contained within a structure and surrounded on all four sides by the walls of the enclosing structure.

SWIMMING POOL, OUTDOOR. Any swimming pool which is not an indoor pool.

SECTION AG103 SWIMMING POOLS

AG103.1 In-ground pools. In-ground pools shall be designed and constructed in compliance with ANSI/NSPI-5.

AG103.2 Above-ground and on-ground pools. Above-ground and on-ground pools shall be designed and constructed in compliance with ANSI/NSPI-4.

AG103.3 Pools in flood hazard areas. In flood hazard areas established by Table R301.2(1), pools in coastal high-hazard areas shall be designed and constructed in compliance with ASCE 24.

SECTION AG104 SPAS AND HOT TUBS

AG104.1 Permanently installed spas and hot tubs. Permanently installed spas and hot tubs shall be designed and constructed in compliance with ANSI/NSPI-3.

AG104.2 Portable spas and hot tubs. Portable spas and hot tubs shall be designed and constructed in compliance with ANSI/NSPI-6.

SECTION AG105 BARRIER REQUIREMENTS

AG105.1 Application. The provisions of this appendix shall control the design of barriers for residential swimming pools, spas and hot tubs. These design controls are intended to provide protection against potential drownings and near-drownings by restricting access to swimming pools, spas and hot tubs.

FINAL ACTION RESULTS ON THE 2016 PROPOSED CHANGES TO THE INTERNATIONAL CODES – GROUP B

Updated 2
See highlighted cor

The following is a comprehensive list of the Final Action on the 2016 Group B Proposed Changes to the 2015 Editions of th following *International Codes*:

Administrative Provisions of the *International Codes (ADM)*
International Building Code – Structural (S)
International Energy Conservation Code – Commercial (CE)
International Energy Conservation Code – Residential (RE) and International Residential Code – Energy (RE)
International Existing Building Code – Structural provisions (EB)
International Fire Code (F)
International Residential Code – Building (RB)
International Wildland-Urban Interface Code (IWUIC)

This Final Action includes portions of the following International Codes maintained by Group B Code Development Commit designated in the "Group A and Group B Code Development Committee Responsibilities" matrix.

International Building Code – Egress (E)
International Building Code – Fire Safety (FS)
International Building Code – General (G)
International Fuel Gas Code (FG)
International Mechanical Code (M)
International Property Maintenance Code (PM)

This includes the items considered at the 2016 Public Comment Hearings in Kansas City, MO, **October 19-25, 2016.** For th code changes considered at the Public Comment Hearings, the final action was determined based on the Online Governme Consensus Vote (OGCV) held November 8 – 27, 2016. See page 16 for results of the OGCV.

Approved changes from the 2016 Cycle will be published in the 2018 *International Codes*.

LEGEND:

AS	**Approved as Submitted**
AM	**Approved as Modified at the Committee Action Hearing**
AMPC	**Approved as Modified by Public Comment**
D	**Disapproved**
WP	**Withdrawn by Proponent**
NU	**Number Not Used**

CODE CHANGE NUMBER	FINAL ACTION
ADMINISTRATIVE PROVISIONS	
ADM1-16 Part I	AS
ADM1-16 Part II	AS
ADM1-16 Part III	AS
ADM1-16 Part IV	AS
ADM2-16 Part I	AS
ADM2-16 Part II	AS
ADM2-16 Part III	AS
ADM2-16 Part IV	D

CODE CHANGE NUMBER	FINAL ACTION
ADM4-16 Part III	AS
ADM5-16 Part I	D
ADM5-16 Part II	AS
ADM6-16 Part I	AMPC1
ADM6-16 Part II	AM
ADM6-16 Part III	AM
ADM6-16 Part IV	AM
ADM7-16 Part I	D
ADM7-16 Part II	AM
ADM8-16 Part I	AM

CODE CHANGE NUMBER	FI AC
ADM9-16 Part III	
ADM9-16 Part IV	
ADM10-16 Part I	
ADM10-16 Part II	AM
ADM11-16 Part I	
ADM11-16 Part II	
ADM12-16 Part I	
ADM12-16 Part II	
ADM13-16 Part I	AM
ADM13-16 Part II	

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ADM3-16 ..... AS
ADM4-16 Part I..... AS
ADM4-16 Part II..... AS
ADM8-16 Part II..... AS
ADM9-16 Part I.....AMPC1, 2
ADM9-16 Part II.....AMPC2
ADM14-16 Part I.....
ADM14-16 Part II.....
ADM15-16 Part I.....

.. AS
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CODE CHANGE NUMBER	FINAL ACTION
RB78-16	D
RB79-16	AMPC1
RB80-16	D
RB81-16	AS
RB82-16	AM
RB83-16	D
RB84-16	D
RB85-16	D
RB86-16	D
RB87-16	D
RB88-16	D
RB89-16	AS
RB90-16	D
RB91-16	D
RB92-16	D
RB93-16	D
RB94-16	D
RB95-16	D
RB96-16	AMPC1
RB97-16	D
RB98-16	D
RB99-16	D
RB100-16	D
RB101-16	AS
RB102-16	D
RB103-16	AM
RB104-16	AS
RB105-16	AS
RB106-16	D
RB107-16	AS
RB108-16	AM
RB109-16	D
RB110-16	AS
RB111-16	D
RB112-16	AS
RB113-16	D
RB114-16	D
RB115-16	D
RB116-16	D
RB117-16	AS
RB118-16	D
RB119-16	D
RB120-16	D
RB121-16	D
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RB124-16	D
RB125-16	D
RB126-16	D
RB127-16	D
RB128-16	D
RB129-16	D
RB130-16	D

CODE CHANGE NUMBER	FINAL ACTION
RB135-16	D
RB136-16	D
RB137-16	D
RB138-16	D
RB139-16	AS
RB140-16	D
RB141-16	D
RB142-16	D
RB143-16	D
RB144-16	AS
RB145-16	D
RB146-16	AS
RB147-16	D
RB148-16	D
RB149-16	D
RB150-16	AS
RB151-16	D
RB152-16	D
RB153-16	D
RB154-16	AS
RB155-16	D
RB156-16	D
RB157-16	D
RB158-16	D
RB159-16	D
RB160-16	AMPC2
RB161-16	AMPC1
RB162-16	AS
RB163-16	D
RB164-16	AS
RB165-16	AS
RB166-16	AS
RB167-16	AS
RB168-16	AMPC1
RB169-16	D
RB170-16	D
RB171-16	AM
RB172-16	AS
RB173-16	AS
RB174-16	D
RB175-16	D
RB176-16	AS
RB177-16	AS
RB178-16	AS
RB179-16	AS
RB180-16	WP
RB181-16	AM
RB182-16	D
RB183-16	D
RB184-16	AS
RB185-16	D
RB186-16	D
RB187-16	AS

CODE CHANGE NUMBER	FI AC
RB192-16	
RB193-16	
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RB199-16	
RB200-16	AM
RB201-16	
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RB131-16 ..... AS
RB132-16 ..... AS
RB133-16 .....D
RB134-16 .....D

RB188-16 ..... D
RB189-16 ..... AS
RB190-16 ..... D
RB191-16 ..... D

RB245-16.....
RB246-16.....
RB247-16.....
RB248-16.....

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Public Comment RB168-16 MORRISON 1 :

Proponent : Andrew Morrison, representing Tiny House Enterprises, LLC (Andrew@TinyHouseBuild.com); Martin Hammer, representing Martin Hammer, architect (mfhammer@pacbell.net); Chris Keefe, representing OrganicForms Design (chris@organicformsdesign.com); Brandon Marshall, representing FOG Studio (brandon@fogprojects.com); Gabriella Morrison, representing Tiny House Enterprises, LLC (Gabriella@TinyHouseBuild.com); James Herndon, representing self (jamesmherndon@gmail.com); Tiffany Redding, representing FOG Studio (tiffany@fogprojects.com); Nabil Taha, representing Precision Structural Engineering, Inc. (bill@structure1.com) requests Approve as Modified by this Public Comment.

Replace Proposal as Follows:

2015 International Residential Code

APPENDIX V TINY HOUSES

CHAPTER PART AV101— GENERAL

AV101.1 Scope. This appendix shall be applicable to tiny houses used as single dwelling units. Tiny houses shall comply with this code except as otherwise stated in this appendix.

CHAPTER PART AV102— DEFINITIONS

AV102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

EGRESS ROOF ACCESS WINDOW. A skylight or roof window designed and installed to satisfy the emergency escape and rescue opening requirements in Section R310.2.

LANDING PLATFORM. A landing provided as the top step of a stairway accessing a loft.

LOFT. A floor level located more than 30 inches (762 mm) above the main floor and open to it on at least one side with a ceiling height of less than 6 feet 8 inches (2032 mm), used as a living or sleeping space.

TINY HOUSE. A dwelling that is 400 square feet (37 m^2) or less in floor area excluding lofts.

CHAPTER PART AV103— CEILING HEIGHT

AV103.1 Minimum ceiling height. Habitable space and hallways in tiny houses shall have a ceiling height of not less than 6 feet 8 inches (2032 mm). Bathrooms, toilet rooms, and kitchens shall have a ceiling height of not less than 6 feet 4 inches (1930 mm). Obstructions shall not extend below these minimum ceiling heights including beams, girders, ducts, lighting and other obstructions.

Exception: Ceiling heights in lofts are permitted to be less than 6 feet 8 inches (2032 mm).

CHAPTER PART AV104— LOFTS

AV104.1 Minimum loft area and dimensions. Lofts used as a sleeping or living space shall meet the minimum area and dimension requirements of Sections AV104.1.1 through AV104.1.3.

AV104.1.1 Minimum area. Lofts shall have a floor area of not less than 35 square feet (3.25 m^2).

AV104.1.2 Minimum dimensions. Lofts shall be not less than 5 feet (1524 mm) in any horizontal dimension.

AV104.1.3 Height effect on loft area. Portions of a loft with a sloping ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.

Exception: Under gable roofs with a minimum slope of 6:12, portions of a loft with a sloping ceiling measuring less than 16 inches (406 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.

AV104.2 Loft access. The access to and primary egress from lofts shall be any type described in Sections AV104.2.1 through AV104.2.4.

AV104.2.1 Stairways. Stairways accessing lofts shall comply with this code or with Sections AV104.2.1.1 through AV104.2.1.5.

AV104.2.1.1 Width. Stairways accessing a loft shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The minimum width below the handrail shall be not less than 20 inches (508 mm).

AV104.2.1.2 Headroom. The headroom in stairways accessing a loft shall be not less than 6 feet 2 inches (1880 mm), as measured vertically, from a sloped line connecting the tread or landing platform nosings in the middle of their width.

AV104.2.1.3 Treads and risers. Risers for stairs accessing a loft shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:
1. The tread depth shall be 20 inches (508 mm) minus 4/3 of the riser height, or

2. The riser height shall be 15 inches (381 mm) minus 3/4 of the tread depth.

AV104.2.1.4 Landing platforms. The top tread and riser of stairways accessing lofts shall be constructed as a landing platform where the loft ceiling height is less than 6 feet 2 inches (1880 mm) where the stairway meets the loft. The landing platform shall be 18 inches to 22 inches (457 to 559 mm) in depth measured from the nosing of the landing platform to the edge of the loft, and 16 to 18 inches (406 to 457 mm) in height measured from the landing platform to the loft floor.

AV104.2.1.5 Handrails. Handrails shall comply with Section R311.7.8.

AV104.2.1.6 Stairway guards. Guards at open sides of stairways shall comply with Section R312.1.

AV104.2.2 Ladders. Ladders accessing lofts shall comply with Sections AV104.2.1 and AV104.2.2.

AV104.2.2.1 Size and capacity. Ladders accessing lofts shall have a rung width of not less than 12 inches (305 mm) and 10 inches (254 mm) to 14 inches (356 mm) spacing between rungs. Ladders shall be capable of supporting a 200 pound (75 kg) load on any rung. Rung spacing shall be uniform within 3/8-inch (9.5 mm).

AV104.2.2.2 Incline. Ladders shall be installed at 70 to 80 degrees from horizontal.

AV104.2.3 Alternating tread devices. Alternating tread devices accessing lofts shall comply with Sections R311.7.11.1 and R311.7.11.2. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

AV104.2.4 Ships ladders. Ships ladders accessing lofts shall comply with Sections R311.7.12.1 and R311.7.12.2. The clear width at and below handrails shall be not less than 20 inches (508 mm).

AV104.2.5 Loft Guards. Loft guards shall be located along the open side of lofts. Loft guards shall not be less than 36 inches (914 mm) in height or one-half of the clear height to the ceiling, whichever is less.

CHAPTER PART AV105— EMERGENCY ESCAPE AND RESCUE OPENINGS

AV105.1 General. Tiny houses shall meet the requirements of Section R310 for emergency escape and rescue openings.

> **Exception:** Egress roof access windows in lofts used as sleeping rooms shall be deemed to meet thre requirements of Section R310 where installed such that the bottom of the opening is not more than 44 inches (1118 mm) above the loft floor, provided the egress roof access window complies with the minimum opening area requirements of Section R310.2.1.

Commenter's Reason: During the Committee Action Hearings in Kentucky, IRC Committee members explained their disapproval of RB168-16, but

also their support for addressing the issue of small houses. In the published reasons the Committee stated "The issue of small houses and apartments is important," and that "The IRC needs to address them in some fashion." They encouraged further development of the proposal, stating "There needs to be a more comprehensive approach", and that "The concept of smaller houses may be more suited for an appendix."

This Public Comment follows the Committee's advice by replacing the original piecemeal proposal with a proposed appendix that takes a "more comprehensive approach". It also reduces the 500 square foot threshold for "small houses" in the original proposal to the widely accepted threshold of 400 square feet for "tiny houses". At that smaller size there is increased difficulty in meeting certain dimensional requirements of the IRC; however, through years of practice by tiny house advocates and years of extensive use of comparably sized "recreational park vehicles" governed by ANSI A119.5, safe alternative dimensions and other requirements have been established that are included in the proposed appendix.

In the published reasons the Committee finally noted that "Small houses are a growing concern, [and] the demand for them is increasing." The reasons for that growing demand are both environmental and financial in nature. Below are statistics illustrating problematic housing trends, the environmental impacts of construction, the cost of home ownership, and how tiny houses can be a part of the solution. That is followed by specific reasons for the code language in the proposed appendix.

- The average home size in the U.S. increased 61% since 1973 to over 2600 square feet. In that time period the average household size decreased, leading to a 91% increase in home square footage per inhabitant (1000 SF per person) (source: US Census Bureau).
- The average house in the U.S. uses approximately 17,300 board feet of lumber and 16,000 square feet of other wood products. A 200 square foot tiny house uses only 1,400 board feet of lumber and 1,275 square feet of additional wood products. The lifetime conditioning costs can be as low as 7% of a conventionally sized home.
- United States Green Building Council (USGBC), the California Energy Commission (CEC), and other entities are working hard to increase energy efficiency in the construction industry. This is a great start, however a reduction in home size is the easiest way to lower energy consumption.
- National home ownership fell to 63.7% in 2015, the lowest level in two decades. Increased housing cost is cited as the main reason for low ownership rate. (source: Joint Center for Housing Studies (JCHS) at Harvard University)
- The average home in the United States costs approximately $358,000 to build, an increase of roughly $200,000 since 1998, whereas the average annual income in the United States has remained unchanged for the last several years, lingering near $52,000. (source: US Census Bureau)
- The average American spends roughly 27% of their annual income on housing (nearly 11 hours of every 40-hour work week). 48% of households making less than $30,000 annually pay more than half of their income on housing, leaving these households less than $15,000 a year to purchase food, health care, education, clothing, and anything else. (source: JCHS)
- The cost of new construction for a 200 square foot tiny house can be as low as $35,000. A typical down payment on an average-sized house is $72,000, more than twice the full cost of a tiny house.
- Cities benefit from tiny house ordinances. With significant need for affordable housing, cities are hard-pressed to find solutions that quickly expand their low-income housing stock without burdening an already burdened system. Tiny houses can be quickly installed in municipalities and set up at little or no cost to the cities.
- Although not addressed in the proposed code language of this public comment, it is important to recognize the need for codes pertaining specifically to movable tiny houses. For some people, homeownership is heavily impacted by the cost of land and even the construction of a fixed tiny house becomes unattainable. For those individuals, the presence of movable tiny houses in the building code may create their only path to home ownership. The flexibility of a movable tiny house allows individuals to locate their homes in areas of community living or on ancillary home sites, without the burdensome cost of a single-family lot. It also allows them to take their home with them should they need to relocate, thus eliminating many typical costs of moving.

Tiny houses can play an important role in minimizing the environmental impacts of housing while providing safe and healthy homes at affordable prices. Pride of ownership improves neighborhoods and community morale. Tiny houses enable more people to become homeowners and contribute to their communities.

REASONS FOR DEFINITIONS:

EGRESS ROOF ACCESS WINDOW. Most manufacturers use this term for their skylights and roof windows that are designed to satisfy the dimensional requirements of emergency escape and rescue openings in U.S. building codes.

LANDING PLATFORM: Landing platforms have been demonstrated in practice to allow for the safe transition between stairways and lofts. (See photos)

LOFT. This definition is a modified version of the definition of loft area in Section 1-3 of ANSI A119.5 Recreational Park Trailer Standard.

TINY HOUSE. This definition is based on the widely accepted maximum square footage for tiny houses in the construction industry.

REASONS PER SECTION:

AV103. CEILING HEIGHT: The minimum ceiling height for non-loft habitable spaces in this proposed appendix is 6 feet 8 inches. Though lower than the 7 foot minimum for habitable spaces in the IRC, it is higher than the minimum of 6 feet 6 inches in Section 5-3.5.4 of ANSI A119.5 Recreational Park Trailer Standard, that has proven to provide safe and adequate head room during the extended occupancy of recreational park trailers.

AV104 LOFT: Tiny houses have considerably smaller footprints and building height than conventional houses. As such, lofts are essential to maximize the use of space in tiny houses and make them viable shelter for many individuals and families.

It is common knowledge to many building inspectors that spaces labeled "non-habitable storage" in dwellings of all sizes are sometimes used for sleeping or other habitable purposes once the final inspection is complete. Rather than being unable to enforce a falsely stated use, building departments could regulate the health and safety of those spaces for their intended use with the proposed appendix, ensuring health and safety with minimum loft dimensions, requirements for access and egress, and proper emergency escape and rescue openings.

MINIMUM AREA and **MINIMUM DIMENSIONS**: Lofts in tiny houses are small by necessity; however, minimum dimensions are required for lofts used as a living or sleeping space, so as to not impose a risk to occupant health and safety.

HEIGHT EFFECT ON LOFT AREA: For most roof designs in tiny houses, a minimum ceiling height of 3 feet has proven adequate in sleeping lofts for consideration of their required floor area. For gable roofs with moderate to high slopes, the slope has an aggressive impact on the loss of ceiling height but makes up for it with higher areas under the ridge. Thus lofts under gable roofs with a minimum 6:12 slope have a lesser minimum ceiling height when calculating their required floor area.

STAIRWAY WIDTH: These dimensional requirements are identical to those in Section 5-10.4.1.1 of ASNI A119.5. This provision is considered and proven safe for extended occupancy of recreational park trailers.

STAIRWAY HEADROOM: Because tiny houses are limited in square footage and height, IRC compliant head heights for stairs serving lofts are often not achievable. Therefore the stair headroom requirement has been reasonably reduced to 6 feet 2 inches.

STAIRWAY TREAD/RISER: This is identical to the requirements for treads/risers in Section 5-10.4.1.1 of ANSI A119.5. This provision is considered and proven safe for extended occupancy of recreational park trailers.

LANDING PLATFORMS: Landing platforms have been demonstrated in practice to allow for the safe transition between stairways and lofts. The required range of dimensions allow for a simple transition between standing and kneeling when entering or exiting the loft. (See photos)

LADDERS: This is identical to the requirements for ladders in Section 5-10.5 of ANSI A119.5. This provision is considered and proven safe for extended occupancy of recreational park trailers.

ALTERNATING TREAD DEVICES: Alternating tread devices as described in the IRC, are allowed to provide access to and egress from lofts.

SHIPS LADDERS: Ships ladders as described in the IRC, are allowed to provide access to and egress from lofts.

LOFT GUARDS: The height requirement for loft guards is identical to that for guardrails in Section 5-10.7 of ANSI A119.5.

AV105 EMERGENCY ESCAPE AND RESCUE: Due to the considerably smaller footprints of tiny houses, ceiling heights in sleeping lofts therein are often necessarily lower than minimum ceiling heights required by the IRC for sleeping rooms in larger houses. Egress roof access windows (which are specifically designed to meet the dimensional requirements of emergency escape and rescue openings) can be installed with their openings within 44 inches of the loft floor, thus meeting the requirements of Section R310 when wall mounted windows meeting these requirements are not possible.

Bibliography: ANSI A119.5 Recreational Park Trailer Standard 2009 Edition

Submit Reset Print

DIVISION OF BUILDING SAFETY
APPLICATION FOR REVIEW OF A PROPOSED STATEWIDE AMENDMENT TO STATE ADOPTED CODES
2012 Code Adoption Cycle

Log# _____
(Office Use Only)

PLEASE FOLLOW INSTRUCTIONS ON PAGE FIVE

1. State Building Code to be Amended:

- [x] International Building Code
- [ ] International Residential Code
- [ ] International Fuel Gas Code
- [ ] International Existing Building Code
- [ ] Idaho State Plumbing Code
- [ ] International Energy Conservation Code
- [ ] International Mechanical Code
- [ ] National Electrical Code
- [ ]
- [ ]

Section 2107.2.1 **Page** 438 (page 457 in 2015 IBC)

2. Applicant Name (Specific local government, organization or individual):

Northwest Concrete Masonry Association

3. Signed:

Thomas Young

Proponent | Director **Title** | 4/13/17 **Date**

4. Designated Contact Person:

Tom Young **Name** | Executive Director **Title**

Address: 16300 Mill Creek Blvd, #208-C Mill Creek, WA 98012

Office Phone: 425-697-5298 **Cell:** 425-275-3645 **Fax:** 425-697-2679

E-Mail address: tcyoung@nwcma.org

5. Proposed Code Amendment. Use 'legislative format' including both old and new language. **See instructions on page five for specific details.** Please attach a separate sheet for each separate proposal.

Code IBC **Section** 2107.2.1 **Page** 438 (page 457 in 2015 IBC)

Please note number of additional pages: 1

2107.2.1 Lap splices.

The minimum length of lap splices for reinforcing bars in tension or compression, ld, shall be

ld = 0.002db fs (Equation 21-1)

For SI: ld = 0.29db fs

but not less than 12 inches (305 mm). In no case shall the length of the lapped splice be less than 40 bar diameters.

where:

db = Diameter of reinforcement, inches (mm).

fs = Computed stress in reinforcement due to design loads, psi (MPa).

In regions of moment where the design tensile stresses in the reinforcement are greater than 80 percent of the allowable steel tension stress, Fs, the lap length of splices shall be increased not less than 50 percent of the minimum required length, <u>but need not be greater than 72db</u>. Other equivalent means of stress transfer to accomplish the same 50 percent increase shall be permitted. Where epoxy coated bars are used, lap length shall be increased by 50 percent.

Supporting Data for Statewide Amendment Proposals. This information is required for all statewide amendment proposals. **Attach supporting documentation, as necessary; incomplete proposals will not be accepted.**

The governing boards require supporting data on any amendment proposal to show:

1. **That it meets basic criteria – See Part I to specify how this proposal meets the criteria for code amendment.**
2. **The intended effect—See Part II to describe the purpose of the proposed amendment, including the benefits and the problems addressed.**
3. **The potential impacts or benefits to business—See Part III/Types of Construction, to explain how methods in construction businesses, industries and services would be affected.**
4. **The potential impact on enforcement procedures, See Part III/Types of Services Required, to provide some analysis of the impacts on code enforcement in local jurisdictions.**
5. **Economic costs and benefits – Use the Table in Part IV of this form to estimate the costs and benefits of the proposal on construction practices, users and/or the public, the enforcement community, and operation and maintenance.**

Part I ◆ Background information on amendment.

Code References: IBC Section 2107.2.1 Title: Masonry Lap Splices

Related codes: None (Does this amendment change other related codes?)

Proponent: Tom Young Phone: 425-697-5298 Date: 04/13/2017

NOTE: Amendments to the state building code must be based on one of the following criteria; please indicate the pertinent rationale for the proposed amendment by selecting from the list below:

- ☐ (1) The amendment is needed to address a critical life/safety need.
- ☐ (2) The amendment is needed to address a specific state policy or statute.
- ☐ (3) The amendment is needed for consistency with state or federal regulations.
- ☐ (4) The amendment is needed to address a unique character of the state.
- ☑ (5) The amendment corrects errors and omissions.

Part II ◆ Amendment Benefit:

PROBLEM(S) ADDRESSED (Describe the intended effect of the proposed code amendment):

This code change will place a cap on the required length of reinforcement lap splices for allowable stress design (ASD) of masonry. It will make the allowable stress maximum lap length equivalent to the current strength design maximum lap length.

PRIMARY REASON FOR AMENDMENT: (Describe how the amendment meets one of the criteria listed above)

When masonry allowable design stresses were increased in the 2012 IBC, by TMS 402 reference, it unintentionally increased the length of reinforcement lap splices calculated by equation 21-1.Without an amendment, ASD lap lengths could exceed strength design laps. This isn't logical as there is typically more reinforcement in masonry walls designed by ASD. Placing the 72db cap on the required lap length corrects this problem and provides consistency between masonry design methods.

TYPE OF BENEFITS PROJECTED:

Part III ◆ Amendment Impacts or Benefits:

TYPES OF CONSTRUCTION: ☑ New Construction ☐ Alteration/Tenant Improvement/Repair
☐ Residential-Single Family ☐ Residential-Multi Family ☑ Commercial ☑ Industrial

List businesses/industries affected by amendment:

Manufacturers: Masonry material manufacturers
Specific Construction Contractors & Trades: Mason contractors & brick layers
Construction Supply Industry: Mortar & grout suppliers
Specialty Trades: Brick layers
Types of Buildings: Commercial, low-rise
Fire Protection Industry: _____

Types of Services Required:

☐ **Reporting:** Brief Description_____
☐ **Record Keeping:** Brief Description_____
☐ **Other:** Brief Description_____
☐ **Indirect Cost to Industry:** Indicate whether there are multiple sources to obtain the equipment, material or service required by this proposal. If not, provide a justification of the benefit versus small business impact.

Part IV ◆ Amendment Costs and Benefits

Building Type	Construction[1]				Enforcement[2]			Operations & Maintenance[3]	
	Costs	% impact[4]	Benefits[5]	Costs	% impact	Benefits	Costs	% impact	Benefits
Residential									
Single family									
Multi-family									
Commercial/ Retail	0	0	a,c,d	0	0	a,c,d	0	0	a,c,d
Industrial	0	0	a,c,d	0	0	a,c,d	0	0	a,c,d
Institutional	0	0	a,c,d	0	0	a,c,d	0	0	a,c,d

1 $ / square foot of floor area or other cost. Attach data. **Construction** costs are costs prior to occupancy, and include both design and direct construction costs that impact the total cost of the construction to the owner/consumer.

2 Cost per project plan. Attach data. **Enforcement** costs include governmental review of plans, field inspection, and mediated litigation required for enforcement.

3 Cost to building owner/tenants over the life of the project.

4 Cost differential over a specific size project or range of projects as determined by the proponent. Provide sufficient cost and benefit detail to clarify the impact to the Council. All data should be created and referenced to third party reputable sources for verification.

5 Note sectors with measurable benefit from Part II, including benefits to a) the user, b) the public, c) the industry, and/or d) the economy; use e) for all of the above.

DIVISION OF BUILDING SAFETY
APPLICATION FOR REVIEW OF A PROPOSED STATEWIDE AMENDMENT
TO STATE ADOPTED CODES
2012 Code Adoption Cycle

Log#_____
(Office Use Only)

PLEASE FOLLOW INSTRUCTIONS ON PAGE FIVE

1. State Building Code to be Amended:

☐ International Building Code	☐ International Energy Conservation Code
XX☐ International Residential Code	☐ International Mechanical Code
☐ International Fuel Gas Code	☐ National Electrical Code
☐ International Existing Building Code	☐
☐ Idaho State Plumbing Code	☐

Section ___**IDAPA 07.03.01.02**_____ **Page** _____**3**_____

2. Applicant Name (Specific local government, organization or individual):

Idaho Association of Building Officials

3. Signed:

Jon Laux	Jon Laux by Jen Otten	President	4/14/2017
Proponent		**Title**	**Date**

4. Designated Contact Person:

Jon Laux	President
Name	**Title**

Address: PO Box 8224, Boise ID 83707

Office Phone 208-321-9182 **Cell 208-869-6832** **Fax 208-321-4819**

E-mail address: info@idabo.org

5. Proposed Code Amendment. Use 'legislative format' including both old and new language. **See instructions on page five for specific details.** Please attach a separate sheet for each separate proposal.

IRC	R301.1 (under IDAPA 07.03.01.02)	3
Code	**Section**	**Page**

Please note number of additional pages:

Under IDAPA 07.03.01 the change would be:

02. International Residential Code. 2012 Edition with the following amendments:
e. Add the following to Section R301.1.1 Alternative Provisions:
4. International Code Council 2015 International Residential Code with IDAPA amendments as per this section.

~~e.~~ f. Delete IRC section R109.1.3 …

~~f.~~ g. IRC Table R302.1(1) …

g. h. Delete the exception contained under IRC section R302.2 …

~~h.~~ i. Delete IRC section R303.4 …

~~i.~~ j. Delete the exception contained under IRC section R313.1 …

~~j.~~ k. Delete IRC section R313.2. …

~~k.~~ l. (2012 edition) Add the following to IRC section R315.3 …

~~l.~~ m. Delete IRC section R322.1.10. …

~~m.~~ n. Delete IRC section R322.2.2 subparagraph 2.2 (2012 edition) or 2.1 (2015 edition) …

~~n.~~ o. Delete IRC section R501.3 (2012 edition) or R302.13 (2015 IRC) …

~~o.~~ p. Delete IRC section R602.10 …

~~p.~~ q. Chapter 11 [RE] Energy Efficiency …

i. Table N1102.1.1 (2012 edition) or Table N1102.1.2 (2015 edition) …

ii. Table N1102.1.3 (2012 edition) or Table N1102.1.4 (2015 edition) …

Supporting Data for Statewide Amendment Proposals. This information is required for all statewide amendment proposals. **Attach supporting documentation, as necessary; incomplete proposals will not be accepted.**

The governing boards require supporting data on any amendment proposal to show:

1. **That it meets basic criteria – See Part I to specify how this proposal meets the criteria for code amendment.**
2. **The intended effect – See Part II to describe the purpose of the proposed amendment, including the benefits and the problems addressed.**
3. **The potential impacts or benefits to business – See Part III/Types of Construction, to explain how methods in construction businesses, industries and services would be affected.**
4. **The potential impacts on enforcement procedures, See Part III/Types of Services Required, to provide some analysis of the impacts on code enforcement in local jurisdictions.**
5. **Economic costs and benefits – Use the Table in Part IV of this form to estimate the costs and benefits of the proposal on construction practices, users and/or the public, the euforcement community, and operation and maintenance.**

Part I ♦ Background information on amendment.

Code references: IRC 301.1.1 Title: Alternate Provisions

Related Codes: N/A

(Does this amendment change other related codes?)

Proponent: IDABO Phone: 208-321-9182 Date: 4/14/2017

NOTE: Amendments to the state building code must be based on one of the following criteria; please indicate the pertinent rationale for the proposed amendment by selecting from the list below:

☐ (1) The amendment is needed to address a critical life/safety need.
☐ (2) The amendment is needed to address a specific state policy or statute.
XX☐ (3) The amendment is needed for consistency with state or federal regulations.
☐ (4) The amendment is needed to address a unique character of the state.
☐ (5) The amendment corrects errors and omissions.

Part II ♦ Amendment Benefit:

PROBLEM(S) ADDRESSED (Describe the intended effect of the proposed code amendment):

Many builders and suppliers (truss) are using the 2015 IRC under individually approved R104.11 Alternative Design now. This would allow those builders and designers who choose to use this provision consistency between codes instead of running two parallel codes (2012 IRC - 2015 IBC) that have inconsistencies between them. Jurisdictions around the state are being pressured by designers and contractors to use the 2015 IRC due to cost savings in design and construction allowed under the 2015 IRC.

PRIMARY REASON FOR AMENDMENT: (Describe how the amendment meets one of the criteria listed above)

ICC's 2015 IRC could be used as an alternative method of construction if added to R301.1.1 without having to go through the R104.11 approval process and documentation process for each permit. Design professionals could also use the 2015 IBC engineering designs seamlessly with the current IRC, there would be no need to convert from nominal to ultimate wind loadings.

This would also allow non-commercial accessory structures over 3,000 sq. ft. to be built under the IRC instead of the IBC, thus living spaces (Group R in the IBC) would not have to be sprinkled and comply with IBC accessibility requirements.

Both the National Home Builders Association and the International Code Council have documented these savings under the 2015 IRC.

This amendment simply provides another alternative that can be easily used at the request of the designer, builder or homeowner.

TYPES OF BENEFITS PROJECTED:

These changes will save government jurisdiction time and money by avoiding the R104.11 approval and documentation process, which, without the amendment would have to be done each time a permit/plans are submitted utilizing the 2015 IRC. This additional time can be used to perform plan reviews and or complete processes to finalize permits in a shorter timeframe. This change would give assurances to designers and builders that the 2015 IRC provisions could be utilized without worrying about the approval and documentation process each time. Many jurisdictions are reporting that they have already begun to receive requests from builders and designers to utilize the 2015 version of the IRC due to cost savings and clarifications from the 2012 IRC that make their job easier (see attached studies from Home Innovation Research Labs for the National Association of Home Builders and ICC publications). The proposal would also benefit designers by establishing consistency between neighboring states that have adopted the 2015 I codes.

(application continued on following form)

NOTE ON SUMMARY ON COSTS

Because this amendment only suggests accepting the 2015 IRC as an acceptable alternate method any increase in costs to the contractor would be at their own discretion and choice and therefore does not seem applicable to this amendment request. However we have attached some information on the cost increases and decreases from the 2012 to the 2015 IRC for your information. This information comes from the National Association of Home Builders and the International Code Council.

This amendment would save costs for jurisdictions. Right now we have to go through the process each time the 2015 IRC is used by a designer or contractor of declaring it an acceptable alternate method. It would save time and funds by allowing it at the state level and not requiring this extra paperwork each time a permit is requested using this version of the code.

TYPE OF BENEFITS PROJECTED:

See previous page

Part III ♦ Amendment Impacts or Benefits:

TYPES OF CONSTRUCTION: ☑ New Construction ☑ Alteration/Tenant Improvement/Repair
☑ Residential-Single Family ☑ Residential-Multi Family ☐ Commercial ☐ Industrial

List businesses/industries affected by amendment:

Manufacturers: _____
Specific Construction Contractors & Trades: _____
Construction Supply Industry: home builders and remodelers
Specialty Trades: _____
Types of Buildings: resdiential
Fire Protection Industry: _____

Types of Services Required:

☐ **Reporting:** Brief Description_____
☐ **Record Keeping:** Brief Description_____
☐ **Other:** Brief Description_____
☐ **Indirect Cost to Industry:** Indicate whether there are multiple sources to obtain the equipment, material or service required by this proposal. If not, provide a justification of the benefit versus small business impact.

Part IV ♦ Amendment Costs and Benefits

Building Type		Construction[1]			Enforcement[2]			Operations & Maintenance[3]	
	Co sts	% impact[4]	Benefits[5]	Costs	% impact	Benefits	Costs	% impact	Benefits
Residential	SEE ATTACHED								
Single family	SEE ATTACHED								
Multi-family	SEE ATTACHED								
Commercial/ Retail	N/A								
Industrial	N/A								
Institutional	N/A								

1 $ / square foot of floor area or other cost. Attach data. **Construction** costs are costs prior to occupancy, and include both design and direct construction costs that impact the total cost of the construction to the owner/consumer.

2 Cost per project plan. Attach data. **Enforcement** costs include governmental review of plans, field inspection, and mediated litigation required for enforcement.

3 Cost to building ownar/tenants over tha life of the project.

4 Cost differential ovar a specific size projact or range of projects as determinad by the proponent. Provide sufficient cost and benefit detail to clarify the impact to the Council. All data should be created and referenced to third party reputable sources for verification.

5 Note sectors with measurable benefit from Part II, including benefits to a) the user, b) the public, c) the industry, and/or d) tha economy; use e) for all of the above.

house contained all electric equipment, then any expense associated with combustion equipment within the conditioned space would be eliminated.

It was also assumed that the path to compliance with the 2012 IRC required that the reference houses in climate zones 3 through 8 be constructed of 2x6 to accommodate appropriate thickness of cavity insulation.

RESULTS

Estimated Cost of 2015 Code Compliance for Reference Houses by Location

Table 5 summarizes the estimated cumulative impact of the 2015 code changes on the cost of constructing the reference houses. For the purpose of cost aggregation, it was assumed that reference houses were not built in coastal zones or subject to flooding. The aggregated costs are reported in ranges of "High" and "Low" impact based on the applicability of the changes to the features of the reference houses. The results are also grouped into two climate zones categories (CZ 1&2 and CZ3-8) to illustrate the degree of climatic effects on the aggregated costs.

Table 6 summarizes the cost estimates of the code changes that do not directly apply to the selected reference houses and are not included in the aggregated summary. Those costs can be added or subtracted from the aggregated costs in Table 5 if applicable to a particular location or a specific building. A detailed analysis of each individual code change is provided in Appendix A.

Table 5. Estimated Cost of 2015 Code Compliance

Climate Zones			1 & 2		3-8		
			Range				Applicability
Description	2015 IRC Reference	Report Reference	High ($)	Low ($)	High ($)	Low ($)	
Footing Size	R403	FDN1	$406	$0	$508	$0	If snow load is less than or equal to 30 psf & soil has bearing capacity of at least 2,000 psf
Garage (CS-PF)	R602	FR1	$0	($808)	$0	($808)	If garage front sidewalls are narrow and opening is wide, as with 2-car garages
King Studs, Zones 1&2	R602	FR2	$253	$69			Based on 2x4 construction and the window opening widths in the reference houses
King Studs, Zones 3 thru 8	R602	FR2			$317	$0	Based on 2x6 construction and the window opening widths in the reference houses
Box nails in lieu of common	R602	FR3	$328	$259	$328	$259	Where pneumatic nailing equipment is used
Condensate pump wired to air handler	M1411.4	HVAC1	$29	$0	$29	$0	If design has an air handler in unihabitable location like attic
Isolated combustion room	N1102	HVAC2	$878	$214	$878	$214	If furnace and water heater are natural draft and equipment is in the basement, attic, or garage
Seal snap & button lock duct seams	N1103	MAT1	$215	$103	$314	$232	If a ducted HVAC system is used ; ranges assume slab houses in CZ1-2; basements in CZ3-8
Plumbing fixture flow rates adjusted for green building	P2903.1	PL1	$0	($14)	$0	($14)	If fixtures with lower flow rates are used
No pipe insulation on 1/2" or less diam.	N1103	PL2	($149)	($331)	($287)	($456)	If prescriptive path to EE is followed
TOTAL			$1,961	($507)	$2,088	($572)	

Table 6. Additional Costs of 2015 Code Compliance not Attributed to the Reference Houses

Special Cases							
Climate Zones			1 & 2		3 through 8		
			Range				
Description	2015 IRC Reference	Report Reference	High ($)	Low ($)	High ($)	Low ($)	Applicability
CAZ Testing	R201	AA1	$207	$157	$207	$157	If Appendix T adopted & house has natural draft gas equipment
Carbon monoxide alarm	R315	FEA1	($58)	$0	($58)	$0	Applies to Remodeling special conditions
Zone V exterior door above break-away walls	R322	FEA2	$366	$0	$366	$0	Pier foundation in V Zone where interior door was installed at head of stairs
R-value of access panel to unconditioned area	R402, N1102	FEA3	$12	($55)	$12	($55)	If design has a wall-mounted access to an unconditioned area
Emergency exit from basement	R310	FEA4	$0	$0	$0	($1,555)	Applies to Remodeling special conditions
Safety glazing near stairs	R308	FEA5	$0	($181)	$0	($181)	Applies to certain designs with glass adjacent to stairs
3-Story Structure	R301	FEA6	($2,196)	($2,416)	($2,196)	($2,416)	If wood structural panels are used for wind resistance instead of approved aluminum shutters
Retaining walls 2'-4' do not require engineered design	R404	FEA7	($450)	($450)	($450)	($450)	If the design included retaining walls from 2' - 4' in height
Zone A special flood hazard area - Slab Foundation	R322	FDN2	$14,269	$12,661	$14,269	$12,661	Slab foundation in A Zone
A Zone special flood hazard area - Pier Foundation	R322	FDN2	$96	$0	$96	$0	Pier foundation in A Zone
Treated Lumber Deck, 20'x14'	R507	FR4	$176	$0	$176	$0	If a treated lumber deck is added, joist & beam span or spacing reduction may be required.
High-heeled trusses (12")	R301	FR5	($719)	($388)	($719)	($388)	If trusses with heel heights greater than 15 1/4" are used
Engineered Design for Braced Wall Lines	R602	FR6	$0	($1,150)	$0	($1,150)	Range of engineering fees that could be saved if braced walls for irregularly-shaped house designs do not require engineering
Add central AC condensate pump when equipment is in uncond. Space	M1411	HVAC1	$29	$0	$29	$0	If air handler is in undconditioned space as in slab units and some two zone systems.
Direct vent furnace and water heater (instead of isolated combustion room)	N1102	HVAC2	$883	$883	$883	$883	If furnace and water heater are direct vent so that equipment room does not have to be sealed
Kitchen exhaust fan, eliminate motorized damper	N1503.4	HVAC3	$0	($150)	$0	($150)	If 400 cfm kitchen fan was installed, the requirement for a motorized damper is eliminated
Demand circulation pump	N1103.5	HVAC4	$568	$0	$568	$0	If a demand circulation pump system is added to the the water supply
Tropical Climate Zone added		LOC1	$0	($4,008)	$0	($4,008)	Special envelope features are allowed for small houses located between Tropics of Cancer and Capricorn.
ERI-Alternate Performance Method for Energy Efficiency	N1101, N1106	LOC2	$1,194	$1,121	$5,604	$1,337	If alternate performance method is selected
Engineered fastening schedules required for cladding in high wind speed zones and open terrain	R703.3	LOC3	$450	$0	$450	$0	If exposure category is C or D and wind speed zone is 115 mph or greater; special cladding type/fastening required
Duct diameter matched to fan flow	M1506/7	MAT2	$6	$2	$7	$2	If not previously engineered correctly
Spray polyurethane foam in exposed bandboards without thermal barrier	R316.5	MAT3	($176)	($159)	($260)	($235)	If exposed band boards are insulated with spray foam. NOTE: Only applies to houses with basements or exposed bandboards and through Climate Zone 5
Deck joist hardware for tiedown	R507	MAT4	$0	($42)	$0	($42)	If the house has a deck
Submit Energy Analysis Report at plan review	R405	METH2	$88	$0	$88	$0	If this option is selected
Submit Energy Analysis Report at U&O	R405	METH3	$44	$0	$44	$0	If this option is selected
Emergency floor drain traps require evaporation protection	P3201	PL3	$203	$0	$203	$0	Applies when emergency floor drains are installed in a house

Idaho Specific Notes addressing NAHB Chart

Table 5 –

1. R403 - Footing sizes/costs will vary with some staying the same, some smaller and some larger. For the Boise area, are the ground snow loads 30psf or less? It seems to me that this is not a big change for the largest part of the State. It could increase footing sizes in our City with our 50psf ground snow load but not that much since most contractors have been going with larger footings than were required in the 2012 anyway. For example a one story with a crawlspace could have a 16" x 6" footing per the 2015 code and they have been pouring 16" x 8" footings for years. There would be increases for homes with basements.

2. R602 on the report study sheet, (Table R602.3(1) of the code) - The costs they show for increased nail cost is questionable in my opinion. They refer to a lot of 10 box nails in the tables but most of our contractors are using 16d box nails in lieu of 10d nails or 8d's for most framing applications anyway (other than nailing osb sheathing to studs and trusses). We also have most contractors using staples than nails for the osb attachment.

3. N1103 – Ducts were required to be sealed in the 2012 code and I see no major change in the 2015 requirements, see 1103.3.2 in the 2015, and 1103.2.2 in the 2012. We have not required duct testing unless the duct work is outside of the conditioned area. That is no different than what has been enforced n the past.

Table 6 –

A lot of those items don't apply to Idaho, however some of the savings could apply.

Under IDAPA 07.03.01 the change would be:

02. International Residential Code. 2012 Edition with the following amendments:

...

e. Add the following to Section R301.1.1 Alternative Provisions:

4. International Code Council 2015 International Residential Code with IDAPA amendments as per this section.

~~e.~~ f. Delete IRC section R109.1.3 ...

~~f.~~ g. IRC Table R302.1(1) ...

g. h. Delete the exception contained under IRC section R302.2 ...

~~h.~~ i. Delete IRC section R303.4 ...

~~i.~~ j. Delete the exception contained under IRC section R313.1 ...

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~~k.~~ l. (2012 edition) Add the following to IRC section R315.3 ...

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~~o.~~ p. Delete IRC section R602.10 ...

~~p.~~ q. Chapter 11 [RE] Energy Efficiency ...

i. Table N1102.1.1 (2012 edition) or Table N1102.1.2 (2015 edition) ...

ii. Table N1102.1.3 (2012 edition) or Table N1102.1.4 (2015 edition) ...

Home Innovation
RESEARCH LABS™

ESTIMATED COSTS OF THE 2015 IRC CODE CHANGES

Prepared For

National Association of Home Builders

January 2015

Report No. 5946-002_11192014

400 Prince George's Blvd. | Upper Marlboro, MD 20774 | 800.638.8556 | HomeInnovation.com

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ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

AHS	American Housing Survey—national survey conducted biennially by the U.S. Census Bureau in odd years
A Zone	A coastal area defined by breaking waves and erosion during base flood[1]
BFE	Base flood elevation
BPS	Builder Practices Survey—national survey conducted annually by Home Innovation Research Labs
CAZ	Combustion appliance zone
CDD	Cooling degree days—in the IECC 2012, sum of the differences of mean daily temperature above 50° F
CFM	Cubic feet per minute (a measure of flow)
CFS	Cold-formed steel
CS-PF	Continuous sheathed portal frame—a term for the frame around a two-car garage door opening in the IRC
C.Y.	Cubic yards
CZ	Climate zone, as defined by the International Code Council (ICC)
EE	Energy efficiency
EERO	Emergency escape and rescue opening
ERI	Energy rating index
FG	Fiberglass (batt insulation)
FIRM	Flood Insurance Rate Map (Developed by FEMA to denote flood risk areas)
HDD	Heating degree days—sum of the differences of mean daily temperature below 65°F
HVAC	Heating, ventilation, and cooling
IBC	International Building Code
ICC	International Code Council
IECC	International Energy Conservation Code

[1] https://www.fema.gov/pdf/rebuild/mat/coastal_a_zones.pdf

IRC	International Residential Code
LiMWA	Limit of Moderate Wave Action, defined as the landward extent of a coastal area expected to experience breaking waves 1.5 feet or greater in height. The LiMWA typically defines the landward limit of the Coastal A Zone.
LF	Linear feet
NAHB	National Association of Home Builders
O&P	Overhead and profit
PSF	Pounds per square foot
SF	Square feet
SYP	Southern yellow pine
XPS	Extruded polystyrene (rigid foam sheathing)

BACKGROUND

The National Association of Home Builders (NAHB) provided a list of 47 code changes to the 2012 International Residential Code (2012 IRC) which were approved for incorporation into the 2015 IRC. Home Innovation Research Labs estimated the expected cost impact of these code changes on construction practices and materials. In the process, a number of the selected code changes were found to be inconsequential (e.g. no cost increase or savings). NAHB opted not to include these changes in this report.

Reported as cost variance to the builder, the results are also aggregated in cost estimate ranges in an effort to estimate a cumulative cost impact on an average house in selected climate zones.

METHODOLOGY

Baseline metrics for four single family houses built to the 2012 IRC and 2012 International Energy Conservation Code (2012 IECC) building codes[2] were defined in order to determine the cost impact resulting from the revisions approved for the 2015 codes. The houses were selected for their similarity to new home offerings in the six metropolitan area(s) that were deemed representative locations for this study by the NAHB. The metros identified were Miami, Dallas, Los Angeles, Seattle, New York, and Chicago. Elevations and floor plans for these reference houses are provided in Appendices C through F.

The reference houses defined a starting point for the analysis of the cost impact to a newly-constructed home resulting from adoption of the 2015 IRC and IECC building codes (relative to a 2012 IRC/IECC baseline).

National Construction Cost

Cost impacts in this analysis have been developed primarily with data adapted from the following sources: (1) RSMeans' *Residential Cost Data 2014*,[3] (2) *ASHRAE 1481 RP*[4] and similar reports by the Home Innovation Research Labs (Home Innovation), (3) distributors' or big box retailers' websites, and (4) U.S. government reporting from the Census[5] and the Bureau of Labor Statistics[6]. Other cost sources are cited in *Appendix A* of this report as applicable to a specific code change. Costs are reported at the national level and can be modified for a region using builders' known bid prices or by applying a location factor adjustment shown in *Appendix B*. Costs reported are the cost to the builder and do not include the builder's gross margin, reported as ranging between 17 to 20% of construction cost per *2012 Cost of*

2 International Code Council, www.iccsafe.org/Pages/default.aspx

3 http://rsmeans.reedconstructiondata.com

4 NAHB Research Center, 2009. Economic Database in Support of ASHRAE 90.2 1481 RP. https://www.google.com/#q=ashrae+1481+rp

5 http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

6 http://www.bls.gov/oes/current/oes_nat.htm#47-0000

Doing Business[7] and *2013 Construction Cost Survey for Single-Family Homes*[8]. Therefore, the compiled costs do not reflect the consumer price.

Reference House Configurations

The four single-family detached building designs (see *Appendices C-F)* used in this analysis are based on the data contained in the Census Bureau report, *Characteristics of New Single Family Construction Completed*.[9] The report provides information as to building foundation type (Table 1) and number of stories for new single family detached construction over the previous nine year period. (Table 2).

Table 1. New Construction Foundation Types

Slab	54%
Crawlspace	17%
Basement	30%

Table 2. New Construction Number of Stories

One-story	53%
Two-story	43%
Three-story	3%

The Census data supports defining the four reference houses as follows to encompass approximately 85% of the last decade's new single-family construction:

- One-story on slab foundation
- Two-story on slab foundation
- One-story on basement foundation
- Two-story on basement foundation

House Size, Cost, and Features

A reference house and lot size have been defined based on a report by Heather Taylor, *The Cost of Constructing a Home,* for the NAHB Housing Economics division, January, 2014[10]. The report covers results from a 2013 survey using national averages and indicates that the average 2,607 SF house cost the builder $246,453 to construct on a lot that cost $74,509, for a sales price of $399,352.

Based on the data compiled by Home Innovation from the *Builder Practices Survey 2013* (BPS)[11], a nationwide annual survey, the typical Heating, Ventilation, and Cooling (HVAC) systems used with new houses are summarized in Table 3. According to the BPS, 44% of new homes are cooled with a central air conditioner. These results influenced the selection of a gas furnace with central (electric) air conditioner for each of the reference houses.

7 NAHB Business Management & Information Technology, 2009. http://secure.builderbooks.com/cgi-bin/builderbooks/965?id=hGY9PfM8&mv_pc=22

8 Taylor, H. for NAHB, 2014. www.nahb.org/generic.aspx?sectionID=734&genericContentID=221388&channelID=311

9 www.census.gov/construction/chars/completed.html

10 Taylor, H. for NAHB, 2014. www.nahb.org/generic.aspx?sectionID=734&genericContentID=221388&channelID=311

11 www.homeinnovation.com/trends_and_reports/data/new_construction

Table 3. Typical HVAC Systems Supplied with New Houses

Feature	Quantity or % of Stock
Furnace or Boiler, natural gas or propane	48%
Central Air Conditioner, electric	44%
Standard Heat Pump with Backup Heat	41%
Geothermal Heat Pump	4%
Electric furnace, baseboard, or radiant	4%
Furnace or Boiler, oil	2%

Reference House Definition

The statistics presented in the foregoing tables support reference house features that are enumerated in Table 4. These four houses, in compliance with the minimum requirements of the 2012 IRC, will serve as the baseline(s) for adding or subtracting costs to estimate the impact of the code changes approved for the 2015 IRC.

Table 4. Features of the Reference Houses

Reference House	1	2	3	4
Square Feet	2,607	2,607	2,607	2,607
Foundation	Slab	Slab	Basement	Basement
Number of Stories	1	2	1	2
Number of Bedrooms	3	4	3	4
Number of Bathrooms	2	2.5	2	3
Garage, attached	2-car	2-car	2-car	2-car
Heat, Gas Furnace	Yes	Yes	Yes	Yes
Cooling, (Electric) central air	Yes	Yes	Yes	Yes
Hot Water, Gas 50 gallon tank	Yes	Yes	Yes	Yes
9 ft. Ceilings, 1st	Yes	Yes	Yes	Yes
8 ft. Ceilings, 2nd	n/a	n/a	Yes	Yes
Energy Star appliances	Yes	Yes	Yes	Yes
Laundry Room	Yes - Mudroom	Yes	Yes - Mudroom	Yes - Closet
Walls, 2x4 (Zones 1&2)	Yes	Yes	n/a	n/a
Walls, 2x6 (Zones 3 thru 8)	Yes	Yes	Yes	Yes
Bsmt., Conditioned, Unfinished	n/a	n/a	Yes	Yes
Furnace Location	Attic	Attic	Basement	Basement
Water Heater Location	Interior	Garage	Basement	Basement
Window SF/% gross wall	360/18%	315/12%	360/18%	330/12%
Cladding	Brick, 4 sides	Brick, 4 sides	Brick, 4 sides	Stucco

The furnace location has been designated as a platform in the attic for both slab reference houses, a practice that is common in Florida and Texas, where the weather is temperate year round, and thus, the location is practical. A house built on a slab foundation in a cold climate zone would have the HVAC and water heating equipment located within conditioned space, therefore, some additional costs might be incurred to build that house to the 2015 code. For example, if the HVAC equipment were naturally drafted, a special sealed room with combustion air supply would have to house the equipment, whereas, having defined the reference slab houses as having the equipment outside of conditioned space within the attic eliminates the need (and cost) to specially seal the equipment space. Likewise, if a

house contained all electric equipment, then any expense associated with combustion equipment within the conditioned space would be eliminated.

It was also assumed that the path to compliance with the 2012 IRC required that the reference houses in climate zones 3 through 8 be constructed of 2x6 to accommodate appropriate thickness of cavity insulation.

RESULTS

Estimated Cost of 2015 Code Compliance for Reference Houses by Location

Table 5 summarizes the estimated cumulative impact of the 2015 code changes on the cost of constructing the reference houses. For the purpose of cost aggregation, it was assumed that reference houses were not built in coastal zones or subject to flooding. The aggregated costs are reported in ranges of "High" and "Low" impact based on the applicability of the changes to the features of the reference houses. The results are also grouped into two climate zones categories (CZ 1&2 and CZ3-8) to illustrate the degree of climatic effects on the aggregated costs.

Table 6 summarizes the cost estimates of the code changes that do not directly apply to the selected reference houses and are not included in the aggregated summary. Those costs can be added or subtracted from the aggregated costs in Table 5 if applicable to a particular location or a specific building. A detailed analysis of each individual code change is provided in Appendix A.

Table 5. Estimated Cost of 2015 Code Compliance

Climate Zones			1 & 2		3-8		
			Range				Applicability
Description	2015 IRC Reference	Report Reference	High ($)	Low ($)	High ($)	Low ($)	
Footing Size	R403	FDN1	$406	$0	$508	$0	If snow load is less than or equal to 30 psf & soil has bearing capacity of at least 2,000 psf
Garage (CS-PF)	R602	FR1	$0	($808)	$0	($808)	If garage front sidewalls are narrow and opening is wide, as with 2-car garages
King Studs, Zones 1&2	R602	FR2	$253	$69			Based on 2x4 construction and the window opening widths in the reference houses
King Studs, Zones 3 thru 8	R602	FR2			$317	$0	Based on 2x6 construction and the window opening widths in the reference houses
Box nails in lieu of common	R602	FR3	$328	$259	$328	$259	Where pneumatic nailing equipment is used
Condensate pump wired to air handler	M1411.4	HVAC1	$29	$0	$29	$0	If design has an air handler in unihabitable location like attic
Isolated combustion room	N1102	HVAC2	$878	$214	$878	$214	If furnace and water heater are natural draft and equipment is in the basement, attic, or garage
Seal snap & button lock duct seams	N1103	MAT1	$215	$103	$314	$232	If a ducted HVAC system is used ; ranges assume slab houses in CZ1-2; basements in CZ3-8
Plumbing fixture flow rates adjusted for green building	P2903.1	PL1	$0	($14)	$0	($14)	If fixtures with lower flow rates are used
No pipe Insulation on 1/2" or less diam.	N1103	PL2	($149)	($331)	($287)	($456)	If prescriptive path to EE is followed
TOTAL			$1,961	($507)	$2,088	($572)	

Table 6. Additional Costs of 2015 Code Compliance not Attributed to the Reference Houses

Special Cases							
Climate Zones			1 & 2		3 through 8		
			Range				
Description	2015 IRC Reference	Report Reference	High ($)	Low ($)	High ($)	Low ($)	Applicability
CAZ Testing	R201	AA1	$207	$157	$207	$157	If Appendix T adopted & house has natural draft gas equipment
Carbon monoxide alarm	R315	FEA1	($58)	$0	($58)	$0	Applies to Remodeling special conditions
Zone V exterior door above break-away walls	R322	FEA2	$366	$0	$366	$0	Pier foundation in V Zone where interior door was installed at head of stairs
R-value of access panel to unconditioned area	R402, N1102	FEA3	$12	($55)	$12	($55)	If design has a wall-mounted access to an unconditioned area
Emergency exit from basement	R310	FEA4	$0	$0	$0	($1,555)	Applies to Remodeling special conditions
Safety glazing near stairs	R308	FEA5	$0	($181)	$0	($181)	Applies to certain designs with glass adjacent to stairs
3-Story Structure	R301	FEA6	($2,196)	($2,416)	($2,196)	($2,416)	If wood structural panels are used for wind resistance instead of approved aluminum shutters
Retaining walls 2'-4' do not require engineered design	R404	FEA7	($450)	($450)	($450)	($450)	If the design included retaining walls from 2' - 4' in height
Zone A special flood hazard area - Slab Foundation	R322	FDN2	$14,269	$12,661	$14,269	$12,661	Slab foundation in A Zone
A Zone special flood hazard area - Pier Foundation	R322	FDN2	$96	$0	$96	$0	Pier foundation in A Zone
Treated Lumber Deck, 20'x14'	R507	FR4	$176	$0	$176	$0	If a treated lumber deck is added, joist & beam span or spacing reduction may be required.
High-heeled trusses (12")	R301	FR5	($719)	($388)	($719)	($388)	If trusses with heel heights greater than 15 1/4" are used
Engineered Design for Braced Wall Lines	R602	FR6	$0	($1,150)	$0	($1,150)	Range of engineering fees that could be saved if braced walls for irregularly-shaped house designs do not require engineering
Add central AC condensate pump when equipment is in uncond. Space	M1411	HVAC1	$29	$0	$29	$0	If air handler is in undconditioned space as in slab units and some two zone systems.
Direct vent furnace and water heater (instead of isolated combustion room)	N1102	HVAC2	$883	$883	$883	$883	If furnace and water heater are direct vent so that equipment room does not have to be sealed
Kitchen exhaust fan, eliminate motorized damper	N1503.4	HVAC3	$0	($150)	$0	($150)	If 400 cfm kitchen fan was installed, the requirement for a motorized damper is eliminated
Demand circulation pump	N1103.5	HVAC4	$568	$0	$568	$0	If a demand circulation pump system is added to the the water supply
Tropical Climate Zone added		LOC1	$0	($4,008)	$0	($4,008)	Special envelope features are allowed for small houses located between Tropics of Cancer and Capricorn.
ERI-Alternate Performance Method for Energy Efficiency	N1101, N1106	LOC2	$1,194	$1,121	$5,604	$1,337	If alternate performance method is selected
Engineered fastening schedules required for cladding in high wind speed zones and open terrain	R703.3	LOC3	$450	$0	$450	$0	If exposure category is C or D and wind speed zone is 115 mph or greater; special cladding type/fastening required
Duct diameter matched to fan flow	M1506/7	MAT2	$6	$2	$7	$2	If not previously engineered correctly
Spray polyurethane foam in exposed bandboards without thermal barrier	R316.5	MAT3	($176)	($159)	($260)	($235)	If exposed band boards are insulated with spray foam. NOTE: Only applies to houses with basements or exposed bandboards and through Climate Zone 5
Deck joist hardware for tiedown	R507	MAT4	$0	($42)	$0	($42)	If the house has a deck
Submit Energy Analysis Report at plan review	R405	METH2	$88	$0	$88	$0	If this option is selected
Submit Energy Analysis Report at U&O	R405	METH3	$44	$0	$44	$0	If this option is selected
Emergency floor drain traps require evaporation protection	P3201	PL3	$203	$0	$203	$0	Applies when emergency floor drains are installed in a house

APPENDIX A
DESCRIPTION AND COST IMPACT OF 2015 IRC CODE CHANGES

Appendix A-AA: CAZ Testing Appendix

Report Reference No: AA1

2015 IRC Code Sections: Appendix T

Summary of Code Change:

The code change adds an Appendix T that (if adopted by the jurisdiction) establishes a requirement for testing of atmospheric venting of systems at ≤ 5ACH50 or tighter construction, referred to as combustion appliance zone (CAZ) testing.

Cost Implication of the Code Change:

If Appendix T is adopted as part of the 2015 code, a CAZ test is required to be performed where naturally vented combustion equipment is present. The CAZ test is performed in addition to a Blower Door test which is required for all new houses. A CAZ test would be less expensive if scheduled at the same visit as the Blower Door test that is also required by code, but CAZ testing can only be performed after the combustion naturally drafting appliances are installed and operational which is usually just before occupancy. (Whereas a blower door test can be conducted at the mid-point of construction or "close-in" of the frame.) The estimated cost for a CAZ test under various scenarios is reported in Table AA1. The average added cost is reported in the roll-up in Table 6 of this report.

Table AA1. Estimated Additional Cost of a Combustion Appliance Zone (CAZ) Test

	Hours	Burdened Wages	Total ($)
Cost of a CAZ test with blower door test[1]	Flat fee		100
Cost of CAZ test without blower door test[1]	Flat fee		150
Construction Manager's Time[2]	1	57	57
Added Cost Low Range			157
Added Cost High Range			207
Average Added Cost			182

1. Informal telephone survey of Energy and Green Raters, 5/8/14.
2. Bureau of Labor Statistics; mean annual salary for Construction Manager, burdened by 40%.

Appendix A-FEA: Features

Report Reference No: FEA1

2015 IRC Code Sections: R315.2.2

Summary of Code Change:

The code section defines remodeling/retrofit activities that can trigger a requirement for a carbon monoxide detector in older homes with attached garages and/or combustion equipment. The code change exempts exterior, mechanical, and plumbing improvements from triggering a carbon monoxide (CO) detector requirement and is consistent with similar code provisions for requiring smoke detectors.

Cost Implications of the Code Change:

A plug-in CO detector is the lowest cost method for complying with the 2012 IRC. The remodeling projects that are exempt by the 2015 IRC from installing the CO detector (exterior decks/porches, mechanical, and plumbing improvements) would realize the savings shown in Table FEA1.

Table FEA1. Estimated Savings for Some Remodeling Jobs

	Cost	8% Sales Tax	O & P	Total ($)
Kidde Plug-In CO Alarm with Battery Backup	(44)	(4)	(10)	(58)

HomeDepot.com

Report Reference No: FEA2

2015 IRC Code Sections: R322.3.5.1

Summary of Code Change:

Construction in V Zones requires that walls installed below the base flood elevation (BFE) be breakaway walls. Under the 2012 IRC, an enclosed stairway providing access to the elevated house might have a security (exterior) door at the bottom of the stairs and an interior door at the top at the entry to the house. Because the wall assembly is designed to break away, thus exposing the stairway to flooding and waves as well as wind, the 2015 IRC requires that the door at the top of the stairway must be an exterior door.

Cost Implication of the Code Change:

In accordance with the 2015 IRC, the thermal envelope is defined by the house that has been built above the BFE regardless of whether or not an exterior door is installed at grade level at the bottom of an enclosed stairway. Under the 2012 IRC, the builder had an option to define the stairway as part of conditioned space and install an interior door at the top of the passage. In this case, the transition to the 2015 IRC will result in an added cost to install an exterior door at the head of the stairway, as shown in Table FEA2. The pricing for the exterior door is based on the cost of an impact resistant door.

Table FEA2. Estimated Added Cost for Replacing an Interior Door with an Exterior Door

	Material	Labor	O & P	Total ($)
Exterior Door, 3068, metal face, insulated, brickmold, jamb, flashing	410	64	100	574
Interior Door, 3068 split jamb hollow core	140	32	36	208
Added Cost for Exterior Door				366

RSMeans RCD 2014

Home Depot.com

Report Reference No: FEA3

2015 IRC Code Sections: N1102.2.4

Summary of Code Change:

Access hatches and doors from conditioned space to unconditioned space must be insulated to a level equivalent to the insulation on the surrounding surface with the exception of vertical doors that provide access from conditioned to unconditioned spaces, which shall be permitted to meet the fenestration requirement of Table R402.1.1 based on climate zone. Table FEA3-A shows the reduction in R-values allowed by the code change recognizing the difference in possible R-values for exterior doors versus exterior walls.

Table FEA3-A. Comparative Insulating Values of a Vertical Door or Hatch

Climate Zone	2012		2015	
	Frame Wall		Fenestration	
	U-value	R-value	U-value	R-value
1	0.082	12.2	0.50	2.0
2	0.082	12.2	0.40	2.5
3	0.057	17.5	0.35	2.9
4 < Marine	0.057	17.5	0.35	2.9
5 + Marine 4	0.057	17.5	0.32	3.1
6	0.048	20.8	0.32	3.1
7 & 8	0.048	20.8	0.32	3.1

IRC Table R402.1.1

Cost Implication of the Code Change:

The code change permits vertical doors to follow the thermal requirements of exterior doors versus the previous code's requirement that vertical access panels meet exterior wall requirements. Table FEA3-B presents the cost/benefit of the code revision two ways – as an interior door layered with a lesser thermal value of rigid foam insulation than the previous code required or as the replacement of a modified interior door with an exterior door and no added overlay of rigid foam.

Table FEA3-B. Estimated Cost of Vertical Door

	Material	Labor	O & P	Total ($)
2012 - Interior Door, w/ rigid foam insulation	155	45	60	260
2015 - Interior Door, w/ rigid foam insulation	123	38	44	205
2015 - Exterior Door, 3068, insulated	192	27	52	272
Cost Savings for Reduced Insulation OR				(55)
Added Cost for Exterior Door				12

RSMeans RCD 2014

Home Depot.com/Lowes.com

Report Reference No: FEA4

2015 IRC Code Sections: R310.5, R310.6

Summary of Code Change:

The code change provides exceptions from requiring an emergency escape and rescue opening (EERO) in homes undergoing additions that include basements. The code change also exempts basement alterations and repairs from adding an EERO to the existing basement.

Cost Implication of the Code Change:

Table FEA4-A shows the cost savings if a new EERO does not need to be added to an existing basement. Table FEA4-B indicates the cost savings from not having to add an EERO with a basement addition.

Table FEA4-A. Estimated Cost of an Emergency Escape and Rescue Opening Added to Existing Basement

Construction Activity	Material	Labor (hrs)	Cost/Hr	w/ O & P	Total ($)
Excavation, by hand[1]		12	24	40	481
Window Well - 63" Tall[2]	844				1,055
Saw Cut Foundation[1]		4	32	55	219
Frame Window[1]		2	32	55	110
Tie into Draintile[1]		1	32	55	55
Gravel[1]		1	32	55	55
Window[2]	268				335
Backfill[1]		3	24	40	120
Seed[1]		1	24	40	40
Haul and Disposal[1]		4	24	40	160
Cost Savings					(2,630)

1. RSMeans RCD 2014
2. Home Depot/Lowes

Table FEA4-B. Estimated Cost of an Emergency Escape and Rescue Opening Added with a Basement Addition

Construction Activity	Material	Labor (hrs)	Cost/Hr	w/ O & P	Total ($)
Window Well - 63" Tall[2]	844				1,055
Frame Window[1]		2	32	55	110
Tie into Draintile[1]		1	32	55	55
Window[2]	268				335
Cost Savings					(1,555)

1. RSMeans RCD 2014
2. Home Depot/Lowes

Report Reference No: FEA5

2015 IRC Code Sections: R308.4.7

Summary of Code Change:

The code change narrowed the range where safety glazing for windows in proximity to the bottom stair nosing is required. The revised provisions require safety glazing only within a 180 degree arc from the bottom tread nosing.

Cost Implication of the Code Change:

The cost impact would be dependent on the architectural configuration of the stairs and adjacent glazing. In the reference houses there is a window at a stair landing in the two story house with a basement foundation that would require an impact resistant window that would not have been exempted by this code change, however, it would also have been required in the previous code; for a net cost effect of zero.

Table FEA5 shows the additional cost of safety glazing if a design required its addition. Note that safety glazing might be allowed to be omitted by this code change in some design cases, in which case the estimate in Table FEA5 would indicate the savings per window due to the code change.

Table FEA5. Added Cost of Safety Glazing in a 3040 Window

Component	Additional Cost	Material	w/O & P ($)
3' x 4' Double Hung		279	363
Tempered Windows Add 50%	50%		181
Total - Impact Resistant 3040 Window			181

RSMeans RCD 2014

Report Reference No: FEA6

2015 IRC Code Sections: R301.2.1.2

Summary of Code Change:

This code change expands the use of 7/16 in. wood structural panels for protection of openings from windborne debris in high wind zones to three-story buildings with a mean roof height of 33 ft or less. Previously only one- and two- story buildings qualified for use of wood structural panels for windborne debris protection. Where three-story buildings are built on a sloped surface or with the first story partially embedded in the ground, the mean roof height can be at or below 33 ft.

Cost Implication of the Code Change:

The cost implication of this can vary widely depending on the selected type of hurricane shutters, or alternate opening protection. The low-end cost savings is described in Table FEA6 based on the quantity of windows in a three-story house on a sloped grade (the window quantity was estimated based on extrapolation of the number of windows in the two-story reference homes to a three-story house on a sloped grade). Similar hardware was expected to be used to mount the two products that are compared in the Table.

Table FEA6. Estimated Cost Savings for Hurricane Panels

Component	3-Story	3-Story
Estimated Windows(vary in size)	21	22
7/16" Wood Structural Panels	529	554
Aluminum Hurricane Panels	2,945	2,750
Cost Savings ($)	(2,416)	(2,196)
Average Savings		(2,306)

Home Depot.com

Report Reference No: FEA7

2015 IRC Code Sections: R404.4

Summary of Code Change:

The trigger for engineered design for retaining walls is changed from 24 to 48 in.

Cost Implication of the Code Change:

Retaining walls with height between 24 and 48 in. do not require engineered design and can be constructed based on accepted industry practice. Therefore, there is an opportunity for cost savings on engineering fees. Retaining walls can vary greatly in configuration and complexity. Based on an estimate of an engineer's time of three hours to complete the work and a labor rate of $150/hour that was established by informal telephone surveys with local Professional Engineers, a 2 to 4 ft. retaining wall could be designed without an engineer for a savings of approximately $450.

Appendix A-FDN: Foundation

Report Reference No: FDN1

2015 IRC Code Sections: R403.1.1, Tables 403.1(1-3)

Summary of Code Change:

Minimum sizes for concrete footings were increased for construction on soil with low load-bearing value. The tables with new footing sizes have been expanded to include additional snow loads and soil bearing capacities. Significant footing size changes applied to "poor" soil conditions – in the 1,500 and 2,000 psf soil bearing capacity range.

Cost Implication of the Code Change:

The four reference houses were assumed to be constructed on 2,000 psf soil. The footing that the code currently requires (IRC 2015) was compared to a 12 in. wide x 6 in. deep footing for one- and two-story homes, as was typical for 2,000 psf soil in 2012. The cost increase is shown in Table FDN1.

Table FDN1. Footing Cost For Reference Houses on 2,000 psf Soil

Number of Stories and Roof Load	LF of Footing	2012		2015		Cost/C.Y.	Added Cost ($)
		Footing size	C.Y.	Footing Size	C.Y.		
1 Story Slab ≤ 70 psf snow load	256	12"x6"	4.7	12"x6"	4.7	350	0
2 Story Slab ≤ 70 psf snow load	196	12"x6"	3.6	12"x6"	3.6	350	0
1 Story Bsmt. ≤ 30 psf snow load	256	12"x6"	4.7	14"x6"	5.5	350	277
2 Story Bsmt. 20 psf snow load max.	188	12"x6"	3.5	16"x6"	4.6	350	406
2 Story Bsmt 30 psf snow load max.	188	12"x6"	3.5	17"x6"	4.9	350	508

RSMeans RCD 2014

Because this report focused on 2,000 psf soil and 20-30 psf snow loads for the referenced houses, it does not fully represent the costs that could be incurred in northern climates with heavy annual snowfalls, or where a house will be constructed on soils with less than 2,000 psf capacity.

Report Reference No: FDN2

2015 IRC Code Sections: R322.1, R322.1.6, R322.1.8, R322.1.9, R322.2, R322.2.1, R322.3, R322.3.2, R322.3.3, R322.3.4, R106.1.4

Summary of Code Change:

The code change requires a one-foot freeboard (or additional minimum height of the lowest floor of the structure) above base flood elevation (BFE) or design flood elevation whichever is higher in Zone A - special flood hazard areas. This essentially added a one-foot safety factor to the BFE.

Cost Implication of the Code Change:

The reference houses are not assumed to be located in coastal or riverine hazard areas. For affected houses, it is agreed that the initial cost of construction will increase.

Slab houses, where the BFE is the slab elevation, would be required to be built on a compacted area that is an additional one foot higher than BFE. The compacted mound is required to continue 10 ft beyond the house foundation's edge and be stabilized with plantings. Table FDN2-A covers the cost to create the compacted area based upon the assumption that the additional soil required to raise the grade is available on the site.

Table FDN2-A. Cost to Raise a Slab Foundation by One-Foot on a Compacted Mound

Reference House (slabs, only)	1	2
Slab size	2,987	3,007
Additional 10' all around perimeter	2,160	1,560
Total compacted area, sq. ft.	5,147	4,567
Convert to cu. yds. (divide by 9)	572	507
Cost/ per cu. yd. at 1' depth[A]	$25	$25
Total Cost per compacted area	$14,269	$12,661

[A]RSMeans RCD

An additional tread and two risers would be required to reach the 1 ft higher than grade elevation of the first floor. If the elevation change has not been accommodated with sloped grading of the compacted mound then the stairway would be required for access and Tables FDN2-A and FDN2-B would both apply for the elevated slab. A 3-ft-wide treated wood stairway with one tread and two risers would cost approximately $100, as per the estimate developed in Table FDN2-B.

Table FDN2-B. Estimated Cost of a Stairway Rising One Foot

Component Type	Material	LF	Cost	Total
Stair Treads	5/4x4	3	$8.30	$24.90
Stringers	2x10	6	$8.15	$48.90
Railings	2x4	4	$5.45	$21.80
Total				$95.60

RSMeans RCD

Appendix A-FR: Framing

Report Reference No: FR1

2015 IRC Code Sections: Table R602.10.5

Summary of Code Change:

This code change permits calculating the effective length of a continuously sheathed portal frame (CS-PF) by multiplying the actual length by 1.5. This adds design flexibility in meeting architectural specifications by using narrow wall segments, such as the walls at either side of a garage door opening. The limited width of available garage walls required the use of proprietary shear wall products to meet increased wall bracing amounts at garage doors specified by the 2009 IRC. The 2015 code increases the contributing length of the CS-PF by 1.5 times, allowing the use of conventional framing around these large openings.

Cost Implication of the Code Change:

A Strong Wall®[12] portal frame wall segment or similar proprietary product would have been required to meet the requirements of the previous code. Using the 2015 IRC, a portal frame consisting of a 16 in. wall either side of a 17 ft opening can be conventionally constructed. Table FR1 compares the cost of these two wall designs, indicating the savings that can be attributed to the code change.

Table FR1. Cost Difference of Shear Wall Construction

Items	Material	Labor	Total	w/O&P	Quantity	Unit	Unit Cost ($)
	Cost ($)						
Plywood sheathing - 1/2" pnuematic nailed	0.60	0.44	0.97	1.27	27	sf	34
2x4@12"o.c. wall w/ bottom and dbl top plate	4.93	6.40	11.33	14.84	3	lf	45
Anchor bolts & washers - 1/2"	1.08	1.98	3.06	4.01	4	ea	16
Metal strap - 1 - 1/4" x 21 - 5/8"	2.96	1.61	4.57	5.95	2	ea	12
Subtotal - Cost for field framed CS-PF wall (2015 IRC)							72
Simpson shear wall pair; SW16"x8'x4"[A] (2012 IRC)	608	64	672	880	1	pr	880
Total Cost Savings - 2015 IRC							(808)

[A]Telephone quote by HD Supply; limited availability on East Coast; does not include shipping.

[12] http://www.strongtie.com/products/strongwall/wood-strongwall/index.asp

Report Reference No: FR2

2015 IRC Code Sections: R602.7.5, Table R602.7.5, Fig 602.3(2)

Summary of Code Change:

This code change provides new requirements for additional king studs at each side of a wall opening. The required number of king studs varies with the opening's width. Designs with wide windows or several windows in one opening require additional king studs. The 2012 code does not specifically reference any use of king studs, however, standard practice in conventional light-frame construction is to install one king stud at each side of an opening against the header.

Cost Implication of the Code Change:

Each of the four reference homes have differing opening quantities and sizes. Table FR2-A shows the additional quantity of 2x4 king studs required for each reference house under the new code.
Table FR2-B indicates the additional number of 2x6 studs required under the new code. Table FR2-C provides the cost estimate for providing the required king studs.

In aggregating these costs, 2x4 construction was assumed in Climate Zones 1 and 2, and 2x6 construction was assumed in Climate Zones 3-8. (Where construction includes exterior continuous foam sheathing, substitute Table FR2-A for FR2-B, as applicable.)

Table FR2-A. Additional King Stud Requirement in 2x4 Walls– Climate Zones 1 & 2 Houses

Table R602.7.5 (2015 IRC)			Reference Homes (Zones 1&2)							
			Slab on Grade				Basement			
			1 Story*		2 Story*		1 Story*		2 Story*	
Header Span (ft)	# King studs per side		# openings	# add'l king studs	# openings	# add'l king studs	# openings	# add'l king studs	# openings	# add'l king studs
	Spacing									
	16" o.c.	24" o.c.								
3	1	1	0	0	2	0	9	0	19	0
4	2	1	4	0	10	20	4	0	4	8
8	3	2	3	6	4	16	3	6	0	0
12	5	3	4	16	1	8	0	0	0	0
Total Additional King Studs Required				22		44		6		8

* 1-story of all reference houses assumed to have 24" o.c. spacing. 2-story houses of 2x4 construction assumed to have 16" spacing.
Note: Conventional framing (reference houses) assumed to have had one king stud each side of opening prior to code change.

Table FR2-B. Additional 2015 King Stud Requirement in 2x6 Walls – Climate Zones 3-8

Table R602.7.5 (2015 IRC)			Reference Homes (Zones 3-8)							
			Slab on Grade				Basement			
			1 Story*		2 Story*		1 Story*		2 Story*	
Header Span (ft)	# King studs per side		# openings	# add'l king studs	# openings	# add'l king studs	# openings	# add'l king studs	# openings	# add'l king studs
	Spacing									
	16" o.c.	24" o.c.								
3	1	1	0	0	2	0	9	0	19	0
4	2	1	4	0	10	0	4	0	4	0
8	3	2	3	6	4	8	3	6	0	0
12	5	3	4	16	1	4	0	0	0	0
Total Additional King Studs Required				22		12		6		0

* All 2x6 construction assumed to have 24" o.c. spacing - 1st and 2nd floors.

Note: Conventional frames (reference houses) assumed to have had one king stud each side of opening prior to code change.

Table FR2-C. Cost of Additional King Studs

Component	Material	Labor	Total	w/ O&P	8' Stud Cost ($)	Total Cost ($)			
						Slab on Grade		Basement	
	LNF				EACH	1 Story	2 Story	1 Story	2 Story
2x4 King Studs - Zones 1,2	0.50	0.54	1.04	1.44	11.52	253	507	69	92
2x6 King Studs - Zones 3-8	0.77	0.57	1.34	1.80	14.40	317	173	86	0

RSMeans RCD 2014

Report Reference No: FR3

2015 IRC Code Sections: Table 602.3(1)

Summary of Code Change:

This code change modified the fastening schedule for better consistency with the IBC fastening schedule and the American Wood Council's (AWC) National Design Specification (NDS). In general, use of "common" nails with larger diameters will be required, or an additional "box" nail is required at most framing junctions. Pneumatic nail gun nails have the same gauge as "box" nails, thus, this change affects all construction where nail guns are used.

Cost Implication of the Code Change:

The four reference homes depicted in Appendices C-F were used to estimate the number of "box" nails required before and after the code change. The difference in quantities suggests a roughly 40% increase in the quantity of "box" nails required, which impacts both cost and time to construct. Table FR3-A shows the estimated difference in nails required to comply with the new code and Table FR3-B tabulates the cost.

Table FR3-A. Nail Requirements Using "Box" Nails

	Slab on Grade		Basement		Average
	1 Story	2 Story	1 Story	2 Story	
2012 Code	3,828	4,129	4,032	4,500	4,122
2015 Code	5,252	5,675	5,593	6,301	5,705
Difference (qty. nails)	1,448	1,576	1,584	1,832	1,610
Nail Quantity Increase (%)	38%	38%	39%	41%	39%

Table FR3-B. Cost Increase for "Box" Nails

	Slab on Grade		Basement		Average
	1-Story	2-Story	1-Story	2-Story	1- and 2-story
Quantity of Nails	1,448	1,576	1,584	1,832	739
Cost per Nail[1,2]	0.18	0.18	0.18	0.18	1022
Added Cost ($)	259	282	284	328	288

1RSMeans RCD 2014

2 Homedepot.com and Nailgundepot.com

Report Reference No: FR4

2015 IRC Code Sections: R507.1, R507.4, R507.5, Fig 507.5, R507.5.1, R507.6, R507.7, R507.8, R507.8.1, Fig R507.7.1, R507.8.1

Summary of Code Change:

This code change provides a set of prescriptive details, including joist, beam, and deck span tables, for constructing an exterior deck. Many local jurisdictions had developed deck construction guidelines because building codes previously has limited details addressing the construction of an exterior deck. The new code requirements are based on AWC's DCA6 "Prescriptive Residential Deck Details."

Cost Implication of the Code Change:

Based on comparison with a prescriptive design details required by a local county's permit department, the deck code changes include decreased span tables for Southern Yellow Pine (SYP) lumber, consistent with an industry-wide adjustment. The effect of the changes on a 20 ft x 14 ft, or 280 square foot deck, are shown in Table FR4.

A deck was not defined on any of the reference houses, as decks are most often offered on single family homes as optional features. The deck is accessed from the house interior and has no exterior stairs to grade.

The code change to a 12'-0" clear span either requires spacing of the 2x8s to be reduced from 16 in. on center to 12 in. on center, or the use of 2x10 joists at 16 in. centers, or installation of the support beam below the joists at 11'-10" and the loss of 2 in. of deck width. The costs in Table FR4 represent the use of 2x10 joists at 16 in. on center in lieu of 2x8 joists.

Table FR4. Cost Increase for a 20'x14' Treated Lumber Deck (2x10 versus 2x8 Joists)

Components	Qty	Mat'l	Labor	Total w/O&P ($)
Material Per 2012 IRC		Per LF		
2x8 - 14@ 16" (2' cant.)	223			
Band boards 2x8x10	40	1	1.14	3.02
2-ply 2x8-10 beam under cant	40			
Material Per 2015 IRC		Per LF		
2x10 - 14 (cant 2') @ 16"	223			
Band boards 2x10x10	40	1.31	1.28	3.60
2-ply 2x10-10 beam under cant	40			
Subtotal 2x8				915
Subtotal 2x10				1,091
Difference in Cost				176

RSMeans RCD.

Report Reference No: FR5

2015 IRC Code Sections: R602.10.8.2

Summary of Code Change:

This code change allows high heeled roof trusses to be braced with just wood structural panels provided the wall sheathing is extended from the supporting wall onto the truss heels. This exception eliminates the requirement for additional blocking between high-heel trusses when OSB structural sheathing is installed over the wall top plate to the truss ends and fastened in the stated pattern.

Cost Implication of the Code Change:

Exterior structural sheathing installed across the face of the high heels and properly fastened and secured to the structural wall below the truss is sufficient, outside of hurricane-prone coastal areas and high-seismic regions, to secure the truss ends against rotation and to transfer lateral loads through the truss heels and sheathing without the use of blocking. Previously, four wood scabs (blocking) were required to be installed along the truss heel height, wall top plate, and near the top of the heel, to provide surfaces for fastening additional sheathing and securing the truss ends to the structure. The cost to provide the 2x blocking is shown in Table FR5-A. Each of the four reference homes have different roof shapes (gables and hips), thus truss heel length was estimated for each and shown in Table FR5-B along with the estimated savings from the less stringent blocking requirement.

Table FR5-A. Cost for Truss Blocking

Component	Unit	Material	Labor	Total	w/O&P
2x4 Truss Blocking	LNF	$ 0.50	$ 0.54	$ 1.04	$ 1.44

RSMeans RCD

Table FR5-B. Cost Savings under Revised Bracing Method for High-Heeled Trusses

	Slab on Grade		Basement	
	1 Story	2 Story	1 Story	2 Story
Roof Shape	Hip	Hip/Gables	Gable	Hip
2015 - LF plateline	216	172	116	163
2012 - LF of 2x4 blocking at plateline x 2 plus 15 1/2" (1.3 LF) x 2 x truss quantity for heel height (all 4 sides of space between trusses)	715	570	385	541
Difference in LF of blocking req'd by bracing methods (2015 versus 2012)	(499)	(398)	(269)	(378)
Cost of Blocking per LF	$ 1.44	$ 1.44	$ 1.44	$ 1.44
Savings ($)	(719)	(573)	(388)	(544)

Report Reference No: FR6

2015 IRC Code Sections: Table R602.10.3(1)

Summary of Code Change:

This code change modified the braced wall requirements to account for irregularly-shaped (multiple inside and outside corners) house designs and plans with highly variable braced wall line spacings. The new provision allows the designer to determine the minimum braced wall amount for wind based on the average braced wall line spacing instead of the maximum spacing. The change provide simplification and added flexibility in bracing design for complex-shaped houses.

Cost Implication of the Code Change:

Because of the added design flexibility, there is a potential for savings on engineering fees for a wall bracing design. Instead of hiring a structural engineer to perform detailed wall bracing calculations, the house designer will be able implement prescriptive IRC provisions.

Several structural engineering firms from different regions of the country were contacted for estimates of their engineering fees for wall bracing design. Engineering fees from the survey averaged $1,150 for an analysis, documentation, and drawings based on the reference homes, which could represent the potential savings. These savings are not quantified in Tables 5 and 6 because of the complexity of braced wall design.

Appendix A-HVAC: HVAC Systems

Report Reference No: HVAC1

2015 IRC Code Sections: M1411.4

Summary of Code Change:

The code change requires that condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions.

Summary of Code Change:

A majority of condensate pumps are factory equipped with float switches that are not connected to the appliance[13]. Table HVAC1 summarizes the cost to connect the condensate pump's failure shutoff to the air handler.

Table HVAC1. Cost to Connect Float Switch to HVAC Equipment

Trade	Labor (hrs)	Unit	Cost	w/ O & P	Total ($)
HVAC Contractor	0.5	hrs	36	59	29

RSMeans RCD

[13] From FAQs on Little Giant condensate removal pump. "The Little Giant VCMA-15UL 65 GPH Automatic Condensate Removal Pump Model# 554401 comes with a power cord and a safety switch which has the 2 short wires. They are to be wired to the low voltage of the thermostat and will cause unit to shutoff if pump fails." https://www.acwholesalers.com/Little-Giant-Water-Pumps/554401-VCMA-15UL-65-GPH-Automatic-Condensate-Removal-Pump/32783.ac?gclid=CPrhzP_0g8ACFa_m7AodvQYAew

Report Reference No: HVAC2

2015 IRC Code Sections: N1102.4.4

Summary of Code Change:

The code change requires that combustion appliances that are not direct vented (e.g., furnaces and water heaters) be installed outside of the thermal envelope, or enclosed in a room isolated from the thermal envelope in Climate Zones 3-8. (An exception is made for direct vent combustion appliances with continuous air intake and exhaust pipes.) Entry from conditioned space to the combustion equipment room shall be via an air sealed door and the walls, floors, and ceilings of the sealed room, shall be insulated to the minimum R-value required for basement walls in the same climate zone.

Cost Implication of the Code Change:

Two approaches were used in calculating the cost of this code change. One approach looked at providing a finished, insulated enclosure for the equipment, made airtight and separated from the conditioned space of the house with a door with gasket and floor sweep. Houses with basement foundations would typically have both pieces of equipment located in the enclosed equipment room in the basement. Combustion make up air would be supplied from an outside vent. Table HVAC2 summarizes these costs for the reference houses built on basement foundations.

For the reference houses with slab foundations, the furnace is assumed to be located in the attic and the water heater is located in the garage; both of which are outside of the thermal envelope. For this case the plenum, distribution duct, and hot water lines in the attic or garage would require insulation. Table HVAC2-A summarizes these costs.

Table HVAC2-A. Cost to Seal Equipment Room

Component		slab on grade		basement	
	Unit Cost ($)	1 story	2 story	1 story	2 story
Insulated Wall - LNF	11			217	217
Insulated Ceiling - Sq. Ft.	3			135	135
Interior Prehung 3068 Door	208			208	208
Cost to Gasket/Seal Door	80			80	80
Duct Combustion Air to Closet	105	105	105	105	105
Duct Insulation at Plenum	3	85	85	84	84
Pipe Insulation at Hot Water Supply - LNF	5	24	24	49	49
Added Cost ($)		214	214	878	878

RSMeans RCD

Tables HVAC2-B and HVAC2-C show the cost associated with upgrading atmospheric vent equipment to direct vent equipment, to avoid construction of a special room or adding insulation to pipes and ducts.

Table HVAC2-B. Cost for Direct Vent Furnace

Component	Cost ($)
Atmospheric Gas Furnace	(1,404)
Direct Vent Furnace	2,103
B-Vent	(615)
PVC Direct Vent	415
Added Cost for Direct Vent Furnace ($)	499

Table HVAC2-C. Cost for Direct Vent Water Heater

Component	Cost ($)
Atmospheric Gas 50 gal Water Heaters	(601)
Direct Vent Gas 50 gal Water Heater	1,184
B-Vent	(615)
PVC Direct Vent	415
Added Cost for Direct Vent Water Heater($)	384

Note that for houses with basements, the cost to build the isolation room comes within $5 of the cost to upgrade the equipment ($878 vs $883), and in cases where a direct vent furnace is standard, it would cost less to upgrade the water heater from draft to direct vent than to seal the equipment room. Direct vent appliances would also save the $179 estimated cost of CAZ testing (referenced at AA1 in this Appendix).

Report Reference No: HVAC3

2015 IRC Code Sections: N1503.4

Summary of Code Change:

The code change added some explanatory language to allow that make up air that is required for kitchen exhaust fans rated in excess of 400 cfm can be supplied by either a gravity or electrically operated damper to preclude the previous interpretation that the damper was to be "automatically controlled" versus "automatically opened."

Cost Implication of the Code Change:

In jurisdictions where the code was being interpreted to require a motorized damper, this change provides potential cost savings of $150 (RSMeans, RCD 2014). The reference houses were not assumed to have this fan feature. However, the savings are listed in Table 6 to reflect those instances where a high-end kitchen is provided as an option or for marketability, or where range hoods rated for less than 400 cfm are not commonly available.

Report Reference No: HVAC4

2015 IRC Code Sections: N1103.5.1, N1103.5.1.1, N1103.5.1.2, P2905.1

Summary of Code Change:

This code change points readers accustomed to using the Plumbing chapter(s) of the IRC, only, to the Energy Efficiency chapter if hot water circulation and heat trace systems are installed.

Section N1103.5 Service hot water systems, is pointed to (from P2905) and expanded by this code change. Certain pumps and controls are required of circulation systems, heat trace systems, or demand recirculation systems.

Cost Implication of the Code Change:

The reference houses' cost would be unaffected by this option. For those that utilize a demand recirculating pump, Table HVAC4 is an estimate of the cost to install the system.

Table HVAC4. Cost of a Demand Circulation Pump

Component	Material	Labor[B]	Cost w/O&P[B]
Recirculating pump[A]	200.34	57.00	421
Sensor Valve Kit[A]	52.97	19.00	118
Electrical Connection		17.88	29
Total ($)			568

[A]Homedepot.com

[B]RSMeans RCD

Appendix A-LOC: Location

Report Reference No: LOC1

2015 IRC Code Sections: N1101.8, N1101.13.1

Summary of Code Change:

The code created a Tropical Climate Zone. It was created for houses located on islands between the Tropic of Cancer and the Tropic of Capricorn that have no heating system; limited air conditioning; use the trade winds, windows, and ceiling fans for ventilation and temperature regulation. The code allows reduced requirements for the thermal envelope.

Additional provisions of the code include:

1. *Not more than one-half of the occupied space is air conditioned.*
2. *The occupied space is not heated.*
3. *Solar, wind or other renewable energy source supplies not less than 80 percent of the energy for service water heating.*
4. *Glazing in conditioned space has a solar heat gain coefficient of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.*
5. *Permanently installed lighting is in accordance with Section N1104 (75% fixtures or lamps are high efficacy).*
6. *The exterior roof surface complies with one of the options in Table C402.2.1.1 of the International Energy Conservation Code, or the roof/ceiling has insulation with an R-value of R-15 or greater. If present, attics above the insulation are vented and attics below the insulation are unvented.*
7. *Roof surfaces have a minimum slope of 1/4 inch (6.4 mm) per foot of run. The finished roof does not have water accumulation areas.*
8. *Operable fenestration provides ventilation area equal to not less than 14 percent of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.*
9. *Bedrooms with exterior walls facing two different directions have operable fenestration or exterior walls facing two directions.*
10. *Interior doors to bedrooms are capable of being secured in the open position.*
11. *A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest space that is not used as a bedroom.*[14]

Cost Implication of the Code Change:

The code change was applied to one of the reference houses – the one-story on slab foundation. The house was assumed to have no wall insulation. Attic insulation was foregone and replaced with a radiant barrier on the underside of the roof sheathing. Because Hawaii has a temperate climate ranging between 65-88°F[15], no HVAC system was attributed to the house. An open loop solar thermal water

[14] International Code Council, 2014. *IECC 2015, Section NN1101.13.1 (R401.2.1) Tropical zone*. p.455 http://shop.iccsafe.org/2015-international-energy-conservation-coder-1.html

[15] http://www.weather.com/weather/wxclimatology/monthly/graph/USHI0026

heater was assumed to be installed to comply with the 80% renewable energy requirement of this code provision. The roof surface does not require any special reflective qualities because the building is not air conditioned with equipment. Overall, fenestration in the reference house accounts for 14% (rounded up) of floor area; room by room counts were not calculated to assure compliance, but the ventilation requirement was assumed to have been satisfied with windows. Ceiling fans were added to bedrooms and the family room. Given these assumptions, this code change provides a savings to the cost of the reference house as shown in Table LOC1.

Table LOC1. Savings Associated With Tropical Climate Zone Code Change

Features	Quantity	Cost Per	Total
Sq. Ft. of Exterior Wall Insulation, R-13	2052	1.03	(2,114)
Sq. Ft. of Attic, R-30 blown insulation	2212	1.23	(2,721)
Radiant Barrier (integral with roof sheathing)[1]	2212	0.10	212
Central Air Conditioning & Ductwork (Remove)	1	5,706.00	(5,706)
Open Loop Solar Thermal Water Heat System[2]	1	5,000.00	5,000
Ceiling Fans	5	264.00	1,320
Total			(4,008)

[1]HomeDepot.com

[2]American Solar Energy Society median price with credit for $500.

http://www.ases.org/solar-home-basics/solar-water-heating/

Report Reference No: LOC2

2015 IRC Code Sections: N1101.13, N1106.1-N1106.7.3

Summary of Code Change:

The code change gives an alternative performance compliance method. The Energy Rating Index (ERI) compliance alternative stipulates a mandatory percentage of energy savings. The base design for comparison is the same home built to the 2006 International Energy Conservation Code (IECC) prescriptive requirements, however, the reference house must also include the prescriptive envelope requirements from the 2009 IRC. The ERI for Climate Zones 1-8 ranges from 51-55%, i.e., energy savings of almost 50% over the prescriptive 2006 design.

Cost Implication of the Code Change:

This is an alternative method, thus the cost of complying with this option does not affect the reference houses. Figure LOC2-A summarizes the results of a study showing the cost impact of achieving performance 50% above 2006 IECC (which percentage can be used to approximate the ERI indexes required in the 2015 IRC).

Table LOC2-A. Incremental Cost for 50% Energy Efficiency Savings above the 2006 IECC[16]

Climate Zone/City	Construction Cost w/Standard Equipment	Construction Cost w/High Efficiency Equipment
1 Miami	$4,974	$4,669
2 Phoenix	$7,540	$5,491
3 Memphis	$8,660	$5,569
4 Baltimore	$23,349	$8,572
5 Chicago	$18,978	$7,119
6 Helena	$18,981	$12,766
7 Duluth	$18,500	$12,327
8 Fairbanks	$18,500	$12,327
Weighted Average	$14,681	$7,031

Note: Base reference point is 2006 IECC.

The costs in Table LOC2-A are shown relative to the cost of the 2006 IECC, rather than the 2012 IECC as this analysis requires. Figure LOC2-B graphs the energy savings attributed to each revision of the IECC and indicates that an approximate 38% energy savings occurs between the 2006 to 2012 IECC versions. And, while expenditures for energy efficiency do not necessarily have a linear relationship with savings, for the sake of arriving at estimated cost associated with this new method, Table LOC2-C indicates the 12% of Table LOC2-A cost that may be attributed to this new method. Note that cost development of the other two performance methods contained in the 2015 IECC is beyond the scope of this analysis, thus Table LOC2-C may not represent the least cost approach to 2015 IECC compliance.

[16] Home Innovation Research Labs, 2013. *Cost-Optimized 50% IECC Prescriptive Analysis*. www.homeinnovation.com/trends_and_reports/featured_reports/cost_optimized_50_percent_iecc_prescriptive_analysis

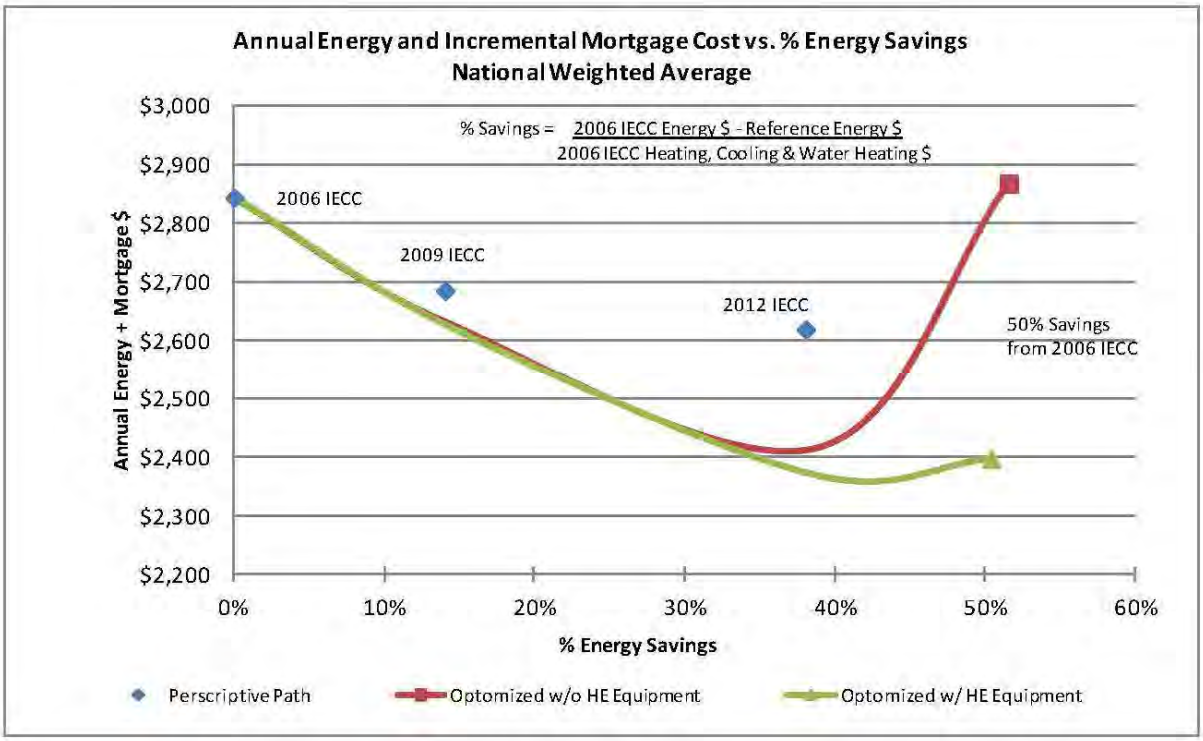


Figure LOC2-B. Energy Savings Attributable to Code Versions[17]

Table LOC2-C. Estimated Additional Cost of ERI Method (2012 IECC to 2015 IECC)

Climate Zone/City	Construction Cost w/Standard Equipment	Construction Cost w/High Efficiency Equipment
1 Miami	$1,194	$1,121
2 Phoenix	$1,810	$1,318
3 Memphis	$2,078	$1,337
4 Baltimore	$5,604	$2,057
5 Chicago	$4,555	$1,709
6 Helena	$4,555	$3,064
7 Duluth	$4,440	$2,958
8 Fairbanks	$4,440	$2,958
Weighted Average	$3,523	$1,687

[17] Home Innovation Research Labs, 2013. *Cost-Optimized 50% IECC Prescriptive Analysis*. www.homeinnovation.com/trends_and_reports/featured_reports/cost_optimized_50_percent_iecc_prescriptive_analysis

Report Reference No: LOC3

2015 IRC Code Sections: R703.3.1, Table 703.3.1(1)

Summary of Code Change:

The code change defines building height limits for use with Table R703.3(1) (cladding attachment and thickness) based on design wind speed and building height and exposure category as shown in new Table R703.5.

Cost Implication of the Code Change:

Homes built in open terrain and near large bodies of water (exposure categories C & D) and where the design wind speed is 115 mph or above are limited to heights of 15 to 30 ft in order to use the cladding fastening schedules in Table R703.3(1). Otherwise, either an alternative cladding could be selected (i.e., stucco) or an engineered fastening schedule devised. The cost of an engineered fastening approach is estimated at $0-$450 based on whether a fastener or cladding manufacturer provides the solution or an engineer is hired for $150/hour.

Appendix A-MAT: Materials

Report Reference No: MAT1

2015 IRC Code Sections: N1103.2.2, M1601.4.1

Summary of Code Change:

The code change no longer exempts snap-lock and button-lock type seams from mandatory air sealing (but still exempts longitudinal duct sealing for ducts having a static pressure classification of less than 2 in. of water column at 500 Pa and continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types). Snap-lock horizontal joints are typical of residentially-used metal ducting.

Cost Implication of the Code Change:

The cost implication of sealing horizontal joints in snap lock metal ducting vary with the HVAC layout and labor costs. The reference houses have been assumed to have a main trunk servicing each story. Branch ducts from the main trunks are assumed to be metal (and snap-lock) when located in first and second floor framing and insulated flexible ducting in attics. Table MAT1 indicates the costs associated with the added sealing of horizontal seams for the reference houses. The sealant is estimated as mastic applied with a brush.

Table MAT1. Cost to Seal Snap Lock Metal Ducting

	1-Story Slab	2-Story Slab	1-Story IG Bsmt.	2-Story IG Bsmt.
LF 6" Branch - flexible (no seams)	216	180		
LF trunk line (2)	144	168	128	128
LF Vertical supply seams (2)	14	25	14	20
LF Return seams (2)	28	50	28	40
LF 6" Branch seams - metal (1)		144	248	378
Subtotal, LF seams to duct seal	186	387	418	566
Cost to duct seal per LF[1]	0.56	0.56	0.56	0.56
Total Cost	103	215	232	314

[1]RSMeans RCD Sheet Metal Apprentice applying one gallon of mastic/hr. (125 lf/hr.)

Report Reference No: MAT2

2015 IRC Code Sections: M1506.1-3, Table 1506.2

Summary of Code Change:

The code change established a new Table M1506.2 in the IRC with the maximum duct length based on the duct diameter and type. The purpose of the change is to assure that the fan reaches its intended flow rate.

Cost Implication of the Code Change:

In accordance with the new IRC table, the air movement per length of smooth-wall duct versus flex duct is nearly 50% more cubic feet per minute (CFM). Builders servicing 50 CFM bath fans and 100 CFM kitchen fans with flexible duct will be required to either minimize the length of the flexible ducting's run to the outside, buy a more powerful fan, or switch to smooth duct. There is no cost implication for the bath fans in the reference house as each of these is located within 56 ft of an exterior wall, which is the maximum length for the minimum flexible duct size (4 in.) servicing a 50 CFM fan. The kitchen fans, on the other hand, would require flexible ducting with a minimum diameter of 5 in.; assuming the longest run, Table MAT2 indicates the cost differential between 4 in. and 5 in. flexible ducting at the lengths required by each design. Other unit costs have been included in the table to assist in the cost calculation for alternatives.

Table MAT2. Cost Difference of Kitchen Fan Ducting ($)

Components	Size	Cost Each/Lnf (Installed)	LF	1-Story Slab	LF	2-Story Slab	LF	1-Story IG Bsmt.	LF	2-Story IG Bsmt.
Flexible Duct	4"	5.40								
Flexible Duct	5"	5.75	18	6.30	6	2.10	20	7.00	6	2.10
Flexible Duct	6"	6.55								
Smooth Duct	4"	4.09								
Smooth Duct	5"	5.41								
Smooth Duct	6"	6.03								
Bath fan	50 CFM	114.00								
Bath fan	80 CFM	138.00								
Bath fan	100 CFM	154.00								
Kitchen fan	100 CFM	100.00								
Kitchen fan	150 CFM	151.00								
Kitchen fan	200 CFM	242.00								

RSMeans, RCD 2014

Home Depot.com

Report Reference No: MAT3

2015 IRC Code Sections: R316.5.11

Summary of Code Change:

The code change allows the application of spray/rigid foam in sill plates, headers, and perimeter joist spaces without a thermal barrier if it meets specific thickness (up to 3-1/4 in.), density, flame spread index, and smoke development index criteria.

Cost Implication of the Code Change:

The code change may broaden the use of foams that comply. There may be a cost savings to builders using foams in unfinished basements, crawlspaces, and attics that will be able to eliminate the thermal barrier if they use foam plastics that comply with the specifications, however the maximum thickness in the code limits the ability of foam to be able to meet the wall thermal requirement by itself in all Climate Zones. (Rigid and spray foams range from R-3.8 to R-6 per inch. At the high end of the thermal resistance range, a 3 1/14 in. depth of material is equal to R-19 to R-20 which will satisfy the code for wall insulation up to Climate Zone 5, only.) Table MAT3 contains an estimation of the possible cost savings in homes with basements where the insulation is used as wall insulation.

Table MAT3. Cost Savings When Spray Polyurethane Foam without a Fire Rating is Applied to Exposed Bandboards

	Basement Houses	
Quantities and Costs	**1-story**	**2-story**
LF and Sq. Ft. of 1st floor bandboard (exposed to basement); 12" deep	204	185
Cost to install 1"x1 Sq. Ft. SPF (R-6)	0.89	
Cost to install 1"x1 Sq. Ft. SPF (R-6), fire resistance rated	1.28	
Difference in Cost from Fire rated to Non-rated SPF	(0.39)	
Savings Zone 1 & 2, (2.2")	($176)	($159)
Savings Zones 3-5 (3.25")	($260)	($235)

Report Reference No: MAT4

2015 IRC Code Sections: R507.2.4, Fig R507.2.3(2)

Summary of Code Change:

This code change allows an alternative to the deck joist tension ties required at each end of the deck for resisting lateral loads. The alternative utilizes an angle connector at four locations.

Cost Implication of the Code Change:

Two prescriptive methods of using hardware to resist lateral loads on an exterior deck have been detailed in Table MAT4. The difference between the two methods, $42, is the savings that may be realized by employing Method 2, which was introduced with this code change.

Table MAT4. Two Methods for Detailing Exterior Decks for Lateral Loads

Hardware	Quantity	Each	Estimated Labor[B]	Cost w/O&P	Method 1 - Deck Tension Tie	Method 2 - Angle Brackets
Simpson Model #DTT2Z-R2 Deck Tension Tie (2-pack with screws)[A]	2	16.71	16.05	55	110	
Simpson RFB#4X5HDG 1/2" Threaded Rod[A]	2	3.24	incl. above	5	11	
Simpson Model # A33 A Angle[A]	4	2.72	8.03	18		72
Simpson SD Connectors (box 100)	0.34	12.69		21		7
Total Cost by Method ($)					121	79

[A]HomeDepot.com

[B]RSMeans RCD 2014

Report Reference No: MAT5 and MAT6

IRC submission no. RB369-13
2015 IRC Code Sections: R703.6.1, Table R703.6.3 (1-2), Table R703.6.1, R703.6.3, R905.7.5, Table905.7.5(2), R905.8.6

Summary of Code Change:

The code change modifies cedar shake wall and roof installation, fastener type, and fastener spacing requirements, as requested by a representative of the industry to minimize failures seen on wood shake roofs. Additionally, where shakes or shingles are installed over a non-permeable WRB, [vertical] furring strips shall be installed before the shakes or shingles.

Cost Implication of the Code Change:

The reference houses in the study were deemed not to have this cladding or roofing option. Per this code change, effective shingle exposure, or cedar shake overlapping requirement, was reduced by an average of 7% of surface area, fastener penetration into sheathing was increased by 50% (to 3/4 in.), and fastener specifications were modified to require galvanized or stainless steel fasteners. Overall, a 7% increase in cost (based on the 7% reduction in coverage) is a reasonable assumption if using cedar shake wall or roof cladding.

Appendix A-METH: Method

Report Reference No: METH1

2015 IRC Code Sections: N1103.3.4

Summary of Code Change:

The code change defines the duct leakage measurement method and changes the duct leakage testing requirement from Mandatory to Prescriptive. The distinction allows builders pursuing energy efficiency (EE) compliance by other methods to trade off a ductwork level of air tightness for other efficiencies.

As with the previous code version, where ducts and equipment are completely within conditioned space, testing is not required.

Duct testing remains required under this amendment, however, where EE compliance is via a method other than the prescriptive approach, no leakage specific metric needs to be met.

Where a duct leakage test metric is required, the maximum duct leakage metric that was established (RE112-13) is 4 cfm per 100 square feet leakage to outdoors and total.

Cost Implication of the Code Change:

Because the specifications for performance under this test did not change, merely its applicability, there should be no additional cost for compliance. The effect of the savings attributable to this trade off was not calculated due to the numerous possible alternatives.

Once again, this code change is applicable to one of four EE compliance approaches – specifically, the performance approach has been freed from the constraint of a duct leakage metric.

Report Reference No: METH2 and METH3

2015 IRC Code Sections: N1105.4.2, N1105.4.2.1, N1105.4.2.2

Summary of Code Change:

This code change refines energy efficiency (EE) reporting requirements for performance method code compliance to include submission of energy analysis report(s) with the building permit application and resubmission of an "as built" analysis at completion.

The change defines the [permit] submission requirements for building permit application and adds submission requirements for occupancy permit application. The following requirements have been added:

For permit application (METH 2):

- A statement that the proposed design complies with N1105 (IRC); and
- A site specific energy analysis report.

For occupancy permit application (METH 3):

- Building street address, or other building site identification;
- A statement indicating that the as-built building complies with Section N1105;
- A certificate indicating that the building passes the performance matrix for code compliance and the energy saving features of the buildings;
- A site-specific energy analysis report that is in compliance with Section N1105;
- Name of the individual performing the analysis and generating the report; and
- Name and version of the compliance software tool.

Batch samplings are prohibited.

Cost Implication of Code Change:

The performance method of energy efficiency compliance is one of three approaches that can be selected, but because of the popularity of the approach, an estimate of the additional cost was included. The code provision does not require that an independent third party perform the EE analysis. The cost estimate, Table METH2-3, supposes that a staff member completes the analysis. If the EE were performed by a third party, then an 18% markup for overhead and profit (O&P) could be added.

Table METH2-3. Estimated Costs for Submission of Energy Efficiency Analysis with Permit and Use and Occupancy Applications with the Performance Method of EE Compliance

Professional Designation	Report Reference	Hours	Burdened Wages ($/hr.)[A]	Total ($)
Energy Auditor perform analysis	METH2	2	44	88
Energy Auditor simulate as built	METH3	1	44	44

[A]Bureau of Labor Statistics; annual mean salary burdened 35%.

Appendix A-PL: Plumbing Systems

Report Reference No: PL1

2015 IRC Code Sections: Table P2903.1

Summary of Code Change:

The code change amends minimum fixture flow rates to align with green building and water efficiency specifications. The code change adds an option to use a combination thermostatic/balanced pressure mixing valve at showers and tubs.

Cost Implication of the Code Change:

Table PL1-A shows the text changes to the existing Table in the code. Deleted references are crossed through and new language is in red and underlined. Costs were developed based on a web search for complying fixtures and a minimum average of three was used to compile the costs estimated in Table PL1-B.

Table PL1-A: Altered Code

TABLE P2903.1		
REQUIRED CAPACITIES AT POINT OF OUTLET DISCHARGE		
FIXTURE SUPPLY	FLOW	FLOW
OUTLET SERVING	RATE	PRESSURE
	(gpm)	(psi)
Bathtub, ~~pressure balanced~~ balanced-pressure ~~or~~, thermostatic or combination balanced-pressure/thermostatic mixing valve	4	20
Bidet, thermostatic mixing valve	2	20
Dishwasher	2.75	8
Laundry ~~tub~~ tray	4	8
Lavatory	~~2~~ 0.8	8
Shower, ~~pressure balanced~~ balanced-pressure ~~or~~, thermostatic or combination balanced-pressure/thermostatic mixing valve	~~3~~ 2.5	20
Sillcock, hose bibb	5	8
Sink	~~2.5~~ 1.75	8
Water closet, flushometer tank	1.6	20
Water closet, tank, close coupled	3	20
Water closet, tank, one piece	6	20

Table PL1-B: Cost Comparison of Fixtures

Fixture	Cost ($)	
	2012	2015
Lavatory	135	145
Shower, ~~pressure balanced~~ balanced-pressure ~~or~~, thermostatic or combination balanced-pressure/thermostatic mixing valve	N/A	N/A
Sink	119	105

Report Reference No: PL2

2015 IRC Code Sections: N1103.5.3

Summary of Code Change:

The requirement for interior hot water pipe insulation for pipes located within conditioned space is simplified by eliminating Table R403.4.2 (N1103.4.2) and requiring R-3 insulation on interior hot water supply pipes of 3/4 in. diameter and greater (along with sub-slab, unconditioned crawl space, etc. locations). The amendment exempts 3/8 and 1/2 in. piping from previously-required insulation (based on the length of the pipe run).

Cost Implication of the Code Change:

The four reference homes depicted in appendices C-F were used to estimate the total length of hot water pipe in the houses (Table PL2-A). The material and labor costs per linear foot are shown in Table PL2-B. Using these tables for quantity and cost per linear foot reference, Tables PL2-C and PL2-D were developed to estimate the cost to insulate these pipes under each code and the resultant savings is tallied in PL2-D.

Table PL2-A: Estimated Pipe

	Slab on Grade		Basement	
	1 Story	2 Story	1 Story	2 Story
Pipe Diam.	Linear Feet			
3/4"	25	15	20	35
1/2"	30	70	60	95

Table PL2-B: Cost Data for Pipe Insulation

Pipe Diam.	Material	Labor	Cost	w/ O&P
3/4"	1.04	2.21	3.25	4.89
1/2"	0.97	2.11	3.08	4.65

Table PL2-C: Cost to Insulate Pipe – 2012 IRC

2012 Code	Slab on Grade		Basement	
	1 Story	2 Story	1 Story	2 Story
Pipe Diam.	Cost ($)			
3/4"	122	73	98	171
1/2"	140	326	279	442
total	262	399	377	613

Table PL2-D: Cost to Insulate Pipe – 2015 IRC with Savings over 2012 IRC

2015 Code	Slab on Grade		Basement	
	1 Story	2 Story	1 Story	2 Story
Pipe Diam.	Cost ($)			
3/4"	112	67	90	157
Difference 2012-2015	(149)	(331)	(287)	(456)

Report Reference No: PL3

2015 IRC Code Sections: P3201.2, P3201.2.1, P3201.2.1.(1-4)

Summary of Code Change:

This code change added a requirement for a trap primer device to emergency floor drain traps and traps subject to evaporation. The trap primer device can be a potable water supplied trap seal primer valve, a reclaimed or gray water supplied trap seal primer valve, a waste water supplied trap primer device, or a barrier type trap seal protection device.

Cost Implication of the Code Change:

Table PL3 shows the cost of a trap primer when installed with a new plumbing and waste system in a location within 20 feet of an existing water supply line.

Table PL3. Cost to Install a Floor Drain Trap Primer

Component	Quantity	Cost	Labor[B]	Total w/O&P
Trap Primer[A]	1	59.95	38	160
1/2" CPVC[C]	20	7.66	19	43
Total ($)				203

[A]globalindustries.com

[B]RSMeans RCD

[C]homedepot.com

APPENDIX B:
LOCATION ADJUSTMENT FACTORS

State	City	Cost Adjustment Factor	State	City	Cost Adjustment Factor
Alabama	Birmingham	0.86	Montana	Billings	0.90
Alabama	Mobile	0.81	Nebraska	Omaha	0.90
Alaska	Fairbanks	1.24	Nevada	Las Vegas	1.03
Arizona	Phoenix	0.86	New Hampshire	Portsmouth	0.97
Arizona	Tucson	0.84	New Jersey	Jersey City	1.13
Arkansas	Little Rock	0.8	New Mexico	Alburquerque	0.83
California	Alhambra	1.08	New York	Long Island City	1.33
California	Los Angeles	1.09	New York	Syracuse	0.98
California	Riverside	1.07	North Carolina	Charlotte	0.86
California	Stockton	1.11	North Carolina	Greensboro	0.85
Colorado	Boulder	0.91	North Carolina	Raleigh	0.86
Colorado	Colorado Springs	0.86	North Dakota	Fargo	0.79
Colorado	Denver	0.89	Ohio	Columbus	0.95
Connecticut	New Haven	1.11	Oklahoma	Oklahoma City	0.82
Deleware	Dover	1.01	Oklahoma	Tulsa	0.78
District of Columbia	Washington, D.C.	0.94	Oregon	Bend	1.00
Florida	Fort Meyers	0.86	Pennsylvania	Norristown	1.10
Florida	Miami	0.86	Pennsylvania	State College	0.91
Florida	Orlando	0.87	Rhode Island	Providence	1.10
Florida	Tampa	0.90	South Carolina	Greenville	0.85
Georgia	Atlanta	0.87	Tennessee	Memphis	0.84
Hawaii	Honolulu	1.22	Texas	Austin	0.78
Idaho	Boise	0.88	Texas	Dallas	0.84
Illinois	Carbondale	1.02	Texas	Houston	0.85
Indiana	Indianapolis	0.93	Texas	San Antonio	0.80
Iowa	Des Moines	0.91	Utah	Ogden	0.79
Kansas	Wichita	0.79	Utah	Provo	0.79
Kentucky	Louisville	0.92	Utah	Salt Lake City	0.80
Louisiana	Baton Rouge	0.82	Vermont	Burlington	0.95
Maine	Portland	0.97	Virginia	Fairfax	1.02
Maryland	Baltimore	0.90	Virginia	Winchester	1.01
Michigan	Ann Arbor	1.03	Washington	Tacoma	1.01
Minnesota	St. Paul	1.11	West Virginia	Charleston	0.97
Mississippi	Biloxi	0.80	Wisconsin	La Crosse	0.96
Missouri	Springfield	0.89	Wyoming	Casper	0.75

Source: RSMeans® *Residential Cost Data 2014* .

APPENDIX C:
ONE-STORY HOUSE WITH SLAB FOUNDATION

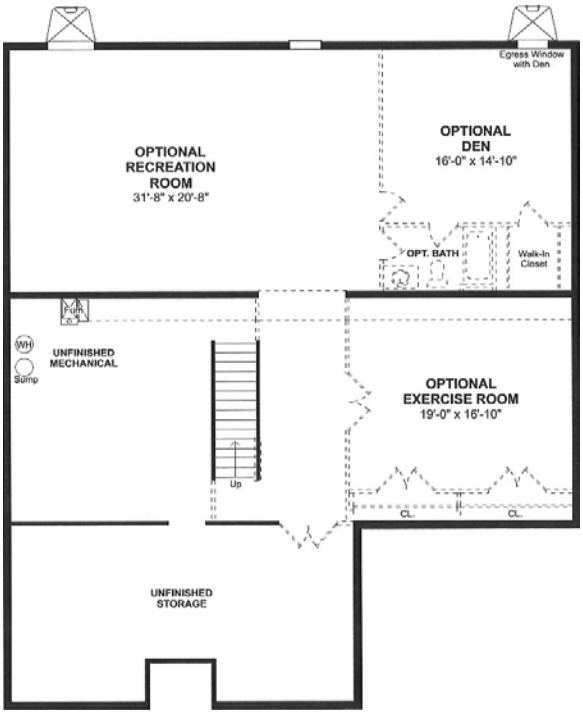
Courtesy: LionsGate Homes at The Creekside

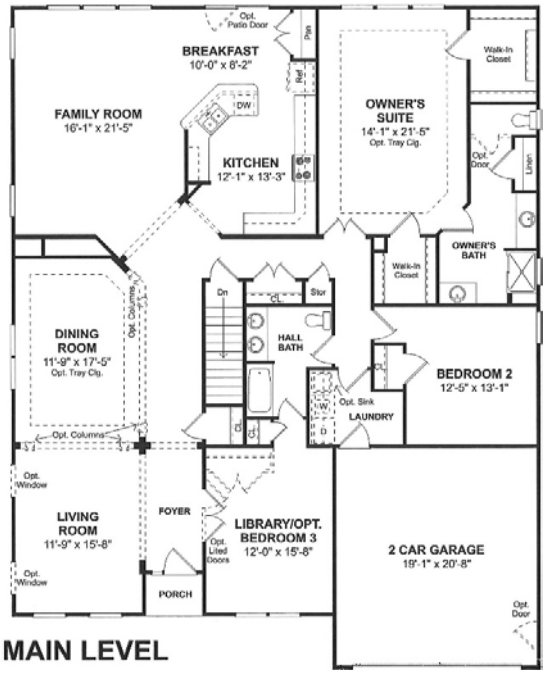
APPENDIX D:
TWO-STORY HOUSE WITH SLAB FOUNDATION

Courtesy: Meritage Homes at Riverstone

APPENDIX E:
ONE-STORY HOUSE WITH BASEMENT FOUNDATION

Courtesy: K Hovnanian Four Seasons at New Kent Vineyards





APPENDIX F:
TWO-STORY HOUSE WITH BASEMENT FOUNDATION

Courtesy: Lennar at Sorento Estates

APPENDIX H: REFERENCES

Florida Solar Energy Center, 2014. Cost Effectiveness of 2015 IECC Compliance Using the HERS Index. www.resnet.us/blog/wp-content/uploads/2014/08/Cost-Effectiveness-of-RE-188.pdf

Hendron, R. Burch, J. Hoeschele, M. Rainer, L., 2009. *Potential for Energy Savings Through Residential Hot Water Distribution System Improvements*, Proceedings of the 3rd International Conference on Energy Sustainability. http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=1647988

Home Innovation Research Labs, 2013. *Cost-Optimized 50% IECC Prescriptive Analysis*. http://www.homeinnovation.com/trends_and_reports/featured_reports/cost_optimized_50_percent_iecc_prescriptive_analysis

International Code Council, 2014. *IECC Section NN1101.13.1 (R401.2.1) Tropical zone*. p.455 http://shop.iccsafe.org/2015-international-energy-conservation-coder-1.html

NAHB Research Center for ASHRAE, 2009. *Economic Database in Support of ASHRAE 90.2 (Energy-Efficient Design of Low-Rise Residential Buildings) 1481 RP.* https://ashrae.org/.../ASHRAE-D-RP1481-20090630.pdf

RS Means, 2014. *Residential Cost Data (RCD).* *http://rsmeans.reedconstructiondata.com/RSMeans_Cost_Data_eBooks.aspx*

Taylor, Heather for NAHB 2014. *Cost of Constructing a Home*. www.nahb.org/generic.aspx?sectionID=734&genericContentID=221388&channelID=311

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2015 I-Code Highlights

International Residential Code

- FEMA's post-disaster flood investigations have resulted in provisions that require Coastal A Zones to meet the requirements for coastal high hazard areas (Zone V). In addition, a factor of safety of one foot of additional freeboard has been added to the elevation requirements. (Section R322; RB180 and RB181 – 13)
- The minimum footing size tables and figures have been expanded to more accurately provide details and contemporary footing sizes for snow load areas up to 70 psf, larger floor and roof tributary areas and greater floor-ceiling heights. (Figures R403.1(1) and R403.1.3 and Tables R403.1(1) – (3); RB211 and RB212 -13)
- The wood floor, ceiling and roof rafter span tables for Southern Pine have been revised to reflect the lower allowable spans as certified by the American Lumber Standards Committee Board of Review. Depending on the joist spacing, size and grade, some of the allowable spans have been reduced by as much as 2'-9". (Chapters 5 and 8; RB250-13)
- The wood deck provisions have been significantly expanded to provide additional prescriptive design and construction details for all facets of decks, including the decking, joists, beams, posts and connections. (Section R507; RB264-13)
- A new section and figure for rim board design and details have been added to the code as an energy saving construction practice that allows insulation to be used in conjunction with the rim boards. (Section R602.7.2 and Figure R602.7.2; RB288-13)
- The simplified wall bracing provisions in the code have been expanded to include three story buildings as well as buildings located in areas where the design wind speed is 130 mph and Wind Exposure Category C. (Section R602.12 and Table R602.12.4; RB324 and RB325-13)
- The masonry construction provisions have been consolidated into a single location versus the multiple locations in previous editions. New provisions for Autoclaved Aerated Concrete masonry and requirements for the re-use of masonry units have been added to the code. (Section R606; RB332-13)
- The exterior wall covering and attachment provisions have been reorganized and clarified. Included are provisions for two new siding materials: insulated vinyl siding and polypropylene siding. (Section R703.3 and Table R703.3(1); RB385, RB387 and RB392 – 13)
- Three new sections have been added which include prescriptive design and details for cladding attachment over foam sheathing which is either attached to wood or cold formed steel framing or attached to masonry or concrete. (Sections R703.15 - R703.17; RB389 - RB391 – 13)
- The roof underlayment and ice barrier provisions have been consolidated since they apply to many different types of roof coverings. This clearly identifies in a single location the key differences in requirements for roof coverings. (Sections R905.1.1, R905.1.2, Tables R905.1.1(1), (2) and (3); RB435-13)

- New provisions for photovoltaic roof shingles, including allowable roof slope, underlayment requirements and attachment have been added to the code. (Section R905.16; RB446-13)
- Provisions for rooftop mounted photovoltaic systems have been added to the roofing chapter of the code. Included are provisions for installation, wind resistance, fire classification and the listing and labeling of the systems. (Section R907; RB447-13)
- An alternative path for residential energy compliance which provides greater flexibility which is likely to lower construction costs has been added. It is called the Energy Rating Index Compliance Alternative. (Section N1106; RE188-13)
- A new section for energy compliance for existing buildings which are undergoing repairs, alterations or changes of occupancy have been added. (Section N1106; CE4-13)
- New provisions for condensate cleanouts and pump interlocks have been added to the code in order to minimize damage and mold due to failure of condensate drains and pumps in concealed locations. (Sections M1411.3.3 and M1411.4; RM21 and RM23 – 13)
- The return air provisions have been completely re-written to remove outdated provisions, resolve interpretive issues and clarify the intent of the section. (Section M1602; RM57-13)
- Chapter 23 has been comprehensively revised and re-titled to Solar Thermal Energy Systems. This includes revisions for seismic bracing, heat transfer fluids, labels and relief valves. This chapter now includes references to three solar standards for solar collectors and solar thermal systems promulgated by the Solar Rating and Certification Corporation (SRCC Standards 100, 300 and 600). (Chapter 23; RM77, 79, 82 and 84 to 93 -13)
- The weighted average of lead content used in drinking water pipe and fittings has been reduced to a “lead-free” value of not more than 0.25 percent lead. This provision meets the new requirements of the Federal reduction of Lead in Drinking Water Act that went into effect in 2014. (Section P2905.2.1; RP102-12)
- Comprehensive provisions for straw bale and straw clay innovative building systems have been added to the appendix. Both building techniques include prescriptive provisions for one story buildings. (Appendices R and S; RB471 and RB473 – 13)

IDAHO BUILDING CODE BOARD

Agenda Item No. 04 **Program Manager Report**

PRESENTER: Arlan Smith, Building Program Manager

OBJECTIVE: Update the Board on the Building program's current activities.

ACTION: Informational

BACKGROUND: This topic is addressed at all regularly scheduled Idaho Building Code Board meetings.

PROCEDURAL HISTORY:

ATTACHMENTS: No documentation

IDAHO BUILDING CODE BOARD

Agenda Item No. 05 **Administrator Report**

PRESENTER: Chris L. Jensen, Administrator

OBJECTIVE: Provide the Board with an overview of the Division's current activities.

ACTION: Informational

BACKGROUND: This topic is addressed at all regularly scheduled Idaho Building Code Board meetings.

PROCEDURAL HISTORY:

ATTACHMENTS: No documentation

IDAHO BUILDING CODE BOARD

Agenda Item No. 05a **Financial Report**

PRESENTER: Chris, L. Jensen, Administrator

OBJECTIVE: Review the Idaho Building Code Board's Financial report.

ACTION: Informational

BACKGROUND: This topic is addressed at all regularly scheduled Idaho Building Code Board meetings.

PROCEDURAL HISTORY:

ATTACHMENTS: Financial report

Division of Building Safety

IDAHO BUILDING CODE FUND 0229-02

Fiscal Year 2017 Financial Statements

As of 3/31/2017

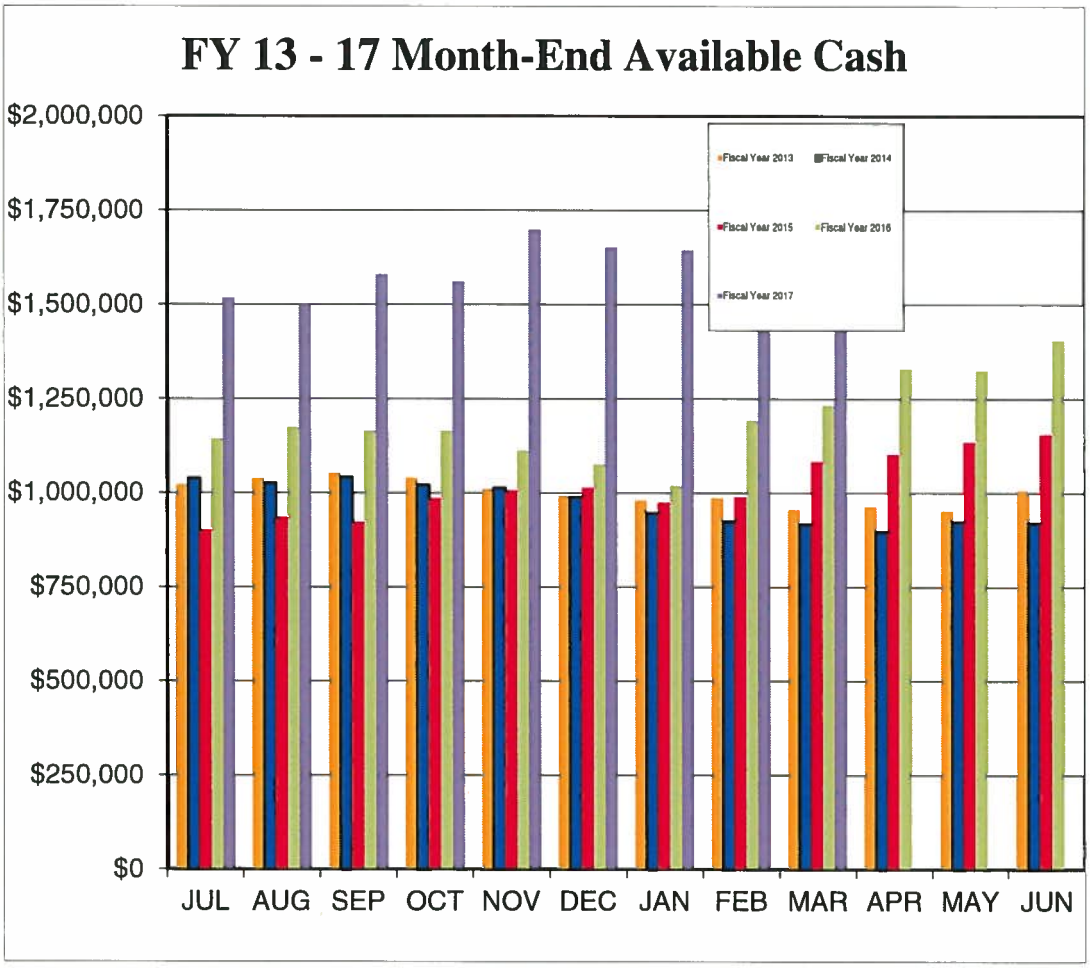
Statement of Revenues and Expenditures

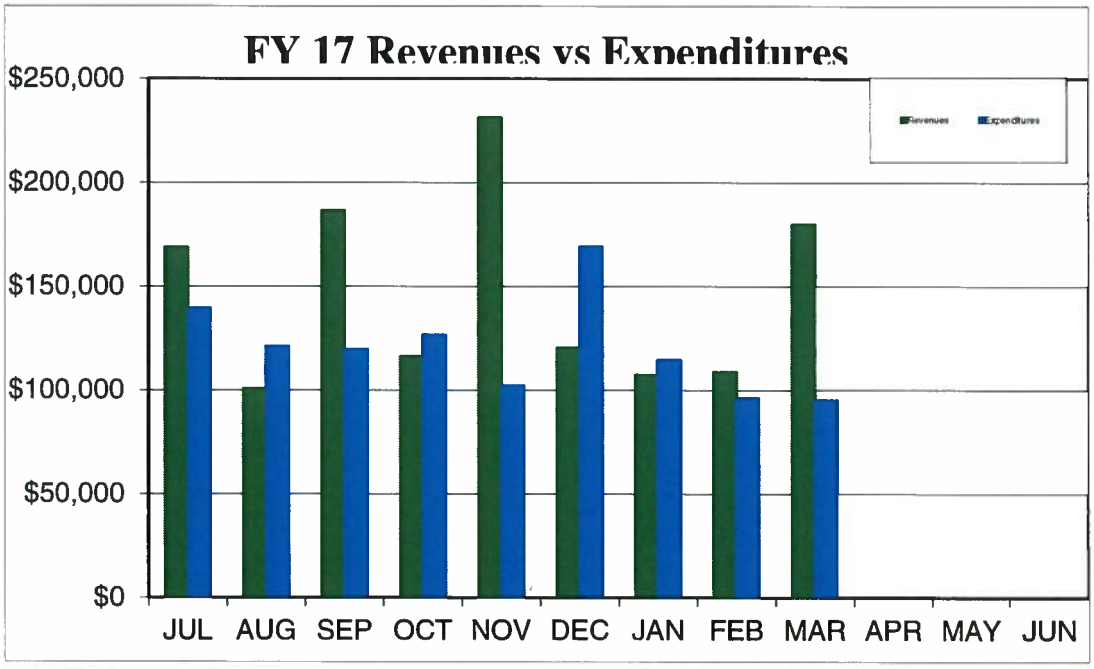
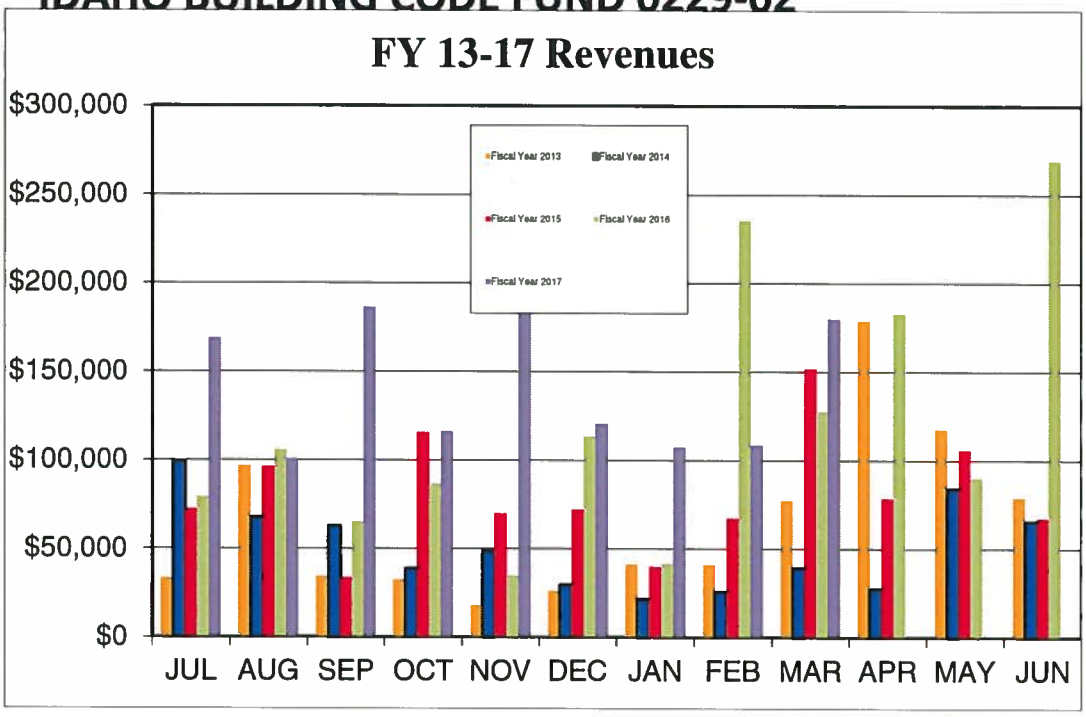
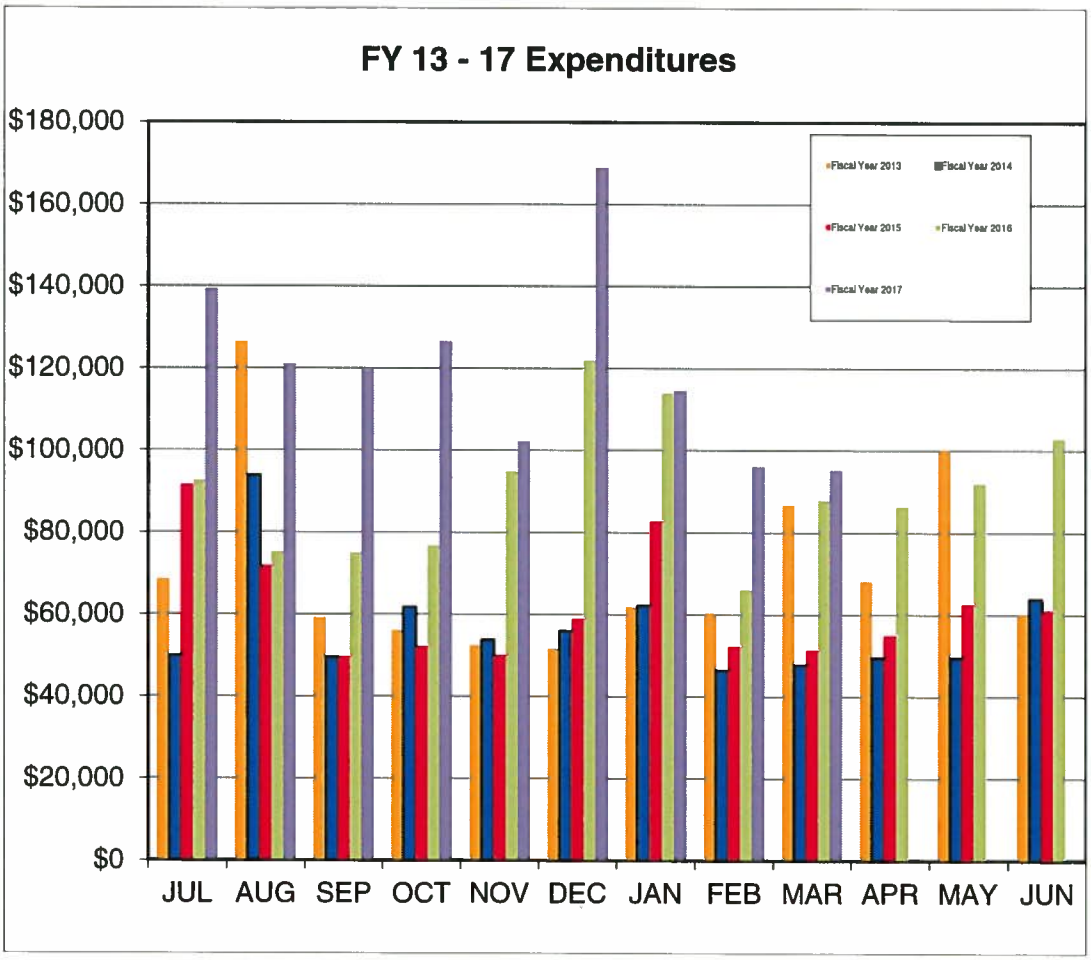
Class	Budget	Fiscal Year To Date	YTD as a % of Budget	Remaining Budget	Projected for Remainder of Year	Projected Year End Totals	Projected Total as a % of Budget
Revenues:	1,288,000	1,318,436	102.4%	(30,436)	559,729	1,878,165	145.8%
Expenditures							
Personnel:	1,088,300	890,924	81.9%	197,376	311,823	1,202,747	110.5%
Operating:	149,300	121,268	81.2%	28,032	32,761	154,030	103.2%
Capital:	50,400	71,127	141.1%	(20,727)	0	71,127	141.1%
Total Expenditures	1,288,000	1,083,319	84.1%	204,681	344,585	1,427,904	110.9%
Net for FY 2017	-	235,117			215,144	450,261	

Statement of Cash Balance

July 1, 2016 Beginning Cash Available	Fiscal Year to Date Revenues	Fiscal Year to Date Expenditures and Encumbrances	Other Changes in Cash	Available Cash as of Mar 31, 2017	Projected Change in Cash for Remainder of Year	Projected Year End Available Cash
1,501,885	1,318,436	(1,083,319)	(8,315)	1,728,687	215,144	1,943,831

IDAHO BUILDING CODE FUND 0229-02

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