

Community Development & Neighborhood Services 281 N. College Avenue

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BUILDING REVIEW BOARD

September 26, 2013 1:00 pm – 3:00 pm City Council Chambers 300 LaPorte Avenue

AGENDA

- 1. Approve minutes from the July 25, 2013 Meeting
- 2. 2012 I-Code Review
- 3. Follow-Up Reports:
 - None
- 4. Other Business
 - None

FORT COLLINS BUILDING REVIEW BOARD Regular Meeting – July 25, 2013 1:00 p.m. Council Liaison: Karen Weitkunat Staff Liaison: Mike Gebo (416-2618) Chairperson: Alan Cram

A regular meeting of the Building Review Board was held on Thursday, July 25, 2013 at 1:00 p.m. in the Council Chambers of the Fort Collins Municipal Building at 300 Laporte Avenue, Fort Collins, Colorado.

BOARD MEMBERS PRESENT:

Alan Cram Andrea Dunlap Justin Montgomery Rick Reider George Smith

BOARD MEMBERS ABSENT:

Torey Lenoch

STAFF MEMBERS PRESENT:

Delynn Coldiron, Customer and Administrative Services Manager Melanie Clark, Staff Support to the Board Mike Gebo, Chief Building Official Paul Eckman, Deputy City Attorney

ROLL CALL

The meeting was called to order and roll call was taken.

1. APPROVAL OF FEBRUARY 28, 2013 MINUTES:

A motion was made by Montgomery to approve the February 28, 2013 minutes as amended. Reider seconded the motion.

Vote:

Yeas: Dunlap, Cram, Reider, Montgomery

Nays: None Abstain: Smith

2. APPROVAL OF APRIL 25, 2013 MINUTES:

A motion was made by Montgomery to approve the April 25, 2013 minutes as amended. Reider seconded the motion.

Vote:

Yeas: Dunlap, Cram, Reider, Montgomery, Smith

Nays: None Abstain: None

2. EXTERIOR PROPERTY MAINTENANCE CODE

Beth Sowder, Neighborhood Services Manager, stated the purpose of this discussion was to discuss possible solutions regarding some ongoing residential exterior property maintenance issues, particularly relating to health and safety, which are not addressed by current City codes. Sowder noted there are few properties in Fort Collins with such issues; however, those properties do have significant negative impacts on neighborhoods. Phase One items are planned to go before Council in September and Phase Two items are slated for a November Council agenda.

Mike Gebo, Chief Building Official, discussed the International Property Maintenance Code (IPMC) and the categories within the document: dangerous, unlawful, unfit, and substandard. He noted owner-occupied dwellings were specifically exempted from the substandard condition when the 2006 IPMC was adopted. Gebo discussed staff's solution to this issue which would be the development of a fifth category, deficient, which would be applicable to all buildings. He went on to detail the dangerous vacant building warning issue.

Sowder discussed the excessive storage of property viewable from the public right-of-way and possible solutions to that issue. She went on to discuss public outreach efforts and available assistance for low-income residents.

Cram asked why owner-occupied dwelling units are exempt from the substandard category. Gebo replied at the time of adoption of the 2006 IPMC, there was concern over requiring owners to do insignificant substandard repairs. He stated the process of creating a new category applicable to all units is easier than re-opening the substandard condition for owner-occupied dwelling units. The new deficient category would apply only to exterior water-resistant elements considered substandard; the interior and exterior substandard list goes beyond these issues.

Cram asked if this change would be well-received by homeowners upon whom the new standards will be imposed. Gebo replied there are only a handful of properties in town which are having these issues. Polly Lauridsen, Code Compliance Supervisor, replied staff has not spoken to all affected parties; however, those who have been contacted have known for months these changes may occur.

Cram asked about the impact on residents who may not be able to afford the improvements. Gebo replied all repair notices are accompanied by a notice of the right to appeal and stated staff works with individuals to get repairs completed.

Cram discussed the reasons behind the exclusion of owner-occupied units from the substandard condition and expressed concern that the new deficient category holds some similar language. Gebo clarified that only Phase One items are moving forward now and that Phase Two items will move forward once some of these details are clarified.

Cram expressed concern regarding what would classify as a nuisance and stated he cannot support making these changes at the owner-occupied level.

Reider asked how many complaints are received by staff regarding these types of issues. Sowder replied many complaints are received from owners near these particular problem properties.

Cram argued these regulations would not be an appropriate use of force. Lauridsen replied this one percent of homes takes up thirty percent of staff time.

Cram asked what would happen should contact with the property owner not occur. Gebo replied the owner would receive a ticket; however, all attempts are made to contact the owner prior to that occurrence. Ultimately, the City could condemn a property and demolish it, though the City's budget does not include provisions for such condemnations.

Gebo stated staff would put together addresses and photos of the few problem properties and forward this on to the Board.

3. VICE-CHAIR ELECTION

Reider nominated Smith for Vice-Chair. Dunlap seconded the nomination.

Vote:

Yeas: Dunlap, Cram, Reider, Montgomery, Smith

Nays: None Abstain: None

4. CONTRACTOR APPEAL: STEVE WHITTAL, d/b/a BY DESIGN HOMES

Reider recused himself from the discussion of this item due to a conflict of interest.

Gebo stated the property at 517 East Magnolia was demolished in June prior to City approval and discussed the violations applicable to this case. He stated the owner authorization to remove the building was not present and the building was demolished without that authorization. Gebo stated Mr. Whittal's license had been suspended in accordance with City regulation.

Steve Whittal, By Design Homes, stated this is the first time he has been before the Building Review Board in his career and stated he has been working on the project at 517 East Magnolia for a year and discussed its history. Mr. Whittal stated he applied for a demolition permit and discussed the issues he faced during that process and argued the owner affidavit has never been required. He stated the owners e-mailed the City their approval for demolition. He argued the consequence for his potential oversight has been huge and requested his license be reinstated.

Mr. Whittal asked how many contractors' licenses had been suspended in the past year, and for how long. Gebo replied one contractor had his license suspended and ultimately revoked.

Delynn Coldiron, Customer and Administrative Services Manager, stated owner authorizations for demolition permits have always been a requirement. Mr. Whittal argued contractors have not been made aware of requirement changes and stated he will work harder to improve his dealings in the future.

Gebo discussed the requirements and avenues for contractors to keep up to date.

Cram noted part of being a licensed contractor is to know requirements and to acquire permits. Mr. Whittal agreed and stated there have been a number of changes to regulations in the area in the past year. He stated he believed he had a demolition permit and in the future would not proceed in this manner.

Cram asked if other issues have occurred with Mr. Whittal in the past. Coldiron replied in the negative.

Gebo discussed the specific violations and necessary Board findings.

Cram made a motion, seconded by Dunlap, finding of fact that Mr. Whittal did knowingly or deliberately disregard the Building Code or any other code adopted by the City related to specific construction project under the responsibility of the certificate holder or license holder set forth in this article; reference to Section 15-162 Item D. Additionally, failure to comply with any provision of the Code related to a specific construction project under the responsibility of the certificate holder or license holder as set forth in this Article and failure to obtain any required permit for the work performed. Cram noted there have not been issues with Mr. Whittal in the past but argued the importance of contractors' knowledge and following of regulations.

Smith disagreed with the knowing or deliberate disregard phrasing.

Vote:

Yeas: Dunlap, Cram, Montgomery, Smith

Nays: None Abstain: None

Montgomery suggested Mr. Whittal's license should be reinstated.

Dunlap agreed with Montgomery arguing there has been no past history of delinquency.

Gebo stated staff is taking a hard stand on contractors operating without permits but agreed with Montgomery.

Smith agreed the license suspension thus far has been sufficient.

Cram noted Mr. Whittal will be under close scrutiny in the future.

Montgomery made a motion, seconded by Smith, that Mr. Whittal's license be reinstated.

Vote:

Yeas: Dunlap, Cram, Montgomery, Smith

Nays: None Abstain: None

5. FOLLOW-UP REPORTS

 Capital Improvement Expansion Fees: Coldiron stated she will provide the Boardmembers with a memo from Jessica Ping-Small regarding Board questions. Property at Harmony and Timberline: Gebo stated the building has been demolished and noted staff was successful at declaring the property a danger. The owner paid for the demolition in full.

5. OTHER BUSINESS

- 2012 I-Code Review Update: Gebo stated the committee has completed review of the 2012 International Building Code and presented the Board with proposed amendments.
- BRB Vacancy: Gebo stated there is an applicant for the vacant BRB position and the item will go before Council on August 20, 2013.
- Cram suggested the Board meet with the new Council liaison, Mayor Weitkunat.

Meeting adjourned at 2:53 p.m.	adjourned at 2:53 p.m.			
Mike Gebo, Chief Building Official	Alan Cram, Chair			

Planning, Development & Transportation Services



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Building Review Board September 26, 2013

Introduction for Adoption:

2012 International Building Code (IBC)
2012 International Residential Code (IRC)
2012 International Mechanical Code (IMC)
2012 International Fuel Gas Code (IFGC)
2012 International Energy Conservation Code (IECC)

Overview:

National building codes and standards are reviewed every three years and voted on by construction industry professionals from across the country under the oversight of the *International Code Council (ICC)*. The latest publications resulting from the ICC are the proposed 2012 International Codes (I-Codes)

Since 1924 the City of Fort Collins has updated and adopted the latest nationally recognized building standards available for the times.

The proposed 2012 International Codes represent a comprehensive, fully integrated body of codes regulating building construction and systems using prescriptive and performance-related provisions. The purpose of these codes is to establish the minimum requirements to safeguard the public health, safety and general welfare by regulating structural strength and stability, sanitation, light and ventilation, energy conservation, and property protection from hazards attributed to the built environment within the City of Fort Collins.

Background:

In August 2012 a committee of volunteers from across the Front Range construction industry including designers, architects, builders, building officials from neighboring jurisdictions, fire officials and trades people convened to review current local amendments and significant changes in the new 2012 I-Codes. A stated goal of the committee members was to promote consistency in construction codes along the Front Range by supporting jurisdiction's adoption of the 2012 editions within the 2013 to early 2014 timeframe. Additionally, the members agreed to assist the construction industry through promoting consistency in codes across jurisdictional lines by limiting local amendments where possible.

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2012 International Building Code (IBC): Minimum standards regulating construction of all commercial and multi-family projects. (The review committee concluded that there are no significant changes in the 2012 IBC considered to be controversial or overly expensive to new construction.)

2012 International Residential Code (IRC): Minimum standards regulating construction of all single-family, duplex, and townhome projects. This all-in-one code includes minimum standards for associated sub-trades such as plumbing, electric, mechanical and fuel gas appliances. (The code review committee concluded that the single most expensive and controversial provision is the requirement that single family homes be provided with a fire-suppression (sprinkler) system. The committee did have some support for the code requirement that sprinklers be installed in new single family dwellings but only in new subdivisions where trade-offs could be incorporated such as narrower streets or fewer fire hydrants. This proposal needs to be vetted through a Land Use Code change and is not considered part of this code review.) City staff will note that this requirement was deleted from the 2009 IRC when adopted and staff does support the requirement with the adoption of this 2012 IRC.

2012 International Mechanical Code (IMC): Minimum standards regulating the installation of all mechanical air handling systems for buildings constructed under the IBC. (Changes include amendments in the 2012 IRC mechanical sections addressing indoor air quality for dwellings of multi-family buildings.)

2012 International Fuel Gas Code (IFGC): Minimum standards regulating the installation of all natural gas and propane fueled appliances and equipment for buildings constructed under the IBC. (Changes include amendments in the 2012 IRC fuel gas sections addressing indoor air quality for dwellings of multi-family buildings.)

2012 International Energy Conservation Code (IECC): Minimum energy efficiency criteria for all commercial and large-scale multi-family residential buildings. (Changes address use of electric heat, requiring upgraded insulation values without the ability to use energy programs that typically use the trade-off approach.)

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2012 International Building Code (IBC) Proposed Amendments

Municipal Code Sec. 5-27. Amendments and deletions to code.

The 2012 INTERNATIONAL BUILDING CODE adopted herein is hereby amended in the following respects:

101.1. Title. These regulations shall be known as the General Building Code of the City of Fort Collins, hereinafter referred to as 'this code'.

Section 101.4.1 through 101.4.9 Referenced codes, is amended to read as follows:

- **101.4.1 Electrical**. All references to the *Electrical Code* shall mean the electrical code currently in effect as enacted by the State of Colorado.
- **101.4.2 Gas.** All references to the *International Fuel Gas Code* shall mean the fuel gas code currently in effect as enacted by the City.
- **101.4.3 Mechanical**. All references to the *International Mechanical Code* shall mean the mechanical code currently in effect as enacted by the City.
- **101.4.4 Plumbing**. All references to the *International Plumbing Code* shall mean the plumbing code currently in effect as enacted by the State of Colorado.
- **101.4.5 Property Maintenance**. All references to the *International Property Maintenance Code* shall mean the property maintenance code currently in effect as enacted by the City.
- **101.4.6 Fire Prevention**. All references to the *International Fire Code* shall mean the fire code currently in effect as enacted by the City.
- **101.4.7 Energy**. All references to the *International Energy Conservation Code* shall mean the energy code currently in effect as enacted by the City.
- **101.4.8 Residential**. All references to the *International Residential Code* shall mean the residential code currently in effect as enacted by the City.
- **101.4.9 Areas prone to flooding.** All references to 'flood hazard' and 'areas prone to flooding' in this code and appendices adopted therewith shall be as specified in the Code of the City, "Chapter 10, Flood Prevention and Protection.

Section 103 Department of Building Safety is amended in its entirety to read as follows:

SECTION 103 CODE ADMINISTRATION

103.1 Entity charged with code administration. The Community Development and Neighborhood Services Department as established by the Code of the City, is hereby charged with the administration and enforcement of this code.

The building official, appointed by the City Manager, is charged with the direct overall administration and enforcement of this code; and, in the performance of said duties, may delegate the necessary authority to the appropriate technical, administrative, and compliance staff under the supervision the building official.

Section 105.2 Work exempt from permit, under the heading of "Building" is amended or added to read as follows:

Building:

- 1."One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, for lawn and garden equipment storage, tool storage and similar uses, including arbors, pergolas, and similar structures, provided the floor area is not greater than 120 square feet (11.15 m²) nor 8 feet (2.438 m) in height, do not house flammable liquids in quantities exceeding 10 gallons (38 l) per building and are constructed entirely of noncombustible materials when located less than 3 feet (0.914 m) from an adjoining property line.
 - 1.1 *Hoop house(s)* not exceeding 120 square feet (11.15 m²) and less than 8 feet (2.438 m) tall when located at least 3 feet (.9 m) from the property line. *Hoop house(s)* less than 5 feet (1.5 m) tall and at least 3 feet (.9 m) from the property line shall not be limited in size. *May not be needed, working with planning to determine*
- 2. Fences not over 7 feet (2134 mm) 6 feet (1829 mm) high.
- 3. Oil derricks
- 4. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing low side grade to the top of the wall, provided the horizontal distance to the next uphill retaining wall is at least equal to the total height of the lower retaining wall, unless supporting a surcharge or impounding Class I, II or IIIA liquids.
- 5. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons (18,927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
- 6. Platforms intended for human occupancy or walking, sidewalks and driveways not more than 30 inches (762 mm) above adjacent grade, and not over any basement window or story below and are not part of an accessible route.
- 7. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
- 8. Temporary motion picture, television and theater stage sets and scenery.

- 9. Prefabricated and portable swimming or wading pools, hot tubs or spas supported directly upon grade when the walls are entirely above grade and which cannot contain water more than 24 inches (610 mm) deep.
- 10. Shade cloth structures constructed for nursery or agricultural purposes, not including service systems.
- 11. Swings and other playground equipment, including one elevated playhouse per lot designed and used exclusively for play not exceeding 64 square feet (5.9 m2) of floor area nor 6 feet (1.82 m) in height measured from the floor to the highest point of such structure.
- 12. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support. Window replacement requiring no structural alteration or no change in the window configuration which reduces the clear opening and when such work is determined not to be historically significant, storm window, storm door and rain gutter installation.
- 13. Non-fixed and movable fixtures, cases, racks, counters and partitions not over 5 feet 9 inches (1753 mm) in height.
- 14. Decks not exceeding 200 square feet (18.58 m2) in area, that are not more than 30 inches (762 mm) above grade at any point, are not attached to a structure and do not serve the exit door required by Chapter 10. Review with code wording??
- 15. Roofing repair or replacement work not exceeding one square (100 square feet) of covering per building.
- 16. Replacement of nonstructural siding, when removal of siding is performed in accordance with State laws regarding asbestos and lead paint.
- 17. Minor work valued at less than \$500 when such minor work does not involve alteration of structural components, fire-rated assemblies, plumbing, electrical, mechanical or fire-extinguishing systems.
- 18. Decorative ponds, fountains and pools, which cannot contain water more than 24 inches (610 mm) deep."
- Section 105.2 Work exempt from permit, is further amended by deleting all headings and references under Electrical, Gas, and Mechanical.

Electrical:

- 1. Listed cord-and-plug connected temporary decorative lighting.
- 2. Reinstallation of attachment plug receptacles but not the outlets there for.
- 3. Replacement of branch circuit over current devices of the required capacity in the same location.
- 4. Electrical wiring, devices, *appliances*, apparatus or *equipment* operating at less than 25 volts and not capable of supplying more than 50 watts of energy.

5. Minor repair work, including the replacement of lamps or the connection of *approved* portable electrical *equipment* to *approved* permanently installed receptacles.

Gas:

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

Mechanical:

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

The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

Section 105.5 Expiration is hereby amended by adding a second paragraph to read as follows:

"Both prior to and subsequent to the effective date of this code, any work authorized by a permit regulated by this code or any other building construction code administered by the building official that involves the construction or alteration of an exterior building component, assembly or finish material, such as the foundation, wall and roof framing, sheathing, siding, fenestration, and roof covering, shall be fully finished and completed for permanent outdoor exposure within 24 months of date of this issuance of such permit, regardless of when then permit was issued. Failure to comply with the preceding specified time period shall constitute a violation of this code, resulting in revocation of the permit, and shall subject the permit holder and property owner to all penalties provided by the Code of the City."

Section 105.8 Premises Identification During Construction is hereby added to read as follows:

"105.8 Premises Identification During Construction. The approved permit number and street address number shall be displayed and be plainly visible and legible from the public street or road fronting the property on which any new building is being constructed."

Section 105.9 Transfer of permits, is added to read as follows:

105.9 Transfer of permits. A current valid building permit may be transferred from one party to another upon written application to the building official. When any changes are made to the original plans and specifications that substantially differ from the plans submitted with the permit, as determined by the building official, a new plan review fee shall be paid as calculated in accordance with Section 109. A fee of \$50 shall be paid to cover administrative costs for all building permit transfers. No change shall be made in the expiration date of the original permit.

Section 107.3.1 Approval of construction documents, is hereby amended to read as;

107.3.1 Approval of construction documents. When the building official issues a permit, the construction documents shall be approved in writing or by a stamp which states "REVIEWED FOR CODE COMPLIANCE.". One set of construction documents so reviewed shall be retained by the building official. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the building official or his or her authorized representative.

Section 108 Temporary Structures and Uses is deleted in its entirety.

Section 109, FEES. is hereby amended in its entirety to read as follows:

SECTION 109 FEES

109.1 Payment of fees. No permit with any amendments and related construction plans therefore shall be valid until the fees prescribed by the City Manager pursuant to Chapter 7.5, ARTICLE I of the Code of the City, entitled, ADMINISTRATIVE FEES, have been paid.

109.2 Related fees. The payment of the fee for the construction, alteration, removal or demolition for work done in connection with or concurrently with the work authorized by a building permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

109.3 Fee refunds. Any fee paid hereunder that is erroneously paid or collected shall be refunded. The building official may authorize the refunding of 90 percent of a plan review fee or building permit fee to the applicant who paid such fee provided the plan review is withdrawn or cancelled and the plan review and/or work authorized under a permit issued in accordance with this code has not commenced; and further provided that such plan review or permit is valid and not expired as set forth in Section 105.5. Prior to authorizing the refunding of any fee paid to the original applicant or permitee, a written request from such party must be submitted to the City within 180 days of the date of the fee payment.

Section 113, Board of Appeals, is hereby amended in its entirety to read as follows:

SECTION 113 BOARD OF APPEALS

113.1 General. The Building Review Board (hereafter "Board") as established in Section 2-117 of the Code of the City is hereby empowered in accordance with the procedures set forth in this section to hear and to decide appeals of orders, decisions, or determinations made by the building official relative to the application and interpretation of this code; to the suitability of alternative materials or alternative methods of construction; and the granting of permit extensions and reinstatements as prescribed by Section 105.5. The building official shall be an ex officio member of the Board without vote and shall serve as the Secretary of the Board. The Board shall adopt rules of procedure for conducting its business and shall render all decisions and findings in writing.

113.2 Applications/Hearings. When a building permit applicant or a holder of a building permit desires relief from any decision of the building official related to the enforcement of this code, except as is otherwise limited in Section 113.4, such building permit applicant, building permit holder, or representative thereof may appeal the decision of the building official to the Board stating that such decision by the building official was based on an erroneous interpretation of the building regulations or that an alternative design, alternative materials and/or the alternative methods of construction proposed by the appellant are equivalent to those prescribed by this code considering structural strength, effectiveness, fire resistance, durability, safety and any other pertinent factors.

The Board shall hear and decide all appeals made to it and shall have the authority to rule in favor of the appellant when the Board determines that the interpretation of the building regulations of the City by the building official was erroneous, or when the Board determines an alternative design, alternative materials and/or the alternative methods proposed by the appellant are equivalent to those prescribed by this code considering structural strength, effectiveness, fire resistance, durability, safety and any other pertinent factors. The Board shall require that sufficient evidence be submitted to substantiate any claims made regarding the proposed alternative design, alternative materials and/or alternative methods of construction. A quorum of 4 members shall be necessary for any meeting of the Board.

113.3 Fees and Notification. Persons desiring to appeal to the Board any decision of the building official as provided in this section shall, at the time of filing such appeal, pay to the City a filing fee in the amount of \$50. Written notice of hearings shall be given to the Appellant and, with respect to requests for exceptions or variances to Section 1101.1 of this code as enacted by the City, to the secretary to the Commission on Disability, at least 3 days prior to the hearing by mailing the same to such party's last known address by regular U.S. mail.

113.4 Limitations. The Building Review Board shall have no authority with respect to any of the following functions:

- 1. The administration of this code except as expressly provided otherwise;
- 2. Waiving requirements of this code, except as provided pursuant to this section;
- 3. Modifying the applicable provisions of, or granting variances to, this code, or approving the use of alternative designs, alternative materials and/or alternative

methods of construction except as provided for in this section and based upon a specific appeal from a determination or decision of the building official on an individual case basis; and

4. Modifying, interpreting, or ruling on the applicability or intent of the zoning and land use regulations or other laws of the City except as expressly empowered otherwise.

Section 114.4, Violation penalties is amended to read as follows:

114.4 Violation penalties. Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the building official, or of a permit or certificate issued under the provisions of this code, shall be guilty of a misdemeanor subject to the penalties and fines pursuant to Section 1-15 of the Code of the City, punishable by a fine of not more than \$1,000.00 dollars, or by imprisonment not exceeding 180 days, or both such fine and imprisonment. Each day that a violation continues after due notice has been served shall be deemed a separate offense.

Section 114.5 Work commencing before permit issuance, is added to read as follows:

114.5 Work commencing before permit issuance. In addition to penalties set forth in Section 114.4, any person or firm who, before obtaining the necessary permit(s), commences any construction of, or work on, a building, structure, electrical, gas, mechanical or plumbing system that is not otherwise exempted from obtaining a permit, shall be subject to a processing and penalty fee in addition to the standard prescribed permit fee. Such additional fee shall be equal to the permit fee, except that such fee shall not be less than \$50 nor more than \$1,000 for the first such violation. A person or firm committing the same such violation repeatedly is subject to processing and penalty fees equal to double the amount of the permit fee or double the amount of the preceding violation, whichever is greater, for every same such subsequent violation committed thereafter within any 180-day period. The foregoing fees may be appealed to the City Manager pursuant to Chapter 2, Article VI of the Code of the City.

Section 202, DEFINITIONS, terms are hereby amended or added in alphabetical sequence in the following respects:

COMMISSIONING A process to verify and document that the selected *building* and systems have been designed, installed, and function in accordance with the *construction documents*, manufacturers' specifications, and minimum code requirements.

DWELLING shall mean a building used exclusively for residential occupancy and for permitted accessory uses, including single-family dwellings, two-family dwellings and multi-family dwellings, and which contains: (a) a minimum of eight hundred (800) square feet of floor area, or (b) in the case of a dwelling to be constructed on the rear portion of a lot in the L-M-N, M-M-N, N-C-L, N-C-M, N-C-B, C-C-N, C-C-R, H-C or E zone districts, a minimum of four hundred (400) square feet of floor area, so long as a dwelling already exists on the front portion of such lot. The term dwelling shall not include hotels, motels, tents or other structures designed or used primarily for temporary occupancy. Any dwelling shall be deemed to be a principal building."

DWELLING UNIT shall mean one (1) or more rooms and a single kitchen and at least one (1) bathroom, designed, occupied or intended for occupancy as separate quarters for the exclusive use of a single family for living, cooking and sanitary purposes, located in a single-family, two-family or multi-family dwelling or mixed-use building."

FAMILY shall mean any individual living alone or any number of persons who are all related by blood, marriage, adoption, guardianship or other duly authorized custodial relationship, and who live together as a single housekeeping unit and share common living, sleeping, cooking and eating facilities."

FIRE CONTAINMENT AREA is a portion of a story or basement which is totally enclosed by not less than one-hour fire-resistive construction and as prescribed in Section 709, entitled 'Fire Partitions' and Section 710, entitled 'Smoke Barriers.'

Openings other than doors and ducts shall be protected as specified in Section 715.5 and shall be limited to a maximum of 25 percent of any one (1) wall. Self-closing devices may be used in place of automatic closing devices on doors unlikely to be fixed open during normal conditions. Examples are doors at toilet rooms, closets and small storage rooms and similar areas.

GRADE (ADJACENT GROUND ELEVATION). The lowest point of elevation of the finished surface of the ground, paving or sidewalk with the area between the building and the property line or, when the property line is more than 5 feet (1.524 m) from the building, between the building and a line 5 feet (1.524 m) from the building.

HOOP HOUSE(S). Structures using a semi-flexible non-metallic frame system intended to support flexible plastic covering of not more than 6 mil polyethylene as cover for the purpose of extending crop growing seasons; do not contain mechanical or electrical systems or equipment and are not open to the public. Not for use as storage

ROOM, SLEEPING (BEDROOM). A habitable room within a dwelling or other housing unit designed primarily for the purpose of sleeping. The presence of a bed, cot, mattress, convertible sofa or other similar furnishing used for sleeping purposes is indicia for determining that such space or room qualifies as a sleeping room. The presence of closets and similar storage facilities are not considered as relevant factors in determining whether or not a room is a sleeping room.

TOWNHOUSE. A single-family dwelling unit constructed as part of a group of 2 or more attached individual dwelling units, each of which is separated from the other from the foundation to the roof and is located entirely on a separately recorded and platted parcel of land (site) bounded by property lines, and which parcel is deeded exclusively for such single-family dwelling.

VOLATILE ORGANIC COMPOUND (VOC): "Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and

ammonium carbonate, which participates in atmospheric photochemical reactions. VOCs include a variety of chemicals, some of which may have short-and long-term adverse health effects emitted as gases from certain solids or liquids.

Section 419.1General is amended to read as follows:

419.1 General. A live/work unit is a dwelling unit or sleeping unit in which a significant portion of the space includes a nonresidential use that is operated by the tenant and shall comply with Sections 419.1 through 419.8.

EXCEPTION:

Dwelling or sleeping units that include an office that is less than (20) twenty percent of the area of the dwelling unit shall not be classified as a live/work unit.

Section 501.3 Premises Identification is hereby added to read as follows:

501.3 Premises Identification During Construction. The approved permit number and street address number shall be displayed and be plainly visible and legible from the public street or road fronting the property on which any new building is being constructed."

Section 505.2.1 Area Limitation is amended by adding a new exception number 3 to read as follows:

3. Within individual dwelling units of Group R occupancies, the maximum aggregate area of a mezzanine may be equal to one-half of the area of the room in which it is located, without being considered an additional story; and to allow the mezzanine to be closed to the room in which it is located, provided exits from the mezzanine are in conformance with Section 505.2.2.

Section 705.3 Buildings on the same lot is amended by adding a third paragraph to read as follows:

Lines or walls which are established solely to delineate individual portions of a building or of a planned unit development (PUD) need not be considered as property lines for the purposes of this code, provided that such building is entirely located on property which is under common ownership and further provided that required distances, set forth in Section 503.1.2 for assumed property lines between buildings located on the same property, are maintained.

Table 903.1 Maximum Allowable Fire-Containment Area is added as follows:

TABLE 903.1

MAXIMUM ALLOWABLE FIRE-CONTAINMENT AREA
(IN SQUARE FEET)

Types of Construction

Occupancy	IA	I B	II A	II B	III A	III B	IV-HT	V A	VB
A1	10,000	10,000	NP	NP	NP	NP	NP	NP	NP
A2,	10,000	10,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
A3, 4	10,000	10,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
B, F1, S1, S2 M, U	10,000	10,000	7,000	<mark>5,000</mark>	7,000	<mark>5,000</mark>	7,000	7,000	5,000
F2	20,000	20,000	10,000	7,000	10,000	7,000	10,000	10,000	5,000
E	10,000	10,000	7,000	5,000	7,000	5,000	7,000	7,000	5,000

NP = Not Permitted

EXCEPTION:

S2 Open parking garages in accordance with Section 406.5

Section 903.2 Where required, is amended by adding an exception number 2 to read as follows:

2. Except for Group R Occupancies an automatic sprinkler system shall be installed in all buildings which are not divided into fire containment areas as specified in Table 903.1.

Section 903.2.11.1.3 Basements is amended to read as follows:

903.2.11.1.3 Basements. Where any portion of a *basement* is located more than 75 feet (22 860 mm) from openings required by Section 903.2.11.1, or where walls, partitions or other obstructions are installed that restrict the application of water from hose streams, the *basement* shall be equipped throughout with an *approved automatic sprinkler system*.

Section 903.3.1.2 NFPA 13R sprinkler systems

903.3.1.2 NFPA 13 Group R sprinkler systems. *Automatic sprinkler systems* in Group R occupancies up to and including four stories in height shall be permitted to be installed throughout in accordance with NFPA 13R Section 903.3.1.1

Note: additional discussion needed to address cost, which is about \$.75/ sq foot over a 13R system.

Section 907.2.11 Single- and multiple-station smoke alarms is amended by adding a second paragraph thereto to read as follows:

When one or more sleeping rooms are added or created in existing Group R Occupancies, the entire building shall be provided with smoke detectors located and installed as required for new Group R Occupancies described herein.

Section 908.7 Carbon monoxide alarms is amended by deleting the exception:

Exception: Sleeping units or dwelling units which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning

appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

- 1. The *sleeping unit* or *dwelling unit* is located more than one story above or below any story which contains a fuel-burning appliance or an attached garage;
- 2. The *sleeping unit* or *dwelling unit* is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and
 - 3. The building is equipped with a common area carbon monoxide alarm system.

Section 1007.3 Stairways, Exceptions 1, 2 are amended to read as follows:

EXCEPTIONS:

- 1. The clear width of 48 inches (1219 mm) between *handrails* is not required in buildings not more than 4 stories above grade plane equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.
- 2. Areas of refuge are not required at stairways in buildings not more than 4 stories above grade plane equipped throughout by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Section 1007.4 Elevators is amended by adding a new exception #5 to read as:

5. Elevators in buildings not more than 4 stories above grade plane are not required to be considered an accessible means of egress when the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Section 1007.8 Two-way communication exception #1 is amended to read as follows:

EXCEPTION:

1. Two-way communication systems are not required at the elevator landing of buildings not required to provide areas of refuge in accordance with Section 1007.4.

Section 1008.1.5 Floor elevation is amended by adding a second paragraph to read as follows:

All exterior steps, slabs, walks, decks and patios serving as exterior door landings or exterior stairs shall be adequately and permanently secured in place by approved methods to prevent such landings or stairs from being undermined or subject to significant displacement due to improper placement of supporting backfill or due to inadequate anchoring methods.

Section 1008.1.5 Floor elevation is further amended by adding a new, *Exception 6*, to read as follows:

6. Exterior doors serving individual dwelling units, other than the main entrance door to a dwelling unit, may open at one intervening exterior step that is equally spaced between the interior floor level above and exterior landing below, provided that the step has a

minimum tread depth of 12 inches, a maximum riser height of 7 ³/₄ inches (7.75"), and a minimum width equal to the door width, and further provided that the door does not swing over the step.

Section 1009.15 Handrails is amended to read as follows:

1009.15 Handrails. Stairways of more than one riser shall have handrails on each side and shall comply with Section 1012. Where glass is used to provide the handrail, the handrail shall also comply with Section 2407.

Section 1013.8 Window Sills is amended to read as follows:

1013.8 Window sills. In Occupancy Groups R-2 and R-3, one- and two-family and multiple-family dwellings, where the opening of the sill portion of an operable window is located more than 72 inches (1829 mm) above the finished grade or other surface below, the lowest part of the clear opening of the window shall be at a height not less than 36 inches (915 mm) 24 inches (304.8 mm) above the finished floor surface of the room in which the window is located. Operable sections of windows shall not permit openings that allow passage of a 4-inch-diameter (102 mm) sphere where such openings are located within 36 inches (915 mm) of the finished floor.

Exceptions:

- 1. Operable windows where the sill portion of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F 2006.
- **2.** Windows whose openings will not allow a 4-inch diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
- **3.** Openings that are provided with non-removable window fall prevention devices that comply with ASTM F 2090.
- **4.** Windows that are provided with non-removable window opening control devices that comply with Section 1013.8.1.
- **5.** Emergency escape and rescue windows shall be installed per Section 1029

Section 1013.9 Below grade openings is amended by adding a new section read as follows:

1013.9 Below grade openings. All area wells, stair wells and light wells attached to any building that are located less than 36 inches from the nearest intended walking surface and deeper than 36 inches below the surrounding ground level, creating an opening with a horizontal dimension greater than 24 inches measured perpendicular from the building, with the side walls of such well having a slope steeper than 2 horizontal to 1 vertical, shall be protected with guardrails conforming to this Section around the entire opening, or be provided with an equivalent barrier.

EXCEPTIONS:

- 1. The access side of stairways need not be barricaded.
- 2. Area wells provided for emergency escape and rescue windows may be protected with approved grates or covers that comply with Section 1029.4 of this code.

3. Covers and grates may be used over stairways and other openings used exclusively for service access or for admitting light or ventilation.

Section 1029.1 General Exceptions 1 is hereby amended to read as follows:

Exceptions:

1. Basements with a ceiling height of less than 80 inches (2032 mm) 72 inches (1828.8 mm) shall not be required to have *emergency escape and rescue openings*.

Section 1029.3.1 Minimum height from floor is added to read as follows:

1029.3.1 Minimum height from floor. *Emergency escape and rescue openings* shall have the bottom of the clear opening not less than 24 inches (609.6 mm) measured from the floor.

Section 1029 Window Wells is amended by adding a new exception to read as follows:

EXCEPTION:

With the window in the full open position, the bottom window well step may encroach a maximum of 12 inches (304 mm) into the minimum horizontal projection, provided the well meets the following criteria:

- 1. The bottom of the well is not less than 36 inches wide (914 mm), centered horizontally on the openable portion of the emergency escape and rescue door or window, and
- 2. An unobstructed clear horizontal projection of 36 inches (914 mm) is maintained at the centerline of the openable portion of the emergency escape and rescue door or window.

Section 1101.2 Design is amended to read as follows:

1101.2 Design. Buildings and facilities shall be designed and constructed to be accessible in accordance with this code and the most recently published edition of ANSI A117.1 as referenced by the building official.

Section 1103.1 Where required is amended by adding a second and third paragraphs to read as follows:

Nothing in this code shall be construed as relieving or waiving compliance with Colorado law as set forth in Section 9-5-101 et seq., C.R.S.

When the Building Review Board considers granting exceptions or variances either to this chapter pursuant to Section 113 of this code or to Colorado Statutes pursuant to Section 9-5-102, C.R.S., it shall require the applicant requesting the exception or variance to demonstrate that the application of a particular standard or specification relating to access for persons with disabilities would impose an extraordinary hardship on the subject property. For the purposes of this Section, an extraordinary hardship shall mean a substantial and unusual hardship which is the direct result of unique physical site conditions such as terrain, topography or geology; or, which is the direct result of other

unique or special conditions encountered on the subject property, but which are not typically encountered elsewhere in the City. Constraints, complications or difficulties that may arise by complying with this chapter and/or with the statutory standards for accessibility but that do not constitute an extraordinary hardship shall not serve to justify the granting of an exception or variance.

Section 1107.2 Design is amended by adding a second and third paragraph to read as follows:

When any building or buildings, classified as Group R, Division 1 or Group R, Division 2 Occupancy, are constructed as a single building project (or any phase thereof) on any one site and such building project (or phase) contains one or more accessible dwelling units as required by this chapter or Colorado law, said building project (or phase) shall be constructed such that all such required accessible dwelling units in such building project (or phase) provide the same functional features as are provided in the nonaccessible units in such building project (or phase). Furthermore, such functional features except for dwelling unit bedroom-types shall be provided in the same proportion as in the nonaccessible units. Not less than 50 percent of the required accessible dwelling units shall be constructed with the distribution of accessible dwelling unit bedroom-types being proportionally the same as the distribution of nonaccessible dwelling unit bedroom-types, provided that at least one of each dwelling unit bedroom-type constructed in the building project (or phase) shall be an accessible dwelling unit.

For purposes of this Section, the following definitions shall apply. 'Dwelling unit bedroom-type' shall mean the number of bedrooms within the dwelling unit. 'Functional feature' shall mean: a closet, a garage, a carport, a patio, a deck, additional rooms (such as a bedroom, bathroom, den, storeroom, laundry or similar room) and any other significant feature built at the time of original construction that offers occupants improved convenience or comfort. Aesthetic or decorative features such as colors, architectural design elements, trim and finish materials, decorative heating appliances not providing the primary comfort heat source, lighting fixture style, cabinet and hardware style, plumbing fixture style, the type and location of windows and glazed lights, or any similar miscellaneous features shall not be construed as functional features.

Section 1203.3 Under-floor ventilation is amended by adding two new paragraphs to read as follows:

The ground surface of the under floor space shall be covered with a vapor retarder material. The vapor retarder shall be a minimum 10-mil non-reinforced polyethylene sheet when tested in accordance with ASTM E154-99. The sheet shall be continuously sealed in an approved manner to the foundation walls, to the interior caissons or footing pads, plumbing lines and at all laps of multiple sheets.

Mechanical ventilation systems for spaces under below grade floors shall designed by a professional engineer; addressing moisture controls and by approved methods considering the impact of negative pressures created by exhaust fans, clothes dryers and similar appliances.

1211.1 Scope. The provisions of this code shall apply to new R-2 Occupancies, new I-1 occupancies, and new I-2 nursing homes.

1211.1 Purpose. The purpose of this code is to provide minimum requirements to enhance the public safety, health and general welfare, through construction methods designed and installed to resist entry of radon gas into the occupied spaces of buildings regulated by this code.

SECTION 1211.2 - DEFINITIONS

1211.2.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

FOUNDATION DRAIN SYSTEM. A continuous length of drain tile, perforated pipe, or filter mat extending around all or part of the internal or external perimeter of a basement or crawl space footing designed to collect and drain away excess subsurface water.

RADON. A naturally occurring, chemically inert, radioactive gas that is not detectable by human senses and can move readily through particles of soil and rock and can accumulate under the slabs and foundations of homes where it can easily enter the living space through construction cracks and openings.

SOIL-GAS-RETARDER. A continuous membrane of 3-mil (0.075 mm) cross-linked polyethylene or other equivalent material used to retard the flow of soil gases into a building.

SUBFLOOR. A concrete slab and other approved permanent floor system that directly contacts the ground and is within the walls of the living spaces of the building.

SUB-MEMBRANE DEPRESSURIZATION SYSTEM. A system designed to achieve lower sub-membrane air pressure relative to crawl space air pressure by use of a vent drawing air from beneath the soil-gas-retarder membrane.

SUB-SLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a vent pipe routed through the conditioned space of a building and connecting the sub-slab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab.

SECTION 1211.3 - REQUIREMENTS

1211.3.1 General. The following required construction methods are intended to resist radon entry and prepare the building for post-construction radon mitigation.

1211.3.2 Subfloor preparation. A layer of gas-permeable material shall be placed under all subfloors. The gas-permeable layer shall consist of one of the following

methods except that where fills of aggregate size less than that described in Method 1 are used beneath a slab, Method 2,3, 4, or 5 must be used.

1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a ¼ -inch (6.4 mm) sieve. In buildings where interior footings or other barriers separate sub-grade areas, penetrations through the interior footing or barrier equal to a minimum of 12 square inches (0.094 m²) per 10 feet (3.048 m) of barrier length shall be provided. A minimum of two penetrations shall be provided per separation and be evenly spaced along the separation.

EXCEPTION:

In buildings where interior footings or other barriers separate the sub-grade area, separate radon vent pipes may be installed for each sub-grade area as specified in Section 1211.5.2 in place of penetrations through the barrier.

- 2. A foundation drain pipe system installed under concrete floor slab areas less than 2,000 square feet (186 m²), consisting of a continuous loop of minimum 3inch (76 mm) diameter perforated pipe shall be laid in the sub-grade with the top of pipe located 1 inch (25.4 mm) below the concrete slab. The pipe may be rigid or flexible but shall have perforations fully around the circumference with a free air space equal to 1.83 square inches per square foot (127 cm²/m²) of exterior pipe surface area. Such pipe shall be wrapped with approved filter material to prevent blocking of pipe perforations. The pipe loop shall be located inside of the exterior perimeter foundation walls not more than 12 inches (305) mm) from the perimeter foundation walls. In buildings where interior footings or other barriers separate the sub-grade area, the loop of pipe shall penetrate, or pass beneath such interior footings or barriers. For slab areas greater than 2,000 square feet (186 m²) but less than 4,000 square feet (372 m²), the preceding configuration may be used, provided a minimum of 4-inch diameter (102 mm) pipe is installed. Slabs in excess of 4,000 square feet (372 m²) shall have under them separate loops for every additional 2,000 square feet (186 m²) of slab area when 3-inch (76 mm) diameter pipe is used; or, slabs may have separate loops provided for each additional increment in area between 2,000 square feet (186 m²) and 4,000 square feet (372 m²) when 4-inch (102 mm) diameter pipe is used.
- 3. A foundation drain soil gas collection mat system installed under concrete floor slab areas of 2,000 square feet (186 m²) or less, consisting of a continuous rectilinear loop of soil gas collection mat or drainage mat having minimum dimensions of 1 inch in height by 12 inches in width (25.4 mm in height x 305 mm in width) and a nominal cross-sectional air flow area of 12 square inches (0.0078 m²) may be laid on top of the sub-grade. The mat shall be constructed of a matrix that allows for the movement of air through it and be capable of supporting the concrete placed upon it. The matrix shall be covered by approved filter material on all four sides to prevent dirt or concrete from entering the

matrix. All breaches and joints in the filter material shall be repaired prior to the placement of the slab. The loop shall be located inside the exterior perimeter foundation walls and within 12 inches (305 mm) from the perimeter foundation walls. In buildings where interior footings or other barriers separate the subgrade area, the mat shall penetrate these interior footings or barriers to form a continuous loop around the exterior perimeter.

Slabs larger than 2,000 square feet (186 m²) but less than 4,000 square feet (372 m²) shall have under them an additional strip of mat that bisects the loop forming two areas approximately equally divided by the two halves of the rectilinear loop. Slabs larger than 4,000 square feet (372 m²) shall have separate loops for each 2,000 (186 m²) square feet; or, increased to 4,000 square feet (372 m2) when a loop is bisected as specified in the preceding configuration.

- 4. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geo-textile drainage matting designed to allow the lateral flow of soil gases.
- 5. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.
- **1211.3.3 Entry routes.** Potential radon entry routes shall be closed in accordance with Sections 1211.3.4.1 through 1211.3.4.8
 - **1211.3.3.1 Floor openings.** Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or equivalent sealant applied in accordance with the manufacturer's recommendations.
 - **1211.3.3.2** Concrete joints. All control joints, isolation joints, construction joints and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.
 - **1211.3.3.3 Condensate drains.** Condensate drains shall be trapped or routed through non-perforated pipe to daylight.
 - **1211.3.3.4** Sumps. Sump pits open to soil or serving as the termination point for sub-slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a sub-slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet and view port.
 - **1211.3.3.5 Foundation walls**. Hollow block masonry foundation walls shall be constructed with either a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground

surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of masonry block or wood foundation walls below the ground surface shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete walls shall be filled.

1211.3.3.6 Dampproofing. The exterior surfaces of portions of concrete and masonry block walls below the ground surface shall be damp-proofed in accordance with Section 1805.

1211.3.3.7 Air-handling units. Air-handling units in crawl spaces shall be sealed to prevent air from being drawn into the unit.

EXCEPTION:

Units with gasketed seams or units that are otherwise sealed by the manufacturer to prevent leakage.

1211.3.3.8 Ducts. Ductwork passing through or beneath a slab shall be of seamless material unless the air-handling system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed to prevent air leakage. Ductwork located in crawl spaces shall have all seams and joints sealed by closure systems in accordance with the *International Mechanical Code*.

1211.3.4 Sub-membrane depressurization system. In buildings with interior structural floors directly above under-floor spaces containing exposed soil surfaces that are not protected by a sub-slab depressurization system, the following components of sub-membrane depressurization system shall be installed during construction.

EXCEPTION:

Buildings in which an approved mechanical ventilation system complying with Section 1203 or such other equivalent system that provides equivalent depressurization across the entire sub-membrane area as determined by the building official is installed in the under-floor spaces.

1211.3.4.1 Ventilation. Crawl spaces and similar under-floor spaces shall be provided with ventilation complying with Section 1203.

1211.3.4.2 Soil-gas-retarder. The exposed soil in under-floor spaces shall be covered with a continuous layer of soil-gas-retarder. Such groundcover joints shall overlap 6 inches (152 mm) and be sealed or taped. The edges of the groundcover shall extend a minimum of 6 inches (152 mm) up onto all

foundation walls enclosing the under-floor space and shall be attached and sealed to foundation walls in an approved manner.

1211.3.4.3 Vent pipe riser. A plumbing tee or other approved connection shall be inserted horizontally beneath the sheeting and connected to a 3- or 4-inch-diameter (76 mm or 102 mm) fitting with a vertical vent pipe installed through the sheeting. The vent pipe shall be extended up through the building floors, terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3.048 m) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (0.610 m) below the exhaust point, and 10 feet (3.048 m) from any window or other opening in adjoining or adjacent buildings.

1211.3.5 Sub-slab depressurization system. The following components of a sub-slab depressurization system shall be installed during construction under basement or slab-on-grade floors.

1211.5.1 Vent pipe riser. A minimum 3-inch-diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the sub-slab aggregate or other permeable material before the slab is cast. A 'T' fitting or equivalent method shall be used to ensure that the pipe opening remains within the sub-slab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the sub-slab aggregate or connected to it through a drainage system.

All vent pipes shall be extended up through the building floors, terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3.048 m) away from any window, air intake, or other opening into the conditioned spaces of the building that is less than 2 feet (0.610 m) below the exhaust point, and 10 feet (3.048 m) from any window or other opening in adjoining or adjacent buildings. The discharge end of vent pipe terminations shall be unobstructed and protected from small animal entry with a corrosion-resistant screen having openings between ½ inch (6.4 mm) and ½ inch (12.7 mm).

1211.3.5.2 Multiple vent pipes. In buildings where interior footings or other barriers separate the sub-slab aggregate or other gas-permeable material, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

1211.3.6 Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the slab or soil-gas retarder.

1211.3.7 Vent pipe accessibility. Radon vent pipes shall be accessible for fan installation through an attic or other area outside the habitable space.

EXCEPTION:

The radon vent pipe need not be accessible in an attic space where an approved roof-top electrical supply is provided.

1211.3.8 Vent pipe identification and notification. All exposed and visible interior radon vent pipes shall be conspicuously identified with at least one label on each floor and in attics provided with access openings. The label shall read substantially as follows: 'Radon Reduction System.' In addition to the preceding label, a notice shall be placed in a conspicuous area near the vent pipe that includes the following statement:

'THIS RADON REDUCTION SYSTEM IS NOT REQUIRED TO BE TESTED AND IS A 'PASSIVE' SYSTEM, RELYING ENTIRELY ON NATURAL VENTILATION. OCCUPANTS ARE ADVISED TO TEST FOR RADON AND TAKE REMEDIAL ACTION AS NECESSARY BY INSTALLING A CONTINUOUSLY OPERATING FAN LOCATED IN THE VENT PIPE (ACCESS TYPICALLY PROVIDED IN THE ATTIC) AND CONNECTED TO THE NEARBY PROVIDED ELECTRICAL OUTLET. CALL 1-800-767-RADON FOR MORE INFORMATION.'

1211.3.9 Combination foundations. Combination basement/crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.

1211.3.10 Building depressurization. Joints in air ducts and plenums in unconditioned spaces shall be substantially air tight and permanently sealed with an approved sealant, mastic, or other approved methods. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in the energy conservation code currently enacted by the City. Firestopping shall be in conformance with the most recent general building code enacted by the City.

1211.3.11 Provisions for future depressurization fan installation. Permanent provisions shall be made for the future installation of an in-line fan to be connected to every radon vent pipe. Such designated fan locations shall be outside of the conditioned envelope of the building, such as in the attic, garage and similar locations, excluding crawl spaces and other interior under-floor spaces. Designated locations shall accommodate an unobstructed permanent cylindrical space with the following minimum dimensions: 12 inches (305 mm) measured radially around the radon vent pipe along a vertical distance of 30 inches (760 mm). Designated fan locations shall be permanently accessible for servicing and maintenance. An electrical circuit shall be provided within 4 feet (1.219 m) of and within sight from designated fan locations. Such circuit shall have a means of positive disconnection and be terminated in an approved electrical outlet in accordance with the applicable current electric code.

1211.3.11.1 Depressurization fan system activation. When a passive system as constructed in accordance with this code is to be converted to an active system, an approved in-line fan shall be installed in a designated fan location as specified in Section 1211.11.1. Additionally, an approved permanent electric light fixture and in-line pipe couplings that facilitate fan replacement shall be provided. The in-line fan shall be designed to operate continuously for a period of not less than 5 years and have a minimum air-flow rating as established by the building official. A readily accessible manometer or other approved warning device that notifies occupants of a fan malfunction by a visible or audible signal shall be installed within the dwelling unit.

Section 1404.9 Vinyl siding is hereby amended in its entirety to read as:

Section 1404.9 Vinyl siding is not allowed on new buildings within the limits of the City of Fort Collins

Section 1404.12 Polypropylene siding is hereby amended in its entirety to read as:

Section 1404.12 Polypropylene siding is not allowed on new buildings within the limits of the City of Fort Collins

Section 1405.13.2 Fenestration installation is amended by adding a new section to read as follows:

1405.13.2 *Fenestration* **installation.** For all new construction and additions, all new *fenestration* installations shall be in accordance with American Architectural Manufacturers Association (AAMA) Standards/Specifications for Windows, Doors and Skylights and shall be supervised and inspected by an individual certified as an Installation Master by Architectural Testing, Inc. (ATI), or other nationally recognized agency.

Section 1503.6 Crickets and saddles is amended by adding a new exception number two to read as follows:

1503.6 Crickets and saddles. A cricket or saddle shall be installed on the ridge side of any chimney or penetration greater than 30 inches (762 mm) wide as measured perpendicular to the slope. Cricket or saddle coverings shall be sheet metal or of the same material as the roof covering.

Exception: 1. Unit skylights installed in accordance with Section 2405.5 and flashed in accordance with the manufacturer's instructions shall be permitted to be installed without a cricket or saddle.

2. Re-roofing per section 1510.

Section 1505.1 General is amended to read as follows.

1505.1 New Construction. The roof-covering classification on any new structure regulated by this code shall be Class A.

Exceptions:

- 1. Noncombustible roof coverings as defined in Section 1507.3, 1507.4, 1507.5 may be applied in accordance with the manufacturer's specifications in place of a fire-retardant roofing assembly.
- 2. Any Class B or Class C roof covering may be applied on any new construction that is added to an existing building classified as a Group R, Division 3 Occupancy, provided the roof extremities of such existing building and new construction are located a minimum distance of 5 feet to the nearest adjacent property line and are a minimum distance of 10 feet to another building.
- 3. Skylights and sloped glazing that comply with Chapter 24 or Section 2610.

Table 1505.1, Minimum Roof Covering Classifications for Types of Construction, is hereby deleted.

Section 1507.2.9.4 Sidewall flashing is amended by adding a new section read as follows:

1507.2.9.4 Sidewall flashing. Flashing against a vertical sidewall shall be by the step- flashing method. The flashing shall be a minimum of 4 inches (102 mm) high and 4 inches (102 mm) wide. At the end of the vertical sidewall the step flashing shall be turned out in a manner that directs water away from the wall and onto the roof and/or gutter.

Exception:

For re-roofing where step flashing would require removal of siding material, provided adequate flashing is installed.

Section 1507.2.9.5 Other flashing is amended by adding a new section read as follows:

1507.2.9.5 Other flashing. Flashing against a vertical front wall, as well as soil stack, vent pipe and chimney flashing shall be applied according to the asphalt shingle manufacturer's printed instructions.

REROOFING, Section 1510.1 is amended by adding two paragraphs at the end to read as follows:

No portion of an existing nonrated roof covering may be permanently replaced or covered with more than one square of nonrated roof covering.

Any existing roof covering system may be replaced with a roof covering of the same materials and classification, provided the replacement roof covering has a minimum rating of Class C.

Section 1608.2 Ground snow load, the first sentence is amended to read as follows:

1608.2 Ground Snow Loads. The ground snow loads to be used in determining the design snow loads for roofs shall be shall be 30 psf.

Section 1609.3Basic wind speed, the first sentence is amended to read as follows:

1609.3 Basic wind speed. The basic wind speed, in mph, for the determination of the wind loads shall be one hundred (100) miles per hour (161 kph) as determined by Figures 1609A, 1609B, and 1609C.

Section 1804.3.1 Final Grading is amended by adding a new section to read as follows:

1804.3.1 Final Grading. Final grading adjacent to the foundation shall be compacted sufficiently and in such a manner that it is not undermined or subject to significant settlement or displacement due to improper placement of backfill.

Section 2902.1 Touch-free toilet facilities is amended by adding a new section read as follows:

2902.1.3 Touch-free toilet facilities. Toilet facilities installed for occupancies associated with food preparation or food service to the public shall be provided with:

- 1. Automatic touch-free water control valves on lavatories.
- 2. Automatic touch-free paper towel dispensers.
- 3. Toilet facilities exit doors that allow exiting without requiring touching by hand, any door hardware, such as knobs, levers, sliding bolts, latches and similar devices.

Exception:

Toilet facilities designed as a single occupant use may be provided with exit door locking hardware to afford privacy.

2902.2 Separate facilities is amended to read as follows:

2902.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions: 1. Separate facilities shall not be required for *dwelling units* and *sleeping units*.

2. Separate facilities shall not be required in structures or tenant spaces with a total *occupant load*, including

both employees and customers, of 30 or less.

3. Separate facilities shall not be required in mercantile occupancies in which the maximum occupant load is

100 or less.

4. Multiple single-user Unisex facilities may be used provided total fixture count as calculated per 2902.1 is satisfied.

Section 3109.6 Barriers around decorative pools, fountains, and ponds is hereby added to read as follows:

3109.6 Barriers around decorative pools, fountains, and ponds. Decorative pools, fountains, and ponds which can contain water deeper than 24 inches (610 mm), shall be protected by barriers installed in accordance with section 3109.4.

Chapter 36 SUSTAINABLE BUILDING CONSTRUCTION PRACTICES is amended by adding a new chapter read as follows:

CHAPTER 36 SUSTAINABLE BUILDING CONSTRUCTION PRACTICES

SECTION 3601 GENERAL

3601.1 Scope. The provisions of this chapter shall govern sustainable *building* construction practices for new construction and additions and remodels over 5,000 square feet that require a building permit, unless otherwise noted.

SECTION 3602 RESOURCE EFFICIENCY

3602.1 Construction waste management. For new *buildings* and additions over 5,000 square feet or remodels over 5,000 square feet a construction waste management plan acceptable to the Building Official that includes recycling of concrete and masonry, wood, metals and cardboard, is required at the time of application for a building. The construction waste management plan shall be implemented and conspicuously posted on the construction site. Compliance shall be certified by the hauler through receipts and signed affidavits. Substantive changes to the plan shall be subject to prior approval by the Building Official

3602.1.1 Building demolitions. Buildings or portions of buildings which are removed shall be processed in such a way as to safely remove all asbestos and lead paint contaminants. All remaining materials shall be recycled such as doors, windows, cabinets, and fixtures, concrete and masonry, wood, metals, and cardboard. Compliance shall be certified by the hauler through receipts and signed affidavits.

3602.2 Certified tropical hardwood. All tropical hardwoods used in new construction, additions and alterations requiring a building permit, shall be certified by the Forest Stewardship Council or other *approved agency*. Certification demonstrating compliance shall be required with delivery of such materials and shall be available for inspection.

SECTION 3603 INDOOR ENVIRONMENTAL QUALITY (IEQ)

3603.1 Indoor Air Quality (IAQ)

3603.1.1 Heating, Ventilating, and Air Conditioning Design. Prior to and during construction, reasonable efforts shall be made to minimize the release and accumulation of debris and particulates, and the specific requirements of this section shall apply.

3603.1.1.1 Air handling system access. The arrangement and location of air handling system components including, but not limited to, air handler units, fans, coils and condensate pans shall allow access for cleaning and *repair* of the air handling surfaces of such components. Piping, conduits, and other *building* components shall not be located so as to obstruct the required access.

- **3603.1.1.2 Durability of air handling surfaces**. Surfaces exposed to airflow within air handling systems shall be constructed of materials that are resistant to deterioration and will not break away, crack, peel, flake off, or show evidence of delamination or continued erosion when tested in accordance with the erosion test in UL 181.
- **3603.1.1.3 Airstream surfaces**. Materials exposed to airflow within ducts, within air plenums, or on top of suspended ceilings, shall not break away, crack, peel, flake off, or show evidence of delamination or continued erosion when tested in accordance with the erosion test in UL 181.
- **3603.1.2 New** *Building* **pollutant flush-out**. After all interior finishes are installed, the *building* shall be flushed-out by ventilating at a minimum rate of 0.30 cfm per ft² of outside air or the design outdoor airflow rate determined from Chapter 4 of the IMC, whichever is greater, for at least 14 days while maintaining an internal temperature of at least 60°F, and relative humidity not higher than 60 percent. Occupancy shall be permitted to start one day after start of the flush-out, provided that flush-out continues for the full 14 days. The *building* shall not be "baked out" by increasing the temperature of the space above the occupied set point. Where continuous *ventilation* is not possible, the aggregate of flush-out periods shall be equivalent to 14 days of continuous *ventilation*. Flush-out reports shall be provided to the Building Official prior to approval.

Exception: All residential *buildings*.

3603.2 Low-volatile organic compound (VOC) materials. Construction materials, floor coverings and site-applied finishes, including sealants and adhesives, resilient flooring, carpeting and pad, site-applied paints, stains and varnishes, structural wood panels, hardwood veneer plywood, particle board and fiber board *building* products, and insulation shall meet specified *volatile organic compound (VOC)* emissions limits in accordance with relevant standards California Department of Public Health (CDPH) 01350; GREENGUARD Environmental Institute GGPS.001 standard for *building* materials and finishes; and Green Seal® standards. Documentation demonstrating compliance shall be required with delivery of such materials and shall be available for inspection.

Exception: For *alterations* to *existing buildings*, carpeting and pad, structural wood panels, hardwood, veneer plywood, particle board and fiber board *building* products and insulation are not subject to this requirement.

- **3603.3 Acoustical control.** Minimum requirements for exterior-to-interior sound transmission, interior sound transmission, and background sound levels in new construction and additions thereto, except as noted hereunder, shall be provided as specified herein.
 - **3603.3.1 Sound transmission.** *Buildings* and tenant spaces shall comply with the following sound transmission requirements:

Exceptions:

1. Portions of *buildings* or *structures* that have the interior environment open to the exterior environment.

- 2. Concession stands and toilet facilities in Group A-4 and A-5 occupancies.
- **3603.3.1.1 Exterior sound transmission.** Where a Group A1, A3, E and I occupancy *building*, a Group B occupancy *building* used for educational purposes, or a Group R occupancy *building* is constructed at a location listed herein, the wall and roof-ceiling assemblies making up the *building thermal envelope* shall have a composite sound transmission class (STC_c) rating of 40 39 or greater in the following locations:
 - 1. within 500 feet (152 m) of a multi-lane highway (road) designed for high-speed travel by large numbers of vehicles, and having no traffic lights, stop signs, nor other regulations requiring vehicles to stop, fire station, heavy industrial or manufacturing zone or facilities, commercial storage facility with back-up alarms, outdoor music amphitheater, or sports arena or stadium;
 - 2. within 250 feet (76 m) of a truck route roadway containing four or more traffic lanes; or
 - 3. within 1,000 feet (305 m) of an active railway.
- **3603.3.1.2 Interior sound transmission**. Interior wall and floor/ceiling assemblies, separating interior rooms and spaces shall be designed in accordance with the following requirements:
 - Wall and floor-ceiling assemblies separating adjacent tenant spaces, tenant spaces and public places, hotel rooms, motel rooms, and patient rooms in nursing homes and hospitals and adjacent classrooms shall have a composite STC rating of 50 or greater.
 - Wall and floor-ceiling assemblies separating classrooms from rest rooms and showers shall have a composite STC rating of 53 or greater.
 - Wall and floor-ceiling assemblies separating classrooms from music rooms, mechanical rooms, cafeteria, gymnasiums, and indoor swimming pools shall have a composite STC rating of 60 or greater.

Exception: Residential Group R occupancies addressed in Section 1207 of this code.

3603.3.1.3 Background Sound. The average background sound levels within unoccupied rooms (from heating, ventilating and air conditioning and other *building* systems) shall be below the maximum A-weighted sound level for specific occupancies from Table 3603 below. This shall be confirmed by spot checks during the commissioning process.

TABLE 3603 MAXIMUM ALLOWABLE BACKGROUND SOUND IN ROOMS

Occupancy	<u>Maximum</u>
	A-weighted sound

	level (dB _a)
Small auditoriums (≤500 seats)	39
Large auditoriums, large live indoor theaters, and large churches (for very good speech articulation) (>500 seats)	35
TV and broadcast studios (close microphone pickup only)	<mark>35</mark>
Small live indoor theaters (≤ 500 seats)	<mark>35</mark>
Private residences:	
Bedrooms	<mark>39</mark>
Apartments	<mark>48</mark>
Family rooms and living rooms	48
Schools:	
Lecture and classrooms	
Core learning space with enclosed volume ≤ 20,000 cu ft (<566 cu m)	<mark>35</mark>
Core learning space with enclosed volume > 20,000 cu ft (>566 cu m)	<mark>40</mark>
Open-plan classrooms	<mark>35</mark>
Hotels/motels:	
Individual rooms or suites	44
Meeting/banquet rooms	44
Service support areas	<mark>57</mark>
Office buildings:	
Offices executive	4.4
	44 48
small, private large, with conference tables	48
Conference rooms	44
Large	<mark>39</mark>
Small	44
Open-plan areas	48
Business machines, computers	53
Public circulation	44 48 53 57
Hospitals and clinics	57
Private rooms	<mark>39</mark>
Wards	<mark>44</mark>
Operating rooms	44 44 53 53 52
Laboratories	<mark>53</mark>
Corridors	<mark>53</mark>
Public areas	<mark>52</mark>
Movie theaters ≤ 500 seats	48
Churches, small (≤500 seats)	44
Courtrooms	44
Libraries	48
Restaurants	<mark>52</mark>
Light maintenance shops, industrial plant control rooms, kitchens, and laundries	<mark>62</mark>
Shops and garages	<mark>67</mark>

SECTION 3604 COMMISSIONING, OPERATIONS & MAINTENANCE

3604.1 *Building commissioning.* For new *buildings* with a gross floor of greater than 15,000 ft² (1,395 m²) and *additions* with a gross floor of greater than 15,000 ft² (1,395 m²), *commissioning* shall be performed in accordance with this section. A commissioning process shall be incorporated into the design and construction of the *building* project that verifies that the delivered *building* and its components, assemblies, and systems comply with the documented *owner project requirements* (OPR). Procedures, documentation, tools and training shall be provided to the *building* operating staff to sustain features of the *building*

assemblies and systems for the service life of the *building*. This material shall be assembled and organized into a systems manual that provides necessary information to the *building* operating staff to operate and maintain all *commissioned* systems identified with the *building* project. The owner shall retain the system manual and final commissioning report described below. An electronic formatted copy of the final commissioning report shall be provided to the Building Official.

The following commissioning activities shall be completed prior to approval:

- 1. Designate an *approved* project *commissioning authority* (CxA) to lead, review, and oversee completion of the *commissioning* process activities.
- 2. The owner, in conjunction with the design team as necessary, shall develop the *owner's project requirements* (OPR) to guide the CxA. The OPR will be distributed to all parties participating in the project programming, design, construction, and operations, and the *commissioning* team members.
- 3. The design team shall develop the *basis of design* (BOD).
- 4. The CxA shall review the both the *OPR* and *BOD* for clarity and completeness.
- 5. Construction phase *commissioning* requirements shall be incorporated into project specifications and other construction documents developed by the design team.
- 6. Develop and implement a *commissioning plan* containing all required forms and procedures for the complete testing of all equipment, systems, and controls included in Section 3604.1.1.
- 7. Verify the installation and performance of the systems to be *commissioned*.
- 8. Complete a final *commissioning* report satisfactory to the Building Official.
- 9. Verify the owner requirements for training operating personnel and *building* occupants are completed.
- 10. Verify that a system manual in a form satisfactory to the Building Official has been prepared. At a minimum, the system manual shall include operations and maintenance documentation and full warranty information, and shall provide operating staff the information needed to understand and operate the *commissioned* systems as designed.

3604.1.1 Systems. The following systems, if included in the *building* project, shall be *commissioned*:

- 1. heating, ventilating, air-conditioning, indoor-air-quality, and refrigeration systems and associated controls;
- 2. *building thermal envelope* systems, components, and assemblies to verify thermal, air, and moisture integrity;
- 3. all lighting controls and shading controls;
- 4. service water heating systems;
- 5. renewable energy systems;
- 6. background sound levels;
- 7. cooling towers water use.

Chapter 35 REFERENCED STANDARDS is hereby amended by adding the following additional referenced standard in alphabetical sequence:

CDPH California Department of Public Health

1615 Capitol Avenue Sacramento, CA 95814

CDPH 01350 Standard Method for Testing VOC emissions from indoor sources
Referenced in Amended 12 IBC Section 3603.2 Low-volatile organic compound (VOC)
materials

FSC Forest Stewardship Council U.S. (FSC-US)

212 Third Avenue North, Suite 504

Minneapolis, MN 55401

GEI GREENGUARD Environmental Institute

2211 Newmarket Parkway, Suite 110

Marietta, GA 30067

GGPS.001.GREENGUARD IAQ Standard for *Building* Materials, Finishes and Furnishings Referenced in Amended 12 IBC Section 3603.2 Low-volatile organic compound (VOC) materials

Green Seal®

1001 Connecticut Avenue, NW

Suite 827

Washington, DC 20036-5525

GS-11 Paintings and Coatings

GS-43 Recycled Content Latex Paints

Referenced in Amended 12 IBC Section 3603.2 Low-volatile organic compound (VOC) materials

Appendix C GROUP U AGRICULTURAL BUILDINGS is adopted in its entirety.

Appendix E SUPPLEMENTARY ACCESSIBILITY REQUIREMENTS, is adopted in its entirety.

Appendix I PATIO COVERS is adopted in its entirety.



Planning, Development & Transportation Services



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Significant Changes Proposed for Adoption of the 2012 International Building Code (IBC) Applicable to all Commercial and Multi-Family Buildings

- 1. New exemption from permits for "hoop houses" if less than 5 feet tall or meet the requirements for shed exemptions.
- 2. New propose requiring NFPA 13 in multi-family buildings. (code allows 13R no attic sprinklers)
- 3. New amendment that requires bedroom egress windows sills to be at least 24 inches above the floor when the window sill height is 72 inches or more above ground in multifamily buildings.
- 4. New Radon systems required in new I-1 occupancies and I-2 nursing homes. These are long term residential uses.
- 5. New Vinyl and Polypropylene siding is not allowed.
- 6. Chapter 36 Sustainable Building Construction Practices (*Green Code Amendments of 2012*) carried over:
 - a. New Chapter 36 now covers remodel work over 5,000 sq ft, as well as new buildings and additions.
 - b. New Buildings demolished required to <u>Soft Strip</u> recyclable materials and recycle non-contaminated wood, concrete, steel, and cardboards.
 - c. New Construction Waste Management Plan required for remodel work over 5,000 sq. ft.
 - i. New Verification required that addresses materials and where recycled to prior to CO.
 - d. The remaining Chapter 36 retained and unchanged addressing:
 - i. Low VOC Materials
 - ii. Ductwork controls limiting construction debris and dust.
 - iii. New Building Flush-Out requirements
 - iv. Acoustical controls and sound transmission
 - v. Building systems commissioning:
 - 1. HVAC
 - 2. Thermal envelope tightness
 - 3. Lighting controls
 - 4. Service water heating
 - 5. Renewable energy systems
 - 6. Background sound levels
 - 7. New, Cooling tower water use

Section R101.1 Title is hereby amended to read as follows:

"R101.1 Title. These provisions shall be known as the Residential Code for One- and Two-family Dwellings of the City of Fort Collins and shall be cited as such and will be referred to herein as "this code."

Section R102.4 Referenced codes and standards, is hereby amended to read as follows:

"R102.4 Referenced codes and standards. The codes and standards referenced herein shall be those that are listed in Section 101.4, entitled 'Referenced Codes' of the adopted *International Building Code* and shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply."

Section R103 Department of Building Safety is hereby amended in its entirety to read as follows:

"SECTION R103 CODE ADMINISTRATION.

R103.1 Entity charged with code administration shall be as determined in accordance with Section 103, entitled 'Code Administration' of the adopted *International Building Code*."

Section R105.2 Work exempt from permit, items 1, 2, 3, 5, 7, 8, 9, 11, 12, 13, 14 under the heading of "Building" are amended or added to read as follows:

Building:

- 1."One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, for lawn and garden equipment storage, tool storage and similar uses, including arbors, pergolas, and similar structures, provided the floor area does not exceed 200 square feet (18.58 m2). 120 square feet (11.15 m²) nor 8 feet (2.438 m) in height, do not house flammable liquids in quantities exceeding 10 gallons (38 l) per building and are constructed entirely of noncombustible materials when located less than 3 feet (0.914 m) from an adjoining property line.
- 1.1 *Hoop house(s)* not exceeding 120 square feet (11.15 m²) and less than 8 feet (2.438 m) tall when located at least 3 feet (.9 m) from the property line. *Hoop house(s)* less than 5 feet (1.5 m) tall and at least 3 feet (.9 m) from the property line shall not be limited in size. *May not need, pending LUC*
- 2. Fences not over 7 feet (2134 mm) 6 feet (1829 mm) high.
- 3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing low side grade to the top of the wall, provided the horizontal distance to the next uphill retaining wall is at least equal to the total height of the lower retaining wall, unless supporting a surcharge or impounding Class I, II or IIIA liquids.
- 4. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons (18,927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
- 5. Platforms and decks intended for human occupancy or walking, sidewalks and driveways not more than 30 inches (762 mm) above adjacent grade, and not over any basement window or story below and are not part of an accessible route.

- 6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
- 7. Prefabricated and portable swimming pools that are less than 24 inches (610 mm) deep. or wading pools, hot tubs or spas supported directly upon grade when the walls are entirely above grade and which cannot contain water more than 24 inches (610 mm) deep.
- 8. Swings and other playground equipment, including one elevated playhouse per lot designed and used exclusively for play not exceeding 64 square feet (5.9 m2) of floor area nor 6 feet (1.82 m) in height measured from the floor to the highest point of such structure.
- 9. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support. Window replacement requiring no structural alteration or no change in the window configuration which reduces the clear opening and when such work is determined not to be historically significant, storm window, storm door and rain gutter installation.
- 10. Decks not exceeding 200 square feet (18.58 m2) in area, that are not more than 30 inches (762 mm) above grade at any point, are not attached to a dwelling and do not serve the exit door required by Section R311.4. *check to code wording*
- 11. Roofing repair or replacement work not exceeding one square (100 square feet) of covering per building.
- 12. Replacement of nonstructural siding, when removal of siding is performed in accordance with State laws regarding asbestos and lead paint.
- 13. Minor work valued at less than \$500 when such minor work does not involve alteration of structural components, fire-rated assemblies, plumbing, electrical, mechanical or fire-extinguishing systems.
- 14. Decorative ponds, fountains and pools which cannot contain water more than 24 inches (610 mm) deep."

Section R105.2 Work exempt from permit, is further amended by deleting all headings and references under Electrical, Gas, and Mechanical.

Electrical:

- 1. Listed cord and plug connected temporary decorative lighting.
- 2. Reinstallation of attachment plug receptacles but not the outlets there for.
- 3. Replacement of branch circuit over-current devices of the required capacity in the same location.
- 4. Electrical wiring, devices, *appliances*, apparatus or *equipment* operating at less than 25 volts and not capable of supplying more than 50 watts of energy.
- 5. Minor repair work, including the replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles.

Gas:

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

Mechanical:

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

The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

Section R105.5 Expiration is hereby amended by adding a second paragraph to read as follows:

"Both prior to and subsequent to the effective date of this code, any work authorized by a permit regulated by this code or any other building construction code administered by the building official that involves the construction or alteration of an exterior building component, assembly or finish material, such as the foundation, wall and roof framing, sheathing, siding, fenestration, and roof covering, shall be fully finished and completed for permanent outdoor exposure within 24 months of date of this issuance of such permit, regardless of when then permit was issued. Failure to comply with the preceding specified time period shall constitute a violation of this code, resulting in revocation of the permit, and shall subject the permit holder and property owner to all penalties provided by the Code of the City."

Section R105.10 Premises Identification is hereby added to read as follows:

"R105.10 Premises Identification During Construction. The approved permit number and street address number shall be displayed and be plainly visible and legible from the public street or road fronting the property on which any new building is being constructed."

Section R105.11 Transfer of permits, is hereby added to read as follows:

"R105.11 Transfer of permits. A current valid building permit may be transferred from one party to another upon written application to the building official. When any changes are made to the original plans and specifications that substantially differ from the plans submitted with the permit, as determined by the building official, a new plan review fee shall be paid as calculated in accordance with Section R108. A fee of \$50 shall be paid to cover administrative costs for all building permit transfers. No change shall be made in the expiration date of the original permit."

Section R106.1.3 Information for construction in flood hazard areas is hereby amended to read as follows:

"R106.1.3 Information for construction in flood hazard areas "For buildings or structures regulated under the scope of this code that are in whole or in part located in flood hazard areas, construction documents shall be

submitted as established in accordance with the Code of the City, Chapter 10, entitled 'Flood Prevention and Protection'."

Section R106.1.4 Grading performance plans and certificate, is hereby added to read as follows:

"R106.1.4 Grading performance plans and certificate. Every building permit application for a new building regulated by this code shall be accompanied by a site drainage/grading performance plan as prescribed by City standards. Drainage plans shall be submitted to and approved by the City's Storm Drainage department prior to the issuance of the permit"

Section R106.3.1 Approval of construction documents, is hereby amended to read as follows:

"R106.3.1 Approval of construction documents. When the building official issues a permit, the construction documents shall be approved in writing or by a stamp. Which states "REVIEWED FOR CODE COMPLIANCE." One set of construction documents so reviewed shall be retained by the building official. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the building official or his or her authorized representative."

Section R107, TEMPORARY STRUCTURES AND USES, is deleted in its entirety.

SECTION R107 TEMPORARY STRUCTURES AND USES

R107.1 General. The building official is authorized to issue a permit for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The building official is authorized to grant extensions for demonstrated cause.

R107.2 Conformance. Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, light, ventilation and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

R107.3 Temporary power. The building official is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in NFPA 70.

R107.4 Termination of approval. The building official is authorized to terminate such permit for a temporary structure or use and to order the temporary structure or use to be discontinued.

Section R108, FEES, is hereby amended in its entirety to read as follows:

SECTION R108 FEES

R108.1 Payment of fees. All items relating to fees shall be as specified and in accordance with Section 109 Fees of the adopted *International Building Code*."

Section R109.1.7 Site Survey required, is hereby added to read as follows:

R109.1.7 Site Survey required. A survey or improvement location certificate of the site on which a new building or addition is to be constructed may be required by the building official to verify that the structure is located in accordance with the approved plans and any other regulations of the City."

Section R110.2 Change in use, is hereby amended to read as follows:

R110.2 Change in use. Changes in the character, use, or occupancy of an existing structure shall not be made except in conformance with this code and the general building code enacted by the City."

Section R112, BOARD OF APPEALS, is hereby amended in its entirety to read as follows:

SECTION R112 BOARD OF APPEALS

R112.1 General. Appeals of decisions, determinations and interpretations of this code shall be made pursuant to applicable provisions as set forth in Section 113, entitled 'Board of Appeals' of the adopted *International Building Code*.'

Section R113.4 Violation penalties, is hereby amended to read as follows:

R113.4 Violation penalties. Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the building official, or of a permit or certificate issued under the provisions of this code, shall be guilty of a misdemeanor subject to the penalties and fines pursuant to Section 1-15 of the Code of the City, punishable by a fine of not more than \$1,000 or by imprisonment not exceeding 180 days, or both such fine and imprisonment. Each day that a violation continues after due notice has been served shall be deemed a separate offense."

Section R113.5 Work commencing before permit issuance is hereby added to read as follows:

R113.5 Work commencing before permit issuance. In addition to penalties set forth in R113.4, any person or firm who, before obtaining the necessary permit(s), commences any construction of, or work on, a building, structure, electrical, gas, mechanical or plumbing system that is not otherwise exempted from obtaining a permit, shall be subject to a processing and penalty fee in addition to the standard prescribed permit fee. Such additional fee shall be equal to the permit fee, except that such fee shall not be less than \$50 nor more than \$1,000 for the first such violation. A person or firm committing such violation repeatedly is subject to processing and penalty fees equal to double the amount of the permit fee or double the amount of the preceding violation, whichever is greater, for every same such subsequent violation committed thereafter within any 180-day period. The foregoing fees may be appealed to the City Manager pursuant to Chapter 2, Article VI of the Code of the City."

Section R202, DEFINITIONS, terms are hereby amended or added in alphabetical sequence in the following respects:

The term, "BASEMENT", is hereby amended to read as follows:

"BASEMENT. That portion of a building located partly or completely below grade, wherein the underside of the floor system immediately above is 72 inches (1829 mm) or more above the surface of an approved permanent basement floor system."

The term, "CITY" is hereby added to read as follows:

"The word *City* shall mean the municipal corporation of Fort Collins, Colorado, including its physical location and boundaries."

The term, "CRAWLSPACE" is hereby added to read as follows:

"CRAWLSPACE. That portion of a building that is conditioned or non-conditioned space located partly or completely below grade (excluding the under-floor space beneath below-grade structural floor

systems), wherein the underside of the adjacent finished floor above is less than 72 inches (1829 mm) above the bottom surface of such crawlspace."

The term, "DWELLING" is hereby amended to read as follows:

"DWELLING shall mean a building used exclusively for residential occupancy and for permitted accessory uses, including single-family dwellings, two-family dwellings and multi-family dwellings, and which contains: (a) a minimum of eight hundred (800) square feet of floor area, or (b) in the case of a dwelling to be constructed on the rear portion of a lot in the L-M-N, M-M-N, N-C-L, N-C-M, N-C-B, C-C-N, C-C-R, H-C or E zone districts, a minimum of four hundred (400) square feet of floor area, so long as a dwelling already exists on the front portion of such lot. The term dwelling shall not include hotels, motels, tents or other structures designed or used primarily for temporary occupancy. Any dwelling shall be deemed to be a principal building."

The term, "DWELLING UNIT" is hereby amended to read as follows:

"DWELLING UNIT shall mean one (1) or more rooms and a single kitchen and at least one (1) bathroom, designed, occupied or intended for occupancy as separate quarters for the exclusive use of a single family for living, cooking and sanitary purposes, located in a single-family, two-family or multi-family dwelling or mixed-use building."

The term, "FAMILY" is hereby added to read as follows:

"FAMILY shall mean any individual living alone or any number of persons who are all related by blood, marriage, adoption, guardianship or other duly authorized custodial relationship, and who live together as a single housekeeping unit and share common living, sleeping, cooking and eating facilities."

The term, "FLOOR AREA" is hereby added to read as follows:

"FLOOR AREA. The area included within the surrounding exterior walls of a building or portion thereof, exclusive of vent shafts and courts. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above."

The term, "GRADE" is hereby amended to read as follows:

"GRADE (ADJACENT GROUND ELEVATION). The lowest point of elevation of the finished surface of the ground, paving or sidewalk, deck or platform with the area between the building and the property line or, when the property line is more than 5 feet (1.524 m) from the building, between the building and a line 5 feet (1.524 m) from the building."

The term "*HOOP HOUSE(S)*" is hereby added to read as follows.

HOOP HOUSE(S). Structures using a semi-flexible non-metallic frame system intended to support flexible plastic covering of not more than 6 mil polyethylene as cover for the purpose of extending crop growing seasons; do not contain mechanical or electrical systems or equipment and are not open to the public. Not for use as storage

The term "ROOM, SLEEPING (BEDROOM"), is hereby added to read as follows:

"ROOM, SLEEPING (BEDROOM). A *habitable space* within a dwelling or other housing unit designed primarily for the purpose of sleeping. The presence of a bed, cot, mattress, convertible sofa or other similar furnishing used for sleeping purposes is indicia for determining that such space or room qualifies as a sleeping room. The presence of closets and similar storage facilities is not considered a relevant factor in determining whether or not a room is a sleeping room."

The term "SITE", is hereby added to read as follows:

"SITE. A parcel of land bounded by a property line or a designated portion of a public right-of-way."

The term, "TOWNHOUSE", is hereby amended to read as follows:

"TOWNHOUSE: A single-family dwelling unit constructed in a group of two or more attached individual units, each of which is separated from the other from the foundation to the roof and is located entirely on a separately recorded and platted parcel of land (site) bounded by property lines that is deeded exclusively for such single-family dwelling."

Section 301.1.3 Engineered Design is hereby amended to read as follows:

R301.1.3 Engineered design. When a building of otherwise conventional light-frame construction contains structural elements not conforming to this code, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design, in accordance with the general building code enacted by the City, is permitted for all buildings, structures, and portions thereof included in the scope of this code."

Table R301.2(1), Climatic and Geographic Design criteria, is hereby amended to read as follows:

GROUND SNOW LOAD	WIND SPEED ^b	SEISMIC DESIGN CATE- GORY	SUBJECT TO DAMAGE FROM			WINTER DESIGN TEMP	AIR FREEZ- ING INDEX ^f	MEAN ANN- UAL	FLOOD ^e HAZARDS		
			Weathering ^a	Roof Ice ^c Damming	Frost line depth	Termite	Decay ^d			TEMP.	
30psf (1436.4pa)	100mph (161 kph)	B	Severe	No	30 inches (762mm)	Slight to Moderate	None to Slight	+7° F (-14° C)	<mark>906</mark>	48.4	July 16, 1979

For SI: $^{\circ}$ C = [($^{\circ}$ F)-32]/1.8.

a. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The weathering column is based on the weathering index (i.e.,

"severe") for concrete as determined from the Weathering Probability Map [Figure R301.2 (3)]. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.

- b. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.
- c. Based on the average daily temperature in January greater than 25⁰ F (-4⁰ C) or where the history of local damage from the effects of ice damming is not substantial.
- d. None to slight in accordance with Figure R301.2(7).
- e. Date of the City's entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), or the date(s) of the currently effective FIRM and FBFM, or other flood hazard map adopted by the community.
- f. 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table Air Freezing Index- USA Method (Base 32° Fahrenheit) at www.ncdc.noaa.gov/fpsf.html.
- g. Mean annual temperature from the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32° Fahrenheit) at www.ncdc.noaa.gov/fpsf.html."

Section R301.2.1.5.2 Basic Wind Speed is hereby added, to read as follows:

R301.2.1.5.2 Basic Wind Speed. The Special Wind Region as indicated on Figure R301.2(4) of this code shall apply using a Basic Wind Speed of 100 miles per hour (161 kph) based on the exposure category as described in Section R301.2.1.4, or the equivalent pressure thereto."

Section R302.1 Exterior walls, is hereby amended to read as follows:

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

Section R302.1.1 Exterior wall finish materials, is hereby added to read as follows:

R302.1.1 Exterior wall finish materials Walls of dwellings located within the fire separation distance (location from property line) of 0 feet to less than 5 feet shall be constructed of exterior finishes containing cementitious materials."

Exception: dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 or NFPA 13D.

Table R302.1(1) Exterior Walls is hereby amended to read as follows:

TABLE R302.1 EXTERIOR WALLS					
EXTERIOR WALL ELEMENT	MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE			

WALLS	FIRE-RESISTANCE RATED	1 HOUR-TESTED IN ACCORDANCE WITH ASTM E 119 OR UL 263 WITH EXPOSURE FROM BOTH SIDES	LESS THAN 3 FEET
	NOT FIRE RESISTANCE RATED	0 HOURS	3 FEET OR MORE
DDOJECTIONS	FIRE-RESISTANCE RATED	1 HOUR ON THE UNDERSIDE	2 TO <mark>3 FEET</mark>
PROJECTIONS	NOT ALLOWED	N/A	LESS THAN 2 FEET
OPENINGS IN	NOT ALLOWED	N/A	LESS THAN 3 FEET
WALLS	UNLIMITED	0 HOURS	3 FEET OR MORE
PENETRATIONS	ALL	COMPLY WITH SECTION R317.3 R302.4	LESS THAN 3 FEET
PENETRATIONS	ALL	NONE REQUIRED	3 FEET OR MORE

Table R302.1(2) Exterior Walls-Dwellings with Fire Sprinklers is hereby deleted.

Section R302.2 Townhomes, exception is hereby amended to read as follows:

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

Need to include property line at projections, not clear in IRC by ICC intends that the projections be protected as required in the IBC

Section R302.2.1Continunity is hereby amended to read as follows:

R302.2.1 Continuity. The fire-resistance-rated adjoining wall or assembly separating townhouses along property lines shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed accessory structures."

Section R302.3 Two-family dwellings is hereby amended to read as follows:

R302.3 Two-family dwellings. Dwelling units in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than a two-hour fire-resistance rating or by 2 walls of one-hour fire-resistance rating when tested in accordance with ASTME 119 or UL 263. Fire-resistance-rated floor-ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of $\frac{1}{2}$ one half-hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

- 2. Wall assemblies in buildings equipped with a fire suppressions system complying with NFPA 13, 13R or IRC P2904, need not extend through attic spaces when the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board and an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings. The structural framing supporting the ceiling shall also be protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.
- 3. A fire-resistance rating of 1 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 or NFPA 13D or NFPA 13R.

Section R308.4.5 Glazing and wet surfaces is hereby amended to read as follows:

R308.4.5 Glazing and wet surfaces. Glazing in walls, enclosures or fences containing or facing hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface shall be considered a hazardous location. This shall apply to single glazing and all panes in multiple glazing.

Exception: Glazing that is more than 60 inches (1524 mm), 48 inches (1219 mm), measured horizontally and in a straight line, from the water's edge of a bathtub, hot tub, spa, whirlpool, or swimming pool.

Section R308.4.7 Glazing adjacent to the bottom stair landing is hereby amended to read as follows:

R308.4.7 Glazing adjacent to the bottom stair landings. Glazing adjacent to the stair landings at the bottom of a stairway where the glazing is less than 36 inches (914 mm) above the landing and within 60 inches (1524 mm) horizontally of the top or bottom tread shall be considered a hazardous location.

Exception: The glazing is protected by a guard complying with Section R312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Section R310.1 Emergency escape and rescue required is hereby amended to read as follows:

R310.1 Emergency escape and rescue required. *Basements*, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Emergency escape and rescue window openings that are located more than 72 inches (1829 mm) above the finished grade or surface directly below the window, shall have a sill height of not less than 24 inches (609 mm) measured from the finished interior side floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a *yard* or court that opens to a public way.

Exception: Basements used only to house mechanical equipment and not exceeding total floor area of 200 square feet (18.58 m2).

Section R310.2 Window Wells is amended by adding a new exception #2 to read as follows:

- 2. With the window in the full open position, the bottom window well step may encroach a maximum of 12 inches (304 mm) into the minimum horizontal projection, provided the well meets the following criteria:
 - (a) The bottom of the well is not less than 36 inches wide (914 mm), centered horizontally on the openable portion of the emergency escape and rescue door or window, and
 - (b) An unobstructed clear horizontal projection of 36 inches (914 mm) is maintained at the centerline of the openable portion of the emergency escape and rescue door or window.
 - (c) Window well steps shall not exceed a rise of 16 inches maximum and the step run shall be 4 inches minimum.

Section R310.2.2 Drainage is amended to read as follows and by adding a new exception #2 to read as follows:

R310.2.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R405.1 or by an approved alternative method. Inlet to the drainage system shall be a minimum of 4 inches (101 mm) below the window sill. Where no drains are required the window well surface shall be a minimum of 4 inches (101 mm) below the window sill.

Exception: 1. A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1. as determined by the foundation engineer of record.

2. A drainage system is not required for new window wells on additions to existing dwellings.

Section R311.7.1 Stairways Width Exception is amended to read as follows:

Exception: The width of spiral stairways installed within individual dwelling units shall be in accordance with Section R311.7.9.1.

Section R311.7.5.1 Risers is hereby amended to read as follows:

R311.7.5.1 Risers. The maximum riser height shall be 7 3/4 inches (196 mm), the minimum riser height shall be not less than 4 inches (102 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the opening between treads does not permit the passage of a 4-inch-diameter (102 mm) sphere.

Exception: The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

Section R312.1.1 Where required is hereby amended to read as follows:

R312.1.1 Where required. *Guards* shall be located along open-sided walking surfaces, including stairs, ramps and landings, that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below. at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard*.

Section R312.1.1.1 Area well retaining walls, is amended by adding a new section to read as follows:

R312.1.1.1 Area well retaining walls. Where any area well wall, bulkhead enclosure wall or similar retaining wall or barrier is located less than 36 inches (914 mm) from the nearest intended walking surface, parking surface, or driveway and the surface elevation difference between the higher and lower side of the well wall, bulkhead enclosure wall, or retaining wall is greater than 36 inches, such wall shall be protected with guards or be provided with an equivalent barrier.

Exceptions:

- 1. The access side of stairways need not be barricaded.
- 2. Area wells provided for emergency escape and rescue windows may be protected with approved grates or covers that comply with Section R310.4.
- 3. Covers and grates may be used over stairways and other openings used exclusively for service access or for admitting light or ventilation.
- 4. Area well walls, bulkhead enclosure walls, or retaining walls adjacent to a building that are located 24 inches (610 mm) or less measured perpendicular from the building.
- 5. Locations where the slope of the embankment or the side of the enclosure or the opening adjacent to such walls does not exceed 2 horizontal to 1 vertical.

Section R313 Automatic Fire Sprinkler Systems is hereby amended in its entirety to read as follows:

R313.1 Townhouse automatic fire sprinkler systems design. An automatic residential fire sprinkler system installed in townhouses shall be designed and installed in accordance with Section P2904 or NFPA 13R or NFPA 13.

R313.2 One- and two-family dwellings automatic fire systems design. An automatic residential fire sprinkler system installed in one and two-family dwellings shall be designed and installed in accordance with Section P2904 or NFPA 13D.

Section R314.3.1 Alterations, repairs and additions, is hereby amended by deleting exception #2.

2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Section R320.1 Scope, is hereby amended to read as follows:

R320.1 Scope. Where there are 4 or more dwelling units or sleeping units constructed in a single structure, or when constructed as part of a planned development containing a total of 7 or more dwelling units, regardless of whether such units are separated by fire-resistance-rated assemblies, the applicable provisions of Colorado Revised Statutes, Federal regulations, and the provisions of Chapter 11 of the adopted *International Building Code* for Group R-3 shall apply.

Section R322.1 General is amended to read as follows:

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1) shall be designed and constructed in accordance with the provisions contained in this section. In addition to complying with the provisions of this section, buildings and structures constructed in flood hazard areas shall be designed and constructed in accordance with the provisions of the Code of the City, Chapter 10, Flood Prevention and Protection. In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall demonstrate that the cumulative effect of the proposed buildings and structures on design flood elevations, including fill, when

combined with all other existing and anticipated development, will not increase the design flood elevation more than one foot at any point within the City.

Section R324 Resource Efficiency a new section is hereby added to read as follows:

SECTION R324

RESOURCE EFFICIENCY

R324.1 Construction waste management. For new *buildings*, and additions over 5,000 square feet or remodels over 5,000 square feet a construction waste management plan acceptable to the Building Official that includes recycling of concrete and masonry, wood, metals and cardboard, is required at time of application for a building permit. The construction waste management plan shall be implemented and conspicuously posted on the construction site. Compliance shall be certified by the hauler through receipts and signed affidavits. Substantive changes to the plan shall be subject to prior approval by the Building Official.

R324.1.1 Building demolitions. Buildings or portions of buildings which are removed shall be processed in such a way as to safely remove all asbestos and lead paint contaminants. All remaining materials shall be recycled such as doors, windows, cabinets, and fixtures, concrete and masonry, wood, metals, and cardboard. Compliance shall be certified by the hauler through receipts and signed affidavits.

R324.2 Certified tropical hardwood. All tropical hardwoods used in new construction, additions and alterations requiring a building permit, shall be certified by the Forest Stewardship Council or other *approved agency*. Certification demonstrating compliance shall be required with delivery of such materials and shall be available for inspection.

Section R325 Indoor Environmental Quality a new section is hereby added to read as follows:

SECTION R325

INDOOR ENVIRONMENTAL QUALITY (IEQ)

R325.1 Low-volatile organic compound (VOC) materials. Construction materials, floor coverings and site applied finishes, including sealants and adhesives, resilient flooring, carpeting and pad, site-applied paints, stains and varnishes, structural wood panels, hardwood veneer plywood, particle board and fiber board *building* products, and insulation shall meet specified *volatile organic compound (VOC)* emissions limits in accordance with California Department of Public Health (CDPH) 01350; GREENGUARD Environmental Institute GGPS.001 standard for *building* materials and finishes; and Green Seal® standards. Documentation demonstrating compliance be required with delivery of such materials and shall be available for inspection."

Exception: For *alterations* to *existing buildings*, carpeting and pad, structural wood panels, hardwood, veneer plywood, particle board and fiber board *building* products and insulation are not subject to this requirement.

Section R326 Outdoor Environmental Quality a new section is hereby added to read as follows:

SECTION R326 OUTDOOR ENVIRONMENTAL QUALITY (OEQ)

R326.1 Exterior lighting. All exterior lighting fixtures associated with new buildings shall have the "Fixture Seal of Approval" from the International Dark-Sky Association (IDA) or meet equivalent criteria approved by

the Building Official. Lighting placement shall conform to IDA Model Lighting Ordinance for Lighting Zone LZ-1. Light shall be shielded such that the lamp itself or the lamp image is not directly visible outside the property perimeter.

Section R327 Operations and Maintenance and Building Owner Education a new section is hereby added to read as follows:

SECTION R327 OPERATIONS AND MAINTENANCE AND BUILDING OWNER EDUCATION

R327.1 Operations and maintenance. In new buildings operation and maintenance information addressing all installed systems shall be provided for the *building* owner prior to final approval.

Section R401.1 Application is hereby amended to read as follows:

R401.1 Application. The provisions of this chapter shall control the design and construction of the foundation and foundation spaces for all buildings. In addition to the provisions of this chapter, the design and construction of foundations in areas prone to flooding as established by Table R301.2(1) shall meet the provisions of Section R322. All foundations shall be designed by a qualified professional licensed in the State of Colorado. Such designs shall be performed in accordance with accepted and approved engineering practices, including considerations for soil load-bearing capacities, surface and subsurface water conditions, adequate foundation and floor drainage, adequate ventilation of enclosed interior foundation spaces, and foundation waterproofing and dampproofing.

Exception: Foundations for accessory buildings and minor additions unlikely to be located on expansive, compressible, or shifting soils, soils of unknown characteristics, or for other valid reasons as determined by the building official, need not be designed by a licensed professional.

Wood foundations in Seismic Design Category D0, D1 or D2 shall be designed in accordance with accepted engineering practice.

Exception: The provisions of this chapter shall be permitted to be used for wood foundations only in the following situations:

- 1. In buildings that have no more than two floors and a roof.
- 2. When interior basement and foundation walls are constructed at intervals not exceeding 50 feet (15 240 mm).

Section, R401.5 Placement of Backfill is hereby added to read as follows:

R401.5 Placement of Backfill. The excavation outside the foundation, including utility trenches and excavation ramp, shall be backfilled with soil that is substantially free of organic material, construction debris and cobbles, boulders, and solid soil masses larger than 6 inches (152 mm) diameter; or of frozen soil. The backfill shall be placed in lifts and compacted as set forth in the engineering documents. The backfill shall be placed in a manner that does not damage the foundation or the waterproofing or dampproofing material. Excavation ramps shall be backfilled in such a manner that the ramp does not become a conduit for surface water to flow toward the foundation. Where excavations include more than one house, a specially engineered drainage system may be required by the building official.

Section R403.1.4.1Frost Protection Exceptions is hereby amended to read as follows:

Exceptions:

- 1. Protection of freestanding unheated or unconditioned *accessory structures* with an area of 600 square feet (56 m2) or less, of light-frame construction, with an eave height of 10 feet (3048 mm) or less shall not be required.
- 2. Protection of freestanding unheated or unconditioned *accessory structures* with an area of 400 square feet (37 m2) or less, of other than light-frame construction, with an eave height of 10 feet (3048 mm) or less shall not be required.
- 3. Decks not supported by a dwelling need not be provided with footings that extend below the frost line.

Section R405.1 Concrete or masonry foundations, is hereby amended to read as follows:

R405.1 Concrete or masonry foundations. "Drains consisting of piping conforming with ASTM Designation D2729-89 shall be provided adjacent to the lowest concrete or masonry foundations that retain earth and enclose spaces that are partially or entirely located below grade. Unless perimeter drains are designed to daylight, they shall terminate in sump pits with an electrical power source permanently installed within 36 inches (914 mm) of the sump opening. Piping for sump pumps shall discharge at least 60 inches (1524 mm) away from foundations or as otherwise approved by the building official. Drains shall be installed in bedding materials that are of such size and installed in such manner to allow ground water to seep into the perimeter drain. Filter fabric or other measures to restrict the passage of fines shall be used to further protect the perimeter drain from blockage.

Exception: A drainage system is not required when determined by the engineer of record that the foundation is installed on well-drained ground or sand gravel mixture soils according to the Unified Soil Classification System, Group I Soils, as detailed in Table R405.1.

Section R405.3 Landscape irrigation, is added to read as follows:

R405.3 Landscape irrigation. Landscape irrigation systems shall be installed such that the ground surface within 60 inches (1524 mm), measured perpendicular from the foundation, is not irrigated.

Section R408.1Ventilation is hereby amended to read as follows:

R408.1 Ventilation. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls. All exposed ground surfaces shall be covered by a Class 1 vapor retarder material. All joints in the retarder shall be overlapped by 6 inches (153 mm) and sealed or taped, with the retarder edges extending a minimum of 6 inches (153 mm) up the foundation wall and attached and sealed thereto in an approved manner. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m2) for each 1,500 square feet (140 m2) of under-floor space area. One such ventilating opening shall be within 3 feet (914 mm) of each corner of the building.

Exception: Crawlspaces complying with section R408.3

Section R408.2.1 Ventilated under-floor spaces, is hereby added to read as follows:

R408.2.1 Ventilated under-floor spaces. Floor systems above ventilated under-floor spaces shall be insulated to R-30 in accordance with the adopted *International Energy Conservation Code* Table 402.1.1. Floor system shall be sealed to prevent heat loss and air infiltration.

Section R408.3 Unvented crawl space, Item 3 is hereby added to read as follows:

3. The perimeter walls enclosing un-vented crawl spaces shall be thermally insulated to R-15 continuous insulation or R-19 batt insulation in accordance with Table N1102.1.1

Section R408.3.1 Spaces under below-grade floors, is hereby added to read as follows:

R408.3.1 Spaces under below-grade floors. Mechanical ventilation systems for spaces under below-grade floors shall be installed as designed by a professional engineer.

Section, R408.6 Finished grade is hereby amended by adding a sentence at the end to read as follows:

In areas where expansive or collapsible soils are known to exist, under floor clearances shall be provided in accordance with the professional designed foundation system.

Section R703.8.1Fenestration Installation is hereby added to read as follows:

R703.8.1 *Fenestration* installation. For all new construction, all *fenestration* installations shall be in accordance with American Architectural Manufacturers Association (AAMA) Standards/ Specifications for Windows, Doors and Skylights.

Section R801.3 Roof Drainage is hereby amended to read as follows:

R801.3 Roof drainage. In areas where expansive or collapsible soils are known to exist, All dwellings shall have a controlled method of water disposal from roofs that will collect and discharge roof drainage to the ground surface at least 5 feet (1524 mm) from foundation walls or to an *approved* drainage system.

Section R902.1 Roofing Covering Materials is hereby amended to read as follows:

R902.1 Roofing covering materials. Except as otherwise allowed, roofs shall be covered with materials listed as Class A and with materials as set forth in Sections R904 and R905. Classes A, B and C roofing required to be listed by this section shall be tested in accordance with UL 790 or ASTM E 108. Roof assemblies with coverings of brick, masonry, slate, clay or concrete roof tile, exposed concrete roof deck, ferrous or copper shingles or sheets, and metal sheets and shingles, shall be considered Class A roof coverings.

Exception: Any Class B or Class C roof covering may be applied on any new construction that is added to an existing building, provided the roof extremities of such existing building and new construction are located a minimum distance of 5 feet (1.524 m) from the nearest adjacent property line and are a minimum distance of 10 feet (3.048 m) from another building.

Section R907.1 General is hereby amended to read as follows:

R907.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 9. No portion of an existing nonrated roof covering may be permanently replaced or covered with more than one square of nonrated roof covering.

Exceptions:

- 1. Reroofing shall not be required to meet the minimum design slope requirement of one-fourth vertical in 12 units horizontal (2-percent slope) in Section R905 for roofs that provide positive roof drainage.
- 2. Any existing roof covering system may be replaced with a roof covering of the same materials and classification, provided the replacement roof covering has a minimum rating of Class C.

Section R1003.9.1 Spark arrestors, is hereby amended to read as follows:

R1003.9.1 Spark arrestors. Chimneys attached to any appliance or fireplace that burns solid fuel shall be equipped with an approved spark arrester meeting all of the following requirements:

- 1. The net free area of the arrestor shall not be less than four times the net free area of the outlet of the chimney flue it serves.
- 2. The arrestor screen shall have heat and corrosion resistance equivalent to 19-gage galvanized steel or 24-gage stainless steel.
- 3. Openings shall not permit the passage of spheres having a diameter greater than 1/2 inch (12.7 mm) nor block the passage of spheres having a diameter less than 3/8 inch (9.5 mm).
- 4. The spark arrestor shall be accessible for cleaning and the screen or chimney cap shall be removable to allow for cleaning of the chimney flue.

Section R1004.1 General is hereby amended by adding new sentence at the end to read as follows:

Solid fuel fireplaces, fireplace stoves and solid-fuel-type room heaters shall also comply with Section 5-110 of the Code of the City.

Section R1004.4 Unvented Gas log Heaters is amended by deleting in its entirety.

R1004.4 Unvented gas log heaters. An unvented gas log heater shall not be installed in a factory-built fireplace unless the fireplace system has been specifically tested, *listed* and *labeled* for such use in accordance with UL 127.

N1101.1.1 Thermal design parameters. The following thermal design parameters in Table N1101.1 shall be used for calculations required under this chapter.

TABLE N1101.1 THERMAL DESIGN PARAMETERS CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

Winter Outdoor, Design Dry-bulb (°F)	= <mark>7</mark>
Winter Indoor, Design Dry-bulb (°F)	$=\frac{72}{1}$
Summer, Outdoor Design Dry-bulb (°F)	= <mark>90</mark>
Summer, Indoor Design Dry-bulb (°F)	= <mark>75</mark>

Summer, Outdoor Design Wet-bulb (°F) = 62 Summer, Indoor Design Wet-bulb (°F) = 62

For SI: $^{\circ}C = [(^{\circ}F)-32]/1.8$.

Note: based on the 2013 Colorado Climate Center analysis.

N1101.4 (R101.4.5) Change in space conditioning, is hereby amended to read as follows:

N1101.4 (**R101.4.5**) Change in Space conditioning. Any non-conditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this chapter. *Habitable Spaces* shall be conditioned as required by this code.

Section N1101.8 (R103.2) Information on construction documents, is hereby amended to read as follows:

N1101.8 (R103.2) Information on construction documents Construction documents for all buildings shall describe the exterior wall envelope in sufficient detail to determine compliance with this code. When applicable as determined by the building official, construction documents submitted as part of the building permit application shall provide details of the exterior wall envelope as required, including flashing, intersections of dissimilar materials, corners, end details, control joints, intersections at roof, eaves, or parapets, means of drainage, water-resistive membrane, and details around openings. The construction documents shall include manufacturing installation instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the weather resistance of the exterior wall envelope. The supporting documentation shall fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and shows in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their Rvalues; fenestration (window schedule) listing U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.

Section N1102, TABLE N1102.1.1 Insulation and fenestration requirements by component is hereby amended by the addition of electric heat requirements to read as follows:

TABLE N1102.1.1 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

_		, , , , , , , , , , , , , , , , , , , ,	120 1111		0 11 111.				, _		
	HEATING	FENESTRATION	SKYLIGHT ^b	GLAZED	CEILING	WOOD	MASS	FLOOR	BASEMENT ^c	SLABd	CRAWL ^c
	SYSTEM	U-FACTOR ^b	U-FACTOR	FENESTRATION	R-	FRAME	WALL	R-	WALL	R-	SPACE
	TYPE			SHGC	VALUE	WALL	R-	VALUE ^e	R-VALUE	VALUE	WALL
						R-VALUE	VALUE	VALUE		&	R-
		· ·								DEPTH	VALUE
	Non-Electric	0.32	0.55	NR	49	20 or	15/19	30	10/13h	10,2	15/19
		****								C,	
	heat					$13 + 5_{g}$				Ιt	
	Electric heat	0.30	0.55	NR	49	$20+5^{f}$	15/19	30	10/15	10,4	15/19
							-2.22			c.	
										It	

For SI: 1 foot = 304.8 mm

a. R-values are minimums. U-factors SHGC are maximums. R-19 batts compressed into a nominal 2x6 framing cavity such that the R-value is reduced by R-1 or more shall be marked with the compressed batt R-value in addition to the full thickness R-value.

b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

- c. "15/19" means R-15 continuous insulation on the interior or exterior of the foundation wall or R-19 cavity insulation at the interior of the foundation wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the foundation wall plus R-5 continuous insulation on the interior or exterior of the foundation wall. "10/15" means R-10 continuous insulation on the interior or exterior of the foundation wall or R-15 cavity insulation at the interior of the foundation wall.
- d. R-5 shall be added to the required slab edge R-values for heated slabs.
- e. Or insulation sufficient to shall fill the framing cavity, R-19 minimum.
- f. "20+5" means R-20 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of the exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2. The second R-value applies when more than half the insulation is on the interior of the mass wall.
- g First value is cavity insulation, second is continuous insulation or insulated siding, so "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used to maintain a consistent total sheathing thickness.
- h. All rim joist and plates shall be insulated using spray foam insulation to an R-Value equal to the wall above or below.

Section N1102, TABLE N1102.1.3 Equivalent U-Factors is hereby amended by the addition of electric heat requirements to read as follows:

TABLE N1102.1.3 EQUIVALENT *U*-FACTORS^a

HEATING SYSTEM	FENESTRATION	SKYLIGHT	CEILING	FRAME WALL	MASS	FLOOR	BASEMENT	CRAWL
HEATING STSTEM	FENESTRATION	SKILIGHI	CEILING	FRAME WALL	MASS	FLOOK	DASEMENT	CKAWL
TYPE	<i>U</i> -FACTOR	U-FACTOR	R-VALUE	U-FACTOR	WALL	<i>U</i> -FACTOR	WALL	SPACE
					U-FACTOR ^b		U-FACTOR	WALL
								U-FACTOR
Nonelectric heat	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
Electric heat	0.30	<mark>0.60</mark>	0.026	0.043	0.060	0.033	0.050	0.055

- a. Non-fenestration *U*-factors shall be obtained from measurement, calculation or an *approved* source.
- b. When more than half the insulation is on the interior, the mass wall *U*-factor shall be the same as the frame wall *U*-factor.

Section N1102.2 Specific insulation requirements is hereby amended by adding a second paragraph to read as follows:

N1102.2 (R402.2) Specific insulation requirements (Mandatory)

In addition to the requirements of Section N1102.1, insulation shall meet the specific requirements of Sections N1102.2.1 through N1102.2.12. All insulation shall be installed to meet Residential Energy Services Network (RESNET) Grade I standard with six-sided encapsulation.

Exceptions: RESNET Grade II is acceptable for:

1. cavity insulation in exterior walls that include continuous rigid insulating sheathing and/or insulated siding with a minimum R-5 value; and

Section N1102.2.7.1 Rim insulation requirements is hereby added to read as follows:

N1102.2.7.1 Rim insulation requirements (Mandatory) All rim plates and rim joist which are part of the thermal envelope shall be insulated using spray foam materials with an insulation R-value equal to that of the wall below.

Section N1102.4.1.2 Testing is hereby amended to read as follows:

N1102.4.1.2 (**R402.4.1.2**) **Testing.** The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Zones 1 and 2, and 3 air changes per hour in Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *building official*, testing shall be conducted by an *approved* third party. A written report of the

results of the test shall be signed by the party conducting the test and provided to the *building official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. Isolation of attached garages from adjoining *conditioned areas* shall be verified with an *approved* differential pressure test.

During testing:

- 1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weather-stripping or other infiltration control measures;
- 2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
- 3. Interior doors, if installed at the time of the test, shall be open;
- 4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed:
- 5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
- 6. Supply and return registers, if installed at the time of the test, shall be fully open.
- 7. Combustion air inlets shall not be closed or otherwise obstructed.
- 8. Garage doors to the exterior shall be closed.

In additions or alterations to existing *buildings*, air sealing compliance shall be considered acceptable when the items listed in Table N1102.4.1.1, applicable to the method of construction, are field-verified.

Section N1102.5 Maximum fenestration U-factor and SHGC (Mandatory) is hereby amended in its entirety to read as follows:

N1102.5 Maximum *fenestration U-factor* and *SHGC*. For new construction and additions that require a building permit, the area-weighted average maximum *fenestration U-factor* permitted using trade-offs from Section N1102.1.4 or N1105 shall be 0.40 *for vertical fenestration*, and 0.75 for *skylights*.

Section N1105 Simulated Performance Alternative (Performance) is hereby amended by the addition of exception to read as follows:

N1105.1 (**R405.1**) **Scope.** This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling, and service water heating energy only.

Exception: In addition to all Mandatory sections, new buildings, additions, or alterations where the primary heat source is electrical shall comply with prescriptive portions of the code.

Section M1307.3 Elevation of ignition source is amended to read as follows:

Section M1307.3 Elevation of ignition source. Electrical devices, equipment and appliances having an ignition source shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor in garages. For the purpose of this section, rooms or spaces that are not part of the living space of a dwelling unit and that communicate with a private garage through openings shall be considered to be part of the garage.

Section M1309 Testing and verification is hereby added to read as follows:

M1309 Testing and verification. Installed heating, cooling and ventilation systems shall be performance-tested by an approved agency and adjusted to operate within design specifications, in accordance with

ANSI/ACCA QI 5-2007 HVAC Quality Installation Specification. Documentation of results shall be submitted to the Building Official prior to approval.

Section M1401.3 Sizing is hereby amended in its entirety to read as follows:

M1401.3 Heating and cooling system design. The design of new heating and cooling systems shall meet the requirements of this Section. Design documents shall be submitted to the Building Official at the time of application for a building permit.

M1401.3.1 Equipment sizing. Heating and cooling equipment shall be sized in accordance with ACCA Manual S, based on design *building* loads calculated in accordance with ACCA Manual J, or other equivalent methodology approved by the Building Official, using thermal design parameters in Table N1101.1 as amended. The total equipment output capacity shall be between the following limits, as applicable for the equipment type:

- 1. 95% and 115% of calculated system cooling load, for air conditioners and heat pumps;
- 2. 95% and 125% of calculated system cooling load, for heat pumps with winter heating dominated requirements;
- 3. 100% and 140% of calculated system heating load, for warm air systems, unless dictated by the cooling equipment selection; and
- 4. 100% and 115% of calculated system heating load, for heating boilers.

Where no available equipment is within the applicable capacity limits, the next largest nominal piece of equipment that is available may be used.

M1401.3.2 Room loads. Room-by-room design heating and cooling loads shall be calculated.

Exception: Equipment replacement in an existing building.

M1401.3.3 Matched components. Air-conditioning, Heating and Refrigeration Institute (AHRI) matched evaporators, condensing units and air handlers shall be required."

Exception: Equipment replacement in an existing building.

Section, M1414.1 General is hereby amended to read as follows:

M1414.1 General. Fireplace stoves shall be listed, labeled and installed in accordance with the terms of the listing. Fireplace stoves shall be tested in accordance with UL 737. Wood burning appliances shall meet the latest emission standards as stated by the State of Colorado and Federal Regulation 40 CFR Part 60, Subpart AAA.

Section M1501.1 Outdoor discharge is hereby amended to read as follows:

M1501.1 Outdoor discharge. The air removed by every mechanical exhaust system shall be discharged to the outdoors such that the exhaust termination is at least 10 feet (3048 mm) from intakes of other mechanical ventilating systems. Air shall not be exhausted into an attic, soffit, ridge vent or crawl space.

Exception: Whole-house ventilation-type attic fans that discharge into the attic space of dwelling units having private attics shall be permitted.

Section M1501.2 Indoor depressurization is hereby added to read as follows:

M1501.2 Indoor depressurization. Ducted exhaust systems shall not induce or create a negative pressure sufficient to cause backdrafting of naturally vented, open combustion-chamber, fuel-burning appliances, or create negative pressure in excess of negative 3 Pa. in the immediate proximity of combustion chambers of such appliances.

Section M1502.4.4.2 Manufacturer's instructions, is hereby deleted in its entirety.

M1502.4.4.2 Manufacturer's instructions. The size and maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer at the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table M1502.4.4.1 shall be used.

Section M1507.3 Whole-house mechanical ventilation system is hereby amended in its entirety to read as::

M1507.3 Whole-house mechanical ventilation system. For new *buildings*, a mechanical exhaust system, supply system, or combination thereof shall be installed for each *dwelling unit* to provide whole-*dwelling unit ventilation*. Such system shall comply with Sections M1507.4.1 through M1507.4.4.

M1507.3.1 Whole-house mechanical ventilation rate. The whole-house mechanical ventilation system shall provide outdoor air at a continuous rate of not less than that determined in accordance with Table M1507.3.3(1).

Exception: The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25-percent of each 4-hour segment and the ventilation rate prescribed in Table M1507.3.3(1) is multiplied by the factor determined in accordance with Table M1507.3.3(2).

M1507.3.2 System design. The design of the required Whole-house mechanical ventilation system shall comply with the requirements of this Section. System design documents shall be submitted to the Building Official at the time of application for a building permit.

M1507.3.2.1 System type. The system shall consist of one or more supply or exhaust fans, or a combination thereof, and associated ducts and controls. Exhaust fans shall be permitted to be part of a mechanical exhaust system. Outdoor air ducts connected to the return duct of a forced air furnace shall be sized to provide adequate mechanical *ventilation* in accordance with ASHRAE 62.2 and shall meet the manufacturer's requirements for minimum return air temperature to the furnace heat exchanger.

M1507.3.2.2 Outdoor air intakes. Outdoor air intakes shall have automatic dampers that close when the *ventilation* system is not operating.

M1507.3.2.3. Exhausts. Exhausts shall have gravity dampers that close when the *ventilation* system is not operating.

M1507.3.2.4. Air circulation fan motors. Motors for air circulation fans used in the *ventilation* system, rated at one-quarter horsepower or greater, shall meet at least one of the following criteria:

- 1. Where the furnace serves as an air handler for the *ventilation* system, the furnace shall be certified as an "electrically Efficient Furnace" by the Air-conditioning, Heating and Refrigeration Institute (AHRI).
- 2. The blower motor shall be specified as a "Brushless DC" (BL or BLDC) motor by the manufacturer.
- 3. The blower motor shall be specified as "Brushless Permanent Magnet" (BPM) motor.
- 4. The blower motor shall be specified as "Electronically Commutated Motor" (ECM)".
- 5. The blower shall meet equivalent criteria acceptable to the Building Official.

M1507.3.2.5. System controls. The mechanical *ventilation* system shall be provided with readily accessible and labeled controls that enable occupant override.

M1507.3.2.6. Sound ratings for fans. Whole-house mechanical ventilation fans shall be rated for sound at a maximum of 1.0 sones, in accordance with the procedures of the Home Ventilating. Institute (HVI 915, Procedure for Loudness Rating of Residential Fan Products).

Exception: Heating, ventilating and air conditioning air handlers and remote-mounted fans need not meet sound requirements. To be considered for this exception, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets and hallways, and there must be a least 4 ft (1 m) of ductwork between the fan and the intake grille.

M1507.3.3 System installation. The installation of the Whole-house mechanical ventilation system and equipment shall be carried out in accordance with the manufacturers' design requirements and installation instructions.

M1507.3.4 Performance verification. Performance of installed mechanical *ventilation* systems shall be verified in accordance with Section M1309.

Section M1601.1 Duct design is hereby amended to read as follows:

M1601.1 Duct design. Duct systems serving new heating, cooling and ventilation equipment shall be fabricated and designed in accordance with the provisions of this section and *ACCA Manual D* or other approved methods.

Section M1601.1.1 Above-ground duct systems Item 7. stud wall cavities is hereby amended in its entirety to read as follows:

7. Duct systems shall not be located outside the interior vapor barrier of the building thermal envelope.

Exception: Insulated ducts located within attics provided the ducts are covered to the full depth of the required attic R-value insulation

Section, M1601.4.10 Construction debris and contamination is hereby added to read as follows:

M1601.4.10 Construction debris and contamination. Mechanical air-handling systems and their related ducts shall be protected from the entrance of dirt, debris, and dust during the construction and installation process. Prior to passing final inspection or issuance of a Certificate of Occupancy, such systems shall be

substantially free of construction-related contaminants.

Section, M1602.1 Return air is hereby amended to read as:

M1602.1 Return air. Return air shall be taken from inside the *dwelling*. Dilution of return air with outdoor air shall be permitted. A return air path shall be provided in all *habitable rooms* by means of ducts or transfer grills.

Section G2404.3 (301.3) Listed and labeled is hereby amended by deleting the last sentence to read as follows:

G2404.3 (301.3) Listed and labeled. *Appliances* regulated by this *code* shall be listed and labeled for the application in which they are used unless otherwise *approved* in accordance with Section R104.11. The approval of unlisted *appliances* in accordance with Section R104.11 shall be based upon approved engineering evaluation.

Section G2406.2 (303.3) Prohibited locations is hereby amended by deleting exceptions 3. and 4.

3. A single wall-mounted *unvented room heater* is installed in a bathroom and such *unvented room heater* is equipped as specified in Section G2445.6 and has an input rating not greater than 6,000 *Btu*/h (1.76 kW). The bathroom shall meet the required volume criteria of Section G2407.5.

4. A single wall-mounted *unvented room heater* is installed in a bedroom and such *unvented room heater* is equipped as specified in Section G2445.6 and has an input rating not greater than 10,000 *Btu*/h (2.93 kW). The bedroom shall meet the required volume criteria of Section G2407.5.

Section G2406.4 Natural Draft Appliances locations, is hereby added to read as follows:

G2406.4 Natural Draft Appliances locations. For new *buildings* and new appliance or new HVAC systems installed within additions, *natural draft appliances* shall not be located within the *building thermal envelope*.

Exceptions: 1. Where *natural draft appliances* are located in an enclosed mechanical room and sealed to air flow from adjoining conditioned area and the following conditions are met:

- a. The access to the mechanical room is through a self-closing, gasketed door;
- b. No other exhaust appliances are located within the mechanical room;
- c. The mechanical room is provided with outside combustion air as specified in this code;
- d. The isolation of the mechanical room from adjoining conditioned areas is verified with a differential-pressure test performed by approved licensed contractors;
- e. Such *natural draft appliances* pass a combustion safety test under worst-case depressurization conditions in accordance with Building Performance Institute (BPI) Technical Standards for the Heating Professional; and
- f. Documentation of satisfactory testing results are submitted to the building official prior to final approval.
- 2. *Natural draft* fireplaces that pass a combustion safety test, under worst-case depressurization conditions, performed by approved licensed contractors and conducted in accordance with the Building Performance Institute (BPI) Technical Standards for the Heating Professional, prior to final approval.

Section G2407.11 (304.11) Combustion air ducts exception to Item, 1 is hereby amended to read as follows:

Exception: Where the installation of galvanized steel ducts is not practical due to existing finish materials within dwelling units that are undergoing alteration or reconstruction, unobstructed stud and joist spaces shall not be prohibited from conveying combustion air, provided that not more than one required fireblock is removed.

This section is hereby further amended by adding item, 9 to read as follows:

9. All combustion air openings or ducts shall be readily identifiable with an approved label or by other means warning persons that obstruction of such openings or ducts may cause fuel-burning equipment to release combustion products and dangerous levels of carbon monoxide into the building.

Section G2408.1 General is hereby amended by deleting the second paragraph and replacing it to read as follows:

Where *natural draft appliances* are replaced in existing *buildings*, all appliances with a *draft hood* shall pass a combustion safety test under natural conditions, conducted by approved licensed contractors in accordance with the Building Performance Institute (BPI) Technical Standards for the Heating Professional. Such appliances shall also be combustion safety tested under worst-case depressurization conditions, by approved licensed contractors in accordance with Building Performance Institute (BPI) Technical Standards for the Heating Professional. Should an appliance not pass such test, a disclosure form reporting the test results shall be provided to the homeowner. A copy of such disclosure form, signed by the homeowner, shall be submitted to the Building Official prior to approval.

Section G2408.2 (305.3) Elevation of ignition source is hereby amended by deleting the exception.

Exception: Elevation of the *ignition source* is not required for *appliances* that are listed as flammable vapor ignition resistant.

Section G2409.4.4 (308.4.5) Clearance from supply ducts is hereby amended to read as follows:

G2409.4.4 (308.4.5) Clearance from supply ducts. Supply air ducts connecting to listed central heating furnaces where the bonnet temperature exceeds 150 °F (68 °C), shall have the same minimum clearance to combustibles as required for the furnace supply plenum for a distance of not less than 3 feet (914 mm) from the supply plenum. Clearance is not required beyond the 3-foot (914 mm) distance.

Section G2415.12 (404.12) Minimum burial depth is hereby amended to read as follows:

G2415.12 (**404.12**) **Minimum burial depth.** Underground piping systems shall be installed a minimum depth of 18 inches (457 mm) below grade, except as provided for in Section G2415.10.1.

Section G2415.12.1 (404.12.1) Individual outside appliance is hereby amended to read as follows:

G2415.12.1 (404.12.1) Individual outside appliances. Individual lines to outside lights, grills or other appliances shall be installed a minimum of 18 inches (457 mm) below finished grade.

Exception: Approved materials installed a minimum of 6 inches (152 mm) below finished grade when covered with a concrete slab 4 inches (102 mm) in minimum thickness.

Section G2415.15 (404.15) Outlet closure is hereby amended to read as follows:

G2415.15 (404.15) Outlet closures. Gas outlets and fittings which allow for future gas line expansion that do not connect to appliances shall be provided with an approved gas shutoff valve with the end capped gas tight.

Exception: Listed and labeled flush-mounted-type quick-disconnect devices and listed and labeled *gas* convenience outlets shall be installed in accordance with the manufacturer's installation instructions.

Section G2416.1 (405.1) General is hereby amended to read as follows:

G2416.1 (405.1) General. Changes in direction of rigid metallic pipe specified in G2414.4 shall be made only by the use of fittings and factory bends.

Section G2416.2 (405.2) Metallic pipe is hereby deleted in its entirety.

G2416.2 (405.2) Metallic pipe. Metallic pipe bends shall comply with the following:

- 1. Bends shall be made only with bending tools and procedures intended for that purpose.
- 2. All bends shall be smooth and free from buckling, cracks or other evidence of mechanical damage.
- 3. The longitudinal weld of the pipe shall be near the neutral axis of the bend.
- 4. *Pipe* shall not be bent through an arc of more than 90 degrees (1.6 rad).
- 5. The inside radius of a bend shall be not less than six times the outside diameter of the pipe.

Section G2417.4.1 (406.4.1) Test pressure is hereby amended to read as follows:

G2417.4.1 (**406.4.1**) **Test pressure.** The test pressure to be used shall be not less than one and one-half times the proposed maximum working pressure, but not less than 10 psig (67 kPa gauge) irrespective of design pressure. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe.

Section G2420.5.2 (409.5.2) Vented decorative appliances and room heaters is hereby amended to read as follows:

G2420.5.2 (**409.5.2**) **Vented decorative appliances and room heaters.** Shutoff *valves* for vented decorative *appliances*, room heaters and decorative *appliances* for installation in vented fireplaces shall be permitted to be installed in an area remote from the *appliances* where such *valves* are provided with *ready access*. Such *valves* shall be permanently identified and shall serve no other *appliance*. Remote valves shall be operable on the same floor as the appliance served and within 12 feet (3.658 m) of the appliance as measured along the floor line. The *piping* from the shutoff *valve* to within 6 feet (1829 mm) of the *appliance* shall be designed, sized and installed in accordance with Sections G2412 through G2419.

Section G2421.3 (410.3) Venting of regulators is hereby amended to read as follows:

G2421.3 (**410.3**) **Venting of regulators.** Pressure regulators that require a vent shall have an independent vent to the outside of the building. The vent shall be designed to prevent the entry of water or foreign objects. Vents shall not terminate within 3 feet (0.916 m) of openings into the building.

Exception: A vent to the outdoors is not required for *regulators* equipped with and labeled for utilization with an *approved* vent-limiting device installed in accordance with the manufacturer's instructions.

Section G2425.8 (501.8) Appliances not required to be vented is hereby amended by deleting item 7.

7. Room heaters listed for unvented use.

Section G2427.6.4 (503.6.5) **Minimum height** is hereby amended by the addition of the last sentence to read as follows:

G2427.6.4 (**503.6.5**) **Minimum height.** A Type B or L gas vent shall terminate at least 5 feet (1524 mm) in vertical height above the highest connected *appliance draft hood* or *flue collar*. A Type B-W gas vent shall terminate at least 12 feet (3658 mm) in vertical height above the bottom of the wall *furnace*. All gas vents shall terminate a minimum of 22 inches (559 mm) above the surface or grade directly below.

Section G2439.1 (614.1) Installation is hereby amended to read as follows:

G2439.1 (**614.1**) **Installation.** Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture and any products of combustion to the outside of the building. Dryer exhaust duct terminations shall not be located within 36 inches (914 mm) of exterior openings into conditioned spaces, crawl spaces, and attic spaces

Section G2439.5.5.2 (614.6.5.2) Manufacturer's instructions, is hereby deleted in its entirety.

Section G2445 (621), UNVENTED ROOM HEATERS, is hereby deleted in its entirety.

Section G2447.6 Kitchens with gas cooking is hereby added to read as follows:

G2447.6 Kitchens with gas cooking. Kitchens with gas cooking appliances shall be supplied with an exhaust system vented to the outside. Ducts serving kitchen exhaust systems shall not terminate in an attic or crawl space or areas inside the building and shall not induce or create a negative pressure in excess of negative 3 Pa or adversely affect gravity-vented appliances.

Section G2454 Outdoor Decorative Appliances is hereby amended to read as follows:

G2454.1 General. Permanently fixed-in-place outdoor decorative appliances shall be tested in accordance with ANSI Z21.97 and shall be provided with a *flame safeguard* device and be installed in accordance with the manufacturer's instructions. Appliances shall not be located beneath or within 10 feet (3048 mm) of combustible construction.

Section P2503.5.1 Rough Plumbing is hereby amended to read as follows:

- **P2503.5.1 Rough plumbing.** DWV systems shall be tested on completion of the rough piping installation by water or for piping systems other than plastic, by air with no evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough piping has been installed, as follows:
- 1. Water test. Each section shall be filled with water to a point not less than 10 feet (3048 mm) above the highest fitting connection in that section, or to the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.

2. Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa). This pressure shall be held without introduction of additional air for a period of 15 minutes.

Section P2903.2 Maximum flow and water consumption is hereby amended to read as follows:

P2903.2 Maximum flow and water consumption. The maximum water consumption flow rates and quantities for all plumbing fixtures and fixture fittings shall be in accordance with Table P2903.2 and such fixtures shall be Environmental Protection Agency (EPA) WaterSense® labeled fixtures or such fixtures and fittings that provide the equivalent maximum flow rates.

TABLE P2903.2 is hereby amended to read as follows:

TABLE P2903.2 MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS b

PLUMBING FIXTURE	PLUMBING FIXTURE	¥	
OR FIXTURE FITTING	OR FIXTURE FITTING		
Lavatory faucet	1.5 gpm at 60 psi		
Shower head ^a	2.0 gpm at 80 psi		
Sink faucet	1.8 gpm at 60 psi		
Water closet	1.28 gallons per flushing		IaP threshold of 350 grams

For SI: 1 gallon per minute (gpm) = 3.785 L/m.

b. Consumption tolerances shall be determined from referenced standards."

Chapter 44 REFERENCED STANDARDS is hereby amended by adding the following additional referenced standards in alphabetical sequence:

Add the following referenced title standard to ACCA; ANSI/ACCA QI 5-2007 HVAC Quality Installation Specification. Referenced in Amended 09 IRC Section M1309 Performance verification

ATI Architectural Testing, Inc.
130 Derry Court
York, PA 17406

Installation MastersTM Testing and Certification Program
Referenced in Amended 09 IRC Section R703.8.1 Fenestration installation

CDPH California Department of Public Health
1615 Capitol Avenue
Sacramento, CA 95814

CDPH 01350 Standard Method for Testing VOC emissions from indoor sources

Referenced in Amended 09 IRC Section R325.1 Low-volatile organic compound (VOC) materials."

"FSC Forest Stewardship Council U.S. (FSC-US)

¹ pound per square inch (psi) = 6.895 kPa A handheld shower spray is also a shower head

and it is a second of the seco

212 Third Avenue North, Suite 504 Minneapolis, MN 55401"

"GEI GREENGUARD Environmental Institute

2211 Newmarket Parkway, Suite 110

Marietta, GA 30067

GGPS.001.GREENGUARD IAQ Standard for *Building* Materials, Finishes and Furnishings

Referenced in Amended 09 IRC Section R325.1 Low-volatile organic compound (VOC) materials."

"Green Seal® 1001 Connecticut Avenue, NW

Suite 827

Washington, DC 20036-5525

GS-11 Paintings and Coatings

GS-43 Recycled Content Latex Paints

Referenced in Amended 09 IRC Section R325.1 Low-volatile organic compound (VOC) materials."

"HVI Home Ventilating Institute

1000 N Rand Rd, Ste 214

Wauconda, IL 60084 USA

HVI referenced standard HVI 915, Procedure for Loudness Rating of Residential Fan Products Referenced in Amended 09 IRC Section M1507.4.2.6. Sound ratings for fans."

"IDA International Dark-Sky Association

3225 N. First Avenue

Tucson, Arizona 85719

IDA fixture seal of approval (FSA) third-party certification for luminaires that minimize glare, reduce light trespass, and don't pollute the night sky.

http://www.darksky.org/

http://www.darksky.org/outdoorlighting/mlo

http://www.darksky.org/outdoorlighting/about-fsa

"RESNET® Mortgage Industry National Home Energy Rating Systems Standards

Residential Energy Services Network, Inc.

P.O. Box 4561

Oceanside, CA 92052-4561

http://resnet.us

RESNET® reference standard Grade I and Grade II Insulation

Referenced in Amended 09 IRC Section N1102.2 Specific insulation requirements.

APPENDIX E, MANUFACTURED HOUSING USED AS DWELLINGS, is hereby adopted in its entirety.

APPENDIX F, RADON CONTROL METHODS, is hereby adopted and amended in its entirety to read as follows:

Appendix F - RADON CONTROL METHODS

SECTION AF101 TITLE, SCOPE AND PURPOSE

AF101.1 Title. These provisions shall be known as *Appendix Chapter F*, the FORT COLLINS RADON RESISTANT CONSTRUCTION CODE FOR ONE- AND TWO-FAMILY DWELLINGS, and shall be cited as such and will be referred to herein as this appendix.

AF101.2 Scope. The provisions of this appendix shall apply to new one- and two-family dwellings completely separated from adjacent dwellings by unobstructed physical space (detached) and multiple, attached single-family dwellings (townhouses) not more than three stories in height and with each townhouse having its own separate means of egress.

AF01.3 Purpose. The purpose of this appendix is to provide minimum requirements to enhance the public safety, health and general welfare, through construction methods designed and installed to resist entry of radon gas into the occupied spaces of buildings regulated by this appendix.

SECTION AF102 DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DWELLING UNIT, SINGLE-FAMILY DETACHED. An independent building completely separated from adjacent dwellings by unobstructed physical space, exclusively containing one dwelling unit located entirely on a separately recorded and platted parcel of land (site) bounded by property lines, and which parcel is deeded exclusively for such single-family dwelling.

DWELLING UNIT, TWO-FAMILY DETACHED. An independent building completely separated from adjacent dwellings by unobstructed physical space, exclusively containing two dwelling units located entirely on a separately recorded and platted parcel of land (site) bounded by property lines, and which parcel is deeded exclusively for such two-family dwelling.

FOUNDATION DRAIN SYSTEM. A continuous length of drain tile, perforated pipe, or filter mat extending around all or part of the internal or external perimeter of a basement or crawl space footing designed to collect and drain away excess subsurface water.

RADON. A naturally occurring, chemically inert, radioactive gas that is not detectable by human senses and can move readily through particles of soil and rock and can accumulate under the slabs and foundations of homes where it can easily enter the living space through construction cracks and openings.

SOIL-GAS-RETARDER. A continuous membrane of 3-mil (0.075 mm) cross-linked polyethylene or other equivalent material used to retard the flow of soil gases into a building.

SUBFLOOR. A concrete slab and other approved permanent floor system that directly contacts the ground and is within the walls of the living spaces of the building.

SUB-MEMBRANE DEPRESSURIZATION SYSTEM. A system designed to achieve lower sub-membrane air pressure relative to crawl space air pressure by use of a vent drawing air from beneath the soil-gas-retarder membrane.

SUB-SLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a vent pipe routed through the conditioned space of a building

and connecting the sub-slab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab.

TOWNHOUSE. A single-family dwelling unit constructed as part of a group of two or more attached individual dwelling units, each of which is separated from the other from the foundation to the roof and is located entirely on a separately recorded and platted parcel of land (site) bounded by property lines, and which parcel is deeded exclusively for such single-family dwelling.

SECTION AF103 REQUIREMENTS

AF103.1 General. The following required construction methods are intended to resist radon entry and prepare the building for post-construction radon mitigation (see Figure AF102).

AF103.2 Subfloor preparation. A layer of gas-permeable material shall be placed under all subfloors. The gas-permeable layer shall consist of one of the following methods except that where fills of aggregate size less than that described in Method 1 are used beneath a slab, Method 2.3, 4, or 5 must be used.

1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4 -inch (6.4 mm) sieve. In buildings where interior footings or other barriers separate sub-grade areas, penetrations through the interior footing or barrier equal to a minimum of 12 square inches (0.094 m²) per 10 feet (3.048 m) of barrier length shall be provided. A minimum of two penetrations shall be provided per separation and be evenly spaced along the separation.

EXCEPTION:

In buildings where interior footings or other barriers separate the sub-grade area, separate radon vent pipes may be installed for each sub-grade area as specified in Section AF103.5.2 in lieu of penetrations through the barrier.

- 2. A foundation drain pipe system installed under concrete floor slab areas less than 2,000 square feet (186 m²), consisting of a continuous loop of minimum 3-inch (76 mm.) diameter perforated pipe shall be laid in the sub-grade with the top of pipe located 1 inch (25.4 mm) below the concrete slab. The pipe may be rigid or flexible but shall have perforations fully around the circumference with a free air space equal to 1.83 square inches per square foot (127 cm²/ m²) of exterior pipe surface area. Such pipe shall be wrapped with approved filter material to prevent blocking of pipe perforations. The pipe loop shall be located inside of the exterior perimeter foundation walls not more than 12 inches (305 mm) from the perimeter foundation walls. In buildings where interior footings or other barriers separate the sub-grade area, the loop of pipe shall penetrate, or pass beneath such interior footings or barriers. For slab areas greater than 2,000 square feet (186 m²) but less than 4,000 square feet (372 m²), the preceding configuration may be used provided a minimum of 4-inch diameter (102 mm) pipe is installed. Slabs in excess of 4,000 square feet (372 m²) shall have under them separate loops for every additional 2,000 square feet (186 m²) of slab area when 3-inch (76 mm) diameter pipe is used; or, slabs may have separate loops provided for each additional increment in area between 2,000 square feet (186 m²) and 4,000 square feet (372 m²) when 4-inch (102 mm) diameter pipe is used.
- 3. A foundation drain soil gas collection mat system installed under concrete floor slab areas of 2,000 square feet (186 m²) or less, consisting of a continuous rectilinear loop of soil gas collection mat or drainage mat

having minimum dimensions of 1 inch in height by 12 inches in width (25.4 mm in height x 305 mm in width) and a nominal cross-sectional air flow area of 12 square inches (0.0078 m²) may be laid on top of the sub-grade. The mat shall be constructed of a matrix that allows for the movement of air through it and be capable of supporting the concrete placed upon it. The matrix shall be covered by approved filter material on all four sides to prevent dirt or concrete from entering the matrix. All breaches and joints in the filter material shall be repaired prior to the placement of the slab. The loop shall be located inside the exterior perimeter foundation walls and within 12 inches (305 mm) from the perimeter foundation walls. In buildings where interior footings or other barriers separate the sub-grade area, the mat shall penetrate these interior footings or barriers to form a continuous loop around the exterior perimeter.

Slabs larger than 2,000 square feet (186 m²) but less than 4,000 square feet (372 m²) shall have under them an additional strip of mat that bisects the loop forming two areas approximately equally divided by the two halves of the rectilinear loop. Slabs larger than 4,000 square feet (372 m²) shall have separate loops for each 2,000 (186 m²) square feet; or, increased to 4,000 square feet (372 m²) when a loop is bisected as specified in the preceding configuration.

- 4. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geo-textile drainage matting designed to allow the lateral flow of soil gases.
- 5. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.

AF103.3 Entry routes. Potential radon entry routes shall be closed in accordance with Sections AF103.3.1 through AF103.3.11.

- **AF103.3.1 Floor openings.** Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or equivalent sealant applied in accordance with the manufacturer's recommendations.
- **AF103.3.2 Concrete joints.** All control joints, isolation joints, construction joints and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.
- **AF103.3.3 Condensate drains.** Condensate drains shall be trapped or routed through non- perforated pipe to daylight.
- **AF103.3.4 Sumps.** Sump pits open to soil or serving as the termination point for sub-slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a sub-slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet and view port.
 - **AF103.3.5 Foundation walls.** Hollow block masonry foundation walls shall be constructed with either a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks or other openings around all penetrations of both exterior and

interior surfaces of masonry block or wood foundation walls below the ground surface shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete walls shall be filled.

AF103.3.6 Dampproofing. The exterior surfaces of portions of concrete and masonry block walls below the ground surface shall be damp-proofed in accordance with Section R406 of this appendix.

AF103.3.7 Air-handling units. Air-handling units in crawl spaces shall be sealed to prevent air from being drawn into the unit.

Exception: Units with gasketed seams or units that are otherwise sealed by the manufacturer to prevent leakage.

AF103.3.8 Ducts. Ductwork passing through or beneath a slab shall be of seamless material unless the airhandling system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed to prevent air leakage. Ductwork located in crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.3.1.

AF103.4 Sub-membrane depressurization system. In buildings with interior structural floors directly above under-floor spaces containing exposed soil surfaces that are not protected by a sub-slab depressurization system, the following components of a sub-membrane depressurization system shall be installed during construction.

Exception: Buildings in which an approved mechanical ventilation system complying with Section R408 or such other equivalent system that provides equivalent depressurization across the entire sub-membrane area as determined by the building official is installed in the under-floor spaces.

AF103.4.1Ventilation. Crawl spaces and similar under-floor spaces shall be provided with ventilation complying with Section R408.

AF103.4.2 Soil-gas-retarder. The exposed soil in under-floor spaces shall be covered with a continuous layer of soil-gas-retarder. Such ground cover joints shall overlap 6 inches (152 mm) and be sealed or taped. The edges of the ground cover shall extend a minimum of 6 inches (152 mm) up onto all foundation walls enclosing the under-floor space and shall be attached and sealed to foundation walls in an approved manner.

AF103.4.3 Vent pipe riser. A plumbing tee or other approved connection shall be inserted horizontally beneath the sheeting and connected to a 3- or 4-inch-diameter (76 mm or 102 mm) fitting with a vertical vent pipe installed through the sheeting. The vent pipe shall be extended up through the building floors, terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3.048 m) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (0.610 m) below the exhaust point, and 10 feet (3.048 m) from any window or other opening in adjoining or adjacent buildings.

AF103.5 Sub-slab depressurization system. The following components of a sub-slab depressurization system shall be installed during construction under basement or slab-on-grade floors.

AF103.5.1 Vent pipe riser. A minimum 3-inch-diameter (76 mm) ABS or PVC DWV pipe, or equivalent gas-tight pipe shall be embedded vertically into the sub-slab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains

within the sub-slab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the sub-slab aggregate or connected to it through a drainage system.

All vent pipes shall be extended up through the building floors and terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3.048 m) away from any window, air intake, or other opening into the conditioned spaces of the building that is less than 2 feet (0.610 m) below the exhaust point, and 10 feet (3.048 m) from any window or other opening in adjoining or adjacent buildings. The discharge end of vent pipe terminations shall be unobstructed and protected from small animal entry with a corrosion-resistant screen having openings between .25 inch (6.4 mm) and .5 inch (12.7 mm).

AF103.5.2 Multiple vent pipes. In buildings where interior footings or other barriers separate the sub-slab aggregate or other gas-permeable material, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

AF103.6 Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the slab or soil-gas retarder.

AF103.7 Vent pipe accessibility. Radon vent pipes shall be accessible for fan installation through an attic or other area outside the habitable space.

Exception: The radon vent pipe need not be accessible in an attic space where an approved roof-top electrical supply is provided.

AF103.8 Vent pipe identification and notification. All exposed and visible interior radon vent pipes shall be conspicuously identified with at least one label on each floor and in attics provided with access openings. The label shall read substantially as follows: Radon Reduction System. In addition to the preceding label, a notice shall be placed in a conspicuous area near the vent pipe that states the following:

THIS RADON REDUCTION SYSTEM IS NOT REQUIRED TO BE TESTED AND IS A (PASSIVE) SYSTEM, RELYING ENTIRELY ON NATURAL VENTILATION. OCCUPANTS ARE ADVISED TO TEST FOR RADON AND TAKE REMEDIAL ACTION AS NECESSARY BY INSTALLING A CONTINUOUSLY-OPERATING FAN LOCATED IN THE VENT PIPE (ACCESS TYPICALLY PROVIDED IN THE ATTIC) AND CONNECTED TO THE NEARBY PROVIDED ELECTRICAL OUTLET. Call 1-800-767-RADON FOR MORE INFORMATION.

AF103.9 Combination foundations. Combination basement/crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.

AF103.10 Building depressurization. Joints in air ducts and plenums in unconditioned spaces shall be substantially air tight and permanently sealed with an approved sealant, mastic, or other approved methods. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in the energy conservation code currently enacted by the City. Firestopping shall be in conformance with the most recent general building code enacted by the City or meet the requirements contained in Section R602.8.

AF103.11 Provisions for future depressurization fan installation. Permanent provisions shall be made for the future installation of an in-line fan to be connected to every radon vent pipe. Such designated fan locations shall be outside of the conditioned envelope of the building, such as in the attic, garage and similar locations, excluding crawl spaces and other interior under-floor spaces. Designated locations shall accommodate an unobstructed permanent cylindrical space with the following minimum dimensions: 12 inches (305 mm) measured radially around the radon vent pipe along a vertical distance of 30 inches (760 mm). Designated fan locations shall be permanently accessible for servicing and maintenance. An electrical circuit shall be provided within 4 feet (1.219 m) of and within sight from designated fan locations. Such circuit shall have a means of positive disconnection and be terminated in an approved electrical outlet in accordance with the applicable current electric code.

AF103.12 Depressurization fan system activation. When a passive system as constructed in accordance with this appendix is to be converted to an active system, an approved in-line fan shall be installed in a designated fan location as specified in Section AF103.11.1. Additionally, an approved permanent electric light fixture and in-line pipe couplings that facilitate fan replacement shall be provided. The in-line fan shall be designed to operate continuously for a period of not less than five years and have a minimum air-flow rating as established by the building official. A readily accessible manometer or other approved warning device that notifies occupants of a fan malfunction by a visible or audible signal shall be installed within the dwelling unit. A separate permit shall be required for installation of such fan when it is not installed at the time the building is originally approved for occupancy.

APPENDIX G, SWIMMING POOLS, SPAS, AND HOT TUBS, is hereby adopted in its entirety.

Section AG 105.6 Barrier around decorative pools, fountains, and ponds is hereby added to read as follows:

AG105.6 Barriers around decorative pools, fountains, and ponds. Decorative pools, fountains, and ponds which can contain water deeper than 24 inches (610 mm), shall be protected by barriers installed in accordance with section AG105.2.

APPENDIX H, PATIO COVERS, is hereby adopted in its entirety.

APPENDIX J, EXISTING BUILDINGS AND STRUCTURES, is hereby adopted in its entirety.

APPENDIX M, HOME DAY-CARE R-3 OCCUPANCIES, is hereby adopted in its entirety.

Planning, Development & Transportation Services



Community Development & Neighborhood Services 281 North College Avenue P.O. Box 580 Fort Collins, CO 80522.0580

970.416.2740 970.224.6134- fax fcgov.com

Significant Changes Proposed for Adoption of the 2012 International Residential Code (IRC) Applicable to New Single-family; Duplex; and Townhomes

- 1. New exemption from permits for "hoop houses" if less than 5 feet tall or meet the requirements for shed exemptions.
- 2. Changes to fire rating of exterior walls due to location on the property in relation to property lines. The proposed changes assume that code-required fire-suppressions systems in single family dwellings will not be supported and adopted. (The code review committee did have some support for the code requirement that sprinklers be installed in new single family dwellings but only in new subdivisions where trade-offs could be incorporated such as narrower streets or fewer fire hydrants. This proposal needs to be vetted through a Land Use Code change and is not considered part of this code review.)

 Staff will be presenting the committees' views while promoting the code requirement that fire-suppression sprinkler systems should be installed in new single family homes using the P2904 combination potable water/sprinkler system. (See attached Residential Sprinkler Reports for sustainable benefits of fire-suppression systems.)
- 3. New amendment that requires bedroom egress windows sills to be at least 24 inches above the floor when the window sill height is 72 inches or more above ground.
- 4. New amendment requiring basement window wells to have drainage and the drain inlet to be at least 4 inches below the window sill.
- 5. Existing amendments carried over from the Green Code Amendments of 2012. No longer identified as Green Code Amendments, but rather simply local amendments, including:
 - a. Construction Waste Management of new buildings and New to this code cycle: CWMP for remodels over 5,000 sq. ft.
 - b. New CWMP Documentation required prior to CO that indicates amounts and where materials recycled to.
 - c. New Demolition of entire buildings required to <u>Soft Strip</u> recyclable materials and recycle uncontaminated wood, concrete, metals, and cardboard.
 - d. Low VOC products,
 - e. Exterior "Dark Sky" lighting (New Clarified to reflect the International Dark-Sky Association (IDA) Lighting Zone-1 (LZ-1) which indicates that the lamp or the light shall not be directly visible beyond the property line.).
- 6. New Electrically heated homes shall show energy compliance by the prescriptive path charts verses using a computer program such as RESNET or U of A Performance Path which allows for trade-offs of the insulation values.
- 7. Existing amendments carried over from the Green Code Amendments of 2012 which require mechanical system testing, building air-tightness testing, and mandatory requirements for insulation installation, combustion safety testing and garage to home isolation testing.

2012 IRC

Significant Proposed Amendments

- 8. Whole-house ventilation (WHV) system now required in the code and amended to better match the Green Code Amendments providing clarity on how the system is to operate and owner controls.
- 9. New amendment clarifying that HVAC ductwork shall not be located outside the interior vapor barrier. (In other words, all duct work shall not be located in the exterior wall insulation.)
- 10. New amendment dwellings with any gas cooking (not just gas ovens) will be required to have a range hood vented to the outside.
- 11. Existing amendments carried over from the Green Code Amendments of 2012 which set maximum flow rates of plumbing fixtures.

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970.416.2740 970.224.6134- fax fcgov.com

Residential Sprinkler Reports

NISTIR Report 7451 (reporting period 2002-2005) U.S. Department of Commerce National Institute of Standards and Technology Benefit Cost Analysis of Residential Fire Sprinkler Systems

Owners of homes with Fire-Suppressions Systems (sprinkler systems) installed benefit from;

- 1.) Reduction in the risk of civilian fatalities and injuries
- 2.) Reduction in homeowner's insurance premiums
- 3.) Reduction in uninsured direct property loss
- 4.) Reduction in uninsured indirect cost.

Homes equipped with smoke alarms and sprinklers experienced

- 1.) 100% fewer civilian fatalities
- 2.) 57% fewer civilian injuries
- 3.) 32% less direct and indirect property loss verses homes with just smoke alarms.
- 4.) According to the Insurance Service Office (ISO) insurance premiums were reduced by approximately 8%.

National Fire Protection Association (NFPA 2006) (reporting period 2002-2005).

- 1.) There were 296,500 residential fires (one and two-family dwellings)
- 2.) Causing 10,188 civilian injuries
- 3.) Causing 2566 civilian deaths
- 4.) Responsible for \$5.3 billion (2005 dollars) in direct residential property loss
- 5.) No civilian deaths in residential fires when provided with sprinkler systems

NISTIR Report 7277 (reporting period 2005)

U.S. Department of Commerce National Institute of Standards and Technology *Economic Analysis of Residential Fire Sprinkler Systems*

- 1.) Using the multi-purpose network into the cold-water plumbing system (2012 International Residential Code (IRC) Section P-2904). The sprinkler system is an extension of the buildings cold-water system and is equivalent to NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two- family Dwellings and Manufactured Homes.
- 2.) Labor and material for the sprinkler system only added to the potable water system ranges from \$0.48 to \$0.57 per square foot, minus overhead and profit. (Local market pricing of \$1.25 to \$2.00 per square foot has been reported)

The Fire Protection Research Foundation

Home Fire Sprinkler Cost Assessment (September 2008) (Updated September 2013 Ft Collins Colorado average \$1.55 to \$2.32 per square foot))

- 1.) Using thirty (30) housing floor plans in ten (10) communities, one (1) in Canada and nine (9) throughout the US. Total area sprinkled includes basements, garages, and attics. (2012 IRC P2904 would not require garages and attics to be sprinkled)
- 2.) The cost range from \$0.38 to \$3.66 per square foot. The low range represents a California community with long standing ordinance requiring sprinkler systems and some potential for pricing benefits based on volume of homes being sprinkled. The high range represents a Colorado mountain home on well water, using an antifreeze system with copper piping.
- 3.) The average cost to the builder was \$1.49 per square foot. Higher cost per square footage were associated with local requirements for use of copper pipe versus CPVC or PEX plastic piping, on-site water supply versus municipal services, requirements to sprinkle attics and garages, and whether a stand-alone or combination potable water/sprinkler system was used.
- 4.) Five insurance companies with a market share of the communities surveyed reported a premium discount from 0% to 10% with an average premium discount of 7%.

The Fire Protection Research Foundation Home Fire Sprinkler Impact on Fire Injury (October 2012)

- 1.) The analysis hypothesized that by making smaller fires, sprinklers might reduce the frequency of injuries and the average severity of the injuries.
- 2.) The model used the impact on injuries per one hundred (100) fires and injury cost per one hundred (100) fires. Cost data included: medical cost, legal and liability cost, cost from lost work time, and pain and suffering cost. Medical cost was evaluated separately from the other items identified as total cost.
- 3.) Primary results indicate that:
 - a. Sprinkler presence is associated with a 29% reduction in injuries per one hundred (100) reported fires
 - b. Sprinkler presence is associated with a 48% reduction in medical cost (approximately \$85,000.00) of injuries per one hundred (100) reported fires
 - c. Sprinkler presence is associated with a 40% reduction in total cost (approximately \$442,000.00) of injuries per one hundred (100) reported fires.
- 4.) Results by age of victim:
 - a. Children (age 14 and under) a sprinkler presence is associated with:
 - i. A 72% reduction in the number of fire injuries per one hundred (100) reported fires
 - ii. A 85% reduction in medical cost of injuries per one hundred (100) reported fires
 - iii. A 78% reduction in total cost of injuries per one hundred (100) reported fires

(Children are much less likely to be cooking where a vast majority of small fires begin.)

- b. Adults (age 15 to 64) a sprinkler presence is associated with:
 - i. A 30% reduction in the number of fire injuries per one hundred (100) reported fires

- ii. A 52% reduction in medical cost of injuries per one hundred (100) reported fires
- iii. A 39% reduction in total cost of injuries per one hundred (100) reported fires.
- c. Older adults (age 65 and older) a sprinkler presence is associated with:
 - i. A 12% *increase* in the number of fire injuries per one hundred (100) reported fires
 - ii. A 41% reduction in medical cost of injuries per one hundred (100) reported fires
 - iii. A 23% reduction in total cost of injuries per one hundred (100) reported fires.

(The hypothesis cites that sprinklers make for smaller fires and that a smaller fire may seem easier to fight. Injuries are increased particularly in older adults as it appears that this age group more often attempts fire-fighting efforts.)

Federal Emergency Management Association (FEMA)

Residential Fire Sprinkler Activation Report (January 2003 to June 2007)

- 1.) The Residential Fire Sprinkler Activation project is an on-line data gathering system used by the National Association of State Fire Marshals (NASFM) and the Residential Fire Sprinkler Institute (RFSI). The purpose is to gather current and relevant data pertaining to the activation of residential fire sprinklers, information necessary to assess the performance of these systems in real-life, non-laboratory conditions.
- 2.) In this reporting period 89 fire departments participated, reporting 556 incidents.
- 3.) Reporting data:
 - a. 62% of the activations were in multi-family buildings, 17.9% in single family buildings.
 - b. 40.6 % of the activations were in the kitchen with bedrooms second at 14.5%
 - c. Over 60% of the activations were in rooms of less than 150 square feet
 - d. Over 67% of the activations involved just one fast-response sprinkler head
 - e. While 73% of the activation included a smoke detector, only 58% of the detectors operated.
 - f. Over 47% of the incidents estimate dollars saved in the \$250,000 range
 - g. Over 57% of the incidents report a dollar loss of under \$5,000

FM Global Research Division

Environmental Impact of Automatic Fire Sprinklers (March 2010)

- 1. Two identical structure fire tests, one test included a single fire sprinkler head; the second test had no sprinklers.
- 2. A single fire event can negate any benefits from "green" construction due to the subsequent carbon dioxide and other greenhouse gases generated from burning combustible materials, in addition to the carbon associated with disposal of damaged materials and reconstruction, increasing "lifecycle carbon emission".
- 3. The combustible material consumed in the tests was 3% in the sprinklered test and between 62% and 95% in the non-sprinklered test.
- 4. The use of automatic fire sprinklers reduced the greenhouse gas emissions, consisting of carbon dioxide, methane, and nitrous oxide by 97%.

Residential Sprinkler

5. Analysis of the tests indicates that the reduction in water use achieved by using sprinklers could be as much as 91% when extrapolated to a full-sized home.

Disaster Safety

Residential Fire Sprinklers (August 2012)

- 1. According to the U.S. Fire Administration (USFA), in 2007, 414,000 residential fires resulted in 2,895 deaths and 14,000 injuries, causing \$7.5 billion in property damage.
- 2. 90% of house fires with sprinkler systems are contained by the operation of a single sprinkler head.
- 3. In 1992 Prince George's County in Maryland enacted sprinkler ordinance mandating the installation of automatic fire sprinkler systems in new one- and two-family dwellings.
 - a. A study of Prince George's ordinance issued in 2009 stated that from 1992-2007 there were 13,494 fires involving single-family homes, resulting in 101 deaths and 328 injuries in non-sprinklered homes.
 - b. No deaths and only 6 injuries in homes with sprinkler systems.
 - c. Since the ordinance went into effect the cost of sprinkler systems have decreased to less than \$2.00 per square foot, according to sprinkler installers in the area.
- 4. Scottsdale Arizona enacted their sprinkler ordinance in 1986 and reported that:
 - a. The average fire loss in in a house with a sprinkler system was \$1,544, compared to \$11,624 for houses without fire- sprinkler systems.
 - b. The average sprinkler used 357 gallons of water per incident to extinguish the fire, while manual fire-fighting would have equaled 4,884 gallons of water per incident to extinguish the same fires.
 - c. Because sprinklers activate within a few minutes of the ignition, suppression efforts are underway before the arrival of fire department personnel, which can be in the 8-10 minute range.