ORDINANCE NO. 074, 2017
OF THE COUNCIL OF THE CITY OF FORT COLLINS
AMENDING CHAPTER 5, ARTICLE II, DIVISION 2, OF THE CODE
OF THE CITY OF FORT COLLINS FOR THE PURPOSE OF REPEALING THE
2012 INTERNATIONAL RESIDENTIAL CODE (IRC), AND ADOPTING THE
2015 INTERNATIONAL RESIDENTIAL CODE, WITH AMENDMENTS

WHEREAS, since 1924, the City has reviewed, amended and adopted the latest nationally recognized building standards available for the times; and

WHEREAS, upon recommendation of City staff, the City Council has determined that it is in the best interests of the City to align the five interconnected basic construction codes under one publication year; and

WHEREAS, the five interconnected basic construction codes are the *International Building Code, International Residential Code, International Mechanical Code, International Fuel Gas Code,* and *International Energy Conservation Code*; and

WHEREAS, the City Council has determined that the 2015 publication year of the five interconnected basic construction codes ought to be adopted and that their counterpart codes previously adopted should be repealed, both in order to align the publication years of the codes and also because the 2015 publications contain improvements in construction code regulation; and

WHEREAS, City staff has conducted a significant public outreach program, working with the regulated construction industry and building professionals; and

WHEREAS, the adoption of the five interconnected basic construction codes has been presented to and recommended by the Affordable Housing Board, the Commission on Disability, the Air Quality Advisory Board, the Natural Resources Advisory Board, the Building Review Board, the Electric Board, the Landmark Preservation Commission and the Water Board; and

WHEREAS, the City Council has determined that it is in the best interest of the health, safety and welfare of the City and its citizens that the *2012 International Residential* Code, as previously adopted and amended by the City pursuant to Ordinance 020, 2014, be repealed, and that in its place, the *2015 International Residential Code*, be adopted, with local amendments as set forth in this Ordinance; and

WHEREAS, pursuant to the City Charter II, Section 7, City Council may enact any ordinance which adopts a code by reference in whole or in part provided that before adoption of such ordinance the Council hold a public hearing thereon and that notice of the hearing is published twice in a newspaper of general circulation published in the City, with one of such publications occurring at least eight (8) days preceding the hearing and the other publication occurring at least fifteen (15) days preceding the hearing; and

WHEREAS, in compliance with Article II, Section 7, the City Clerk published in the Fort Collins *Coloradoan* such notice of hearing concerning adoption of the 2015 International Residential Code on May 21, 2017, and May 28, 2017; and

WHEREAS, attached as Exhibit "A" and incorporated herein by reference is the Notice of Public Hearing dated May 14, 2107, that was so published and which the Council hereby finds meets the requirements of Article II, Section 7 of the City Charter. NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF FORT COLLINS as follows:

Section 1. That Section 5-26(d) of the Code of the City of Fort Collins is hereby amended to read as follows:

(d) Pursuant to the power and authority conferred on the City Council by Section 31-16-202, C.R.S., and Article II, Section 7 of the Charter, the City Council hereby repeals the ~~2012~~ Edition of the *International Residential Code*, and adopts, as the residential building code of the City, the *2015 International Residential Code* published by the International Code Council, as amended by the City, which shall have the same force and effect as though set forth in full herein. The subject matter of the *International Residential Code* adopted herein includes comprehensive provisions and standards for the protection of the public health and safety by prescribing regulations governing the construction, alteration, enlargement, relocation, replacement, repair, equipment, use and occupancy, location, removal and demolition of, and its applicability is hereby limited to, individual nonattached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three (3) stories above grade in height with a separate means of egress, and their accessory structures. As provided in the 2015 *International Residential Code*, Appendices are not adopted except as expressly set forth in Section 5-30.

Section 2. That Section 5-30 of the Code of the City of Fort Collins is hereby repealed and reenacted to read as follows:

Sec. 5-30 Amendments and deletions to code.

The *2015 INTERNATIONAL RESIDENTIAL CODE* adopted herein is hereby amended in the following respects:

(1) ***Section R101.1 Title,*** is hereby retained in its entirety with the following amendments:

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."

(2) ***Section R102.4 Referenced codes and standards,*** is hereby retained in its entirety with the following amendments:

R102.4 Referenced codes and standards. The codes and standards referenced in this code 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 and as further regulated in Sections R102.4.1 and R102.4.2.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions shall apply.

(3) ***Section R103 Department of Building Safety,*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

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.*

(4) ***Section R105.2 Work exempt from permit,*** is hereby retained in its entirety with the following amendments:

. . .

Building:

1. One-story, detached, *accessory structures* for lawn and garden equipment storage, tool storage and similar uses, as well as arbors, pergolas, and similar structures, provided the floor area does not exceed 120 square feet (11.15 m^2) or 8 feet (2.438 m) in height, do not house flammable liquids in quantities exceeding 10 gallons (38 l) per building and are located at least 3 feet (0.914 m) from an adjoining property line.

2. Fences not over 6 feet (1829 mm) high.

3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the 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 intended for human occupancy or walking, sidewalks and driveways not more than 30 inches (762 mm) above adjacent *grade*, 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 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, or play house/structure not exceeding 120 square feet. One elevated play house or play structure per lot designed and used exclusively for play. Elevated play houses or play structures shall not exceed 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 and do not extend over the public right of way. 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 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.

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. Work valued at less than $500 when such work does not involve *alteration* of structural components, fire-rated assemblies, plumbing, electrical, mechanical or fire-extinguishing systems.

14. Decorative ponds, fountains and pools that cannot contain water more than 24 inches (610 mm) deep.

15. Shade cloth structures constructed for nursery or agricultural purposes, not including service systems. Hoop houses constructed with a flexible frame such as PVC tubing used for starting plants.

(5) ***Section R105.3.2 Time limitation of application,*** is hereby retained in its entirety with the following amendments:

R105.3.2 Time limitation of application An application for a permit for any proposed work shall be deemed to have been abandoned 180 days after the date of filing, unless such application has been pursued in good faith or a permit has been issued; except that the building official is authorized to grant one or more extensions of time for additional periods not exceeding 180 days each provided the application has not expired and is

considered an active application. The extension shall be requested in writing and justifiable cause demonstrated. Applications that have expired for 30 days or more will be considered as null and void and all plans discarded.

(6) ***Section R105.5 Expiration,*** is hereby retained in its entirety with the following amendments:

Section R105.5 Expiration. Every *permit* issued shall become invalid unless the work authorized by such *permit* is commenced within 180 days after its issuance, or if the work authorized by such *permit* is suspended or abandoned for a period of 180 days after the time the work is commenced. The *building official* is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

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.

(7) A new ***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.

(8) A new ***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.

(9) ***Section R106.1.4 Information for construction in flood hazard areas,*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

R106.1.4 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 City Code, Chapter 10, entitled 'Flood Prevention and Protection'.

(10) **A new *Section R106.1.5 Grading performance plans and certificate***, is hereby added to read as follows:

R106.1.5 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.

(11) ***Section R106.3.1 Approval of construction documents***, is hereby retained in its entirety with the following amendments:

R106.3.1 Approval of construction documents. Where the *building official* issues a *permit*, the *construction documents* shall be *approved* in writing or by a stamp that indicates the *approved* permit number. 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 a duly authorized representative.

(12) ***Section R107, Temporary Structures and Uses***, is deleted in its entirety.

(13) ***Section R108, Fees***, is hereby deleted in its entirety and the following is hereby added in lieu thereof:

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, as amended by the City.*

(14) A new ***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.

(15) A new ***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 when approved by the *building official* and the structure is in conformance with this code and the *International Building Code, as amended by the City.*

(16) ***Section R112, Board of Appeals***, is hereby deleted in its entirety and the following is hereby added in lieu thereof:

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 *International Building Code, as amended by the City.*

(17) ***Section R113.4 Violation penalties,*** is hereby retained in its entirety with the following amendments:

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 City Code, 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.

(18) A new ***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 City Code.

(19) ***Section R202 Definitions***, is hereby amended to delete, modify, or add, in alphabetical order, the following definitions:

...

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.

...

CITY. The municipal corporation of Fort Collins, Colorado, including its physical location and boundaries.

...

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.

...

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*. The term *dwelling* shall not include hotels, motels, homeless shelters, seasonal overflow shelters 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 or more rooms and a single *kitchen* and at least 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.

...

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.

...

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.

...

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.

...

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

...

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.

...

(20) ***Section 301.1.3 Engineered design,*** is hereby retained in its entirety with the following amendments:

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 *International Building Code*, as amended by the City, is permitted for all buildings, structures, and portions thereof included in the scope of this code.

(21) ***Section R301.2(1), Climatic and geographic design criteria***, is hereby deleted in its entirety and the following is hereby added in lieu thereof:

ROOF SNOW LOAD	WIND SPEED[b] MPH	*SEISMIC DESIGN CATE-GORY*	SUBJECT TO DAMAGE FROM					WINTER DESIGN TEMP	AIR FREEZ-ING INDEX[f]	MEAN ANN-UAL TEMP.[g]	FLOOD[e] HAZARDS
			Weathering[a]	Roof Ice[c] Damming	Frost line depth	Termite	Decay[d]				
30psf (1436.4p a)	100 Nom 129 Ult	B	Severe	Yes	30 inches (762mm)	Slight to Moderate	None to Slight	+6° F (-14° C)	906	48.4	July 16, 1979

For SI: °C = [(°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 25° F (-4° 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.

(22) A new ***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*, 100 miles per hour (161 kph) Vasd or 129 miles per hour (208 kph) Vult, based on the exposure category as described in Section R301.2.1.4, or the equivalent pressure thereto.

(23) ***Section R302.1*** **Exterior walls,** is hereby retained in its entirety with the following amendments:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1 (1) as amended.

Exceptions:

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

2. Walls of dwellings and accessory structures located on the same lot.

3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.

4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).

5. Foundation vents installed in compliance with this code are permitted.

(24) A new ***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.

(25) ***Table R302.1(1) Exterior Walls,*** is hereby retained in its entirety with the following amendments:

TABLE R302.1(1) *EXTERIOR WALLS*			
EXTERIOR WALL ELEMENT		**MINIMUM FIRE-RESISTANCE RATING**	**MINIMUM *FIRE SEPARATION DISTANCE***
WALLS	FIRE-RESISTANCE RATED	1 HOUR-TESTED IN ACCORDANCE WITH ASTM E 119 OR UL 263 WITH EXPOSURE FROM BOTH SIDES	LESS THAN 3 FEET
	NOT FIRE RESISTANCE RATED	0 HOURS	3 FEET OR MORE
PROJECTIONS	FIRE-RESISTANCE RATED	1 HOUR ON THE UNDERSIDE	2 TO 3 FEET
	NOT ALLOWED	N/A	LESS THAN 2 FEET
OPENINGS IN WALLS	NOT ALLOWED	N/A	LESS THAN 3 FEET
	UNLIMITED	0 HOURS	3 FEET OR MORE
PENETRATIONS	ALL	COMPLY WITH SECTION R302.4	LESS THAN 3 FEET
		NONE REQUIRED	3 FEET OR MORE

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.
a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

(26) ***Table R302.1(2) Exterior Walls-Dwellings with Fire Sprinklers,*** is hereby deleted in its entirety:

(27) ***Section R302.2.1 Continuity*** is hereby retained in its entirety with the following amendments:

R302.2.1 Continuity. The fire-resistance-rated common 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 and/or enclosed *accessory structures* or spaces. The fire-resistance-rating shall be maintained within concealed spaces of projecting elements such as, roof overhangs, canopies, marquees and similar projections. The fire- resistant rated adjoining *walls* shall extend to

the outer edge of horizontal projecting elements such as balconies which extend more than 24 inches beyond the *exterior wall.*

(28) ***Section R302.3 Two-family dwellings*** is hereby retained in its entirety with the following amendments:

R302.3 Two-family dwellings. Two-family dwellings shall be provided with a fire-suppression system as per P2904 at a minimum. *Dwelling units* in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than a 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 ½ hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

2. Wall assemblies need not extend through attic spaces when the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board and an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings. The structural framing supporting the ceiling shall also be protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

(29) ***Section R308.4.5 Glazing and wet surfaces*** is hereby retained in its entirety with the following amendments:

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) shall be considered a hazardous location. This shall apply to single glazing and all panes in multiple glazing.

Exception: Glazing that is more than 48 inches (1219 mm), measured horizontally and in a straight line, from the water's edge of a bathtub, shower, hot tub, spa, whirlpool, or swimming pool or from the edge of a shower, sauna or steam room and not less than 48 inches measured vertically above any standing or walking surface.

(30) ***Section R308.4.7 Glazing adjacent to the bottom stair landing*** is hereby retained in its entirety with the following amendments:

R308.4.7 Glazing adjacent to stair landings. Glazing adjacent to the stair landings where the glazing is less than 36 inches (914 mm) above the landing and within a 60 inch

(1524 mm) horizontal arc less than 180 degrees 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.*

. . .

(31) ***Section R310.1 Emergency escape and rescue opening required*** is hereby retained in its entirety with the following amendments:

R310.1 Emergency escape and rescue opening required *Basements, habitable attics,* habitable lofts and *mezzanines,* and every sleeping room, shall have not less than one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exception: Storm shelters and *basements* used only to house mechanical *equipment* not exceeding a total floor area of 200 square feet (18.58 m2).

(32) ***Section R310.2.2 Window sill height*** is hereby retained in its entirety with the following amendments:

R310.2.2 Window sill height Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches (1118 mm) above the floor; where the sill height is below *grade,* it shall be provided with a window well in accordance with Section R310.2.3. Emergency escape and rescue window openings that are located more than 72 inches (1829 mm) above the finished *grade* shall have a sill height of not less than 24 inches (609 mm) measured from the finished interior side floor.

Exception: Emergency escape and rescue openings located over a roof surface with a *slope* of 4:12 or less and extending a minimum of 5 feet horizontally outward from the window.

(33) ***Section R310.2.3 Window wells*** is hereby retained in its entirety with the following amendments:

R310.2.3. Window wells. The horizontal area of the window well shall be not less than 9 square feet (0.9m2), with a horizontal projection and width of not less than 36 inches (914 mm).The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exceptions:

1. The ladder or steps required by Section R310.2.3.1 shall be permitted to encroach not more than 6 inches (152 mm) into the required dimensions of the window well.

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.

(34) ***Section R310.2.3.2 Drainage*** is hereby retained in its entirety with the following amendments:

R310.2.3.2 Drainage. All 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. The 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.

Exceptions:

1. A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils as determined by the foundation engineer of record.

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

(35) ***Section R311.7.1 Width*** is hereby retained in its entirety with the following amendments:

R311.7.1 Width Stairways shall be not less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 41/2 inches (114 mm) on either side of the stairway and the clear width of the stairway at and below the handrail height, including treads and

landings, shall be not less than 311/2 inches (787 mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides.

Exception: The width of spiral stairways installed as part of an individual *dwelling* unit shall be in accordance with Section R311.7.10.1.

(36) ***Section R311.7.5.1 Risers*** is hereby retained in its entirety with the following amendments:

R311.7.5.1 Risers. The riser height shall be not more than 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 openings located more than 30 inches (762 mm), as measured vertically, to the floor or grade below do not permit the passage of a 4-inch-diameter (102 mm) sphere.

Exceptions:

1. The opening between adjacent treads is not limited on spiral stairways.

2. The riser height of spiral stairways shall be in accordance with Section R311.7.10.1.

(37) A new ***Section R312.1.1.1 Area well retaining walls,*** is hereby added 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.

(38) ***Section R313.2 One- and two-family dwellings automatic fire systems*** is hereby retained in its entirety with the following amendments:

R313.2 Two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in two-family *dwellings*.

Exception: An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing buildings that are not already provided with an automatic residential sprinkler system.

(39) ***Section R314.2.2 Alterations, repairs and additions***, is hereby retained in its entirety with the following amendments:

R314.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke equipped with smoke for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.

(40) ***Section R315.2.2 Alterations, repairs and additions***, is hereby retained in its entirety with the following amendments:

R315.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with carbon monoxide alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, is exempt from the requirements of this section.

(41) ***Section R320.1 Scope,*** is hereby retained in its entirety with the following amendments:

R320.1 Scope. Where there are four or more *dwelling units* or sleeping units constructed in a single structure, 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.

(42) ***Section R322 Flood-resistant construction*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

R322 Flood-Resistant Construction

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.

(43) ***Section R326 Swimming pools, spas and hot tubs*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

SECTION R326
BARRIER REQUIREMENTS

R326.1 General.
The provisions of this Section shall apply to the design of barriers for pools and spas. These design controls are intended to provide protection against the potential drowning and near drowning by restricting access to such pools or spas. These requirements provide an integrated level of protection against potential drowning through the use of physical barriers and warning devices.

Exceptions:

1. Spas and hot tubs with a lockable safety cover that complies with ASTM F 1346.

2. Swimming pools with a powered safety cover that complies with ASTM F 1346.

R326.2 Outdoor swimming pools and spas.
Outdoor pools and spas and indoor swimming pools shall be surrounded by a barrier that complies with Sections 305.2.1 through 305.7.

R326.2.1 Barrier height and clearances.
Barrier heights and clearances shall be in accordance with all of the following:

1. The top of the barrier shall be not less than 48 inches (1219 mm) above *grade* where measured on the side of the barrier that faces away from the pool or spa. Such height shall exist around the entire perimeter of the barrier and for a distance of 3 feet (914 mm) measured horizontally from the outside of the required barrier.

2. The vertical clearance between *grade* and the bottom of the barrier shall not exceed 2 inches (51 mm) for *grade* surfaces that are not solid, such as grass or gravel, where measured on the side of the barrier that faces away from the pool or spa.

3. The vertical clearance between a surface below the barrier to a solid surface, such as concrete, and the bottom of the required barrier shall not exceed 4 inches (102 mm) where measured on the side of the required barrier that faces away from the pool or spa.

4. Where the top of the pool or spa structure is above *grade*, the barrier shall be installed on *grade* or shall be mounted on top of the pool or spa structure. Where the barrier is mounted on the top of the pool or spa, the vertical clearance between the top of the pool or spa and the bottom of the barrier shall not exceed 4 inches (102 mm).

R326.2.2 Openings.
Openings in the barrier shall not allow passage of a 4-inch-diameter (102 mm) sphere.

R326.2.3 Solid barrier surfaces.
Solid barriers that do not have openings shall not contain indentations or protrusions that form handholds and footholds, except for normal construction tolerances and tooled masonry joints.

R326.2.4 Mesh fence as a barrier.
Mesh fences, other than chain link fences in accordance with Section 305.2.7, shall be installed in accordance with the manufacturer's instructions and shall comply with the following:

1. The bottom of the mesh fence shall be not more than 1 inch (25 mm) above the deck or installed surface or *grade*.

2. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not permit the fence to be lifted more than 4 inches (102 mm) from *grade* or decking.

3. The fence shall be designed and constructed so that it does not allow passage of a 4-inch (102 mm) sphere under any mesh panel. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not be more than 4 inches (102 mm) from *grade* or decking.

4. An attachment device shall attach each barrier section at a height not lower than 45 inches (1143 mm) above *grade*. Common attachment devices include, but are not limited to, devices that provide the security equal to or greater than that of a hook-and-eye type latch incorporating a spring-actuated retaining lever such as a safety gate hook.

5. Where a hinged gate is used with a mesh fence, the gate shall comply with Section 305.3.

6. Patio deck sleeves such as vertical post receptacles that are placed inside the patio surface shall be of a nonconductive material.

7. Mesh fences shall not be installed on top of on ground residential pools.

R326.2.5 Closely spaced horizontal members.
Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches (1143 mm), the horizontal members shall be located on the pool or spa side of the fence. Spacing between vertical members shall not exceed 13/4 inches (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 13/4 inches (44 mm) in width.

R326.2.6 Widely spaced horizontal members.
Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, spacing between vertical members shall not exceed 4 inches (102 mm). Where there are decorative cutouts within vertical members, the interior width of the cutouts shall not exceed 13/4 inches (44 mm).

R326.2.7 Chain link dimensions.
The maximum opening formed by a chain link fence shall be not more than 1 3/4 inches (44 mm). Where the fence is provided with slats fastened at the top and bottom which reduce the openings, such openings shall be not more than 1 3/4 inches (44 mm).

R326.2.8 Diagonal members.
Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members shall be not more than1 3/4 inches (44 mm). The angle of diagonal members shall be not greater than 45 degrees (0.79 rad) from vertical.

R326.2.9 Clear zone.
There shall be a clear zone of not less than 36 inches (914 mm) between the exterior of the barrier and any permanent structures or equipment such as pumps, filters and heaters that can be used to climb the barrier.

R326.2.10 Poolside barrier setbacks.
The pool or spa side of the required barrier shall be not less than 20 inches (508 mm) from the water's edge.

R326.3 Gates.
Access gates shall comply with the requirements of Sections 305.3.1 through 305.3.3 and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the pool or spa, shall be self-closing and shall have a self-latching device.

R326.3.1 Utility or service gates.
Gates not intended for pedestrian use, such as utility or service gates, shall remain locked when not in use.

R326.3.2 Double or multiple gates.
Double gates or multiple gates shall have at least one leaf secured in place and the adjacent leaf shall be secured with a self-latching device. The gate and barrier shall not have openings larger than 1/2 inch (12.7 mm) within 18 inches (457 mm) of the latch release mechanism. The self-latching device shall comply with the requirements of Section 305.3.3.

R326.3.3 Latches.
Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from *grade*, the release mechanism shall be located on the pool or spa side of the gate not less than 3 inches (76 mm) below the top of the gate, and the gate and barrier shall not have openings greater than 1/2inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.

R326.4 Structure wall as a barrier.
Where a wall of a *dwelling* or *structure* serves as part of the barrier and where doors or windows provide direct access to the pool or spa through that wall, one of the following shall be required:

1. Operable windows having a sill height of less than 48 inches (1219 mm) above the indoor finished floor and doors shall have an alarm that produces an audible warning when the window, door or their screens are opened. The alarm shall be listed and labeled as a water hazard entrance alarm in accordance with UL 2017. In *dwellings* or *structures* not required to be Accessible units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located 54 inches (1372 mm) or more above the finished floor. In *dwellings* or *structures* required to be *Accessible* units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the finished floor.

2. A safety cover that is listed and labeled in accordance with ASTM F 1346 is installed for the pools and spas.

3. An *approved* means of protection, such as self-closing doors with self-latching devices, is provided. Such means of protection shall provide a degree of protection that is not less than the protection afforded by Item 1 or 2.

R326.5 On ground residential pool structure as a barrier.
An on ground residential pool wall *structure* or a barrier mounted on top of an on ground residential pool wall *structure* shall serve as a barrier where all of the following conditions are present:

1. Where only the pool wall serves as the barrier, the bottom of the wall is on *grade*, the top of the wall is not less than 48 inches (1219 mm) above *grade* for the entire perimeter of the pool, the wall complies with the requirements of Section 305.2 and the pool manufacturer allows the wall to serve as a barrier.

2. Where a barrier is mounted on top of the pool wall, the top of the barrier is not less than 48 inches (1219 mm) above *grade* for the entire perimeter of the pool, and the wall and the barrier on top of the wall comply with the requirements of Section 305.2.

3. Ladders or steps used as means of access to the pool are capable of being secured, locked or removed to prevent access except where the ladder or steps are surrounded by a barrier that meets the requirements of Section 305.

4. Openings created by the securing, locking or removal of ladders and steps do not allow the passage of a 4inch (102 mm) diameter sphere.

5. Barriers that are mounted on top of on ground residential pool walls are installed in accordance with the pool manufacturer's instructions.

R326.6 Natural barriers.
In the case where the pool or spa area abuts the edge of a lake or other natural body of water, public access is not permitted or allowed along the shoreline, and required barriers extend to and beyond the water's edge not less than 18 inches (457 mm), a barrier is not required between the natural body of water shoreline and the pool or spa.

R326.7 Natural topography.
Natural topography that prevents direct access to the pool or spa area shall include but not be limited to mountains and natural rock formations. A natural barrier as approved by the *building official* shall be acceptable provided that the degree of protection is not less than the protection afforded by the requirements of Sections 305.2 through 305.5.

R326.8 Entrapment avoidance.
Suction outlets shall be designed and installed in accordance with ANSI/APSP-7.

R326.9 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.

(44) A new ***Section R327 Resource Efficiency*** is hereby added to read as follows:

R327 Resource Efficiency

R327.1 Construction waste management. For new *buildings*, and additions over 2,500 square feet or remodels over 2,500 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.*

R327.1.1 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 metals, asphalt, concrete and masonry that are free of asbestos and lead paint shall be recycled, and where possible, all remaining materials, such as doors, windows, cabinets, fixtures, and wood, shall be recycled. A construction waste management plan shall be submitted at time of demo permit. Compliance with the CWMP shall be certified by the hauler through receipts and signed affidavits.

(45) A new ***Section R328 Indoor Environmental Quality*** hereby added to read as follows:

R328 Indoor Environmental Quality (IEQ)

R328.1 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.

(46) A new ***Section R329 Outdoor Environmental Quality*** is hereby added to read as follows:

R329 Outdoor Environmental Quality (OEQ)

R329.1 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.

(47) A new ***Section R330 Operations and Maintenance and Building Owner Education*** is hereby added to read as follows:

R330 Operations and Maintenance and *Building* Owner Education

R330.1 Operations and maintenance. In new buildings, operation and maintenance information addressing all installed systems shall be provided for the *building owner*.

(48) ***Section R401.1 Application*** is hereby retained in its entirety with the following amendments:

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 damp-proofing. Final engineer's reports, indicating his/her acceptance of the above requirements, shall be submitted to the *building official* prior to the issuance of the Certificate of Occupancy.

Exceptions:

1. When approved by the *building official*, engineering is not required on foundations for non-habitable detached accessory buildings, or habitable additions of less than 120 sq. ft., when such structures are unlikely to be located on expansive, compressible, or shifting soils, soils of unknown characteristics, or for other valid reasons.

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

    a. In buildings that have no more than two floors and a roof.

b. Where interior basement and foundation walls are constructed at intervals not exceeding 50 feet (15 240 mm).

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

(49) A new ***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 damp-proofing 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.*

(50) ***Section R403.1.4.1Frost protection*** is hereby retained in its entirety with the following amendments:

R403.1.4.1 Frost protection. Except where otherwise protected from frost, foundation walls, piers and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. Extended below the frost line specified in Table R301.2. (1).

2. Constructed in accordance with Section R403.3.

3. Constructed in accordance with ASCE 32.

4. Erected on solid rock.

Exceptions:

1. Protection of freestanding 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 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.

Footings shall not bear on frozen soil unless the frozen condition is permanent.

(51) ***Section R405.1 Concrete or masonry foundations,*** is hereby retained in its entirety, including Table 405.1, with the following amendments:

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 the engineer of record has determined 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.

...

(52) A new ***Section R405.3 Landscape irrigation***, is added to read as follows:

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

(53) ***Section R408.1Ventilation*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

R408.1 Crawl space soil gas retarder. All exposed earth in a crawl space shall be covered with a minimum 3 mil cross-linked Class I *vapor retarder*. Joints of the *vapor retarder* shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (152 mm) up the perimeter stem wall and any footing pads on *grade*, and be permanently attached and sealed to the stem wall or footing pads. Reference adopted Appendix F of this code.

(54) ***Section R408.2 Openings for under-floor ventilation*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

R408.2 Crawl space. Crawl spaces shall be designed and constructed to be inside the *building thermal envelope*, in accordance with the insulation and air sealing requirements for crawl space walls and rim joists of Section N1102 of this code. Crawl spaces shall not

be vented to the exterior. They shall be conditioned using one of the following approaches:

1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7m2) of crawlspace floor area, including an air pathway to the common area (such as a duct or transfer grille);

2. *Conditioned air* supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m2) of under-floor area, including a *return air* pathway to the common area (such as a duct or transfer grille);

3. *Plenum* in existing *structures* complying with Section M1601.5, if under-floor space is used as a *plenum.*

Exception: Crawl spaces shall be permitted to be designed and constructed as unconditioned spaces, outside the *building thermal envelope*, provided the following requirements are met:

1. The floor above the crawl space is part of the *building thermal envelope.* It shall meet the insulation requirements of Table N1102.1.1 of this code and shall be air-sealed in accordance with Section N1102.4.1 of this code.

2. Ventilation openings shall be placed through foundation walls or exterior walls. 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.

3. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1/4 inch (6.4 mm):

    a. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
    b. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
    c. Cast-iron grill or grating.
    d. Extruded load-bearing brick vents.
    e. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
    f. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch (3.2 mm) thick.

4. The installation of operable louvers shall not be prohibited.

(55) A new ***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 or floors open to the exterior or floors above an unconditioned space below shall be insulated to R-30. Floor system shall be sealed to prevent heat loss and air infiltration.

(56) ***Section R408.3 Unvented crawl space 3*** is hereby retained in its entirety with the following amendments:

R408.3 Unvented crawl space. Ventilation openings in under-floor spaces specified in Sections R408.1 and R408.2 shall not be required where the following items are provided:

1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall or insulation.

2. One of the following is provided for the under-floor space:

   2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7m2) of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with N1102.2.11 of this code.

   2.2. *Conditioned air* supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m2) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11 of this code.

   2.3. Plenum in existing structures complying with Section M1601.5, if under-floor space is used as a plenum.

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 N1102.1.2.

(57) A new ***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.

Exception: Below *grade* floors designed specifically to accommodate soils expansion and less than 18 inches in depth.

(58) A new ***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 and shall be supervised or inspected by an individual certified as an Installation Master or by one having attended training by the manufacturer of the specific window product being installed. *Fenestration* perimeter flashing shall be installed per Installation Masters Chapter 16 Method A or A1, including either rigid or flexible sill pan flashing.

(59) A new ***Section R703.11.1.5 Vinyl siding on new buildings*** is hereby added to read as follows:

Section R703.11.1.5 Vinyl siding on new buildings. Vinyl siding on new buildings shall be installed over one-hour fire-rated assemblies listed for exterior fire exposure, in both the vertical and horizontal plane.

(60) A new ***Section R703.13.2 Insulated vinyl siding on new buildings*** is hereby added to read as follows:

Section R703.13.2 Insulated vinyl siding on new buildings. Insulated vinyl siding on new buildings shall be installed over one-hour fire-rated assemblies listed for exterior fire exposure, in both the vertical and horizontal plane.

(61) A new ***Section R703.14.3 Polypropylene siding on new buildings*** is hereby added to read as:

R703.14.3 Polypropylene siding on new buildings. Polypropylene on new buildings shall be installed over one-hour fire-rated assemblies listed for exterior fire exposure, in both the vertical and horizontal plane.

(62) ***Section R902.1 Roofing Covering Materials*** is hereby retained in its entirety with the following amendments:

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.

(63) ***Section R903.2.2 Crickets and saddles*** is hereby retained in its entirety with the following amendments:

R903.2.2 Crickets and saddles. A cricket or saddle shall be installed on the ridge side of any chimney or penetration more than 18 inches (457 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.

Exceptions:

1. Unit skylights installed in accordance with Section R308.6 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 R907.

(64) ***Section R905.1.2 Ice barriers*** is hereby retained in its entirety with the following amendments:

R905.1.2 Ice barriers. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier shall be installed for asphalt shingles, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles and wood shakes. The ice barrier shall consist of not fewer than two layers of underlayment cemented together, or a self-adhering polymer-modified bitumen sheet shall be used in place of normal underlayment and extend from the lowest edges of all roof surfaces to a point not less than 12 inches (304 mm) inside the exterior wall line of the building. On roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall also be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.

Exceptions:

1. Detached accessory structures not containing conditioned floor area.

2. Re-roofing where the existing roof covering has not been removed.

(65) ***Section R905.2.1 Sheathing requirements*** is hereby retained in its entirety with the following amendments:

R905.2.1 Sheathing requirements Asphalt shingles shall be fastened to solidly sheathed decks. Gaps in the solid decking shall not exceed 1/8 inch.

(66) ***Section R908.1 General*** is hereby retained in its entirety with the following amendments:

R908.1 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. For roofs that provide positive drainage, re-covering or replacing an existing roof covering shall not require the secondary (emergency overflow) drains or scuppers of Section R903.4.1 to be added to an existing roof.

3. 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.

(67) ***Section R1004.1 General*** is hereby retained in its entirety with the following amendments:

Factory-built fireplaces shall be *listed* and *labeled* and shall be installed in accordance with the conditions of the *listing*. Factory-built fireplaces shall be tested in accordance with UL 127. Solid fuel fireplaces, fireplace stoves and solid-fuel-type room heaters shall also comply with Section 5-110 of the City Code and shall be provided with a spark arrestor.

(68) ***Section R1004.4 Unvented Gas log heaters*** is hereby deleted in its entirety.

(69) **A new *Section N1101.1.1 Thermal design parameters*** is hereby added to read as follows:

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)	= 6
Winter Indoor, Design Dry-bulb (°F)	= 72
Summer, Outdoor Design Dry-bulb (°F)	= 90
Summer, Indoor Design Dry-bulb (°F)	= 75
Summer, Outdoor Design Wet-bulb (°F)	= 62

Summer, Indoor Design Wet-bulb (°F)	= 62
Degree Days heating	= 5710
Degree days cooling	= 694

Fort Collins is in Climate Zone 5

For SI: °C = [(°F)-32]/1.8.
Note: based on the 2013 Colorado Climate Center analysis.

(70) ***Section N1101.5 (R103.2) Information on construction documents,*** is hereby kept and preserved in its entirety with the following amendments:

N1101.5 (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,

1. insulation materials and their *R*-values;
2. fenestration schedule listing sizes, *U*-factors and SHGCs;
3. area-weighted *U*-factor and SHGC calculations;
4. mechanical system design criteria;
5. mechanical and service water heating system and equipment types, sizes and efficiencies;
6. economizer description;
~~6~~7. equipment and systems controls;
8. fan motor horsepower (hp) and controls;
~~7~~9. duct sealing, duct and pipe insulation and location;
10. lighting fixture schedule with wattage and control narrative; and
~~8~~11. air sealing details.

(71) ***Table N1102.1.2 (Table R402.1.2) Insulation and fenestration requirements by component*** is hereby retained in its entirety with the following amendments:

TABLE N1102.1.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE HEATING SYSTEM TYPE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U-FACTOR*	GLAZED FENESTRATION SHGC	CEILING *R-VALUE*	WOOD FRAME WALL *R*-VALUE [f g]	MASS WALL *R*-VALUE[g]	FLOOR *R*-VALUE[e]	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL[c] SPACE WALL *R*-VALUE
Non-Electric heat	0.32	0.55	NR	49	20 or 13 + 5	13/17	30	10/13h 15/19i	10,2 ft	10/13h 15/19i
Electric heat	0.30	0.55	NR	49	20+5	15/19	30	15/19	10,3 ft	15/19

For SI: 1 foot = 304.8mm

a. *R*-values are minimums. *U*-factors and 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-19cavity 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. "10/13" means R-10 continuous insulation on the interior or exterior of the foundation wall or R-13 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. Insulation shall fill the framing cavity, R-19 minimum.

f. First value is cavity insulation, second is insulated sheathing or siding, so "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.

g. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

h. All rim joists and adjoining plates shall be air-sealed and insulated using spray foam insulation to R-15 minimum.

i. All rim joists and adjoining plates shall be air-sealed.

(72) ***Table N1102.1.4 (Table R402.1.4) Equivalent U-Factors*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

TABLE N1102.1.4
EQUIVALENT *U*-FACTORS[a]

HEATING SYSTEM TYPE	FENESTRATION *U*-FACTOR	SKYLIGHT *U-FACTOR*	CEILING *R-VALUE*	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
Nonelectric heat	0.32	0.55	0.026	0.057	0.082	0.033	0.059	0.055
Electric heat	0.30	0.55	0.026	0.048	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.

(73) ***Section N1102.2 (R402.2) Specific insulation requirements*** is hereby retained in its entirety with the following amendments:

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 N1102.2.13. 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
2. rim joist.

(74) ***Section N1102.2.1 (R402.2.1) Ceilings with attic spaces*** is hereby retained in its entirety with the following amendments:

N1102.2.1 (R402.2.1) Ceilings with attic spaces

1. Where Section R1102.1.2 would require R-38 insulation in the ceiling, installing R-30 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly, where Section R1102.1.2 would require R-49 insulation in the ceiling, installing R-38 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R-49 insulation wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section R1102.1.4 and the total UA alternative in Section R1102.1.5.

2. (Mandatory) At the eaves, the insulation extending over the exterior wall top plate shall be R-19 minimum.

Exception: In remodels of existing buildings, R-10 shall be installed over top plates where the top plates are exposed during the remodel.

(75) ***Section N1102.2.3 (R402.2.3) Eave baffles*** is hereby retained in its entirety with the following amendments:

N1102.2.3 (R402.2.3) Eave baffles and blocks (Mandatory). For air permeable insulations in vented attics with ventilation from open or box soffits, a baffle shall be installed to provide ventilation from the soffit to the attic adjacent to each soffit or eave vent. In the case of continuous soffit vents, enough baffles shall be installed to maintain the required attic ventilation from the soffit. Baffles shall maintain an opening equal or greater than the size of the vent. The ventilation baffles shall extend over the top of the attic insulation between rafters or trusses, maintaining a minimum 1" clear opening below the roof deck and sufficient space for the minimum depth of attic insulation. The baffle shall be permitted to be any solid material. All other spaces between rafters or trusses shall be blocked full height, at the outside edge of the exterior wall top plate, with air impermeable materials.

(76) **A new *Section N1102.2.7.1 (R402.2.8.1) Rim insulation requirements*** is hereby added to read as follows:

N1102.2.7.1 (R402.2.8.1) Rim insulation requirements All rim plates and rim joist that are part of the thermal envelope shall be air-sealed. All rim plates and rim joist that are part of the thermal envelope shall be insulated using spray foam materials to R-15

minimum when the basement walls are insulated to 10/13 in accordance with Table N1102.1.2. Where spray foam insulation is not used at the rim joist and adjoining plates, the rim joists and adjoining plates shall be insulated to minimum R-19.

(77) ***Section N1102.4.1.2 (R402.4.1.2) Testing*** is hereby retained in its entirety with the following amendments:

N1102.4.1.2 (R402.4.1.2) Testing. The building or individual dwelling units shall be tested and verified as having an air leakage rate of not exceeding 3 air changes per hour. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals) in accordance with Section 802 of the RESNET Mortgage Industry National Home Energy Rating Standards or City of Fort Collins Building Code Protocol for *New Multifamily Building Air Tightness Testing* in duplex or townhomes. 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*. Isolation of attached garages from adjoining *conditioned areas* shall be verified in accordance with City of Fort Collins protocols.

Testing shall occur after rough-in and after installation of penetrations of the *building thermal envelope*, including but not limited to penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.

General requirements 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;

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; and

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.

(78) ***Section N1102.5 Maximum fenestration U-factor and SHGC*** **(Mandatory)** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

N1102.5 (R402.5) Maximum *fenestration U-factor* and *SHGC* (Mandatory). 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*.

(79) ***Section N1103.3.1 (R403.3.1) Insulation*** is hereby retained in its entirety with the following amendments:

N1103.3.1 (R403.3.1) **Insulation (Mandatory).** Supply and return ducts in attics shall be insulated to a minimum of R-8 where 3 inches (76.2 mm) in diameter and greater and R-6 where less than 3 inches (76.2 mm) in diameter. Supply and return ducts in other portions of the building shall be insulated to a minimum of R-6 where 3 inches (76.2 mm) in diameter or greater and R-4.2 where less than 3 inches (76.2 mm) in diameter.

Exception: Ducts or portions thereof located completely inside the *building thermal envelope.*

(80) ***Section N1104.1 (R404.1) Lighting equipment*** is hereby retained in its entirety with the following amendments:

N1104.1 (R404.1) Lighting equipment (Mandatory). A minimum of 75 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps or a minimum of 50 percent of the permanently installed lighting fixtures shall contain only LED lamps.

(81) ***Section N1105.1 (R405.1)Scope*** is hereby retained in its entirety with the following amendments:

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.

(82) ***Section M1307.3 Elevation of ignition source*** is hereby retained in its entirety with the following amendments:

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.

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

(83) **A new *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 and adjusted to operate within design specifications, in accordance with ANSI/ACCA QI 5-2010 *HVAC Quality Installation Specification.* Documentation of results shall be submitted to the *building official* prior to the issuance of the Certificate of Occupancy.

(84) ***Section M1401.3 Equipment and appliance sizing*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

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.

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

(85) ***Section, M1414.1 General*** is hereby retained in its entirety with the following amendments:

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.

(86) ***Section M1501.1 Outdoor discharge*** is hereby retained in its entirety with the following amendments:

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.

(87) A new ***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 back-drafting 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.

(88) ***Section M1502.4.5.2 Manufacturer's instructions***, is hereby deleted in its entirety.

(89) ***Section M1507.3 Whole-house mechanical ventilation system*** is hereby deleted in its entirety and the following is hereby added in lieu thereof:

M1507.3 Whole-dwelling unit 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 M1507.3.1 through M1507.3.4.

M1507.3.1 Whole-dwelling unit mechanical ventilation rate. The whole-dwelling unit 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-*dwelling unit* 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).

TABLE M1507.3.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 – 1	2 – 3	4 – 5	6 – 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m^2, 1 cubic foot per minute = 0.0004719 m^3/s.

TABLE M1507.3.3(2)
INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS[a,b]

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor[a]	4	3	2	1.5	1.3	1.0

a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
b. Extrapolation beyond the table is prohibited.

M1507.3.2 System design. The design of the required whole-*dwelling unit* 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 side of an air handler shall be considered to provide supply ventilation.

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-*dwelling unit* mechanical ventilation fans shall be rated for sound at a maximum of 1.5 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-*dwelling unit* 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.

(90) ***Section M1601.1 Duct design*** is hereby retained in its entirety with the following amendments:

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

(91) ***Section M1601.1.1 Above-ground duct systems,*** is hereby retained in its entirety with the exception of subsection 7 (including subsections 7.1 through 7.5), which is stricken in its entirety.

(92) **A new *Section, M1601.4.11 Construction debris and contamination*** is hereby added to read as follows:

M1601.4.11 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.

(93) ***Section M1602.2 Return air openings*** is hereby retained in its entirety with the following amendments:

M1602.2 Return air openings. A return air path shall be provided in all habitable rooms by means of ducts or transfer grills. Return air openings for heating, ventilation and air conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another appliance located in the same room or space.

2. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.

3. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturers' installation instructions, Manual D or the design of the registered design professional.

4. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet (3048 mm) from the cooking appliances.

2. Dedicated forced-air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

3. Taking return air from an unconditioned crawl space shall not be accomplished through a direct connection to the return side of a forced-air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.

4. Return air from one dwelling unit shall not be discharged into another dwelling unit.

(94) ***Section G2404.3 (301.3) Listed and labeled*** is hereby retained in its entirety with the following amendments:

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."

(95) ***Section G2406.2 (303.3) Prohibited locations*** is hereby retained in its entirety with the exception of subsections 3 and 4 which are stricken in their entirety.

(96) A new ***Section G2406.4 (303.5.1) 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* or be located in a space where the only access to that space is from sleeping rooms, bathrooms, toilet rooms, storage closets, or surgical rooms.

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 not exceeding 45 Pascals, 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.

(97) ***Section G2407.11 (304.11) Combustion air ducts*** is hereby retained in its entirety with the following amendments:

G2407.11(304.11)Combustion air ducts. *Combustion air* ducts shall comply with all of the following:

1. Ducts shall be constructed of galvanized steel complying with Chapter 16 or of a material having equivalent corrosion resistance, strength and rigidity.

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.

...

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.

...

(98) ***Section G2408.1 (305.1) General*** is hereby retained in its entirety with the following amendments:

G2408.1(305.1) General. *Equipment* and *appliances* shall be installed as required by the terms of their approval, in accordance with the conditions of listing, the manufacturer's instructions and this *code*. Manufacturer's installation instructions shall be available on the job site at the time of inspection. Where a *code* provision is less restrictive than the conditions of the listing of the *equipment* or *appliance* or the manufacturer's installation instructions, the conditions of the listing and the manufacturer's installation instructions shall apply.

Where *natural draft appliances* are replaced in existing *buildings*, all appliances with a *draft hood* shall have a Combustion Safety Test (CST) performed under first, the worst-case conditions and secondly, under natural conditions. The CST shall be performed by licensed contractors in accordance with the Building Performance Institute (BPI) Technical Standards for the Heating Professional. If the test passes under the worst-case conditions, no further testing is required. If the appliance fails the worst-case conditions

proceed to the natural conditions test. Appliances that fail the natural conditions test shall be repaired until a natural condition test is passed. Should an appliance not pass the worst-case 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.

(99) ***Section G2408.2 (305.3) Elevation of ignition source*** is hereby retained in its entirety with the following amendments:

G2408.2 (305.3) 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 hazardous locations and public garages, private garages, repair garages, motor fuel-dispensing facilities and parking 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 directly with a private garage through openings shall be considered to be part of the private garage.

(100) ***Section G2409.4.4 (308.4.5) Clearance from supply ducts*** is hereby retained in its entirety with the following amendments:

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.

(101) ***Section G2415.9 (404.9) Above-ground piping outdoors*** is hereby retained in its entirety with the following amendments:

G2415.9 (404.9) Above-ground piping outdoors. All *piping* installed outdoors shall be elevated not less than 6 inches (152 mm) above ground and where installed across roof surfaces, shall be elevated not less than 31/2 inches (152 mm) above the roof surface. *Piping* installed above ground, outdoors, and installed across the surface of roofs shall be securely supported and located where it will be protected from physical damage. Where passing through an outside wall, the *piping* shall also be protected against corrosion by coating or wrapping with an inert material. Where *piping* is encased in a protective *pipe* sleeve, the annular space between the *piping* and the sleeve shall be sealed.

(102) ***Section G2415.12 (404.12) Minimum burial depth*** is hereby retained in its entirety with the following amendments:

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 G2415.12.1.

(103) ***Section G2415.12.1 (404.12.1) Individual outside appliance*** is hereby kept and preserved in its entirety with the following amendments:

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 3 1/2 inches (88.9 mm) in minimum thickness, stone patio, concrete pavers or other approved materials.

(104) ***Section G2415.15 (404.15) Outlet closure*** is hereby retained in its entirety with the following amendments:

G2415.15 (404.15) Outlet closures. Gas *outlets* and fittings that 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:

1. 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.

2. Drip/dirt legs installed at the floor level at appliances.

(105) ***Section G2416.1 (405.1) General*** is hereby retained in its entirety with the following amendments:

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.

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

(107) ***Section G2417.4.1 (406.4.1) Test pressure*** is hereby retained in its entirety with the following amendments:

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.

(108) **A new *Section G2420.3.1 (409.3.2.1) Exterior appliances*** is hereby added to read as

follows:

G2420.3.1 (409.3.2.1) Exterior appliances Any building serving exterior appliances shall provide a shut-off valve at the exterior of the building.

(109) ***Section G2420.5.2 (409.5.2) Vented decorative appliances and room heaters*** is hereby retained in its entirety with the following amendments:

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.

(110) ***Section G2421.3 (410.3) Venting of regulators*** is hereby retained in its entirety with the following amendments:

G2421.3 (410.3) Venting of regulators. *Pressure regulators* that require a vent shall be vented directly to the outdoors. The vent shall be designed to prevent the entry of insects, 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.

(111) ***Section G2425.8 (501.8) Appliances not required to be vented*** is hereby kept and preserved in its entirety with the exception of subsection 7, which is stricken in its entirety.

(112) ***Section G2427.5.5.1 (503.5.6.1) Chimney lining*** is hereby retained in its entirety with the following amendments:

G2427.5.5.1 (503.5.6.1) Chimney lining. *Chimneys* shall be lined in accordance with NFPA 211.

(113) ***Section G2427.6.4 (503.6.5) Minimum height*** is hereby retained in its entirety with the following amendments:

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.

(114) ***Section G2439.3 (614.4) Exhaust installation*** is hereby retained in its entirety with the following amendments:

G2439.3 (614.4) Exhaust installation. Dryer exhaust ducts for *clothes dryers* shall terminate on the outside of the building and shall be equipped with a backdraft *damper*. Dryer exhaust duct terminations shall not be located within 36 inches (914 mm) of exterior openings into *conditioned spaces*, crawl spaces and *attics*. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the flow. *Clothes dryer* exhaust ducts shall not be connected to a *vent connector*, vent or *chimney*. *Clothes dryer* exhaust ducts shall not extend into or through ducts or plenums.

(115) ***Section G2439.7.4.2 (614.8.4.2) Manufacturer's instructions***, is hereby deleted in its entirety.

(116) ***Section G2445 (621), Unvented Room Heaters***, is hereby deleted in its entirety.

(117) A new ***Section G2447.6 (623.8) Kitchens with gas cooking*** is hereby added to read as follows:

G2447.6 Kitchens with gas cooking. Residential 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.

(118) A new ***Section G2451.3 (630.3) Combustion and ventilation air*** is hereby added to read as follows:

G2451.3 (630.3) Combustion and ventilation air Where infrared heaters are installed, natural or mechanical means shall provide outdoor ventilation air at a rate of not less than 4 cfm per 1,000 Btu/h (0.38 m3/min/kW) of the aggregate input rating of all such heaters installed in the space. Exhaust openings for removing flue products shall be above the level of the heaters.

(119) ***Section G2454.1 (636.1) General*** is hereby retained in its entirety with the following amendments:

G2454.1 (636.1) 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 or as allowed by the listing.

(120) ***Section P2503.5.1 Rough Plumbing*** is hereby retained in its entirety with the following amendments:

P2503.5.1 Rough plumbing. DWV systems shall be tested on completion of the rough piping installation by water or 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.

(121) ***Section P2903.2 Maximum flow and water consumption*** is hereby retained in its entirety with the following amendments:

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.

(122) ***Table P2903.2*** is hereby retained in its entirety with the following amendments:

Table P2903.2 Maximum Flow Rates and Consumption For Plumbing Fixtures and Fixture Fittings [b]

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATES
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	1.6 gallons per flushing cycle 1.28 gallons per flushing cycle, with minimum MaP threshold of 350 grams

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

1 pound per square inch (psi) = 6.895 kPa

2 A handheld shower spray is also a shower head

3 Consumption tolerances shall be determined from referenced standards.

(123) A new ***Section E3401.5 Electrical Vehicle Ready*** is hereby added to read as follows:

Section E3401.5 Electrical Vehicle Ready. All new single family *dwellings* with an attached garage or carport shall be provided with an empty conduit of 1/2 inch (12.7 mm) minimum, installed from the *dwellings* electrical panel board to a junction box in readily accessible location in the garage or carport, capable of supporting a 30 ampere 220 volt outlet.

(124) A new ***Section E3401.6 Photovoltaic Ready*** is hereby added to read as follows:

Section E3401.6 Photovoltaic Ready All new single family *dwellings* shall be provided with an empty conduit of 3/4 inch (19.05 mm) minimum, installed from the *dwellings* attic space beneath the roof which most likely would support the majority of installed *photovoltaic system*, to a junction box located within 12 inches of the *dwellings* electrical meter or connected directly to the *dwellings* electrical panel board.

(125) ***Chapter 44 Referenced Standards*** is hereby retained in its entirety with the following amendments:

...

ANSI/ACCA QI 5-2007 *HVAC Quality Installation Specification.*
Referenced in Amended 2012 IRC Section M1309 Performance verification

Installation Masters™ Testing and Certification Program
Referenced in Amended 2012 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 2012 IRC Section R325.1 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 2012 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 2012 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 2012 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 2012 IRC Section N1102.2 Specific insulation requirements.
...

(126) ***APPENDIX E, MANUFACTURED HOUSING USED AS DWELLINGS***, is hereby adopted in its entirety.

(127) ***APPENDIX F, RADON CONTROL METHODS***, is hereby retained in its entirety with the following amendments:

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 1are 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 m^2) 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 m^2), 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 cm^2/ m^2) 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 m^2) but less than 4,000 square feet (372 m^2), 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 m^2) shall have under them separate loops for every additional 2,000 square feet (186 m^2) 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 m^2) and 4,000 square feet (372 m^2) 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 m^2) 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 m^2) 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 m^2) but less than 4,000 square feet (372 m^2) 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 m^2) shall have separate loops for each 2,000 (186 m^2) square feet; or, increased to 4,000 square feet (372 m^2) 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 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 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 (152mm) 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.

(128) ***APPENDIX H, PATIO COVERS***, is hereby adopted in its entirety.

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

Introduced, considered favorably on first reading, and ordered published this 6th day of June, A.D. 2017, and to be presented for final passage on the 5th day of July, A.D. 2017.

CITY OF FORT COLLINS SEAL COLORADO

Mayor

ATTEST:

W Winkelman

City Clerk

Passed and adopted on final reading on this 5th day of July, A.D. 2017.

Mayor

ATTEST:

City Clerk

NOTICE OF PUBLIC HEARING

NOTICE is hereby given of a public hearing to be held before the City Council of the City of Fort Collins, Colorado, on the 6th day of June, A.D., 2017 at 6:00 p.m., or as soon thereafter as the matter may come on for hearing, in the Council Chambers at the City Hall, 300 LaPorte Avenue, Fort Collins, Colorado for the purpose of considering the adoption of ordinances adopting by reference the *2015 International Building Code, 2015 International Residential Code, 2015 International Energy Conservation Code, 2015 International Mechanical Code,* and the *2015 International Fuel Gas Code* together with local amendments, promulgated by the International Code Council.

Not less than one (1) copy of said Codes has been, and now is on file in the Office of the City Clerk of the City of Fort Collins and is available for public inspection.

The purpose of the International Building Code, International Residential Code, International Energy Conservation Code, International Mechanical Code, and the International Fuel Gas Code adopted by said ordinance is to provide for protection of public health and safety and general welfare.

The City of Fort Collins will make reasonable accommodations for access to City services, programs and activities and will make special communication arrangements for persons with disabilities. Please call 221-6515 (V/TDD: Dial 711 for Relay Colorado) for assistance.

This notice is given and published by order of the City of Fort Collins, Colorado.

Dated at Fort Collins, Colorado this 14th day of May, A.D. 2017.

Wanda Winkelmann
City Clerk