Resolution No. R-019-124

Resolution Amending the Douglas County Building Code Through the Adoption of the Following Revised Codes: The 2018 International Building Code, 2018 International Building Code Appendix C, 2018 International Residential Code, 2018 International Residential Code Appendix M, 2018 International Pluming Code, 2018 International Plumbing Code Appendix E, 2018 International Mechanical Code, 2018 International Fuel Gas Code, and the 2018 International Energy Conservation Code, with Amendments is being re-recorded to correct the spelling of "Pluming" to "Plumbing" on page 1.

RESOLUTION NO R-019- 124

THE BOARD OF COUNTY COMMISSIONERS
OF THE COUNTY OF DOUGLAS, COLORADO

A RESOLUTION AMENDING THE DOUGLAS COUNTY BUILDING CODE THROUGH THE ADOPTION OF THE FOLLOWING REVISED CODES: THE 2018 INTERNATIONAL BUILDING CODE, 2018 INTERNATIONAL BUILDING CODE APPENDIX C, 2018 INTERNATIONAL RESIDENTIAL CODE, 2018 INTERNATIONAL RESIDENTIAL CODE APPENDIX M, 2018 INTERNATIONAL PLUMBING CODE, 2018 INTERNATIONAL PLUMBING CODE APPENDIX E, 2018 INTERNATIONAL MECHANICAL CODE, 2018 INTERNATIONAL FUEL GAS CODE, AND THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE, WITH AMENDMENTS.

WHEREAS, C.R.S. § 30-28-201, authorizes the Board of County Commissioners ("Board") to adopt a building code consistent with the Uniform Building Code, 1988 edition, as promulgated by the International Conference of Building Officials and as revised from time to time, in all or part of the county, and not embraced within the limits of any city or town; and

WHEREAS, C.R.S. § 30-28-204, allows the Board to alter and amend any county building code after public hearing; and

WHEREAS, the Chief Building Official has recommended that the Board amend the current Douglas County Building Code by the adoption of the following revised Codes: the 2018 INTERNATIONAL BUILDING CODE, 2018 INTERNATIONAL BUILDING CODE APPENDIX C, 2018 INTERNATIONAL RESIDENTIAL CODE, 2018 INTERNATIONAL RESIDENTIAL CODE APPENDIX M, 2018 INTERNATIONAL PLUMBING CODE, 2018 INTERNATIONAL PLUMBING CODE APPENDIX E, 2018 INTERNATIONAL MECHANICAL CODE, 2018 INTERNATIONAL FUEL GAS CODE, and the 2018 INTERNATIONAL ENERGY CONSERVATION CODE, ; including the Amendments as set forth in Exhibits A through F, attached hereto and incorporated herein (collectively the "Codes").

WHEREAS, on October 7, 2019, the Planning Commission held a public hearing on the adoption of the revised Codes; and

WHEREAS, the Planning Commission has certified the Codes to the Board with a recommendation that the revised Codes be adopted for the entire unincorporated area of Douglas County; and

WHEREAS, notice of public hearing before the Board on the adoption of the Codes was published once (for four consecutive weeks with five insertions) in a newspaper of general circulation in Douglas County; and

WHEREAS, on November 12, 2019, the Board conducted a public hearing on the adoption of the Codes; and

WHEREAS, the Board desires to adopt the revised Codes for the entire unincorporated area of Douglas County; now, therefore,

BE IT RESOLVED, by the Board of County Commissioners of the County of Douglas, State of Colorado, that the Douglas County Building Code shall be amended by the adoption of the following revised Codes, including the Amendments thereto, for the entire unincorporated area of Douglas County:

International Building Code, 2018 Edition

International Building Code Appendix C, 2018 Edition

International Residential Code, 2018 Edition

International Residential Code Appendix M, 2018 Edition

International Plumbing Code, 2018 Edition

International Plumbing Code Appendix E, 2018 Edition

International Mechanical Code, 2018 Edition

International Fuel Gas Code, 2018 Edition

International Energy Conservation Code, 2018 Edition

The International Building Code, International Residential Code, International Plumbing Code, International Mechanical Code, International Fuel Gas Code and the International Energy Conservation Code are published by the International Code Council, 500 New Jersey Avenue, NW 6th Floor, Washington, DC 20001.

BE IT FURTHER RESOLVED that this Resolution, and the Codes as amended hereto, shall become effective at 12:01 a.m. on January 1, 2020; and all prior resolutions adopting former versions of building codes, and amendments thereto, are repealed at 12:01 a.m. on January 1, 2020.

PASSED AND ADOPTED this 12 day of November 2019, in Castle Rock, Douglas County, Colorado.

THE BOARD OF COUNTY COMMISSIONERS
OF THE COUNTY OF DOUGLAS, COLORADO

ROGER A. PARTRIDGE, Chair

Attest:

KRISTIN RANDLETT, Clerk to the Board

DOUGLAS COUNTY, COLORADO SEAL EST. 1874

2018 CODE AMENDMENTS
TABLE OF CONTENTS

Exhibit A

AMENDMENTS COMMON TO ALL ADOPTED 2018 INTERNATIONAL CODES

International Existing Building Code	**Not adopted**
International Private Sewage Disposal Code	**Not adopted**
International Property Maintenance Code	**Not adopted**
ICC Electrical Code	**Not adopted**
International Zoning Code	**Not adopted**
International Wildland-Urban Interface Code	**Not adopted**

Any references made to the above listed codes within the adopted codes are not valid in Douglas County.

10.0 FEES **Add new section and subsections**

10.1 Payment of fees
A permit shall not be valid until the fees, prescribed by law, have been paid, nor shall an amendment to a permit be issued until the additional fee, if any, has been paid.

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

10.2 Valuation of work
The determination of value or valuation shall be established by the Building Official utilizing building valuation data printed in the Building Safety Journal, published by the International Code Council, as a guide and using a modifier of one (1), or the applicant shall provide an estimated project valuation at the time of application. Permit valuations shall include the total value of work, including materials and labor, for which the permit is being issued, such as electrical, gas, mechanical, plumbing equipment and permanent systems. If, in the opinion of the Building Official, the valuation is underestimated on the application, the permit shall be denied unless the applicant can provide detailed estimates to meet the approval of the Building Official. Final building permit valuation shall be set by the Building Official.

10.3 Schedule of permit fees
On new or altered structures, gas, mechanical, plumbing or roofing requiring a permit, a fee for each permit shall be paid in accordance with Table 10.3 (1997 edition of the Uniform Building Code, Table 1-A).

10.3.1 Plan review fee

The plan review fee shall be 65% of the permit fee. In cases of stock plans, the plan review fee shall be 10% of the permit fee.

10.3.2 Electrical permit fee

Fees for electrical only permits shall be as established by Resolution R-018-066, setting fees at 85% of the fees established by the State of Colorado Electrical Board.

10.3.3 Wildfire mitigation assessment fee

A fee of $120.00 shall be assessed to new structures located in wildfire hazard areas as determined by the Wildfire Hazard Overlay Map that requires an on-site assessment and final inspection.

10.3.4 Driveway permit fee *(Detached single-family residents only)*

A permit fee of $40.00 shall be required for vehicular access to residential dwellings or accessory buildings thereto in rural areas generally not served by combination curb, gutter, and sidewalk.

10.3.5 Drainage, Erosion, and Sediment Control (DESC) permit fee

(Detached single-family residents only)

A DESC permit fee is required on all new single-family residential construction and new construction of accessory structures (e.g. additions, barns, arenas, detached garages, etc.) on existing single-family home sites. Fees for each DESC permit shall be determined in accordance with Table 10.3.5.

10.3.5.1 DESC plan review fee *(Detached single-family residences only)*

The DESC plan review fee shall be 65% of the DESC permit fee.

Table 10.3.5
DESC Permit Fee Schedule

Project Valuation	Permit Fee
$0 to $25,000.00	$25.00
$25,001.00 to $50,000.00	$35.00
$50,001.00 to $100,000.00	$50.00
$100,001.00 to $900,000.00	$50.00 for the first $100,000.00 plus $32.00 for each additional $100,000.00 of the valuation, or fraction thereof
$900,001.00 and up	$338.00

10.3.6 Zoning fee

10.3.6.1 One and two-family dwellings or townhouses as defined in the IRC
A review fee of $50.00 is required per single family/townhouse as each unit is permitted individually. Additionally, a fee of $30.00 will be assessed for permits for accessory structures.

10.3.6.2 Commercial and multi-family buildings as defined in the IBC
A review fee of $50.00 is required for each commercial structure as each unit is permitted individually. Apartment and condominium buildings will be assessed a $50.00 fee per building. Additionally, a fee of $30.00 will be assessed for permits for accessory structures.

10.3.7 Re-inspection fee
When an inspection has been requested for work, or portion of work that has not been completed, a re-inspection fee may be assessed.

Re-inspection fees may be assessed when: the inspection record card is not posted or otherwise available on the work site, the approved plans are not readily available to the inspector, for failure to provide access on the date for which the inspection is requested, or for deviating from approved plans.

When re-inspection fees have been assessed, no additional inspections will be performed until the required fees have been paid. Re-inspection fees shall be in accordance with Table 10.3.

10.3.8 Investigation fee
Investigation fees shall be determined in accordance with Table 10.3.

10.3.8.1 Work commencing before permit issuance
Investigation fees may be assessed for work regulated by this Resolution that commences prior to a valid permit being issued. An investigation fee may amount to two times the calculated permit fee.

10.3.9 Elevator/escalator inspection fee
A conveyance inspection fee in accordance with the Douglas County Administrative Fee Schedule shall be paid for each separate elevator/escalator installed in the county. These fees shall cover annual safety inspections and witness inspections as required by the State. Notice of the fee shall be given to each conveyance owner by the Building Division for the specific inspection service provided.

10.3.10 Use Tax A Use Tax on construction and building materials shall be collected at time of permit issuance for most types of permits, in accordance with Resolution R-994-147 and approval by registered electors at general election, and as modified by subsequent statutorily authorized public approval processes.

10.4 Refunds

The Building Official may authorize the refunding of fees for the following:

1. The full amount of any fee paid hereunder which was erroneously paid or collected.

2. Not more than 80% of the permit fee paid when no work has been done under a permit issued in accordance with this code.

3. Not more than 80% of the plan review fee paid when an application for a permit for which a plan review fee has been paid is withdrawn or canceled before any plan review effort has been expended.

The Building Official shall not authorize a refund of any fee paid, except upon written application filed by the original permittee, not later than 180 days after the date of fee payment.

Table 10.3

(1997 Uniform Building Code, Table 1-A)

Total Valuation	Building Permit Fee
$1.00 to $500.00	$23.50
$501.00 to $2,000.00	$23.50 for the first $500.00 plus $3.05 for each additional $100.00, or fraction thereof, to and including $2,000.00
$2,001.00 to $25,000.00	$69.25 for the first $2,000.00 plus $14.00 for each additional $1,000.00, or fraction thereof, to and including $25,000.00
$25,001.00 to $50,000.00	$391.25 for the first $25,000.00 plus $10.10 for each additional $1,000.00, or fraction thereof, to and including $50,000.00
$50,001.00 to $100,000.00	$643.75 for the first $50,000.00 plus $7.00 for each additional $1,000.00, or fraction thereof, to and including $100,000.00
$100,001.00 to $500,000.00	$993.75 for the first $100,000.00 plus $5.60 for each additional $1,000.00, or fraction thereof, to and including $500,000.00
$500,001.00 to $1,000,000.00	$3,233.75 for the first $500,000.00 plus $4.75 for each additional $1,000.00, or fraction thereof, to and including $1,000,000.00
$1,000,001.00 and up	$5,608.75 for the first $1,000,000.00 plus $3.65 for each additional $1,000.00, or fraction thereof

Other inspections and fees:

1. Inspections outside normal business hours..... $47.00 per hour [A]
   (minimum charge of two hours)
2. Re-inspection fees..... $47.00 per hour [A]
   (minimum charge of one hour)
3. Inspections for which no fee is specifically indicated..... $47.00 per hour [A]
   (minimum charge of one-half hour)
4. Additional plan review required by changes, additions or revisions to plans..... $47.00 per hour [A]
   (minimum charge of one-half hour)
5. For use of outside consultants for plan checking and inspections, or both..... Actual costs [B]
6. Investigation fees..... $47.00 per hour [A]
   (minimum charge of two hours)

A. $47.00 per hour fee or the total hourly cost to the jurisdiction will be charged, whichever is greatest. The cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

B. Actual costs include administrative and overhead costs.

20.0 CONTRACTOR REGISTRATION Add new section and subsections

20.1 General

No contractor shall hire, employ, contract with, or engage another person to perform any construction work unless the person so hired, employed, contracted with, or engaged to perform construction work is registered with Douglas County Building Division.

Exceptions:

1. A homeowner is not required to register and is exempt from this Section.
2. Construction trades other than mechanical, electrical and plumbing performing work under a registered general contractor are not required to be registered.

A contractor shall be responsible for all work included under the scope of the contractors' registration regardless of whether such work is done by the contractor directly or by a sub-contractor which is exempt pursuant to this Section.

It shall be the duty of any applicant for electrical or plumbing registration to furnish copies of the State contractor's license, master's license and to send updates as new State licenses are issued, or if licensed tradespersons are replaced. No permits for electrical wiring or plumbing work may be issued to any applicant unless such State license is properly verified and registered.

Permits will only be issued to a registered contractor or their authorized representative.

20.2 Definitions

CONTRACTOR

A contractor is any person, firm, co-partnership, corporation, association, or other organization, or any combination thereof, who builds, constructs, alters, adds to, or repairs any building or structure either on its own property, or who supervises or advises on any such activity, or hires and pays subcontractors.

HOMEOWNER

The owner of the property who elects to act as an owner-builder for their residential dwelling or accessory structure, as defined in the International Residential Code (IRC). A homeowner may secure a permit on only one residential dwelling in a twelve (12) month period with the intent of occupying the structure upon completion. Any person who builds two or more residences in unincorporated Douglas County in any twelve (12) month period shall be deemed to be a contractor, who must then comply with Section 20.0.

20.3 Class of registration

It shall be unlawful to perform work which is not authorized under the scope or limits of work for which such registration was issued. Registration classifications are as follows:

20.3.1 Building contractor – CLASS "A"
This registration shall entitle the holder to contract for the construction, alteration, tenant finish, or repair of any type or size of structure permitted by the International Building Code (IBC) or International Residential Code (IRC).

20.3.2 Building contractor – CLASS "B"
This registration shall entitle the holder to contract for the construction, alteration, or repair of multi-family/townhouses with three or more units per structure as permitted by the IBC or IRC.

20.3.3 Building contractor – CLASS "C"
This registration shall entitle the holder to contract for the construction, alteration, or repair of single-family homes and duplexes as permitted by the IRC.

20.3.4 Building contractor – CLASS "D"
This registration shall entitle the holder to contract for the construction, alteration and repair of, but not limited to, garages, barns, basement finishes, alterations, decks, remodels, and low voltage wiring as permitted by the IRC.

20.3.5 Mechanical contractor – CLASS "MA"
This registration shall entitle the holder to perform work on heating, ventilation, air conditioning, and refrigerating systems.

20.3.6 Electrical contractor
Any person, firm, co-partnership, corporation, association, or combination thereof that undertakes or offers to undertake for another the planning, layout, supervision, installation or repair of wiring apparatus and equipment for electrical light, heat, and power. Pursuant to C.R.S. 12-23-105, electrical contractors are licensed by the State of Colorado and are only required to register with Douglas County. Electrical contractors are exempt from the fee requirements of this Section.

20.3.7 Plumbing contractor
Any person, firm, co-partnership, corporation, association, or combination thereof that undertakes or offers to undertake for another the planning, layout, supervision, installation, modification or repair of plumbing systems. Pursuant to C.R.S. 12-58-105, plumbing contractors are licensed by the State of Colorado and as such are only required to register with Douglas County. Plumbing contractors are exempt from the fee requirements of this Section.

20.3.8 Roofing contractor
This registration shall entitle the holder to contract for the replacement and repairs of existing roofs as permitted by the IBC or IRC.

20.4 Contractor registration fee
Fees for all types of registrations will be waived until further action by the Board of County Commissioners, effective July 1, 2013, per Douglas County Resolution (R-012-068).

20.5 Probationary registration
The Building Official may issue a probationary registration where the Building Official determines that qualifications must be established prior to issuance of a regular registration.

20.6 Expiration of registration and regulations
All registrations shall expire one (1) year from the date of issuance. Registrations with State issue licenses shall expire thirty (30) days after the State license expires, unless otherwise provided. No permits may be obtained, nor may work already under permit be continued, until the registration has been renewed. Applicants for registration renewals shall meet all current requirements for a new registration.

20.7 Insurance requirements
Prior to registration, the contractor shall file with the Building Official a Certificate of Liability insurance and Worker's Compensation insurance. The insurance certificate must be signed by an agent of an insurance company stating that the policy, or policies, required by this Section have been issued to the contractor. The policy, or policies, shall state the name of the company, effective date of such policies, and the expiration date of policy or policies. Each policy of insurance shall contain an endorsement to the effect that the insurance carrier shall notify the Douglas County Building Division of the effective date of a reduction or cancellation of the policy. The cancellation or reduction of insurance below the required amount of coverage shall be cause for automatic suspension of the contractor's registration until coverage is reinstated. All policies shall be kept in effect for the period of the registration.

Single occurrence liability insurance shall have the following minimum coverage amount:

Class "A" Contractor	$1,000,000.00
Class "B" Contractor	$1,000,000.00
Class "C" Contractor	$500,000.00
Class "D" Contractor	$300,000.00
Electrical Contractor	$300,000.00
Plumbing Contractor	$300,000.00
Mechanical Contractor	$300,000.00
Roofing Contractor	$300,000.00

20.8 Registration suspension and revocation

The Building Official may suspend or revoke the registration of any registered contractor for good cause, as described in this Section. Upon suspension or revocation, the Building Official shall provide written notice to the registered contractor by delivery to the

business mailing address provided by the contractor at time of registration. The notice of suspension or revocation shall include information regarding the appeals process for the suspension or revocation, including the right of the contractor to appear before the Board of Appeals and show cause why the registration should not be suspended or revoked. At the hearing before the Board of Appeals, the contractor shall have the right to present their case by oral and documentary evidence, to submit rebuttal evidence, as may be required for a full and true disclosure of the facts.

Suspension or revocation of a contractor's registration shall not be construed to release the contractor from liabilities and obligations of completing his contract. During the period prior to the hearing before the Board of Appeals, the contractor shall not be allowed to submit an application for any other projects.

The Board of Appeals, after review of the evidence presented, shall have the power to suspend, revoke or reinstate a contractor's registration for good cause shown. Good cause includes, but is not limited, to the following:

1. Violating any provisions of the Douglas County Building Code including any codes which are adopted by reference.

2. Failure to comply with any lawful order of the Building Official or any other authorized representative of the Building Division pertaining to the administration of the building code and those codes adopted by reference.

3. Using a contractor's registration to obtain a permit required under this code for any other person, corporation or legal entity.

4. Failure to reveal any material fact in the application for a contractor's registration or permit, or the supplying of information which is untrue or misleading as to any material fact in the application, for a contractor's registration or permit.

5. Failure to obtain a proper permit for any work for which a permit is required.

The Board of Appeals (BOA) may reinstate a registration for any contractor whose registration has been revoked, provided a majority of the BOA votes in favor of such reinstatement for such reason as the BOA may deem sufficient. In such case where the contractor's registration has been revoked and the contractor is petitioning the BOA for reinstatement, the petitioner shall follow the established policies for requesting such hearing and pay all applicable fees.

30.0 BOARD OF APPEALS — Add new section and subsections

30.1 General

In order to hear and decide appeals of orders, decisions, or determinations made by the Building Official relative to the application and interpretation of this code, there shall be and is hereby created a Board of Appeals (BOA). The Building Official shall be an ex-

officio member of, and shall act as secretary to said BOA, but shall have no vote on any matter before the BOA. The BOA shall operate as and perform the duties of the Board of Review, pursuant to Section 30-28-206, C.R.S.. The BOA shall be appointed by the Douglas County Board of County Commissioners and any member of the BOA may be removed for cause by the Douglas County Board of County Commissioners. The BOA shall consist of no less than five members nor more than seven members. The member's terms shall be of such length and such arrangement that the term of at least one member shall expire each year. Vacancies shall be filled for an unexpired term in the same manner as in the case of original appointments. The Douglas County Board of County Commissioners shall provide for general rules to cover the organization, procedure, and jurisdiction of the BOA. The BOA may adopt supplemental rules of procedure not inconsistent with Article 28, Title 30, C.R.S. or such general rules. The BOA shall render all decisions and finding, in writing, to the appellant. A duplicate copy shall be sent to the Building Official.

30.2 Limitations on authority

Pursuant to Section 30-28-206, C.R.S., the BOA, in appropriate cases and subject to a determination as to the suitability of alternate materials and methods of construction, may make special exceptions to the terms of the Building Code in harmony with its purpose and intent. The BOA shall have no authority to waive requirements of this Code or provide product approvals.

30.3 Qualifications

The BOA shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction and are not employees of the jurisdiction.

30.4 Code amendments

Pursuant to Section 30-28-206(2), C.R.S., the BOA is authorized to formulate suggested amendments to the Douglas County Building Code for consideration by the Douglas County Board of County Commissioners.

30.5 Administration

The Building Official shall take immediate action in accordance with the decision of the BOA.

30.6 Fees

The fee for a hearing before the Board of Appeals shall be $250.00. The fee is non-refundable.

40.0 NOISE MITIGATION **Add new section and subsections**

40.1 Interior Noise Level

All new structures, and the alteration or repair of existing structures, that are located in the Centennial Airport Review Area (CARA) as defined in Section 19 of the Douglas County Zoning Resolution, requiring noise mitigation, shall comply with table 40.1.

Exception:

An acoustical engineer, registered with the State of Colorado, may certify that construction practices and/or materials of the structure will achieve an interior noise level of DNL 45 dBA. The acoustical professional shall submit documentation of the proposed measures to the Building Official before permitting.

Field testing to show compliance with minimum STC ratings listed in Table 40.1, shall be performed and reported in accordance with ASTM E966 (current version at time of testing), 'Standard Guide for Field Measurements of Airborne Sound Insulation of Building Facades and Facade Elements'. Field measured outdoor to indoor transmission loss (OITL) ratings shall be no more than 5-points less than the minimum STC ratings listed in Table 40.1.

Table 40.1
Minimum Sound Transmission Class (STC)[A]

A-weighted DNL	Wall, Floor and Roof Assemblies	Window and Door Assemblies
≥75	50	42
≥70 to 75	45	37
≥65 to 70	39	28

A. The STC of construction assemblies shall be determined by a certified sound testing laboratory.

40.2 Penetrations

All membrane or through penetrations in the construction assemblies for piping, electrical devices, recessed cabinets, bathtubs, soffits, heating, combustion, ventilation or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings.

50.0 SITE SANITATION **Add new section and subsections**

50.1 Sanitation facilities required

Every building site during construction, remodeling or demolition activities, shall be furnished with approved sanitation facilities for workers in accordance with Section 311 of the International Plumbing Code and an appropriate enclosure or other means approved by Douglas County to contain trash and debris.

50.2 Location

Sanitary facilities and approved trash enclosures shall be located within 300 feet of the building site. Sanitary facilities and trash enclosures shall not be located within the public right-of-way. Failure to comply with this section may cause suspension of inspections until compliance is achieved.

AMENDMENTS TO THE 2018 INTERNATIONAL RESIDENTIAL CODE (IRC)

Note: Refer to the section "Common to all adopted 2018 International Codes" for more information.

Appendix M Home Day Care Group R-3 Occupancy **Adopt Appendix**

Wildfire Mitigation Standards **Adopt as an appendix**
Attached hereto, as Exhibit "B"

Water Supply Standard for Rural Firefighting **Adopt as an appendix**
Attached hereto, as Exhibit "C"

Installation Standard IS-22-98 **Adopt as an appendix**
Installation standards for potable water storage tanks and cisterns for domestic use
Attached hereto, as Exhibit "D"

R101.1 Title **Insert**
Douglas County Building Division

R104.2.1 Election to proceed under previous code **Add new subsection**
Within the first 180 days following the adoption of this code, an applicant under subsection R104.2 may elect to, and if approved by the Building Official may, proceed under the set of codes previously adopted on August 9, 2016; provided, however, that said election must be made certain and in writing, and under no circumstances shall an applicant be permitted to proceed partially under one set of codes and partially under the other.

R105.2(5) Work exempt from permit (Building) **Delete words "and driveways"**

R105.2(11-16) Work exempt from permit (Building) **Add new exceptions**

11. Manufactured metal shipping containers used as tool and storage sheds with a floor area not larger than 200 square feet:
    11.1. Not used for storage of hazardous materials, or
    11.2. Not modified, connected or stacked on top of each other.

12. Shade structures such as fabric shade sails or fabric covered awnings, and detached pergolas that do not exceed 200 square feet and are not subject to a uniformly distributed snow load; and detached ornamental garden structures and greenhouses accessory to a dwelling that do not exceed 200 square feet.

13. Replacement windows and doors installed in accordance with Section R310.2.5 (1) or (2) where no structural modification of the rough opening is required.

14. The replacement or repair of roofing less than one square (100 square feet).

15. Residential irrigation systems.

16. Residential water softeners and filtration systems.

All work exempted by this Section must comply with applicable zoning requirements and the regulations of other agencies having authority.

R105.3 Application for permit (8) and (9) **Add new subsection requirements**

8. Proof of ownership of the property shall be submitted with the building permit application. When access is not from a public road, proof of legal and physical access shall be submitted with the application. If legal access is in question, the Building Official may confer with the County Attorney to determine the legality of the proposed access. If physical access is in question, referral comments may be sought from the Douglas County Department of Public Works and the Fire Protection District serving the property. The Building Official shall then determine whether legal access is available and whether physical access is safe, reasonable, and adequate. If the Building Official determines that the physical access is not safe, reasonable, or adequate, he may recommend whatever improvements would be necessary to provide safe and reasonable access.

9. A soils test of the building site prepared by a professional engineer registered by the State of Colorado shall be submitted with the application for a building permit. A professional engineer registered by the State of Colorado shall design the foundation in accordance with the soils report. Concrete foundations shall comply with ACI 318. When the building site is located in a hillside area, or in the opinion of the Building Official, is located in an area subject to geological hazards or steep slopes, the Building Official may require an engineering geologist, working within their field of expertise, to submit specific recommendations regarding the building site and the proposed location and design.

R108 Fees **Delete section in its entirety**

R109.1.1 Foundation inspection **Addition to the end of the subsection**

Inspections shall be performed by a Colorado licensed professional engineer or architect that is registered in the State of Colorado. A stamped written report shall be provided to the Building Official of the results for these inspections by a Colorado licensed professional engineer or architect that is registered in the State of Colorado.

R112 Board of Appeals **Delete section in its entirety**

R202 Definitions

Accessory Structure **Amend to read as follows**

Accessory Structure. A structure that is not over two stories in height, the use of which is customarily accessory to and incidental to that of the dwelling(s), or other allowed use, and that is located on the same lot.

Table R301.2(1) Climatic and geographic design criteria **Delete table and substitute**

GROUND SNOW LOAD	WIND SPEED	SEISMIC DESIGN CATEGORY	SUBJECT TO DAMAGE FROM			RAINFALL PER HOUR (100 YEAR)	ICE BARRIER UNDERLAYMENT	FLOOD HAZARDS	WINTER DESIGN TEMP	AIR FREEZING INDEX	MEAN ANNUAL TEMP
			Weathering	Frost Line Depth	Termite						
SEE TABLE BELOW	SEE TABLE BELOW	B	SEVERE	36 Inches	Slight to Moderate	2.5 Inches	Above 7000 ft. USGS Elevation [A]	Current FEMA FIRM Maps	-3° Fahrenheit	867	48.1

ELEVATION	LATTITUDE	WINTER HEATING	SUMMER COOLING	ALTITUDE CORRECTION FACTOR	INDOOR DESIGN TEMPERATURE	DESIGN TEMPERATURE COOLING	HEATING TEMPERATURE DIFFERENCE
	39° N	-3°	90°	0.84	70°	75°	73°
COOLING TEMPERATURE DIFFERENCE		WIND VELOCITY HEATING	WIND VELOCITY COOLING	COINCIDENT WET BULB	DAILY RANGE	WINTER HUMIDITY	SUMMER HUMIDITY
15°		15	7.5	32 - 48	High	30%	50%

USGS ELEVATION RANGES (feet)[A]	SNOW LOAD (psf)	WIND SPEED
5152 – 5999	30	115 Ultimate Wind Speed, Exposure C
6000 – 6499	35	
6500 – 6999	40	
7000 – 7499	45	130 Ultimate Wind Speed, Exposure C
7500 – 7999	50	
8000 – 8499	55	
8500 – 8999	60	
9000 – 9499	65	
Ground Snow Load = Roof Snow Load	**Reduction for Snow Loads are not allowed**	

A. Elevation is measured from the top of foundation.

R302.3.1 Two-family dwellings separated by lot lines **Add new section**

Dwelling units in two-family dwellings separated by a lot line shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.2 for Townhouses.

R302.3.1 Supporting construction is amended to a new **Section R302.3.1.1**

R302.13 Fire protection of floors. **Delete section in its entirety**

R310.1 Emergency escape and rescue openings required **Delete exception (2)**

R310.2.3 Window wells **Add exception (2)**

Exception 2. In basements of existing R-3 (one- or two-family dwellings) occupancies, egress window wells may have a minimum horizontal projection of 24 inches (610mm) and must be the full width of the window. If a ladder is required in the window well, the ladder must be installed such that it does not interfere with or is in front of the operable side of the window.

R310.6 Alterations or repairs of existing basements **Delete section in its entirety**

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

An automatic residential fire sprinkler system *may* be installed in townhouses.

R313.2 One and two-family dwellings automatic fire sprinkler systems **Delete section in its entirety and add**

Owner occupied lodging houses, bed and breakfast with five or fewer guest rooms and 10 or fewer total occupants permitted to be constructed in accordance with the International Residential Code shall be equipped with an automatic residential fire sprinkler system designed and installed in accordance with Section P2904 or NFPA 13D.

R315.2.2 Alterations, repairs and additions **Delete exception 2**

R315.3 Location **Delete in its entirety and substitute**

Carbon monoxide alarms in dwelling units shall be installed outside each separate sleeping area within 15 feet of each bedroom's entrance. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

R401.2 Requirements **Addition to the end of the subsection**

Based on soils reports for lots within the Dipping Bedrock Overlay District, as identified by the Colorado Geological Survey, the Building Official may require additional testing to determine the proper foundation design. Such additional testing may include, but are not limited to, testing for initial water content, initial dry density, grain size distribution, Atterberg Limits (liquid limit and plasticity index), percent swell and test load surcharge, swell pressure, penetration resistance (blow counts), and unconfined compressive strength.

R401.3 Drainage **Delete in its entirety and substitute**

Single-family detached dwelling units and accessory structures thereto, shall comply with the Douglas County Drainage, Erosion and Sediment Control (DESC) manual.

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

R905.7.4 Material standards. **Delete in its entirety and substitute**

Wood shingles shall have a minimum class C rating, be of naturally durable wood and comply with the requirements of Table R905.7.4.

R905.8.5 Material standards. **Delete in its entirety and substitute**

Wood shakes shall have a minimum class C rating and comply with the requirements of Table R905.8.5.

R908.7 Drip edge flashing for asphalt shingle roof **Add new subsection**

Drip edge flashing shall be provided at eaves and rake edges of shingle roofs. Adjacent segments of drip edge shall be overlapped a minimum of 2 inches. Drip edges for eaves shall extend a minimum of 1.5 inches below the roof sheathing and extend up the roof deck a minimum of 4 inches. Drip edges for gables shall extend a minimum of .25 inches below the roof sheathing and extend up the roof deck a minimum of 2 inches. Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches on center with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the drip edge on rakes/gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.

R908.3.1.1 Roof recover not allowed **Addition exception (4)**

Exception 4. Where the existing roof covering is asphalt shingle, a recover of asphalt shingle shall not be permitted.

Chapter 11 Energy efficiency **Delete Chapter in its entirety and substitute**

IRC Sections N1101 through N1111 (R505) in Chapter 11 are deleted in their entirety and replaced with a new section N1101 to read as follows:

SECTION 1101
GENERAL REQUIREMENTS

N1101.1 Scope. This chapter regulates the energy efficiency for the design and construction of buildings regulated by this code.

N1101.2 Criteria. Buildings shall be designed and constructed in accordance with the International Energy Conservation Code (IECC) as amended and adopted by Douglas County. The climate zone for unincorporated Douglas County is established as Zone 5B.

G2406.2(303.3) (3) and (4) Prohibited locations **Delete in their entirety**

G2415.12 (404.12) Minimum burial depth **Delete in its entirety and substitute**

Underground gas piping systems shall be installed at a minimum depth of eighteen (18) inches (457 mm) below grade.

G2415.12.1 (404.12.1) Individual outdoor appliances **Delete subsection in its entirety**

G2417.4.1 (406.4.1) Test pressure **Delete section in its entirety and substitute**

Test pressure and duration Low pressure gas piping systems not exceeding six (6) inches of water column shall be tested at ten (10) pounds per square inch on a thirty (30) pounds per square inch gauge using air, CO2 or Nitrogen for not less than fifteen (15) minutes with no perceptible drop in pressure. For welded piping, and for piping carrying gas at pressures in excess of fourteen (14) inches (356 mm) water column pressure, the test pressure shall not be less than sixty (60) pounds per square inch (413.4 kPa) and shall be continued for not less than thirty (30) minutes with no perceptible drop in pressure.

G2417.4.2 (406.4.2) Test duration **Delete in its entirety**

G2425.8 (7) Appliances not required to be vented **Delete in its entirety**

G2433.1 General **Delete in its entirety and substitute**

Log lighters are prohibited.

G2445 Unvented room heaters **Delete section in its entirety and substitute**

Unvented room heaters and unvented fireplaces are prohibited within a dwelling.

Clarification: IRC Section G2445 and IFGC Section 501.8(8) are deleted in their entirety and amended to prohibit the use of unvented room heaters and specifically unvented or ventless fireplaces. These are defined as appliances that have no flue collar or flue pipe associated with them and are designed to discharge all products of combustion through the front or face of the appliance and into the room or space being heated. It is the intent of the Building Official to prohibit the installation of these appliances inside dwellings or to provide heat to habitable spaces. However, these appliances may be installed in accordance with their listings and manufacturers specifications, outside or on patios with or without covers, with at least one open side that communicates directly with the atmosphere.

Chapters 34 through 43. **Delete Chapters in their entirety and substitute** Chapters 34 through 44 are deleted in their entirety and replaced by a new Chapter 34, General Requirements, which shall to read as follows:

CHAPTER 34
GENERAL REQUIREMENTS

E3401.1 Scope. This chapter governs all electrical components, equipment and systems used in buildings and structures regulated by this code.

E3401.2 Criteria. All electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of NFPA 70 (National Electric Code, NEC), as amended and adopted by Douglas County.

AMENDMENTS TO THE 2018 INTERNATIONAL BUILDING CODE (IBC)

Note: Refer to the section "Common to all adopted 2018 International Codes" for more information.

Appendix C - Group U Agricultural Buildings — **Adopt Appendix**

Wildfire Mitigation Standards — **Adopt as an appendix**
Attached hereto, as Exhibit "B"

Water Supply Standard for Rural Firefighting — **Adopt as an appendix**
Attached hereto, as Exhibit "C"

Appendix O – Solar Photovoltaic Power Systems — **Adopt as a new appendix**
Attached hereto, as Exhibit "E"

101.1 Title — **Insert**
Douglas County Building Division

101.4.4 Property Maintenance — **Delete in its entirety**

105.2(2) Work exempt from permit (Building) — **Delete item 2 and substitute**
2. Fences not over 7 feet high, unless electrically energized. All electrified fences shall require permitting and compliance with this code, the adopted National Electrical Code and International Fire Code as amended and adopted by Douglas County.

105.3(8) Application for permit — **Add a new section**
A soils test of the building site prepared by a professional engineer registered by the State of Colorado shall be submitted with the application for a building permit. A professional engineer registered by the State of Colorado shall design the foundation in accordance with the Soils Report. When the building site is located in a hillside area, or in the opinion of the Building Official, is located in an area subject to geological hazards or steep slopes, the Building Official may require an engineering geologist, working within their field of expertise, to submit specific recommendations regarding the building site and the proposed location and design. Such recommendations shall include, but are not limited to, the relationships of site grading, structural integrity, site vegetation characteristics (or potential), location of septic drain fields, and protection of adjacent property.

105.3.1.1 Election to proceed under previous code — **Add new subsection**
Within the first 180 days following the adoption of this code, an applicant under Subsection 105.3 may elect to, and if approved by the Building Official may, proceed under the set of codes previously adopted on August 9, 2016; provided, however, that

said election must be made certain and in writing, and under no circumstances shall an applicant be permitted to proceed partially under one set of codes and partially under the other.

109 Fees — **Delete section and all subsections to fees in their entirety**

110.3.1 Footing and foundation inspection — **Add to end of subsection**

Inspections shall be performed by a Colorado registered professional engineer. A stamped written report shall be provided to the Building Official of the results for these inspections by a Colorado registered professional engineer.

111.1 Use and occupancy — **Add new exception**

2. Certificates of occupancy are not required for buildings and structures permitted under Section 312 Utility and Miscellaneous Group U.

113 Board of Appeals — **Delete this section in its entirety**

310.4.2 Lodging Houses. — **Add to end of subsection**

Owner-occupied lodging houses with five or fewer guest rooms and 10 or fewer total occupants shall be permitted to be constructed in accordance with the International Residential Code, provided an automatic sprinkler system is installed in accordance with IRC Section P2904 or that meets the requirements of NFPA 13D.

1010.1.10 Panic and fire exit hardware — **Add to end of subsection**

Where equipment rated 800 A or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and shall be equipped with listed panic hardware.

1507.17 Photovoltaic shingles. — **Addition to subsection**

and Appendix O.

1511.3.1.1 Roof Recover Exceptions — **Addition exception (4)**

Exception 4. Where the existing roof covering is asphalt shingle, a recover of asphalt shingle shall not be permitted.

1608.2 Ground snow loads — **Delete in its entirety and substitute**

Snow loads for portions of Douglas County outside of the Pike National Forest boundary shall be 30 pounds per square foot for an elevation up to 6,000 feet and shall increase 5 pounds per square foot for every 500-foot increment above 6,000 feet. Snow loads for all elevations above 8,000 feet shall be determined based on the Snow Load Design Data for Colorado recommendations prepared by the Structural Engineer's Association of Colorado. No reduction for ground snow load to flat roof snow load ($p_g = p_f$).

1609.3 Basic design wind speed **Delete in its entirety and substitute**

Risk Category II - Figure 1609.3(1) equals 115 miles per hour
Risk Category III - Figure 1609.3(2) equals 120 miles per hour
Risk Category IV - Figure 1609.3(3) equals 120 miles per hour
Risk Category I - Figure 1609.3(4) equals 105 miles per hour

1609.4.3 Exposure categories **Delete in its entirety and substitute**

The design wind exposure category for unincorporated Douglas County shall be Exposure C.

1612.3 Establishment of flood hazard areas **Delete in its entirety and substitute**

All flood hazard areas in unincorporated Douglas County shall be defined and governed by the Douglas County Zoning Resolution, Section 18, Floodplain – Overlay District.

1803.2.1 Investigations required **Add new subsection**

Based on soils reports for lots within the Dipping Bedrock Overlay District, as identified by the Colorado Geological Survey, the Building Official may require additional testing to determine the proper foundation design. Such additional testing may include, but are not limited to, testing for initial water content, initial dry density, grain size distribution, Atterberg Limits (liquid limit and plasticity index), percent swell and test load surcharge, swell pressure, penetration resistance (blow counts), and unconfined compressive strength.

1809.5 Frost protection **Addition as first sentence**

Frost depth for all areas of Douglas County shall be a minimum of 36 inches.

3001.2 Emergency elevator communication systems for the deaf, hard of hearing and speech impaired. **Delete in its entirety**

3111.1 General **Delete in its entirety and substitute**

Solar photovoltaic panels/modules shall comply with the requirements of this code and IBC Appendix O (added herein).

AMENDMENTS TO THE 2018 INTERNATIONAL PLUMBING CODE (IPC)

Note: Refer to the section "Common to all adopted 2018 International Codes" for more information.

Appendix E **Adopt appendix**

Sizing of Water Piping Systems

101.1 Title **Insert**

Douglas County Building Division

106.6 Fees **Delete section and all subsections to fees in their entirety**

108.4 Violation penalties **Delete in its entirety**

108.5 Stop work orders — **Delete the last sentence**

109 Means of appeal — **Delete in its entirety**

305.4.1 Sewer depth — **Delete in its entirety**

308.7.2 Hanger rods — **Add a new subsection**

308.7.2 Hanger Rods
Hanger rods shall be sized per Table 308.7.2(1)

Table 308.7.2(1)
Minimum Hanger Rod Size

Pipe and Tube Size (inches)	Rod Size (inches)
1/2 - 4	3/8
5 - 8	1/2
10 - 12	5/8

903.1 Roof extension — **Delete in its entirety and substitute**

All open vent pipes that extend through a roof shall be terminated at least twelve (12) inches above the roof, except where a roof is to be used for any purpose other than weather protection the vent extension shall terminate not less than 7 feet above the roof.

1003.2.1 Municipalities or special districts — **Add a new subsection**

Regulations by the municipalities or special districts for wastewater into which the grease trap or interceptor effluent is transported and/or treated may supersede the requirements of Section 1003.

1302 On-site non-potable water reuse systems — **Delete in its entirety**

Chapter 14 Subsurface Landscape Irrigation Systems — **Delete in its entirety**

AMENDMENTS TO THE 2018 INTERNATIONAL MECHANICAL CODE (IMC)

Note: Refer to the section "Common to all adopted 2018 International Codes" for more information.

101.1 Title — **Insert**

Douglas County Building Division

106.5 Fees — **Delete section and all subsections to fees in their entirety**

108.4 Violation penalties — **Delete in its entirety**

108.5 Stop work orders — **Delete the last sentence**

AMENDMENTS TO THE 2018 INTERNATIONAL FUEL GAS CODE (IFGC)

Note: Refer to the section "Common to all adopted 2018 International Codes" for more information.

101.1 Title — **Insert**

Douglas County Building Division

106.6 Fees — **Delete section and all subsections to fees in their entirety**

108.4 Violation penalties — **Delete in its entirety**

108.5 Stop work orders — **Delete the last sentence**

109 Means of appeal — **Delete in its entirety**

303.3(3) and (4) Prohibited locations — **Delete in their entirety**

404.12 Minimum burial depth — **Delete and substitute**

Underground gas piping systems shall be installed at a minimum depth of eighteen (18) inches (457 mm) below grade.

404.12.1 Individual outdoor appliances — **Delete in its entirety**

406.4.1 Test pressure — **Delete and substitute**

406.4.1 Test pressure and duration

Low pressure gas piping systems not exceeding six (6) inches of water column shall be tested at ten (10) pounds per square inch on a thirty (30) pounds per square inch gauge using air, CO2 or Nitrogen for not less than fifteen (15) minutes with no perceptible drop in pressure. For welded piping, and for piping carrying gas at pressures in excess of fourteen (14) inches (356 mm) water column pressure, the test pressure shall not be less than sixty (60) pounds per square inch (413.4 kPa) and shall be continued for not less than thirty (30) minutes with no perceptible drop in pressure.

406.4.2 Test duration — **Delete in its entirety**

501.8 (8) Appliances not required to be vented — **Delete in its entirety**

603.1 General — **Delete in its entirety and substitute**

Log lighters are prohibited.

621 Unvented room heaters — **Delete section in its entirety and substitute**

Unvented room heaters and unvented fireplaces are prohibited within dwellings. (See clarification in the IRC amendments).

AMENDMENTS TO THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)

Note: Refer to the section "Common to all adopted 2018 International Codes" for more information.

R101.1 Title — **Insert**

Douglas County Building Division

104 Fees — **Delete section and all subsections to fees in their entirety**

108.4 Failure to comply — **Delete subsection in its entirety**

109 Board of appeals — **Delete section in its entirety**

C103.6.3 Systems operation control — **Delete subsection in its entirety**

R202 Definitions — **Delete in their entirety and substitute**

RESIDENTIAL BUILDING
For this code, includes single-family as defined in the IRC, R-3 buildings, as well as R-2 and R-4, buildings three stories or less in height above grade.

EQUIPMENT ROOM
A space that contains either electrical equipment, mechanical equipment, machinery, water pumps, or hydraulic pumps that are a function of the buildings' services.

R401.3 Certificate — **Delete the first two sentences and substitute**

A permanent certificate shall be completed by the builder or permit holder and be posted on the return air plenum of the furnace where it is readily accessible. Where a return air plenum is not available, the certificate shall be posted in the area housing the mechanical equipment.

R402.4.1.2, Testing — **Delete the first sentence and substitute**

The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding five air changes per hour or 0.30 cubic feet per minute for multi-family units and not exceeding three air changes per hour or 0.24 cubic feet per minute for all other residential buildings and dwelling units.

R402.4.4 Rooms containing fuel burning appliances — **Delete in its entirety and substitute**

In Climate Zones 3-8, where open combustion air ducts provide combustion air to open combustion fuel-burning appliances, the appliances and combustion air opening shall be

located outside the building thermal envelope or enclosed in a room that is isolated from inside the thermal envelope. Such rooms shall be insulated in accordance with the envelope requirements of Table R402.1.2, where the walls and ceilings shall meet a minimum of the basement wall R-value requirement. The door into the room shall be fully gasketed and any waterlines in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to an R-value of not less than R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section R402.4.2 and Section R1006 of the International Residential Code.

Exhibit B

WILDFIRE MITIGATION STANDARDS

General

(a). Purpose. The provisions of this appendix chapter are intended to promote public safety and welfare by reducing the risk of fire-induced damages to property and the environment.

(b). Scope. This chapter applies to all property, buildings and structures located within wildfire hazard areas as determined by the Wildfire Overlay District Map and site-specific rating and analysis. Buildings or conditions in existence at the time of the adoption of this standard are allowed to have their use or occupancy continued, if such condition, use or occupancy was legal at the time of the adoption of this standard.

(c). Design and Construction. The design and construction of buildings and structures located within the boundaries of a Wildfire Hazard Area shall be in accordance with the standard set forth below.

Chapter 1 Introduction

1-1 Scope. This standard presents minimum planning criteria for the protection of life and property from wildfire. It includes information on safe procedures and practices at the wildland/urban interface or intermix.

1-2 Purpose. The purpose of this standard is to provide criteria for fire agencies, land use planners, architects, developers, forestry consultants and local government for development in areas that may be threatened by wildfire.

1-3 Definitions. For the purpose of this standard, the following terms have the meanings shown below:

Access Routes. Principal vehicular ingress and egress to a structure or through a development, crossing more than one parcel, including public and private roads, streets and lanes, that extend to and intersect with a publicly maintained road, street, or lane.

Accessory Building or Structure. Any building or structure used incidentally to another building or structure or other allowed use, and which is located on the same lot or parcel.

Aerial Fuels. Standing and supported live and dead combustibles not in direct contact with the ground and consisting mainly of foliage, twigs, branches, stems, cones, bark, and vines.

Approved. Acceptable to the "authority having jurisdiction."

Aspect. Direction towards which the slope faces.

Authority Having Jurisdiction. The "authority having jurisdiction" shall be the Building Official. When matters of joint interest are involved, the Building Official may request referral comments from other organizations, offices, or individuals.

Brush. Shrubs and scrub vegetation or other vegetative growth heavier than grass but not full tree size.

Building. Any structure used or intended for supporting any use or occupancy.

Classified Roof. A roof constructed with a roof covering that is listed as meeting the requirements for Class A, B, or C roof covering materials (see NFPA 256, Standard Methods of Fire Tests of Roof Coverings).

Combustible. Any material that, in the form in which it is used and under the condition anticipated, will ignite and burn.

Defensible Space. An area either natural or man-made, where material capable of allowing a fire to spread unchecked has been treated, cleared or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire suppression operations to occur.

Development. Human-made improvement of property.

Dwelling Unit. Any building or structure or portion thereof that contains living facilities with provisions for sleeping, eating, cooking, and sanitation for not more than one family.

Fire Hydrant. A valved connection on a piped water supply system having one or more outlets and that is used to supply hose and fire department pumpers with water.

Fuel Break. An area, usually a long strip strategically located, wherein vegetative fuels are reduced in volume and maintained to cause a reduction of fire intensity if ignited by a wildland fire.

Fuel Loading. The volume of fuel in a given area, generally expressed in tons per acre.

Fuel Modification. The removal of fuels, increased spacing of individual plants or reduction of fuel loading.

Fuels. All combustible materials within the wildland/urban Interface or wildland/urban intermix, including, but not limited to, vegetation and structures.

Ground Fuels. Any native or landscape vegetation not considered a tree and generally in contact with the ground, including, but not limited to, duff layer and loose surface litter.

Home Ignition Zone. The structure itself and everything around it up to a minimum of 100 feet unless limited by property boundaries.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

Noncombustible. A material that, in the form in which it is used and under the conditions anticipated, will not aid combustion or add appreciable heat to an ambient fire. Materials tested in accordance with Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C (1382° F), ASTM E 136, and conforming to the criteria contained in Section 7 of the referenced standard shall be considered non-combustible.

Occupancy. The purpose for which a building, or part thereof, is used or intended to be used.

Residential Driveway. A vehicular access for private use that serves one lot or parcel connecting a house, garage, or other allowed use to the public or private road.

Residential Shared Driveway. A vehicular access for private use that may serve no more than three lots or parcels for the purpose(s) of ingress and egress to buildings, structures, or other allowed use.

Roadway. Any surface improved, designed, or ordinarily used for vehicular travel other than a private residential driveway or residential shared driveway as defined in this Standard.

Slope. Upward or downward incline or slant, usually calculated as a percent of slope [rise or fall per 100 feet of horizontal distance].

Standard. This Exhibit B, Douglas County Wildfire Mitigation Standards.

Structure. That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

Traveled Way. The portion of a roadway that provides for vehicular travel in all permitted directions.

Turnaround. A portion of a roadway or driveway unobstructed by parking, that allows for a safe reversal of direction for emergency equipment.

Turnouts. A widening in a roadway or driveway of sufficient length and width to allow vehicles to pass one another.

Wildland/Urban Interface. An area where development and wildland fuels meet at a well-defined boundary.

Wildland/Urban Intermix. An area where development and wildland fuels meet with no clearly defined boundary.

Wildfire. An unplanned and unwanted fire requiring suppression action; an uncontrolled fire, usually spreading through vegetative fuels but often threatening structures.

Chapter 2 Wildland/Urban Interface and Wildland/Urban Intermix Analysis

2-1 General. The analysis of the wildland/urban interface or wildland/urban intermix will help identify and document local problem areas and guide the application of standards and establishment of priorities relative to fire danger.

2-2 Analysis Ratings. The authority having jurisdiction shall perform a wildland fire hazard analysis of all developments, existing or planned, to determine wildland fire protection ratings. The ratings developed under the authority of this section shall be the basis for the implementation of fire conscious design and construction criteria. The higher the relative value, the higher the wildland/urban interface or wildland/urban intermix hazard rating. Analysis ratings of 16 or higher shall be required to comply with the requirements of this Standard, as amended. Extreme hazard severity classifications shall be defined as medium size or heavy, large fuels in combination with slopes 21% or greater.

2-3 Analysis Components. The analysis shall contain the following components:

(a) Wildland/urban interface or wildland/urban intermix boundaries

(b) Slope hazard rating

(c) Structure hazard rating

(d) Additional factors rating

(e) Wildland/urban interface or wildland/urban intermix hazard rating

2-3.1 Mapping Wildland/Urban Interface or Mapping Wildland/Urban Intermix Areas. Areas shall be delineated as logical units or areas and given a name or number.

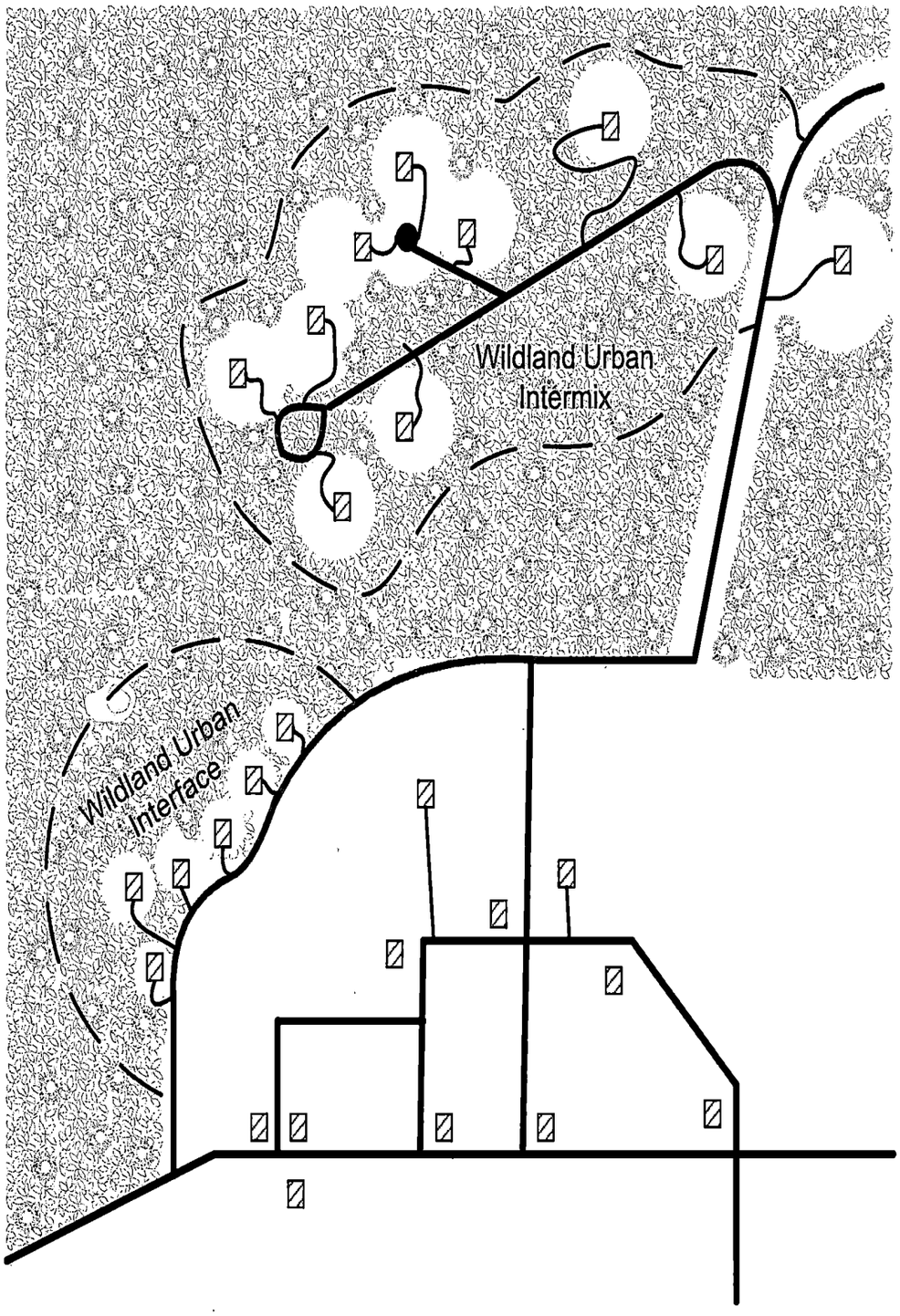

Figure 2-3.1 Wildland/urban interface and wildland/urban intermix

2-3.2 Assigning a Fuel Hazard Rating. For each area wildland/urban interface and wildland/urban intermix area, a fuel hazard rating shall be assigned based on Table 2-3.2. where fuel types vary within an area, the rating assigned for an area shall be that which best represents the fuel type.

Table 2-3.2 Fuel Hazard Rating

Type	Rating
Small, light fuels (grass, weeds, shrubs)	1
Medium size fuels (brush, large shrubs, small trees)	2
Heavy, large fuels (woodland, timber, heavy large brush)	3

2-3.3 Assigning a Slope Hazard Rating. For each wildland/urban interface and wildland/urban intermix area, a slope hazard rating shall be assigned based on Table 2-3.3. Where slopes vary within an area, the rating for the area shall be that which best represents the slope range.

Table 2-3.3 Slope Hazard Rating

Slope	Rating
Mild slopes (0-5%)	1
Moderate slopes (6-20%)	2
Steep slopes (21-40%)	3
Extreme slopes (41% and greater)	4

2-3.4 Assigning a Structure Hazard Rating. For each wildland/urban interface and wildland/urban intermix area, a structure rating that best represents the combination of design characteristics in each unit or area shall be assigned based on Table 2-3.4. Ratings occurring between those shown in the table shall be assigned where they represent areas of mixed structures.

Table 2-3.4 Structure Hazard Rating

Design Characteristics	Rating
Class A roof and non-combustible siding materials	3
Classified roof and combustible siding materials	5
Unclassified roof and non-combustible siding materials	7
Unclassified roof and combustible siding materials	9

2-3.5 Assigning an Additional Factor Rating. Where other factors influence community needs and where determined to be appropriate by the authority having jurisdiction, an additional factor rating shall be assigned based on Table 2-3.5. Other factors shall be permitted to be considered in addition to those listed in the table include water supplies, access, and fire behavior. NFPA 1141, Standard for Fire Protection in Planned Building Groups, and NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting, shall be permitted to be utilized.

Table 2-3.5 Additional Factor Rating

Additional Factor	Rating
Areas having a history of fire occurrence higher than the surrounding area due to special situations such as lightning, railroads, escaped debris burning, arson, etc.	+3
Areas that are periodically exposed to unusually severe weather such as strong winds.	+2
Existing areas where fuel modifications or fuel breaks provide usable fire control points or protection to structures or wildland.	-3
Areas where local municipal type water services exist and are served by hydrants approved by a local fire protection district or fire department with an ISO (Insurance Service Organization) rating class of 1, 2, 3, 4, or 5.	-2
Areas where local municipal type water services exist and are served by hydrants approved by a local fire protection district or fire department with an ISO (Insurance Service Organization) rating of Class 6, 7, 8, or 9.	-1

2-3.6 Calculating the Wildland/Urban Interface or Wildland/Urban Intermix Hazard Rating. The wildland/urban interface or wildland/urban intermix hazard rating shall be calculated for each area by multiplying the fuel hazard rating by the slope hazard rating, adding the structure hazard rating to the subtotal, and then adding or subtracting the additional factor rating from the total.

2-4 Establishing Wildland/Urban Interface or Wildland/Urban Intermix Planning Priorities. The relative wildland/urban interface or wildland/urban intermix hazard of each area shall be rated from highest to lowest.

2-5 Review and Appeals. Reviews of the applicability of this standard for individual sites within a subdivision shall be requested in writing upon application for a building permit with reasons and justification for review. The Building Official shall review such request and provide approval, denial, or approval with conditions. Decisions may be appealed to the Douglas County Board of Appeals as provided for by Section 30 of this Resolution.

Chapter 3 Fuel Modification Planning

3-1 General. This chapter will provide guidance in the mitigation of measures associated with fuel hazards and special hazard conditions. Fuel modifications shall be the primary mitigation measure. New developments shall complete the hazardous fuel reduction and mitigation work outlined in the Douglas County approved forest management or wildfire mitigation plan submitted by the applicant, if required, prior to the issuance of building permits for habitable structures within the development. The Douglas County Wildfire Mitigation Specialist shall determine whether a wildfire mitigation or forest management plan is required based on current forest conditions

3-2 Evaluation Factors. As prescribed in Chapter 2 of this standard, a comprehensive assessment of the fuel hazard shall be made. Factors that shall be considered in the assessment and designated on maps include:

(a) Fuel-type identification

(b) Fuel loading (volume)

(c) Size of fuel bed (acres)

(d) Slope and aspect

3-2.1 Fuel-type Identification. All fuel, natural vegetation, as well as other flammable materials existing within the area shall be identified and rated as its potential to increase the hazard. The ease of ignition and ability to assist in the spread of fire are important factors.

3-2.2 Fuel Loading. The volume of fuels, both presently existing and likely to be present under expected development, shall be estimated and included on maps.

3-2.3 Slope. Percent of slope and aspect shall be determined and indicated on maps.

3-2.4 Fuel Modification. The purpose of the fuel modification effort shall be to reduce the volume of vegetative fuel to protect structures from approaching wildfire as well as to reduce the potential for a structure fire from spreading to the wildland. The fuel modification shall be initially provided by the developer prior to building permit issuance for habitable structures, through the implementation of a Douglas County approved wildfire mitigation or forest management plan and shall be maintained by the property owner. Additional fuel modification may be required when buildings or structures are proposed through the building permit process to create defensible space management zones around buildings or structures.

3-2.5 Maintenance of Defensible Space.

Responsibility. Persons owning, leasing, controlling, operating or maintaining buildings or structures are responsible for maintenance of defensible space. Maintenance of the defensible space includes modifying or removing non-fire resistive vegetation and keeping leaves, needles and other dead vegetative material regularly removed from roofs of buildings and structures.

Trees. Prune tree branches extending to within 10 feet of any structure to maintain a minimum horizontal clearance of 10 feet. Prune tree branches within the defensible space to remove limbs located less than 10 feet above the ground surface adjacent to trees.

Prune portions of tree branches that extend within 10 feet of the outlet of a chimney to maintain a minimum horizontal clearance of 10 feet.

3-3 Defensible Space Management Zones.

Zone 1 is the area of maximum modification and treatment. It consists of an area of 15 feet around the structure in which all flammable native vegetation is removed. This 15 feet is generally measured from the outside edge of the building or structure's eaves and any attached structures, such as decks.

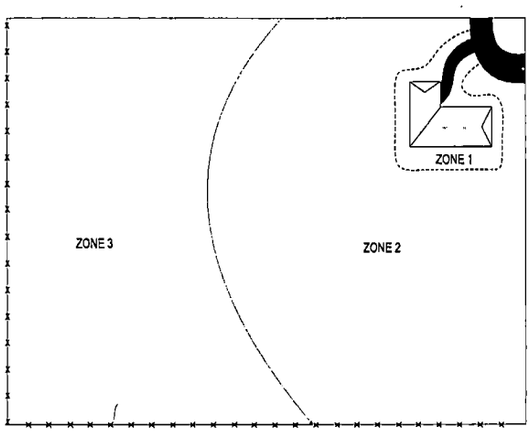

Figure 3-3: Forested property showing the three fire-defensible zones around a home or other structure.

Zone 2 is an area of fuel reduction. It is a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible zone, or home ignition zone (HIZ) consisting of the home or structure itself, zone 1 and zone 2. shall extend at least 100 feet from the structure unless limited by property boundaries. Within this zone, the continuity and arrangement of vegetation is modified. Remove stressed, diseased, dead or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Extend thinning along either side of the driveway all the way to the main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing safety and the aesthetics of the property.

Zone 3 is an area of traditional forest management and is of no particular size. It extends from the edge of the defensible space zone to the property boundaries.

3-3.1 Modification of Fuel Types. Where consistent with ecological factors, less fire-prone vegetation shall be encouraged.

3-3.2 Reduction of Fuel Loading. Trees and brush shall be cleared away from structures for a distance that is in accordance with section 3-3 to prevent ignition of either the structure or the vegetation, should the other burn. Vegetation existing away from the immediate area of the structure shall be thinned and pruned to prevent a fire from being carried toward or away from the structure. Annual grasses shall be mowed to 6 inches or less in accordance with Figure 6. Ground litter shall be removed annually. Over-mature, dead and dying trees shall be evaluated as to their potential to ignite and to carry fire. All trees determined to contain such potential shall be removed.

3-3.3 Mitigation of Slope and Aspect Impact. Slope and aspect greatly affect the potential for carrying fire, and very little opportunity exists to modify them directly. Where the degree of slope or aspect is determined to affect the hazards, greenbelts or fuel breaks shall be provided.

3-3.4 Building Envelope Siting. Building envelope siting shall comply with Chapter 3 of this standard. If proper building envelope siting cannot be or is not met as required by Chapter 3, the Building Official, in his or her sole discretion, may approve alternative mitigation methods to include, but not be limited to, private fire protection systems, classified siding, Class "A" roofing, or triple pane windows.

Chapter 4 Roads, Streets, and Ways

Delete Section 4-1 through 4-4.10 in their entirety. All new roads, whether public or private, shall be designed and constructed in accordance with the most current edition of the Douglas County Roadway Design and Construction Standards manual as amended and adopted by the Board of County Commissioners.

4-4.11 Driveways and shared driveways. Driveways and shared driveways serving new structures shall be designed and installed in accordance with this section. Additions that increase the area of an existing structure by greater than 50% or result in an aggregate area greater than 5,000 square feet may be required by Douglas County to meet the following criteria to the maximum extent practicable.

(A) All driveways serving a single lot or parcel shall provide a minimum unobstructed all-weather driving surface width of twelve (12) feet and a minimum unobstructed vertical and horizontal clearance of fifteen (15) feet. A shared driveway as defined in this standard shall provide a minimum unobstructed all-weather driving surface width of sixteen (16) feet.

(B) No driveway shall be constructed with a curvature radius of less than thirty-six (36) feet measured at the centerline of the driveway.

(C) Grades shall not be steeper than ten (10) percent, except that the Building Official shall be permitted to allow steeper grades where alternative mitigation measures have been submitted and approved by the Building Official.

(D) Driveways shall be maintained and shall have an all-weather driving surface to support the heaviest fire apparatus likely to be driven upon it. The driveway shall be accessible anytime of the year, day or night. For the purpose of this section, an all-weather driving surface shall be class six (6) road base or equivalent.

(E) A vehicular turnaround shall be provided at all building or structure sites when the driveway that provides access to the building or structure exceeds one hundred fifty (150) feet in developed length and shall be within fifty (50) feet of the building or structure served.

4-4.12 Gated Entrances to Private Driveways.

(a) The clear opening provided through the gate shall be 3 feet wider than the traveled way and provide a minimum unobstructed vertical clearance of 15' feet.

(b) All gates shall be located at least 30 feet from the public right-of-way or private road. Swinging gates shall open inward, allowing a vehicle to stop without obstructing traffic on the public or private road.

Gated vehicular entrances not shown on the submitted site plan shall be subject to the following criteria:

1. Application for an individual permit for construction of the proposed gate, including construction plans and foundation or footing engineering if applicable.

2. Electrical permit if applicable.

3. Site plan submittal to Douglas County Planning and Zoning for review of easements, setbacks or other applicable criteria.

Delete Chapter 5 in its entirety.

Chapter 6 Emergency Water Supplies

Where, in any specific case, the amount of water storage for rural fire fighting conflicts with International Fire Code, the Standard for Water Supplies for Rural Firefighting, attached hereto as Exhibit "C" shall govern.

6-1 General. This chapter describes the process by which provisions for emergency water supplies shall be evaluated, designed, constructed, and maintained.

6-2 Notification. The authority having jurisdiction shall be notified in writing before any water system is constructed, altered, or removed and before site development or construction of any structure commences so that fire protection can be evaluated and ample water supply capabilities pertinent to such construction can be established.

6-3 Evaluation of Water Supply Needs.

6-3.1 Authority. The fire protection agency having jurisdiction shall evaluate all buildings, proposed and existing, to obtain information required for computing minimum water supply. Information obtained from plans or on-site surveys and determinations made and recorded shall reflect the water supply category required. The computation of minimum water supplies for other than municipal, domestic, or fixed fire protection systems shall be in accordance with NFPA 1142 or other approved method.

6-3.2 Design, Construction, and Maintenance. Based upon the water supply evaluation, the authority having jurisdiction shall approve the design, construction, and maintenance of water

supplies and distribution systems to ensure that the fire protection concerns have been addressed and adequate water supplies and access thereto have been provided.

6-4 Minimum Water Supply Requirements. Water shall be available to provide a minimum fire flow of two hundred fifty (250) gallons per minute for a two (2) hour duration in accordance with Exhibit C of this Resolution.

6-5 Static Water Supplies. The design and construction of and access to static water supplies shall be in accordance with NFPA 1142 or other approved method.

6-6 Signage of Water Supplies. When required by the authority having jurisdiction, each fire hydrant or access to water shall be identified as follows:

(a) A reflectorized marker, with a minimum dimension of three (3) inches, shall be located on the driveway address sign signifying the hydrant location and on a fire-retardant post located near the fire hydrant, and;

(b) A fire-retardant reflectorized sign with the words "DRAFT WATER" or "PRESSURE WATER" having letters a minimum of four (4) inches in height, with ½-inch stroke, reflectorized and contrasting to the background color, shall be located near the hydrant or access to water.

(c) The signpost shall be within three (3) feet of said fire hydrant or access to water, with the sign no less than three (3) feet nor greater than five (5) feet above the ground and visible from the driveway.

Chapter 7 Structural Design and Construction

7-1 General. All proposed buildings in the wildland/urban interface or the wildland/urban intermix having an analysis rating 16 or higher, as determined by chapter 2, shall be designed and constructed to comply with the requirements of this chapter and with this standard. All buildings and structures located in the National Forest shall be required to comply with the requirements of this chapter and with this standard. Agricultural properties, not located in a subdivision, shall have the applicability of this standard determined upon application for a building permit.

7-1.1 Minimum Requirements. Structures and developments in or adjacent to wildland fire hazard areas shall be located, designed, and constructed in a manner to minimize the possibility of ignition from a wildfire and to minimize the spread of a structural fire to the wildland.

7-2 Roofing. Only listed roof covering tested and rated in accordance with UL 790, NFPA 256, Standard Methods of Fire Tests of Roof Coverings; ASTM E 108, Standard Test Methods for Fire Tests of Roof Coverings; or equivalent, shall be used. Subdivision covenants, conditions, and restrictions shall not require the use of roof covering materials that do not meet this Standard.

7-2.1 Wood Shakes and Wood Shingles. Wood shakes and wood shingles are prohibited within the boundaries of the Wildfire Hazard Overlay District.

7-2.2 Replacement or Repair of Roof Coverings. The roof covering on buildings or structures in existence prior to the adoption of this standard that are replaced or have 100 square feet or more replaced in a 12-month period shall be replaced entirely with a roof covering required for new construction in accordance with Chapter 7 of this Standard.

7-3 Vents. Vents for attic and subfloor ventilation shall be screened with a corrosion-resistant, noncombustible wire mesh with the mesh not to exceed nominal ¼ inches in size.

7-4 Exterior Vertical Walls. Exterior vertical walls shall be constructed of at least ½-inch nominal sheathing or equivalent material and shall extend from the top of the foundation to the roof line.

7-5 Chimneys and Flues.

7-5.1 Outlet Screen. Every chimney, flue, or vent shall be provided with an approved spark arrester consisting of 12-gauge welded or woven wire mesh not exceeding ½ inch.

7-5.2 Construction. Chimney or flue outlets shall be constructed with 10-foot clearance from all vegetation and obstructions.

7-6 Manufactured Homes. Manufactured homes shall meet all applicable construction and safety standards. Permanently located mobile and manufactured homes with an open space beneath shall be provided with full skirting constructed of noncombustible material or a fire resistive assembly having a minimum fire resistive rating of 20 minutes.

7-6.1 Enclosed space beneath the mobile or manufactured homes. Any enclosed space beneath the mobile or manufactured home shall be vented according to 7-3.

7-7 Location of LP Fuel Storage Tanks. Location of LP fuel storage tanks shall be in accordance with the International Fire Code.

Chapter 8 Public Fire Prevention and Fire Safety Information and Education

8-1 Information and Education Plan. The authority having jurisdiction shall prepare a year-round fire prevention and fire safety public information/education plan. The plan, at a minimum, shall identify and analyze:

(a) Specific hazards

(b) Risks

(c) Fire causes

(d) Applicable prevention and safety programs

(e) Target audiences

(f) Activities.

The plan shall utilize a variety of communication techniques to achieve desired objectives.

Chapter 9 Referenced Publications

9-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document.

9-1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 1144, Standard for Reducing Structure Ignition Hazards from Wildland Fire 2008 edition

NFPA 256, Standard Methods of Fire Tests of Roof Coverings, 2003 edition

NFPA 1141, Standard for Fire Protection in Planned Building Groups, 2003 edition

NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting, 2007 edition

9-1.2 International Code Council

International Wildland-Urban Interface Code 2012 edition

9-1.3 Colorado State Forest Service

Standard for Creating Defensible Zones no. 2012-1

Commentary on Defensible Space Zone Prescriptions

Descriptions

Zone 1

The size of Zone 1 is 15 feet, measured from the edges of the structure.

Remove all native vegetation from Zone 1 to reduce fire hazards. If you do keep a tree, consider it part of the structure and extend the distance of the entire defensible space accordingly. Isolate

the tree from any other surrounding trees. Prune it to at least 10 feet above the ground. Remove any branches that interfere with the roof or are within 10 feet of the chimney. Remove all "ladder fuels" from beneath the tree. Ladder fuels are vegetation with vertical continuity that allows fire to burn from ground level up into the branches and crowns of trees. Ladder fuels are potentially very hazardous but are easy to mitigate. No ladder fuels can be allowed under tree canopies. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/2 the height, whichever is the least).

Zone 2

Zone 2 is an area of fuel reduction designed to reduce the intensity of any fire approaching a building or structure. Follow these management steps.

Thin trees and large shrubs so there are at least 10 feet between crowns. Crown separation is measured from the furthest branch of one tree to the nearest branch on the next tree (Figure 3). On steep slopes, allow more space between tree crowns. (See Figure 4 for minimum required spacing for trees on steep slopes.) Remove all ladder fuels from under these remaining trees. Carefully prune trees to a height of at least 10 feet.

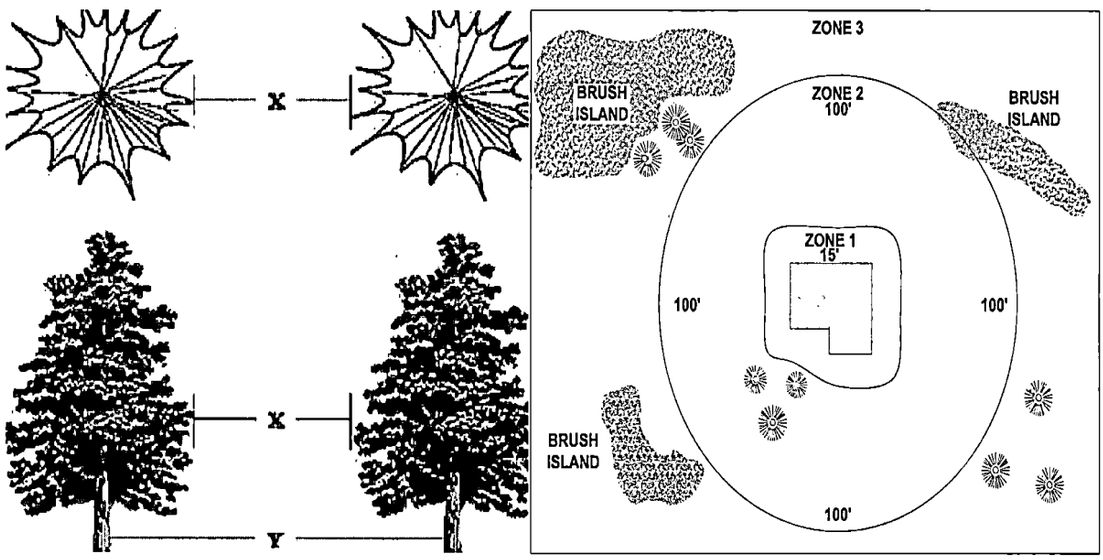

Figure 3: X = crown spacing; Y = stem spacing. Do not measure between stems for crown spacing, measure between the edges of tree crowns.

Small clumps of 2 to 3 trees may be occasionally left in Zone 2. Leave more space between the crowns of these clumps and surrounding trees.

Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. Thin the portions of Zone 3 adjacent to Zone 2 more heavily than the outer portions.

Zone 3

This zone is of no specified size. It extends from the edge of the defensible space to the property lines.

Forest management in Zone 3 is an opportunity to increase the health and growth rate of the forest in this zone. Keep in mind that root competition for available moisture limits tree growth and ultimately the health of the forest.

A greater number of wildlife trees can remain in Zone 3. Make sure that dead trees pose no threat to power lines or vehicular access.

Mowing is not necessary in Zone 3.

Any approved method of slash treatment is acceptable for this zone, including chipping or lop-and-scatter.

Grasses

Keep dead, dry or curing grasses mowed to less than 6 inches. Defensible space size where grass is the predominant fuel can be reduced. Use Figure 6 when applying this practice.

Figure 4: Minimum tree crown and shrub clump spacing

% slope	Tree Crown Spacing	Brush and Shrub Clump Spacing
0 -10 %	10′	2 1/2 x shrub height
11 - 20%	15′	3 x shrub height
21 - 40%	20′	4 x shrub height
> 40%	30′	6 x shrub height

Figure 5: Minimum tree spacing for Zone 3.

Tree Diameter Average Stem Spacing Between Trees	
(in inches)	**(in feet)**
3	10
4	11
5	12
6	13
7	14
8	15
9	16
10	17
11	19
12	21
13	23
14	24
15	26
16	28
17	29
18	31
19	33
20	35
21	36
22	38
23	40
24	42

Figure 6: Minimum defensible space size for grass fuels.

% slope	D-space size (uphill, downhill, sidehill)
0 - 20 %	30' Feet
21 - 40%	50' Feet
> 40%	70' Feet

Exhibit C

STANDARD FOR WATER SUPPLIES FOR RURAL FIRE FIGHTING

TABLE OF CONTENTS

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Section 1 Administration

1-1 Scope.

This standard defines the minimum requirements for fire protection water supplies necessary for the protection of property in rural areas of Douglas County. This standard applies to new parcels in rural areas in which adequate and reliable water supplies do not exist and shall apply to all portions of unincorporated Douglas County. Douglas County subdivision regulations may require greater amounts of water storage. Where, in any specific case, the amount of water storage for rural fire fighting conflicts with the International Fire Code for Group R- 3 occupancies, the requirements of this chapter shall govern.

1-2 Purpose.

This standard specifies minimum requirements for water supply for fire fighting purposes to protect property from fire in areas where water must be transported from a river, lake, canal, stream, pond, cistern, or other similar source of water that is available as a suction supply for fire department use. A hydrant served by a water distribution system shall be permitted to be the source of supply for water that is transported to the rural fire area.

It is the intent of this standard to provide and maintain water supplies for fire fighting purposes through the establishment of a cooperative working arrangement among the Douglas County Fire Districts, the developers of rural parcels, and the property owners.

1-3 Referenced Criteria.

The fire protection water requirements in this standard are based in part on NFPA 1142, NFPA 1144, ISO Fire Suppression Rating Schedule, and the International Fire Code. The information from these publications was evaluated and incorporated into this minimum standard in a manner which accounted for the actual fire flow and storage amounts, the ability of Douglas County Fire Districts to utilize the water, the need to account for increased and more effective operations as the fire districts strive to obtain the improved fire insurance ratings for their citizens, and the existing but sometimes unrecorded or undeveloped natural water sources within Douglas County.

1-4 Definitions.

Accessible. A condition that allows for fire department vehicles to approach and connect to a water supply. It shall be an all-weather road surface, capable of supporting a 20-ton fire apparatus, and it shall be maintained during all weather conditions to assure unimpeded vehicular access every day of the year.

Authority Having Jurisdiction (AHJ). The Douglas County Building Official shall be the "authority having jurisdiction".

Cistern. A water storage tank, usually underground and designed with positive pressure, designed to contain a designated volume of water and to permit the removal of water at no less than 1,000 gallons per minute.

Dry Barrel Hydrant. An outlet, for suction supply of fire protection water, connected to a cistern, which is designed with positive pressure and / or requires freeze protection. Dry barrel hydrants shall have a five (5) inch National Standard Thread (NST) outlet and be adapted for the local fire

district suction hose. Dry barrel hydrants shall meet the requirements of American Water Works Association (AWWA C502-85 Standard for Dry Barrel Hydrants).

Dry Hydrant. An outlet for suction supply of fire protection water connected to a natural body of water or cistern, which is designed without positive pressure or does not require freeze protection. Dry hydrants shall have a five (5) inch National Standard Thread (NST) outlet and be adapted for local fire district suction hose. Dry hydrants shall meet the requirements of the dry hydrant section of this standard and the Dry Hydrant Manual in Appendix B.

Fire Flow. The total amount of water expressed in volume at a prescribed rate (in gallons per minute) applied to suppress a fire and protect exposures.

ISO. The Insurance Service Office.

Natural Body of Water. A river, lake, canal, stream, or pond which, if upon evaluation is deemed acceptable during drought or freezing weather, could be utilized as a reliable and adequate source of water for fire protection.

Section 2 Rural Water Supply Standard for One and Two-Family Dwellings

2-1* General.

The standard requires a water supply system which is capable of providing two hundred fifty (250) gallons per minute (GPM) fire flow, with water storage sufficient to maintain the fire flow for a duration of two (2) hours. The water storage shall not be more than two (2) miles travel distance from the vehicular entrance to any parcel served by the water storage site. The water storage facility shall be funded and installed by the developer/owner prior to construction of any structure within the development.

2-1.1 Water Supply Evaluation Criteria.

The Fire Districts within Douglas County shall perform a survey of all developed water supplies suitable for fire protection use within their respective jurisdictions. This information shall be compiled into a usable format and shall be kept in the office of the Building Official for Douglas County. All Fire Districts shall be responsible for providing updated information to the Building Official, to maintain a current County Water Supply Report.

When reviewing proposed developments, the Building Official shall consult with the Fire District for a joint review of existing water for fire protection, utilizing the County Water Supply Report. This review shall evaluate water supplies within the Fire District's jurisdiction as well as those located within the two (2) miles travel distance within neighboring jurisdictions. All currently recognized water supplies shall be credited when determining the need for and the placement of new water storage sites.

2-1.2 Application.
This standard shall apply to all new rural developments that contain or create four (4) or more residential parcels. Developments legally in existence at the time of the adoption of this standard, or new developments that contain or create less than four (4) residential parcels, and additions or modifications to existing homes, are not required to provide minimum water supplies or upgrade existing water supplies to meet this standard.

2-1.3 Design Approval.
One (1) set of installation drawings, manufacturer's installation instructions, and a site plan shall be submitted to the Building Official for approval, and all permits required by Douglas County shall be obtained. All water storage systems shall be installed according to manufacturer's installation instructions. The Fire District and the Building Official may inspect the installation at any time.

2-2* Cistern Design.

2-2.1 Tank Size.
The minimum tank capacity shall not be less than thirty thousand (30,000) gallons. Two smaller tanks may be utilized in areas which may present unique installation problems. If two smaller tanks are installed, they must be connected to allow proper filling as well as discharge, and the combined capacity of both tanks shall not be less than thirty thousand (30,000) gallons.

2-2.2 Tank Material.
All water supply tanks shall be constructed of steel, fiberglass, plastic, or engineered concrete and shall be approved by the manufacturer to be appropriate for non-potable water storage. Steel tanks shall be coated and shall be provided with cathodic protection. Fiberglass and plastic tanks shall be constructed in accordance with appropriate ASTM Standards. Tanks and associated piping and appurtenances shall be new and have been used for no other purpose.

2-2.3 Outlet Piping.
All discharge piping shall be a minimum of six (6) inch diameter PVC Schedule Forty (40). Drain, waste and vent (DWV) pipe and fittings are not acceptable.

2-2.4 Fittings.
All fittings shall be of the type and schedule to be compatible with the piping being used.

2-2.5 Tank Access.
Tanks shall have a manhole or other approved means of access for tank inspection and repair. This access shall be capable of being closed and secured for purposes of safety.

2-2.6 Tank Fill Valve.
A tank fill valve shall be installed on the supply line from the well and shall be controlled by an approved tank level sensor that will ensure that the tank remains full.

2-2.7 Suction Supply Outlet.
All water supply cisterns shall have a minimum of one outlet that meets the size and design requirements of the local fire district. Cisterns designed with positive pressure and systems with discharge pipes that require freeze protection shall have at least one Dry Barrel Hydrant. Cisterns designed without positive pressure shall have at least one Dry Hydrant.

2-2.8 Tank to Outlet Line Valve.
All water storage tanks designed with positive pressure shall have a valve between the tanks and the outlet pipe. This valve shall be capable of being manually operated from ground level.

2-2.9 Tank Installation.
Tanks shall be installed in accordance with manufacturer's recommendations. The tank shall be installed in a manner, which will prevent freezing and surface erosion.

2-2.10 Pipe Installation.
Piping shall be installed in accordance with manufacturer's recommendations. Piping shall be installed in a manner which will prevent freezing and surface erosion.

2-2.11 Water Supply Easement.
An easement shall be recorded to allow the Fire District to repair, use, and maintain the water storage facility.

2-2.12 Water Use Agreement.
An agreement shall be signed and recorded, encumbering the property, granting the Fire District the perpetual right to utilize the water for the fire protection needs of the property to be served.

2-2.13 Well.
A well, installed in accordance with the requirements of the Colorado Division of Water Resources shall be connected to a cistern to maintain the fill level. The well may be a low volume (15 GPM) and shall be connected to the tank in an appropriate manner.

2-3* Natural Bodies of Water.

2-3.1 Outlet Piping.
All discharge piping shall be a minimum of six (6) inch diameter PVC Schedule Forty (40). Drain, waste and vent (DWV) pipe and fittings are not acceptable.

2-3.2 Fittings.
All fittings shall be of the type and schedule to be compatible with the piping being used.

2-3.3 Suction Supply Outlet.
All natural bodies of water utilized for fire protection water supplies shall have a minimum of one outlet that meets the size and design requirements of the local fire district. Natural bodies of water designed with positive pressure and systems with discharge pipes which required freeze

protection shall have a minimum of one Dry Barrel Hydrant. Natural bodies of water with suction outlets designed without positive pressure shall have at least one Dry Hydrant.

2-3.4 Pipe Installation.
Piping shall be installed in accordance with manufacturer's recommendations. Piping shall be installed in a manner, which will prevent freezing and surface erosion.

2-3.5 Water Supply Easement.
An easement shall be recorded to allow the Fire District to repair, use, and maintain the water supply facility.

2-3.6 Water Use Agreement.
An agreement shall be signed and recorded, encumbering the property, granting the Fire District the perpetual right to utilize the water for the fire protection needs of the property to be served.

2-4* Water Supply Access.
The water supply site shall be accessible from a public or private roadway.
A fire apparatus pullout shall be connected to the roadway and constructed to permit fire apparatus to position for water removal and to permit tenders to be filled and turned around. The pullout shall be designed as a forty-five (45) foot radius or twenty (20) foot by sixty (60) foot rectangular area with the water supply hydrant outlet located at the apex of the radius or the centerline of a rectangle. The outlet shall be located not more than eight (8) feet or less than six (6) feet from the edge of the all-weather surface. Two steel posts (bollards) shall be placed at the edge of the all-weather surface to protect the hydrant.

2-5* Testing and Maintenance.

2-5.1 Testing.
Acceptance testing shall be performed jointly by the Building Official and the Fire District whenever possible, prior to the construction of any structures within the development served by the water storage facility. Acceptance testing shall include vacuum test of draft piping, pressure testing at fifty (50) pounds per square inch for pipes in those systems designed with head pressure, and a flow test.

After acceptance, each water storage location shall be checked periodically, and reports kept by the Fire District. Fire Districts should establish a program for testing and maintenance of water supply facilities within their jurisdiction.

2-5.2 Maintenance.
The Fire District shall be responsible to ensure the operational readiness of the water supply facility. The Fire District may choose to delegate the cost and responsibility of the water system maintenance to an organization other than the Fire District. In such case the Fire District shall stipulate to a maintenance agreement, which must be reviewed and approved by Douglas County, that ensures the operational readiness and continued maintenance of each water supply facility.

Section 3 Rural Water Supply Standard for Buildings Other Than One and Two-Family Dwellings

3-1 General.
The required fire flow for buildings other than one and two-family dwellings shall be in accordance with the International Fire Code as amended.

3-2 Application.
Fire flow requirements may be modified when agreed upon by the fire code official and the building official. The Douglas County Standard for Water Supplies for Rural Fire Fighting, NFPA 1141, NFPA 1142, ISO Fire Suppression Rating Schedule or other approved method may be utilized to determine fire flow requirements.

APPENDIX "A"

A-2-1 General.
The application of this standard will, over a period of time, ensure adequate fire suppression water supplies for a large portion of Douglas County. The standard uses a systems approach to fire protection water supply requirements by encouraging a uniform application of these requirements. The installation of standard water supplies, in developed areas of the county, enhances the operation of mutual and auto aide companies in routine and conflagration fires. The use of a uniform standard by all fire districts can diminish the review problems encountered by fire personnel, planners and developers.

Fire Flow.
The minimum fire flow requirement is two hundred fifty (250) GPM based on the Fire Districts ability to transport water using their equipment. The ability to increase the fire flow from two hundred fifty (250) GPM to five hundred (500) GPM or more can be accomplished by utilizing auto aid or additions of tenders by the Fire District.

The two hundred fifty (250) GPM is recognized by ISO as the minimum fire flow necessary for credit as a protected property (Class 9) and a strong argument can be made for all Douglas County Fire Districts ability to apply the available fire flow to the fire. An analysis of response times for arriving engines and tankers can demonstrate the initial ability to utilize a fire flow of two hundred fifty (250) GPM. As other apparatus arrives from more distant locations, including auto aide water hauling tenders, increases in fire flow can be expected and utilized.

Water Storage.
Water for fire protection can utilize either stored water in an underground tank (cistern) or by access to a natural body of water. The minimum amount of water storage is thirty thousand (30,000) gallons, which translates into two (2) hours of the minimum fire flow.

The storage of two (2) hours of fire flow is an accepted fire service (IFC Appendix B) standard and is substantiated by the minimum requirements of the insurance standard. The resulting cistern size of thirty thousand (30,000) gallons works well in a system approach to suppression water. Natural Bodies of Water offer an excellent source for fire protection.

The initial use of the closest water source to develop two hundred fifty (250) GPM may be supplemented by more distant sources by auto aid water hauling tenders. The use of more water storage sites may become a necessary requirement to relieve congestion at a single water storage site used to fill tenders at a set rate.

Travel Distance.
The maximum travel distance shall be two (2) miles from the water source (cistern or natural body of water) to each parcel. The travel distance is computed using ISO formulas for time and distance based on average speed of thirty-five (35) miles per hour. Since rural operations often involve standard operations, which account for long driveways, the driveways are not included. The maximum travel distance of two miles limits the total travel to four miles round trip and places the thirty thousand (30,000) gallon cisterns every four miles. The limit of four travel miles, round trip, encourages developers to ensure an effective roadway network with connections that maximizes the effectiveness of each water storage site.

A-2-2 Cistern Design.
Cisterns shall be built to hold thirty thousand (30,000) gallons and installed with a low volume well, less than fifteen (15) gallons per minute to maintain the water level once the cistern is full. An all-weather road shall accommodate access to engines and tenders and provide a hydrant (wet or dry) with standardized NST connections installed with head pressure whenever possible. The well can be utilized for domestic water supply to a building site, which is encouraged. The daily use of the well helps to ensure it's in service operation and does not compromise the ability to maintain the water level in the cistern. The developer must grant an easement on the building site, which best serves, the area as the cistern location. An agreement for reimbursement of cost to operate the well for large usage can be arranged with the homeowner, while incidental "topping off" is paid for by the daily user of the well.

A-2-3 Natural Bodies of Water.
The use of natural bodies of water requires a field survey which:

- Measures the potential for fire protection water availability every date of the year
- Measures the useful depth of the water as a function of draftable height to the pump intake
- Studies flow characteristics during each of the annual weather seasons for a stream or river source
- Addresses the ability to install an accessible hydrant

The Dry Hydrant Manual referenced in Appendix B provides detailed checklists for the field survey and the draftable limits in feet as function of elevation as designated by the Colorado State Forest Service.

A-2-4 Water Supply Access.
The access specified in Section 2-4 can be accomplished by utilizing different designs provided that the design accommodates an unobstructed area, located outside of the traffic lanes and permits fire engine connection to the outlet and clearance to accommodate tender approach hose connection, and turn around. See examples in Figures 1 through 3.

A-2-5 Testing and Maintenance.

It is important for the Fire District not only to require the proper placement and design of water storage facilities, but also to ensure the continued operational effectiveness. As additional water supplies are installed, the Fire District must formulate a plan to address the future maintenance of the facilities. The standard allows the Fire District many options to meet this end. For example, the Fire District may choose to allow the well serving a facility to be utilized for the domestic needs of the parcel on which the storage facility is located. By doing so, the Fire District has ensured the continued daily function of the well at no cost to the Fire District and has provided an economic incentive to the developer and/or property owner. The balance of the water supply system should be relatively cost effective as little or no maintenance is required on a properly designed and installed system. The standard will allow and encourage creative and individual methods for Fire Districts to address the maintenance requirements of a growing number of water supply facilities located within their jurisdiction.

APPENDIX "B"

Dry Hydrant Manual, A Guide for Developing Alternative Water Sources for Rural Fire Protection; Chestatee-Chattahoochee Resource Conservation & Development Council of Gainesville, Georgia. Copies are available by contacting the Franktown District of the Colorado State Forest Service; P.O. Box 485; Franktown, Colorado 80116. Telephone (303) 660-9625. Copies are also available at the Douglas County Building Division.

Exhibit D

INSTALLATION STANDARDS FOR POTABLE WATER STORAGE TANKS AND CISTERNS FOR DOMESTIC USE IS - 22 – 98

This standard shall govern the installation of potable water storage tanks and underground cisterns for domestic water use in dwellings. This standard includes both interior and exterior underground installations and establishes minimum standards for installation. Interior installations are recommended because they are more suitable for periodic inspection and maintenance by the homeowner.

This standard shall be utilized only when a reliable source of water is not available. In areas where wells are the primary source of water, a well test shall be performed to indicate the gallons per minute flow from the well. If the well fails to produce water or the flow is deemed inadequate by the authority having jurisdiction, only then shall this standard be utilized.

This standard shall apply to all new dwellings and additions or alterations where bedrooms are being added. In cases where existing wells are being used, a well test must be performed to indicate the gallons per minute flow from the well.

301.1 Minimum Standards.

301.1.1 Potable water above ground storage tanks and underground cisterns shall be of materials that are listed for potable use and approved by FDA Title 21, NSF, or AWWA. Steel and concrete tanks must be properly prepared and painted on the inside using an NSF epoxy paint. Additionally, underground steel tanks must be asphaltic coated, or epoxy coated on the outside to retard rusting.

301.1.2 Concrete cisterns or vaults shall be of such design that there are no seams below the fill line of the tank or vault. Concrete cisterns or vaults shall be properly prepared and coated on the inside using an NSF approved epoxy paint.

301.1.3 All piping, fittings, and valves must meet the mandatory referenced standards included in Chapter 14 of the 2012 International Plumbing Code.

301.1.4 The minimum capacity of water storage required for a single-family dwelling shall be based upon a formula using 80 gallons of water per day, per person. Homes served by wells producing less than .5 gallons per minute shall be sized for a minimum 5-day supply. Homes served by wells producing .5 gallons per minute and greater shall be sized for 3-day supply. The number of persons shall be based on a bedroom count assuming that the first bedroom will count for two people and additional bedrooms counting for one person (i.e. 3-bedroom house counts for 4 people and requires 960 gallons storage if gpm is .5 gpm or greater and 1600 gallons of storage if less than .5 gallons). The actual storage capacity of the pressure tank and the water heater may be taken into consideration for the total amount of water storage required.

301.1.5 Buried tanks shall be placed upon and completely surrounded with pea gravel or other manufacturer's approved material and shall not be less than 12 inches in thickness at any point.

301.1.6 All tanks shall be placed in a fashion to permit periodic maintenance, inspection, and repair. This shall include, but not be limited to:

1) Minimum 22 inches manway access into the cistern.

2) Vent piping to the atmosphere must be brass-screened mesh #24 and terminate not less than 36 inches above grade.

3) All connections of wet piping to the cistern shall be made with approved flexible couplings permitting independent movement of the tank due to seismic activity or shrink/swell movement of the soils.

301.1.7 Cisterns shall be located at least 25 feet from buildings, 50 feet away from sewer lines or septic tanks, and at least 100 feet from sewage disposal field.

301.1.8 No structure or traffic path may be constructed over a buried tank system unless required and must be approved by the tank manufacturer.

301.2 All installations shall conform to applicable codes and regulations adopted by the jurisdiction and shall be reviewed for compliance and approved by the Building Official prior to commencement of work.

301.3 Water storage cisterns and associated piping shall not be used for bonding of the electrical system. An alternative method of bonding, compatible with the most current edition of the National Electrical Code shall be used.

301.4 All such systems and associated piping shall be cleaned and sanitized prior to being placed into service.

301.5 All storage vessels shall be new and have been used for no other purpose.

301.6 All systems shall be capable of being filled from an outside source.

301.7 All systems shall be tested for leaks by filling the system with water. No system shall be tested using air pressure (hydrostatic). The test shall incorporate the use of either the vent pipe or fill pipe as a water column with no increase or decrease of more than one inch in the water column over a 24-hour period.

302.1 Interior Water Storage.

302.1.1 Interior spaces where water storage tanks are located shall be a conditioned space to prevent freezing. Tanks and piping shall be accessible for removal,

replacement, inspection, and repair. Interior spaces where tanks are located shall be provided with a floor drain. Pumps, pressure vessels, controls, and associated equipment shall be listed by an approved testing agency and approved by the Building Official.

302.1.2 Tanks shall be securely mounted into position. Vertical, upright positioned tanks exceeding 5 feet in height shall be provided with at least two wall mounted supports, one at the top and one at the bottom of the tank.

303.1 Exterior Buried Cisterns.

303.1.1 Exterior buried vessels shall be positioned at least one foot below frost line. The average frost line in Douglas County has been established at 36 inches. A minimum 22" diameter manway and extension with gasketed, bolted cover shall extend to 6 inches above grade for service and maintenance.

303.1.2 Penetrations of the cistern walls, connections or joints of any kind in any buried cistern for piping and manways shall incorporate the use of flanged, bolted connections.

Explanatory Notes.

Tanks and cisterns are an acceptable means of providing water to a residence where the water well may be a low producing well or in cases where wells have become non-producing. This should not be considered an alternative to being served by a water district or other reliable source of water.

Locating storage tanks within a conditioned space should be strongly considered to eliminate the need for frost protection. The system can be installed in a multiple tank configuration, which allows the owner or occupant the opportunity to clean and provide maintenance on one tank at a time without taking the entire potable water system out of service. Inside translucent polyethylene tank systems can be more easily monitored for visual volume and quality of the water that is being used. Any type of system will eventually accumulate silt particles in the bottom of the tank over a period of time. Exterior buried systems will be much more difficult to clean and maintain and likely will have a higher silt accumulation over a period of time when compared to inside installations.

Water quality should be checked at regular intervals. Water should be tested for bacteria and other harmful waterborne agents. Bacteria or minerals can usually be removed or destroyed with proper treatment technology should such a situation be identified after testing.

Individuals may find that the minimum amount of water storage required by regulation is insufficient and may want to install a larger capacity storage tank. Consideration should also be taken into account that you may see a reduction in the quality of water that has been stored for too long a period of time.

Another issue that should be considered is pump protection for low producing wells. Well pumps can be wired into protective switches that shut off the pump when the pump is running free (i.e. not pumping water because there is no water to pump). Such a condition can shorten the life of a pump and replacement of a well pump usually involves pulling the pump, which can be expensive, even with a shallow well.

Exhibit E

2018 IBC Appendix O - Solar Photovoltaic Power Systems Access, Pathways and Spacing Requirements

O-1204.1 General. Solar photovoltaic systems shall be installed in accordance with sections O-1204.2 through O-1204.5, and the International Fire Code or International Residential Code. The electrical portion of solar PV systems shall be installed in accordance with NFPA 70.

O-1204.2 Access and Pathways. Roof access, pathways and spacing requirements shall be provided in accordance with sections O-1204.2.1 through O-1204.3.3. Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be located in areas with minimal obstructions, such as vent pipes, conduit or mechanical equipment.

Exceptions:

1. Detached, non-habitable group U structures including, but not limited to, detached garages serving group R-3 buildings, parking shade structures, car ports, solar trellises and similar structures.
2. Roof access, pathways and spacing requirements need not be provided where the fire code official has determined that rooftop operations will not be employed.

O-1204.2.1 Solar Photovoltaic systems for group R-3 buildings. Solar photovoltaic systems for group R-3 buildings shall comply with sections O-1204.2.1.1 through O-1204.2.1.3.

Exceptions:

1. These requirements shall not apply to structures designed and constructed in accordance with the International Residential Code.
2. These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal or less.

O-1204.2.1.1 Pathways to ridge. Not fewer than two 36-inch-wide pathways on separate roof planes, from lowest roof edge to ridge, shall be provided on all buildings. Not fewer than one pathway she be provided on the street or driveway side of the roof. For each roof plane with a photovoltaic array, not fewer than one 36-inch-wide pathway from lowest roof edge to ridge shall be provided on the same roof plane as the photovoltaic array, on an adjacent roof plane or straddling the same adjacent roof planes.

O-1204.2.1.2 Setbacks at ridge. For Photovoltaic arrays occupying 33 percent or less of the plan view total roof area, a setback of not less than 18 inches wide is required on both sides of a horizontal ridge. For photovoltaic arrays occupying more than 33 percent of the plan view total roof area, a setback of not less than 36 inches wide is required on both sides of a horizontal ridge.

O-1204.2.1.3 Alternative setbacks at ridge. Where an automatic sprinkler system is installed within the dwelling in accordance with Section 903.3.1.3 of the International Fire Code, setbacks at the ridge shall conform to one of the following:

1. For photovoltaic arrays occupying 66 percent of less of the plan view total roof area, a setback of not less than 18 inches wide is required on both sides of a horizontal ridge.
2. For Photovoltaic arrays occupying more than 66 percent of the plan view total roof area, a setback of not less than 36 inches wide is required on both sides of a horizontal ridge.

O-1204.2.2 Emergency escape and rescue openings. Panels and modules installed on group R-3 buildings shall not be placed on the portion of a roof that is below an emergency escape and rescue opening. A pathway of not less than 36 inches wide shall be provided to the emergency escape and rescue opening.

O-1204.3 Other than Group R-3 buildings. Access to systems for buildings, other than those containing Group R-3 occupancies, shall be provided in accordance with Section O-1204.3.1 through O-1204.3.3.

Exception: Where it is determined by the building official that the roof configuration is similar to that of a group R-3 occupancy, the residential access and ventilation requirements in sections O-1204.2.1.1 through O-1204.2.1.3 are a suitable alternative.

O-1204.3.1 Perimeter pathways. There shall be a minimum 6-foot-wide clear perimeter around the edges of the roof.

Exception: Where either axis of the building is 250 feet or less, the clear perimeter around the edges of the roof shall be permitted to be reduced to a minimum width of 4 feet.

O-1204.3.2 Interior pathways. Interior pathways shall be provided between array sections to meet the following requirements:

1. Pathways shall be provided at intervals not greater than 150 feet throughout the length and width of the roof.
2. A pathways not less than 4 feet wide in a straight line to roof standpipes or ventilation hatches.
3. A Pathway not less the 4 feet wide around roof access hatches, with not fewer than one such pathway to parapet or roof edges.

O-1204.3.3 Smoke ventilation. The solar installation shall be designed to meet the following requirements:

1. Where nongravity-operated smoke and heat vents occur, a pathway not less than 4 feet wide shall be provided bordering all sides.
2. Smoke ventilation options between array sections shall be one of the following:
   2.1 A pathway not less than 8 feet wide.

2.2 Where gravity-operated dropout smoke and heat vents occur, a pathway not less than 4 feet (1219 mm) wide on not fewer than one side.
2.3 A pathway not less than 4 feet (1219 mm) wide boarding 4-foot by 8-foot (1219 mm by 2438 mm) venting cutouts every 20 feet (6096 mm) on alternating sides of the pathway.

O-1204.4 Ground-mounted photovoltaic panel systems. Ground-mounted photovoltaic panel systems shall comply with section O-1204.1 and this section. Setback requirements as set forth by Douglas County Zoning shall apply to all ground- mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet shall be required for ground-mounted photovoltaic arrays.

O-1202.5 Buildings with rapid shutdown. Buildings with rapid shutdown solar photovoltaic systems shall have permanent labels in accordance with sections O-1204.1 through O-1204.5.3.

O-1204.5.1 Rapid shutdown type. The type of solar photovoltaic system rapid shutdown shall be labeled with one of the following:

1. For solar photovoltaic systems that shut down the array and conductors leaving the array, a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of 3/8 inch in black on a yellow background. The remaining characters shall be uppercase with a minimum height of 3/16 inch in black on a white background. The label shall be in accordance with figure O-1204.5.1 (1) and state the following:

SOLAR PV SYSTEMS EQUIPPED WITH
RAPID SHUTDOWN TURN RAPID
SHUTDOWN SWITCH TO THE "OFF"
POSITION TO SHUT DOWN PV SYSTEM
AND REDUCE SHOCK HAZARD IN ARRAY.

2. For photovoltaic systems that only shut down conductors leaving the array, a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of 3/8 inch in black on a yellow background. The remaining characters shall be uppercase with a minimum height of 3/16 inch in black on a white background. The label shall be in accordance with figure O-1204.5.1 (1) and state the following:

THIS SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN. TURN RAPID
SHUTDOWN SWITCH TO THE "OFF"
POSITION TO SHUT DOWN CONDUCTORS
OUTSIDE THE ARRAY. CONDUCTORS WITHIN
ARRAY REMAIN ENERGIZED IN SUNLIGHT.

O-1204.5.1.1 Diagram. The labels in section O-1204.5.1 shall include a simple diagram of a building with a roof. Diagram sections in red signify sections of the solar photovoltaic system that are not shut down when the rapid shutdown switch is turned off.

O-1204.5.1.2 Location. The rapid shutdown label in section O-1204.5.1 shall be located not greater than 3 feet from the service disconnecting means to which the photovoltaic systems are connected and shall indicate the location of all identified rapid shutdown switches if not at the same location.

O-1205.5.2 Buildings with more than one rapid shutdown type. Solar Photovoltaic systems that contain rapid shutdown in accordance with both items 1 and 2 of section O-1204.5.1 or solar photovoltaic systems where only portions of the systems on the building contain rapid shutdown, shall provide a detailed plan view diagram of the roof showing each different photovoltaic system and a dotted line around areas that remain energized after the rapid shutdown switch is operated.

O-1204.5.3 Rapid shutdown switch. A Rapid shutdown switch shall have a label located not greater than 3 feet from the switch that states the following:

RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM

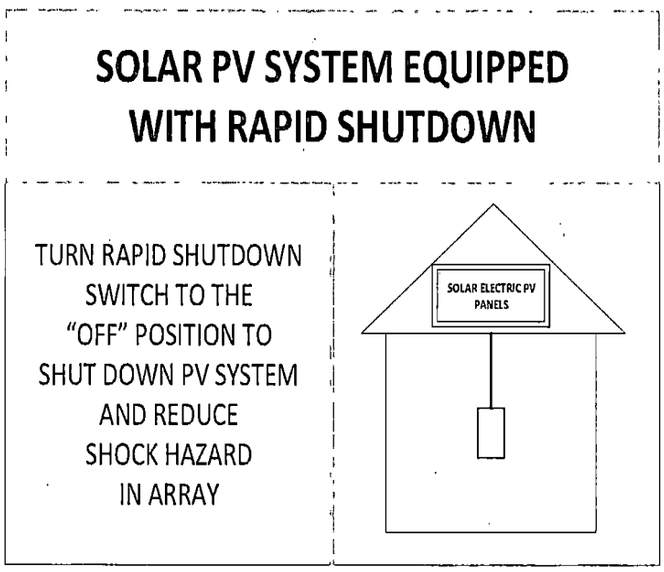

FIGURE O-1204.5.1(1)

LABEL FOR SOLAR PV SYSTEMS THAT REDUCE SHOCK HAZARD WITHIN ARRAY AND SHUT DOWN CONDUCTORS LEAVING ARRAY

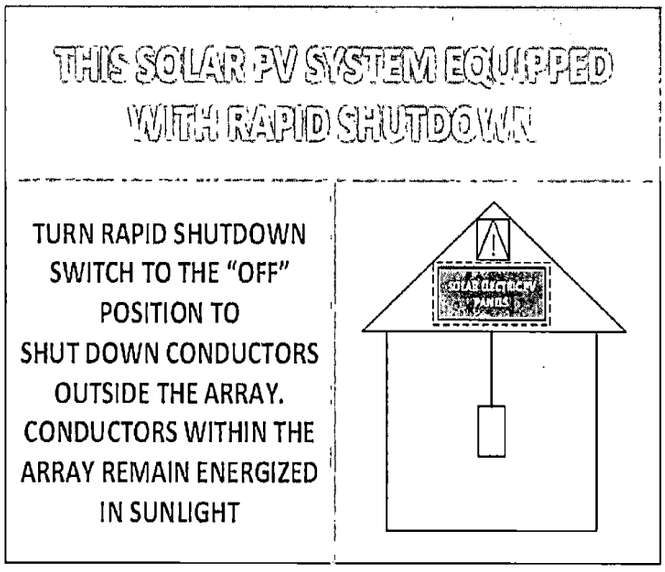

FIGURE O-1204.5.1(2)

LABEL FOR SOLAR PV SYSTEMS THAT ONLY SHUT DOWN CONDUCTORS LEAVING THE ARRAY

Exhibit F

Reference 2018 International Swimming Pool and Spa Code

SECTION 305
BARRIER REQUIREMENTS

305.1 General. The provisions of this section shall apply to the design of barriers for restricting entry into areas having pools and spas. Where spas or hot tubs are equipped with a lockable safety cover complying with ASTM F1346 and swimming pools are equipped with a powered safety cover that complies with ASTM F1346, the area where those spas, hot tubs or pools are located shall not be required to comply with Sections 305.2 through 305.7.

305.2 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.

305.2.1 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. When 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).

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

305.2.3 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.

305.2.4 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 if 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 be not greater 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.

305.2.5 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 1 ¾ inches (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 ¾ inches (44 mm) in width.

305.2.6 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 1 ¾ inches (44 mm).

305.2.7 Chain link dimensions. The maximum opening formed by a chain link fence shall be not more than 1 ¾ inches (44 mm). Where the fence is provided with slats fastened at the top and bottom that reduce the openings, such openings shall be not greater than 1 ¾ inches (44 mm).

305.2.8 Diagonal members. Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members shall be not greater than 1 ¾ inches (44 mm). The angle of diagonal members shall be not greater 45 degrees (0.79 rad) from vertical.

305.2.9 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.

305.2.10 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.

305.3 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.

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

305.3.2 Double or multiple gates. Double gates or multiple gates shall have not fewer than 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 ½ 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.

305.3.3 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 ½ inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.

305.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves a 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) about the finished floor.
2. A safety cover that is listed and labeled in accordance with ASTM F1346 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 protections that is not less than the protection afforded by Item 1 or 2.

305.5 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 4-inch (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.

305.6 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 s not required between the natural body of water shoreline and the pool or spa.

305.7. 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 approved by the governing body shall be acceptable provided that the degree of protection is not less than the protection afforded by the requirement of Sections 305.2 through 305.5.