



Residential Sprinkler Design Enhancements

*A Resource Guide for AHJ's, Builders,
Developers, and Elected Officials*

Compiled by:

National Association of State Fire Marshals

Model Codes Committee

Sub-Committee on Code Amendments Related to Sprinklers



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Acknowledgements

The National Association of State Fire Marshals would like to take this opportunity to thank all the individuals who had a hand in making this document a reality. As has been quoted to NASFM several times during the compilation of this document, "if it were easy, anyone would do it." It has certainly not been an easy, or simple process, but with the aid of a dedicated group of individuals it has come to fruition.

We not only want to take this opportunity to thank all of them, but all of the people who they answer to as well, for giving them the time to complete this important work. Without the support of their families, employers, friends, and coworkers this text may not have come to fruition.

Two small words that mean so much, and that we cannot say enough to everyone who has helped be a part of this effort. Thank you.

The National Association of State Fire Marshals would also like to thank the International Code Council (ICC) for their assistance. As a reminder, all their codes can be purchased or viewed on-through their website www.iccsafe.org.



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Abstract

The purpose of this document is to serve as a reference guide for AHJ's, Builders, Developers, and Elected Officials to ensure life safety concerns meet at least the minimum code requirements, regardless of whether residential fire sprinkler systems are required in their jurisdiction or not.

By clearly identifying all design enhancements allowed when residential sprinkler systems are installed, AHJ's will be able to ensure that when residential occupancies are constructed without residential sprinkler systems these design enhancements are not allowed.

This approach will help ensure that all residential occupancies in their jurisdiction are code compliant, regardless of whether a sprinkler system is installed at the time of construction or not.



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About the National Association of State Fire Marshals (NASFM)

The membership of National Association of State Fire Marshals (NASFM) comprises the most senior fire officials in the United States. State Fire Marshals' responsibilities vary from state to state, but Marshals tend to be responsible for fire safety code adoption and enforcement, fire and arson investigation, fire incident data reporting and analysis, public education and advising Governors and State Legislatures on fire protection. Some State Fire Marshals are responsible for fire fighter training, hazardous materials incident responses, wildland fires and the regulation of natural gas and other pipelines.

Most of our members are appointed by Governors or other high-ranking state officials. Some are state police officers. Many are former firefighters. Some are fire protection engineers, while others are former state legislators, insurance experts and labor union officials.

NASFM's members are the ultimate authority in our organization. The membership meets annually, elects a Board of Directors and Officers, and is consulted whenever possible on crucial matters.



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Purpose of the Document

- a. To serve as a reference guide for AHJ's to ensure life safety concerns meet at least the minimum code requirements, regardless of whether residential fire sprinkler systems can be implemented in their jurisdiction or not.
- b. Clearly identify all design enhancements for use by AHJ's, builders, and developers.
- c. Purpose of design enhancements in the codes
 - i. Maintaining life safety
 - ii. Providing alternatives and best practices for designers to meet local and specific building needs or requirements
- d. Both are code compliant but decisions on which path to follow should be considered based on evaluation of all 5 E's of Community Risk Reduction (CRR)
- e. It is the intent of this document to identify certain design and construction protection features that require consideration to maintain an acceptable level of safety for one- and two-family dwellings where amendments or deletions by local governmental actions have modified certain provisions of the model codes. Consideration has been made to site locations and arrangements for adequate building separation and fire department access, and to required fire flow requirements in addition to internal passive and other active protection features which could be considered as acceptable alternatives to model code requirements necessary to maintain an acceptable level of occupant safety.

The current editions of the model construction codes require the installation of automatic sprinkler protection in all new buildings intended to be used as residential occupancies. These requirements include a provision to install such protection in all new one- and two-family dwellings; however, many state and local ordinances have taken action to remove the requirement for automatic sprinkler protection in these occupancies. The current model codes outline the design and construction requirements when the automatic sprinkler protection requirements are removed during adoption. The purpose of this document is to alert code officials, building design and construction professionals, and regulatory authorities of the potential reductions of intended levels of safety by these local regulatory actions, and to highlight the required alternative designs where the requirement for installation of automatic sprinkler protection has been removed.



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How to Use This Guide

- a. This guide deals exclusively with design enhancement options found in the 2021 Edition of the International Residential Code (IRC), as well as certain special allowances that are provided in the 2021 Edition of the International Fire Code (IFC) and the International Building Code (IBC), all of which are published by the International Code Council (ICC).
- b. The guide has been laid out for ease of reference by design element and occupancy use.
- c. Each design element will detail the code requirements with or without sprinkler protection.
- d. Options for the following design elements can be found in this guide:
 - i. Residential subdivisions
 - ii. IFC Appendices that can impact IRC design and implementation
 - iii. Occupancy type allowances from the IBC
 1. Live/Work units
 2. Owner occupied lodging
 3. Care facility with custodial care
 4. Care facility with medical care
 5. Care facility in a single-family dwelling
 - iv. Fire-Rated Separation
 - v. Townhouse Structural Independence
 - vi. Fire Protection of Floors
 - vii. Emergency Escape Windows in Basements
 - viii. Mezzanines
 - ix. Habitable Attics
 - x. Photovoltaic systems
- e. The guide presents this information in two different formats. Section 1 presents this information as a side-by-side comparison of the requirements for sprinklered vs. unsprinklered occupancies. Section 2 presents the requirements for a sprinklered occupancy first; the requirements for an unsprinklered occupancy are detailed in the second half of the section.



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SECTION 1 - Design Enhancement Options: Sprinklered vs. Unsprinklered

1) RESIDENTIAL SUBDIVISIONS

a) ALL Homes are **Sprinklered**

- i) In accordance with Table R302.1 (2) of the IRC, homes can have non-rated exterior walls and unprotected openings/penetrations, with no separation from the lot line in residential subdivisions where all homes are equipped throughout with an automatic sprinkler system. The adjoining lot line setback shall be six feet minimum in accordance with footnote (a).
- ii) If reducing the separation to the lot line to 0 feet, projections must have a 1-hour rating on the underside or be constructed of heavy timber or fire-retardant-treated wood, unless gable vent openings are not installed in accordance with footnote (c).

b) Some or All Homes are **Unsprinklered**

- i) In accordance with Table R302.1 (1) of the IRC, homes must have 1-hour rated exterior walls that are tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code with exposure from both sides and shall not have any openings, unprotected penetrations, or projections when there is no separation from the lot line in residential subdivisions where all homes are not equipped throughout with an automatic sprinkler system.
- ii) Where projections exist:
 - (1) Between 2' to 5' from the lot line, they must have a 1-hour rating on the underside or be constructed of heavy timber or fire-retardant-treated wood, unless gable vent openings are not installed in accordance with footnote (b).
 - (2) If greater than 5' from the lot line, projections are permitted to be reduced to 0 hours.
- iii) Where openings exist:
 - (1) In a wall that is between 3' to 5' from the lot line, they are limited to a maximum of 25% of the wall area.
 - (2) In walls 5' or more from the lot line, the number of openings is unlimited.
- iv) Where penetrations exist:
 - (1) In a wall that is 3' or less to the lot line, they must be protected in accordance with section R302.4 (IRC).



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2) IFC APPENDICES THAT CAN IMPACT IRC DESIGN AND IMPLEMENTATION

a) ALL Homes are **Sprinklered**

i) Fire Flow

(1) In jurisdictions where Appendix B of the IFC has been adopted:

(a) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are equipped throughout with an automatic sprinkler system and are between 0-3,600 sq. ft. are allowed to reduce the minimum fire flow to of 500 gpm for 30 minutes.

(b) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are equipped throughout with an automatic sprinkler system and are greater than 3,600 sq. ft. are allowed to reduce the minimum fire flow to 1/2 value in Table B105.1(2) for 60 minutes.

ii) Fire Hydrant Spacing

(1) In jurisdictions where Appendix C of the IFC has been adopted:

(a) In accordance with Table C102.1, footnote (g), the average space between hydrants and the maximum distance from any point on a street or road frontage to a hydrant is allowed to be increased by 25%.

iii) Fire Apparatus Access Roads

(1) In jurisdictions where Appendix D of the IFC has been adopted:

(a) In accordance with D107.1, access from two directions shall not be required in developments of one- or two-family dwellings where all dwelling units are equipped throughout with an approved automatic sprinkler system.

b) Some or All Homes are **Unsprinklered**

i) Fire Flow

(1) In jurisdictions where Appendix B of the IFC has been adopted:

(a) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are between 0-3,600 sq. ft., the minimum fire flow must be 1000 gpm for 60 minutes.

(b) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are greater than 3,600 sq. ft., must meet the flow and duration requirements of Table B105.1(2).

ii) Fire Hydrant Spacing

(1) In jurisdictions where Appendix C of the IFC has been adopted:

(a) The average space between hydrants and the maximum distance from any point on a street or road frontage to a hydrant must meet the requirements of Table C102.1.



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iii) Fire Apparatus Access Roads

(1) In jurisdictions where Appendix D of the IFC has been adopted:

(a) In accordance with D107.1, access from two directions shall be required in developments of one- or two-family dwellings where there are more than 30 dwelling units.

3) OCCUPANCY TYPE ALLOWANCES FROM THE IBC

a) The Occupancy is **Sprinklered**

i) Live/Work Units Located in Townhouses

(1) In accordance with R101.2 of the IRC, Live/work units located in townhouses and complying with the requirements of Section 508.5 of the IBC that are equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D are permitted to be constructed in accordance with the IRC.

ii) Institutional Group I-1, Custodial Care Facility

(1) In accordance with 308.2.4 of the IBC, a facility with five or fewer persons receiving custodial care that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.

iii) Institutional Group I-2, Medical Care Facility

(1) In accordance with 308.3.2 of the IBC, a facility with five or fewer persons receiving medical care that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.

iv) Residential Group R-3, Care Facilities within a Dwelling

(1) In accordance with 310.4.1 of the IBC, a facility with five or fewer persons receiving care within a single-family dwelling that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.

v) Residential Group R-3, Lodging Houses

(1) In accordance with 310.4.2 of the IBC, "owner-occupied lodging houses with five or fewer guest rooms and 10 or fewer total occupants" that are equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC are permitted to be constructed in accordance with the IRC.

b) The Occupancy is **Unsprinklered**



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- i) The occupancies outlined in Section 3a must be constructed in accordance with the IBC when not equipped throughout with an automatic sprinkler system.

4) FIRE-RATED SEPARATION

a) The Occupancy is **Sprinklered**

i) Townhouse Common Walls

- (1) In accordance with R302.2.2 of the IRC, when the townhouse units on both sides of the common wall are equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D, "the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code."

ii) Two-Family Dwelling Separation

- (1) In accordance with R302.3 of the IRC, in buildings equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D, dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1/2-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.

b) The Occupancy is **Unsprinklered**

i) Townhouse Common Walls

- (1) In accordance with R302.2.2 of the IRC, when the townhouse units on both sides of the common wall are not equipped throughout with an automatic sprinkler system, "the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code."

ii) Two-Family Dwelling Separation

- (1) In accordance with R302.3 of the IRC, in buildings that are not equipped throughout with an automatic sprinkler system, dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.

Note: In accordance with R302.4.1 of the IRC, wet fire sprinkler piping is permitted as a through penetration of fire-resistance rated walls or ceilings where the annular space is filled with an approved material and R302.4.2 allows metal escutcheons covering the annular space to protect membrane penetrations of wet sprinkler piping through fire-resistance rated walls or ceilings.



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5) TOWNHOUSE STRUCTURAL INDEPENDENCE

a) The Occupancy is **Sprinklered**

- i) In accordance with R302.2.6 of the IRC, townhouse units are not required to be structurally independent when all townhouse units are equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D.

b) The Occupancy is **Unsprinklered**

- i) In accordance with R302.2.6 of the IRC, townhouse units are required to be structurally independent when all townhouse units are not equipped throughout with an automatic sprinkler system.

6) FIRE PROTECTION OF FLOORS

a) The Occupancy is **Sprinklered**

- i) In accordance with R302.13 of the IRC, floor assemblies located directly over a space protected by an automatic sprinkler system complying with Section P2904 or NFPA 13D are permitted to be unprotected.

b) The Occupancy is **Unsprinklered**

- i) In accordance with R302.13 of the IRC, floor assemblies "shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member."

7) EMERGENCY ESCAPE WINDOWS IN BASEMENTS

a) The Occupancy is **Sprinklered**

- i) In accordance with R310.1 of the IRC, sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following:
 - (1) One means of egress complying with the Means of Egress Section (R311) and one emergency escape and rescue opening.
 - (2) Two means of egress complying with Section R311.

b) The Occupancy is **Unsprinklered**

- i) An emergency escape and rescue opening shall be required in each basement sleeping room.



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8) MEZZANINES

a) The Occupancy is **Sprinklered**

- i) In accordance with R325.3 of the IRC, the aggregate area of a mezzanine can be up to one-half of the floor area of the room, as long as the mezzanine is open and unobstructed, except for walls not more than 42 inches, to the room in which it is located.
- ii) In accordance with R325.5 of the IRC, if the mezzanine is not greater than one-third of the floor area of the room or space it is located in, and the building is not more than two stories above grade plane, a mezzanine shall not be required to be open to the room in which the mezzanine is located.

b) The Occupancy is **Unsprinklered**

- i) In accordance with R325.3 of the IRC, the aggregate area of a mezzanine or mezzanines shall be not greater than one-third of the floor area of the room or space in which they are located.
- ii) In accordance with R325.5 of the IRC, mezzanines shall be open and unobstructed to the room in which they are located except for walls not more than 36 inches in height.

9) HABITABLE ATTICS

a) The Occupancy is **Sprinklered**

- i) In accordance with R326.3 of the IRC, a habitable attic is not considered a story above grade plane when it is not greater than 50% of the floor below and does not extend beyond the exterior walls of the story below.
- ii) In accordance with R326.3 of the IRC, a habitable attic can be located above the third story of a dwelling unit or townhouse unit.

b) The Occupancy is **Unsprinklered**

- i) In accordance with R326.3 of the IRC, habitable attics shall be considered a story above grade plane.

10) PHOTOVOLTAIC SYSTEMS

a) The Occupancy is **Sprinklered**

- i) In accordance with R324.6.2 of the IRC,
 - (1) if the array occupies 66% or less of the roof area, not less than an 18-inch clear setback is required on both sides of a horizontal ridge of the roof.



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- (2) if the array occupies more than 66% of the roof area, not less than a 36-inch clear setback is required on both sides of a horizontal ridge of the roof.
- b) The Occupancy is **Unsprinklered**
 - i) In accordance with R324.6.2 of the IRC,
 - (1) if the array occupies 33% or less of the roof area, not less than an 18-inch clear setback is required on both sides of a horizontal ridge of the roof.
 - (2) if the array occupies more than 33% of the roof area, not less than a 36-inch clear setback is required on both sides of a horizontal ridge of the roof.



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SECTION 2 - Design Enhancement Options: Separated Categories

OCCUPANCIES ARE SPRINKLERED

1) RESIDENTIAL SUBDIVISIONS

- a) In accordance with Table R302.1(2) of the IRC, homes can have non-rated exterior walls and unprotected openings/penetrations, with no separation from the lot line in residential subdivisions where all homes are equipped throughout with an automatic sprinkler system. The adjoining lot line setback shall be six feet minimum in accordance with footnote (a).
- b) If reducing the separation to the lot line to 0 feet, projections must have a 1-hour rating on the underside or be constructed of heavy timber or fire-retardant-treated wood, unless gable vent openings are not installed in accordance with footnote (c).

2) IFC APPENDICES THAT CAN IMPACT IRC DESIGN AND IMPLEMENTATION

a) Fire Flow

- i) In jurisdictions where Appendix B of the IFC has been adopted:
 - (1) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are equipped throughout with an automatic sprinkler system and are between 0-3,600 sq. ft. are allowed to reduce the minimum fire flow to of 500 gpm for 30 minutes.
 - (2) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are equipped throughout with an automatic sprinkler system and are greater than 3,600 sq. ft. are allowed to reduce the minimum fire flow to 1/2 value in Table B105.1(2) for 60 minutes.

b) Fire Hydrant Spacing

- i) In jurisdictions where Appendix C of the IFC has been adopted:
 - (1) In accordance with Table C102.1, footnote (g), the average space between hydrants and the maximum distance from any point on a street or road frontage to a hydrant is allowed to be increased by 25%.

c) Fire Apparatus Access Roads

- i) In jurisdictions where Appendix D of the IFC has been adopted:
 - (1) In accordance with D107.1, access from two directions shall not be required in developments of one- or two-family dwellings where all dwelling units are equipped throughout with an approved automatic sprinkler system.



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- 3) OCCUPANCY TYPE ALLOWANCES FROM THE IBC
 - a) Live/Work Units Located in Townhouses
 - i) In accordance with R101.2 of the IRC, Live/work units located in townhouses and complying with the requirements of Section 508.5 of the IBC that are equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D are permitted to be constructed in accordance with the IRC.
 - b) Institutional Group I-1, Custodial Care Facility
 - i) In accordance with 308.2.4 of the IBC, a facility with five or fewer persons receiving custodial care that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.
 - c) Institutional Group I-2, Medical Care Facility
 - i) In accordance with 308.3.2 of the IBC, a facility with five or fewer persons receiving medical care that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.
 - d) Residential Group R-3, Care Facilities within a Dwelling
 - i) In accordance with 310.4.1 of the IBC, a facility with five or fewer persons receiving care within a single-family dwelling that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.
 - e) Residential Group R-3, Lodging Houses
 - i) In accordance with 310.4.2 of the IBC, "owner-occupied lodging houses with five or fewer guest rooms and 10 or fewer total occupants" that are equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC are permitted to be constructed in accordance with the IRC.
- 4) FIRE-RATED SEPARATION
 - a) Townhouse Common Walls
 - i) In accordance with R302.2.2 of the IRC, when the townhouse units on both sides of the common wall are equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D, "the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code."
 - b) Two-Family Dwelling Separation



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- i) In accordance with R302.3 of the IRC, in buildings equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D, dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1/2-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.

Note: In accordance with R302.4.1 of the IRC, wet fire sprinkler piping is permitted as a through penetration of fire-resistance rated walls or ceilings where the annular space is filled with an approved material and R302.4.2 allows metal escutcheons covering the annular space to protect membrane penetrations of wet sprinkler piping through fire-resistance rated walls or ceilings.

5) TOWNHOUSE STRUCTURAL INDEPENDENCE

- a) In accordance with R302.2.6 of the IRC, townhouse units are not required to be structurally independent when all townhouse units are equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D.

6) FIRE PROTECTION OF FLOORS

- a) In accordance with R302.13 of the IRC, floor assemblies located directly over a space protected by an automatic sprinkler system complying with Section P2904 or NFPA 13D are permitted to be unprotected.

7) EMERGENCY ESCAPE WINDOWS IN BASEMENTS

- a) In accordance with R310.1 of the IRC, sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following:
 - i) One means of egress complying with the Means of Egress Section (R311) and one emergency escape and rescue opening.
 - ii) Two means of egress complying with Section R311.

8) MEZZANINES

- a) In accordance with R325.3 of the IRC, the aggregate area of a mezzanine can be up to one-half of the floor area of the room, as long as the mezzanine is open and unobstructed, except for walls not more than 42 inches, to the room in which it is located.



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- b) In accordance with R325.5 of the IRC, if the mezzanine is not greater than one-third of the floor area of the room or space it is located in, and the building is not more than two stories above grade plane, a mezzanine shall not be required to be open to the room in which the mezzanine is located.

9) HABITABLE ATTICS

- a) In accordance with R326.3 of the IRC, a habitable attic is not considered a story above grade plane when it is not greater than 50% of the floor below and does not extend beyond the exterior walls of the story below.
- b) In accordance with R326.3 of the IRC, a habitable attic can be located above the third story of a dwelling unit or townhouse unit.

10) PHOTOVOLTAIC SYSTEMS

- a) In accordance with R324.6.2 of the IRC,
 - i) if the array occupies 66% or less of the roof area, not less than an 18-inch clear setback is required on both sides of a horizontal ridge of the roof.
 - ii) if the array occupies more than 66% of the roof area, not less than a 36-inch clear setback is required on both sides of a horizontal ridge of the roof.



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OCCUPANCIES ARE UNSPRINKLERED

1) RESIDENTIAL SUBDIVISIONS

- a) In accordance with Table R302.1(1) of the IRC, homes must have 1-hour rated exterior walls that are tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code with exposure from both sides and shall not have any openings, unprotected penetrations, or projections when there is no separation from the lot line in residential subdivisions where all homes are not equipped throughout with an automatic sprinkler system.
- b) Where projections exist:
 - i) Between 2' to 5' from the lot line, they must have a 1-hour rating on the underside, or be constructed of heavy timber or fire-retardant-treated wood, unless gable vent openings are not installed in accordance with footnote (b).
 - ii) If greater than 5' from the lot line, projections are permitted to be reduced to 0 hours.
- c) Where openings exist:
 - i) In a wall that is between 3' to 5' from the lot line, they are limited to a maximum of 25% of the wall area.
 - ii) In walls 5' or more from the lot line, the number of openings is unlimited.
- d) Where penetrations exist:
 - i) In a wall that is 3' or less to the lot line, they must be protected in accordance with section R302.4 (IRC).

2) IFC APPENDICES THAT CAN IMPACT IRC DESIGN AND IMPLEMENTATION

- a) Fire Flow
 - i) In jurisdictions where Appendix B of the IFC has been adopted:
 - (1) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are between 0-3,600 sq. ft., the minimum fire flow must be 1000 gpm for 60 minutes.
 - (2) In accordance with Table B105.1(1), single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are greater than 3,600 sq. ft., must meet the flow and duration requirements of Table B105.1(2).
- b) Fire Hydrant Spacing
 - i) In jurisdictions where Appendix C of the IFC has been adopted:
 - (1) The average space between hydrants and the maximum distance from any point on a street or road frontage to a hydrant must meet the requirements of Table C102.1.
- c) Fire Apparatus Access Roads



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- i) In jurisdictions where Appendix D of the IFC has been adopted:
 - (1) In accordance with D107.1, access from two directions shall be required in developments of one- or two-family dwellings where there are more than 30 dwelling units.

- 3) OCCUPANCY TYPE ALLOWANCES FROM THE IBC
 - a) The occupancies outlined in Section 3a must be constructed in accordance with the IBC when not equipped throughout with an automatic sprinkler system.

- 4) FIRE-RATED SEPARATION
 - a) Townhouse Common Walls
 - i) In accordance with R302.2.2 of the IRC, when the townhouse units on both sides of the common wall are not equipped throughout with an automatic sprinkler system, "the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code."
 - b) Two-Family Dwelling Separation
 - i) In accordance with R302.3 of the IRC, in buildings that are not equipped throughout with an automatic sprinkler system, dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.

- 5) TOWNHOUSE STRUCTURAL INDEPENDENCE
 - a) In accordance with R302.2.6 of the IRC, townhouse units are required to be structurally independent when all townhouse units are not equipped throughout with an automatic sprinkler system.

- 6) FIRE PROTECTION OF FLOORS
 - a) In accordance with R302.13 of the IRC, floor assemblies "shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member."



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7) EMERGENCY ESCAPE WINDOWS IN BASEMENTS

- a) An emergency escape and rescue opening shall be required in each basement sleeping room.

8) MEZZANINES

- a) In accordance with R325.3 of the IRC, the aggregate area of a mezzanine or mezzanines shall be not greater than one-third of the floor area of the room or space in which they are located.
- b) In accordance with R325.5 of the IRC, mezzanines shall be open and unobstructed to the room in which they are located except for walls not more than 36 inches in height.

9) HABITABLE ATTICS

- a) In accordance with R326.3 of the IRC, habitable attics shall be considered a story above grade plane.

10) PHOTOVOLTAIC SYSTEMS

- a) In accordance with R324.6.2 of the IRC,
 - i) if the array occupies 33% or less of the roof area, not less than an 18-inch clear setback is required on both sides of a horizontal ridge of the roof.
 - ii) if the array occupies more than 33% of the roof area, not less than a 36-inch clear setback is required on both sides of a horizontal ridge of the roof.



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APPENDIX

The above data is also being provided in the following appendix as an easy to reference chart for informational purposes.



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Code	Chapter	Section	With Sprinklers	Without Sprinklers	Comments
International Residential Code	1 - Scope and Administration	R101.2 Live/Work Units Located in Townhouses	Live/work units located in townhouses and complying with the requirements of Section 508.5 of the IBC that are equipped throughout with an automatic sprinkler system complying with Section P2904 or NFPA 13D are permitted to be constructed in accordance with the IRC.	Must be constructed in accordance with the IBC	
International Residential Code	3 - Building Planning	R302.1 Exterior Walls	<p>1) Homes can have non-rated exterior walls and unprotected openings/penetrations, with no separation from the lot line in residential subdivisions where all homes are equipped throughout with an automatic sprinkler system. The adjoining lot line setback shall be six feet minimum in accordance with footnote (a).</p> <p>2) If reducing the separation to the lot line to 0 feet, projections must have a 1-hour rating on the underside, or be constructed of heavy timber or fire-retardant-treated wood, unless gable vent openings are not installed in accordance with footnote (c).</p>	<p>1) Homes must have 1-hour rated exterior walls that are tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code with exposure from both sides and shall not have any openings, unprotected penetrations, or projections when there is no separation from the lot line in residential subdivisions where all homes are not equipped throughout with an automatic sprinkler system.</p> <p>2) Where projections exist: a) Between 2' to 5' from the lot line, they must have a 1-hour rating on the underside, or be constructed of heavy timber or fire-retardant-treated wood, unless gable vent openings are not installed in accordance with footnote (b). b) If greater than 5' from the lot line, projections are permitted to be reduced to 0 hours.</p> <p>3) Where openings exist: a) In a wall that is between 3' to 5' from the lot line, they are limited to a maximum of 25% of the wall area. b) In walls 5' or more from the lot line, the number of openings is unlimited.</p> <p>4) Where penetrations exist: b) In a wall that is 3' or less to the lot line, they must be protected in accordance with section R302.4 (IRC).</p>	



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Code	Chapter	Section	With Sprinklers	Without Sprinklers	Comments
International Residential Code	3 - Building Planning	R302.2.2 Common Walls	The common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.	The common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.	In accordance with R302.4.1 of the IRC, wet fire sprinkler piping is permitted as a through penetration of fire-resistance rated walls or ceilings where the annular space is filled with an approved material and R302.4.2 allows metal escutcheons covering the annular space to protect membrane penetrations of wet sprinkler piping through fire-resistance rated walls or ceilings.
International Residential Code	3 - Building Planning	R302.3 Dwelling Separation	Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1/2-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.	Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.	In accordance with R302.4.1 of the IRC, wet fire sprinkler piping is permitted as a through penetration of fire-resistance rated walls or ceilings where the annular space is filled with an approved material and R302.4.2 allows metal escutcheons covering the annular space to protect membrane penetrations of wet sprinkler piping through fire-resistance rated walls or ceilings.
International Residential Code	3 - Building Planning	R302.2.6 Structural Independence	Townhouse units are not required to be structurally independent	Townhouse units are required to be structurally independent	



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Code	Chapter	Section	With Sprinklers	Without Sprinklers	Comments
International Residential Code	3 - Building Planning	R302.13 Fire protection of floors	Floor assemblies located directly over a space protected by an automatic sprinkler system complying with Section P2904 or NFPA 13D are permitted to be unprotected.	Floor assemblies that are not required elsewhere in the code to be fire-resistance, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) <i>wood structural panel</i> membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaries, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.	
International Residential Code	3 - Building Planning	R310.1 Emergency Escape Windows	Sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following: a) One means of egress complying with the Means of Egress Section (R311) and one emergency escape and rescue opening. b) Two means of egress complying with Section R311.	An emergency escape and rescue opening shall be required in each basement sleeping room.	
International Residential Code	3 - Building Planning	R324.6.2 Photovoltaic Systems	1) If the array occupies 66% or less of the roof area, not less than an 18-inch clear setback is required on both sides of a horizontal ridge of the roof. 2) If the array occupies more than 66% of the roof area, not less than a 36-inch clear setback is required on both sides of a horizontal ridge of the roof.	1) If the array occupies 33% or less of the roof area, not less than an 18-inch clear setback is required on both sides of a horizontal ridge of the roof. 2) If the array occupies more than 33% of the roof area, not less than a 36-inch clear setback is required on both sides of a horizontal ridge of the roof.	



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Code	Chapter	Section	With Sprinklers	Without Sprinklers	Comments
International Residential Code	3 - Building Planning	R325 Mezzanines	<p>1) The aggregate area of a mezzanine can be up to one-half of the floor area of the room, as long as the mezzanine is open and unobstructed, except for walls not more than 42 inches, to the room in which it is located.</p> <p>2) If the mezzanine is not greater than one-third of the floor area of the room or space it is located in, and the building is not more than two stories above grade plane, a mezzanine shall not be required to be open to the room in which the mezzanine is located.</p>	<p>1) The aggregate area of a mezzanine or mezzanines shall be not greater than one-third of the floor area of the room or space in which they are located.</p> <p>2) Mezzanines shall be open and unobstructed to the room in which they are located except for walls not more than 36 inches in height.</p>	
International Residential Code	3 - Building Planning	R326.3 Habitable Attics	<p>1) A habitable attic is not considered a story above grade plane when it is not greater than 50% of the floor below and does not extend beyond the exterior walls of the story below.</p> <p>2) A habitable attic can be located above the third story of a dwelling unit or townhouse unit.</p>	Habitable attics shall be considered a story above grade plane.	
International Building Code	3 - Occupancy Classification and Use	308.2.4 Institutional Group I-1, Custodial Care Facility	A facility with five or fewer persons receiving custodial care that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.	Must be constructed in accordance with the IBC	



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Code	Chapter	Section	With Sprinklers	Without Sprinklers	Comments
International Building Code	3 - Occupancy Classification and Use	308.3.2 Institutional Group I-2, Medical Care Facility	A facility with five or fewer persons receiving medical care that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.	Must be constructed in accordance with the IBC	
International Building Code	3 - Occupancy Classification and Use	310.4.1 Residential Group R-3, Care Facilities within a Dwelling	A facility with five or fewer persons receiving care within a single-family dwelling that is equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC is permitted to be constructed in accordance with the IRC.	Must be constructed in accordance with the IBC	
International Building Code	3 - Occupancy Classification and Use	310.4.2 Residential Group R-3, Lodging House	"Owner-occupied lodging houses with five or fewer guest rooms and 10 or fewer total occupants" that are equipped throughout with an automatic sprinkler system complying with Section 903.3.1.3 or Section P2904 of the IRC are permitted to be constructed in accordance with the IRC.	Must be constructed in accordance with the IBC	



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Code	Chapter	Section	With Sprinklers	Without Sprinklers	Comments
International Fire Code	Appendix B	B105.1(1) Fire Flow	<p>1) Single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are equipped throughout with an automatic sprinkler system and are between 0-3,600 sq. ft. are allowed to reduce the minimum fire flow to of 500 gpm for 30 minutes.</p> <p>2) Single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are equipped throughout with an automatic sprinkler system and are greater than 3,600 sq. ft. are allowed to reduce the minimum fire flow to 1/2 value in Table B105.1(2) for 60 minutes.</p>	<p>1) Single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are between 0-3,600 sq. ft., the minimum fire flow must be 1000 gpm for 60 minutes.</p> <p>2) Single-, two-family, townhouses, Group R-3 and Group R-4 occupancies that are greater than 3,600 sq. ft., must meet the flow and duration requirements of Table B105.1(2).</p>	