



# Evaluation of Fire Separation Requirements for Zero Lot Line Residential Developments

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# Research Team

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# ISSUES

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- With the adoption of the Florida Building Code - Residential 5<sup>th</sup> edition the requirement for fire separation has become more stringent. Essentially projections less than 5 feet from the property line must be rated one hour to the underside and in no case may the projection be closer than 2 feet from the property line unless every Building in the sub-division is sprinkled (footnote a of table R302.1(2)). This has caused some extreme unintended consequences for local jurisdictions, developers and owners. (Note this is a change from section R302.1 exception 6 of the 2010 FBC-R)

# ISSUES

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- Many jurisdictions have several approved Planned Unit Developments (PUD's) at in various stages of completion. The intent for these PUD's by the contractors and developers was to maximize the use of the land by means of zero lot line development now rendered impossible by this code adoption. Particularly in sub-divisions currently under construction where it is impossible to go back and sprinkle these buildings let alone the financial impact that must be borne by the developer and contractor.

# ISSUES

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- Further the requirement to provide a one hour rating to the underside of the projection less than 5 feet from the property line is problematic do to the fact, to the best of my knowledge, there is no tested system to achieve this rating and the jurisdiction must rely on a prescriptive calculated systems.
- Townhouse design also becomes problematic because current astatic design often offsets vertically for visual appeal and historically the projections of the eaves extending over the property line will no longer be permitted by the code

# STATEMENT OF WORK

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- Research if a projection tested assembly for a one hour protection to the underside exists.
- Provide a prescriptive compliant construction detail for a projection as allowed by the current FBC. The prescriptive rated detail must include fastening requirements.
- Research alternative products that have been tested in the projection configuration that provides equivalent fire resistance.
- Research the change in this protection as described in the 2015 redline version of the ICC Residential code to determine if this change is equivalent.

# STATEMENT OF WORK

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- Research the historic background of this requirement.
- Research and provide recommendations for townhouse walls and overhangs realizing a townhouse is an attached single family dwelling.
  - Note the FBC-R does not require sprinkler and a townhouse is essentially an attached single family dwelling with a zero lot line.
- Research the current code requirements and provide recommendations for a cost effective method of alternative construction to allow for zero lot line buildings that provide for a reasonable alternative to the code.
  - The intent of this research is to find an alternate means of construction that provides equivalent protection and may be used to resolve the problem of existing zero lot subdivisions.

# DELIVERABLES

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- An interim report providing technical information on the problem background and results for work items 1-7 will be submitted by November 15, 2015. The report will be presented to the Commission's appropriate Technical Advisory Committee at a time agreed to by the Contractor and the Department's Project Manager.
- A final report providing background data/information, analysis, results and implication by June 1, 2016. An analysis of individual code changes will also be provided in the Appendix. The report will be presented to the Commission's appropriate Technical Advisory Committee at a time agreed to by the Contractor and the Department's Project Manager.



# Report Scope

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- The scope of this project is to evaluate the requirements for fire separations in the ‘Florida Building Code: Residential,’ 5<sup>th</sup> Edition and the changes to them in the 2015 IRC. There is a concern that these requirements have become more stringent, especially in relation to exterior walls and projections.
- Fire separation distance is defined by the 2015 IRC as:
  - “The distance measured from the building face to one of the following:
    - To the closest interior *lot line*.
    - To the centerline of a street, an alley or public way.
    - To an imaginary line between two buildings on the *lot*.
    - The distance shall be measured at a right angle from the face of the wall.”

# Report Scope

- Based on the fire separation distance, a building's exterior walls, projections and openings have fire-resistance requirements.
  - The primary focus of this evaluation is on exterior wall and projection requirements for single family homes and townhouses, i.e. an attached single family dwelling with a zero lot line.
- Evaluation consisted of a literature review of four (4) concepts related to fire-rated construction and fire separation distances:
  - 2015 code requirement changes,
  - code history,
  - prescriptive and performance based approaches, and
  - cost effective alternative construction.
- The scope was limited strictly to reviewing the fire separation provisions of the codes.
  - Other code requirements will be discussed, as necessary, such as sprinkler protection, opening protection, and penetration protection.

# Code References

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- Codes and standards are used in this analysis:
  - International Residential Code (IRC), 2015 Edition
  - Florida Building Code Residential (FBC-R), 5th Edition (2014)
- Primary reference of this evaluation will be the IRC, 2015 Edition, as Florida will use this code as the basis for the next edition of their building code.
  - Note that the IRC and FBC-R are very similar. Any differences between the codes related to the code requirements addressed herein will be noted.
- IRC terminology used in this report.
  - For example, draftstopping can also be referred to as “draft stop,” “fire block,” or “fire stop.” These other terms may be common in the field, but the code has different definitions for this terminology. In addition, this terminology has changed over time and is present in the legacy codes.

# 2015 Code Requirements

- The current code requirements for exterior walls and fire separation distance are in IRC Section R302.1. Fire separation distance is used to determine the fire-resistance needed for exterior walls, projections and openings.
  - §302.1, “Construction, projections, openings, and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1 (1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1 (2).
    - **Exceptions:**
      - Walls, projections and openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
      - Walls of dwellings and accessory structures located on the same lot.
      - Detached tool sheds and storage sheds, playhouses, and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
      - Detached garages accessory to a dwelling located within 2 ft of a *lot line* are permitted to have roof eave projections not exceeding 4 in.
      - Foundation vents installed in compliance with the codes are permitted.”

# 2015 Code Requirements

**Table R302.1 (2) EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE (feet)
Walls	Fire-resistance Rated	1-hr tested in accordance with ASTM E 119 or UL 263 with exposure from the outside.	< 5
	Not Fire-resistance Rated	0 hrs.	≥ 5
Projections	Not Allowed	N/A	< 2
	Fire-resistance Rated	1-hr on the underside <sup>a, b</sup>	≥ 2 to < 5
	Not Fire-resistance Rated	0 hrs.	≥ 5
Openings in Walls	Not Allowed	N/A	< 3
	25% Maximum of Wall Area	0 hrs.	3
	Unlimited	0 hrs.	5
Penetrations	All	Comply with Section R302.4	< 3
		None	3

a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hrs. on the underside of the eave if fire blocking is provided from the wall top plate to the underside of the roof sheathing.

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

# 2015 Code Requirements

**Table R302.1 (2) EXTERIOR WALLS- DWELLINGS WITH FIRE SPRINKLERS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE (feet)
Walls	Fire-resistance Rated	1-hr tested in accordance with ASTM E 119 or UL 263 with exposure from the outside.	0
	Not Fire-resistance Rated	0 hrs.	3 <sup>a</sup>
Projections	Not Allowed	N/A	< 2
	Fire-resistance Rated	1-hr on the underside <sup>b, c</sup>	2 <sup>a</sup>
	Not Fire-resistance Rated	0 hrs.	3
Openings in walls	Not Allowed	N/A	< 3
	25% Maximum of Wall Area	0 hrs.	3 <sup>a</sup>
	Unlimited	0 hrs.	5
Penetrations	All	Comply with Section R302.4	< 3
		None	3 <sup>a</sup>

- a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 ft., and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 ft. or more in width on the opposite side of the property line.
- b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hrs. on the underside of the eave if fire blocking is provided from the wall top plate to the underside of the roof sheathing.
- c. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hrs. on the underside of the eave provided that gable vent openings are not installed.

# Projection Code History

**Table 1. History of the Projection Code**

Code and Edition	FBC Adoption	Section	Requirement
CABO 1992	Not Adopted	§R-202.1	<ul style="list-style-type: none"> <li>Required exterior walls less than 3 ft. from the property line to have a 1-hr. fire-resistance rating. Projections are not mentioned.</li> </ul>
CABO 1995	Not Adopted	§302.1	<ul style="list-style-type: none"> <li>Required exterior walls less than 3 ft. from the property line to have a 1-hr. fire-resistance rating.</li> <li>Projections were forbidden from extending more than 12 in. into areas where openings were prohibited.</li> </ul>
International One- and Two – Family Dwelling Code 1998	Not Adopted	§302.1	<ul style="list-style-type: none"> <li>Same requirements as CABO 1995.</li> </ul>
IRC 2000	FBC 2007 §R302.1	§R302.1	<ul style="list-style-type: none"> <li>Required exterior walls less than 3 ft. from the property line to have a 1-hr. fire-resistance rating.</li> <li>Projections could not extend more than 1/3 the distance to the property line from where protected openings were required or more than 12 in. into areas where opening were prohibited, whichever was smaller. If they extended past that smaller measurement, a 1-hr. fire-resistance rating was required on the underside.</li> <li>FBC 2007: did not mention projection allowance extending more than 1/3 the distance to property line from where protected openings are required. Did however include 12-in. limitation where openings were prohibited.</li> </ul>
IRC 2003	FBC 2007 §R302.1	§R302.1	<ul style="list-style-type: none"> <li>Required exterior walls less than 3 ft. from the property line to have a 1-hr fire-resistance rating.</li> <li>Projections could not extend to be closer than 2 ft. from the lot line. If they extended into this 2 ft. space then a 1-hr fire-resistance rating was required on the underside.</li> </ul>
IRC 2006	FBC 2007 §R302.1	§R302.1	<ul style="list-style-type: none"> <li>This edition of the code was the beginning of using a single table to classify the construction rating required based on the fire separation distance for exterior walls, projections, openings, and penetration.</li> <li>Projections were still forbidden from extending more than 12 in. into areas where openings were prohibited.</li> </ul>
IRC 2009		§R302.1	<ul style="list-style-type: none"> <li>Same requirements as IRC 2006, FBC 2010 remained the same as 2007.</li> </ul>
IRC 2012	FBC 2014 §R302.1	§R302.1	<ul style="list-style-type: none"> <li>This edition of the code was the beginning of using two tables to classify the construction rating required, based on the fire separation distance and provided suppression, for exterior walls, projections, openings, and penetration.</li> <li>12-in. projection provision was removed.</li> </ul>
IRC 2015		§R302.1	<ul style="list-style-type: none"> <li>See Section 4.1 of this report.</li> </ul>

# Prescriptive Assemblies

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- Prescriptive assemblies are those that are generic and do not require certain brands of products.
- Section 721 of the International Building Code (IBC), provides multiple tables where one can choose the type of structural member to be protected, the type of insulating material to be used, and it will provide how thick the insulating material must be to provide 1, 2, 3, or 4 hrs. of fire-resistance.
- Table 2 (see Draft Report) is a collection of all the permitted 1-hr. construction types given in Section 721 of the IBC.



# Performance Based Assemblies

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- Assemblies found in the ICC-ES database that tested positively on providing a 1-hr fire-resistance rating for exterior wall projections:
  1. Plastic siding by CertainTeed Corporation, ESR-1066, renewal date of 5/2016
  2. Fiber cement lap and panel assembly by Plycem USA, Inc., ESR-1668, renewal date of 10/2016.
  3. Fire-retardant wood by Hoover Treated Wood Products Inc., ESR-1791 renewal date of 12/2015.
- Overall, there are very few options besides using prescriptive assemblies to provide the appropriate 1-hr fire-resistant construction required for the underside of projections.

# Cost Effective Alternative Construction

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- Existing FBC prescriptive and performance options to provide 1-hr fire-resistance protection to the underside of a projection are costly and specific in how the assemblies should be constructed.
- 2015 IRC provides allows the 1-hr. underside protection requirement to be reduced to 0 hr. when the roof vents are relocated from within the projections to the roof ridge and fireblocking is used to block off the projections from the remainder of the roof.
  - This allowance is provided in both the sprinkler protected and non-sprinkler protected building tables, and as such, still provides allowances for zero lot line buildings even when the buildings are not sprinkler protected.
- Following the 2015 IRC is the most cost effective way of addressing projection protection. Moving roof vents and providing fireblocking are significantly less expensive and easier to install than providing 1-hr fire-resistance rated construction for the projections.

# Conclusions

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- This report contains the requirements and construction options for zero lot line buildings allowed in the IRC and therefore, the FBC-R. It provides prescriptive and performance based options to provide the required protection for projections and the best cost effective alternatives to those fire-resistance rated assemblies.

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# QUESTIONS ?