



# CITY OF RAPID CITY

## RAPID CITY, SOUTH DAKOTA 57701

Rapid City Fire Department  
Fire Prevention Division

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April 23, 2015

Office of the Mayor  
300 6<sup>th</sup> Street  
Rapid City SD 57701

Re: 2012 International Residential Building Code adoption (Amended R501.3)

Mayor Kooiker & City Council

This is a follow-up to the discussions initiated several weeks ago regarding the adoption of 2012 IRC as amended. As a part of the adoption of this document it is proposed to eliminate the section 501.3 "Fire Protection of Floors". This section provides for protection of floor assemblies, through the use of a ½ inch sheetrock membrane, 5/8 wood structural panel or equivalent on the underside of the floor framing member. This applies to only to new construction with **no retrofit** clause for existing, and also includes a number of exceptions.

The Rapid City Fire Department is **not** in a position to support the elimination of this code provision, as it negatively impacts the occupants as well as firefighters during basement fire events. The issue at hand is simply extending the time in which the structural stability of the floor assembly can be maintained. The additional time allows occupants the opportunity to escape the home, and buys fire fighters time to affect rescue activities upon arrival. Modern construction practices and materials have unfortunately created an environment where the floor assemblies over basements are now failing at an average time of 6 minutes from the start of a fire, compared to legacy materials which have an average failure time of 18 minutes.

The significance of this is that at an average failure time of 6 minutes, the floor system in a modern home is no longer structurally sound upon arrival of the fire department. Thus hindering any possible search and rescue effort if necessary, as well as affecting suppression activities and property conservation. This has been noted on several calls where Rapid City fire fighters have either partially fallen through the floor, or noted the floor sagging upon arrival in the Rapid City Area.

The accelerated failure rates are not due to inferior materials, but rather very good materials exposed to conditions that they were simply not designed to resist (Fire). Most floor and roof structural assemblies today are constructed utilizing some form of engineered building materials. These engineered materials are straighter, use less material, allow larger loads, span greater distances, provide a more efficient construction process, and so on.

3/8/2012

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You may be familiar with some of the terms associated with these products such as OSB (Oriented Strand Board), TJI (Truss Joist I-Joist), LSL (Laminated Strand Lumber), LVL (Laminated Veneer Lumber), Truss assemblies, just to name a few.

This type of engineered construction is also called Light weight construction, as compared to traditional dimensional materials such as 2x8, 2x10, ect. Construction which relies upon dimensional material bolted and nailed together is now referred to as Legacy construction. Since engineered assemblies depend upon many **small** pieces working together, and not physical size and mass to develop strength, it only takes the loss of one piece in an engineered assembly to begin the process of failure. A couple of examples are when metal truss plates are heated and fall out, or the 7/16 inch thick OSB web in a TJI is burned away. This problem is also enhanced by our modern home furnishings which burn faster with higher heat output than ever seen before.

We understand that this type of construction has been around for many years, and the fire service has witnessed the failures associated with light weight construction many times, as structural collapse occurs and fire fighters continue to fall through floors. But change is slow within code development process, and change is usually reactive to a known problem vs taking a proactive approach. This code provision was introduced into the 2012 code, as the use of fire residential fire sprinkler protection has been restricted in many communities leaving the floor assemblies vulnerable to fire. Code changes are also looked upon negatively by the building community as added cost is associated with many protective features. Unfortunately section R501.3 does have a price tag as well, but several options are available to provide protection of the floor assemblies which meet the provisions of the code. Material costs were found to vary from approximately 15 cents to a few dollars per square foot of basement area.

Lastly it is important to note that the **exclusion** of section R501.3 is an action which is contrary to the basic responsibility of the Rapid City Fire Department, in its duty to provide for public safety. The information provided above should provide for a general outline of our concern and our position. If you have any questions or comments please feel free to contact me at your convenience. Thank you for your time, and attention to this matter.

Sincerely,

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