



Code Connection

Design Limitations

Good communication and familiarity with prescriptive requirements of the code lay the groundwork for a successful and efficient project.

by WTCA Staff

Truss design is mostly only limited by imagination. Truss manufacturing is mostly only limited by the physical constraints of manufacturing machinery and shipping.

Specific types of buildings are limited through prescriptive building codes (like the International Residential Code [IRC] and International Building Code [IBC] Section 2308) where there are defined building size and load limits.

The IRC limits its building scope (R101.2) to detached one- and two-family dwellings or multiple single-family dwellings (townhouses) not more than three stories in height with separate means of egress.

The following is a brief summary of some of the prescriptive code requirements of the IRC 2003:

- **Wind speed:** (R301.2.1.1.1) less than 110 mph (3-second gust)
- **Ground snow:** (R301.2.3) 70 psf or less
- **Seismic:** detailing only required for Seismic Design Category C, D1, D2 (R301.2.2), except that one- and two-family dwellings in Seismic Design Category C are exempt from the seismic requirements (Seismic Design Categories (A-E) are assigned in accordance with Figure R301.2(2))
- **Shape and size:**
 - *Roof pitch:* no limit per Table R301.6
 - *Building height:* Three stories (R101.2) plus story height requirements (R301.3) (about 34 feet to top plate line)
 - *Building width:*
 - for wood framing: 36 feet per header Table R502.5(1)
 - steel floor (R505.1), wall (R603.1.1) and roof framing (R804.1.1): 36 feet
 - *Building length:*
 - no stated limit for wood
 - steel floor (R505.1), wall (R603.1.1) and roof framing (R804.1.1): 60 feet

IBC 2304/2308 (Wood Light Frame Construction) is more restrictive than the IRC in some areas. The following is a brief summary of some of these requirements:

- Three stories above grade
- Bearing wall floor to floor height are not to exceed ten feet
- Loads are not to exceed:
 - Average dead load for roofs and exterior walls, floors and partitions - 15 psf
 - Live loads - 40 psf
 - Ground snow - 50 psf
- Wind speed is not to exceed 100 mph (3-second gust), except that in Exposure Category A or B the wind speed may not exceed 110 mph (Exposure Categories are defined at 1609.4 - C = urban or suburban, D = open terrain with scattered obstructions, and D = flat exposed areas)
- Roof trusses and rafters - 40 feet between points of vertical support
- Not permitted in Seismic Design Category B, C, D, E or F for Seismic Use Group III

at a glance

- ☐ The IRC and IBC codes allow for buildings to be built based on specific rules.
- ☐ The use of trusses fit right into these prescriptive requirements.
- ☐ It is important to have an understanding of the prescriptive requirements so that one knows when the load paths become complex enough that a more detailed look at the flow of loads to the foundation is needed.

- Limited in irregular structures in Seismic Design Category D or E

There are no specific limitations to the types of buildings or to shape and size. The truss and rafter span restriction does not limit structure size, only member span between points of support. In other words, a building could have a 120-foot truss and bearing points every 40 feet and still fall within the IBC prescriptive code.

The limitations relate to structures as a whole. These limitations of the IRC or IBC 2308 are confined to their respective prescriptive requirements. IRC R301.1.3 allows for the engineered design of a portion of the structure or structural element that exceeds the stated limitations. The portion of the structure or structural element that exceeds the stated limitations must be designed considering a complete load path capable of transferring all loads from their point of origin through the load-resisting elements to the foundation (R301.1). All or portions of a structure may be designed to the non-prescriptive sections of the IBC.

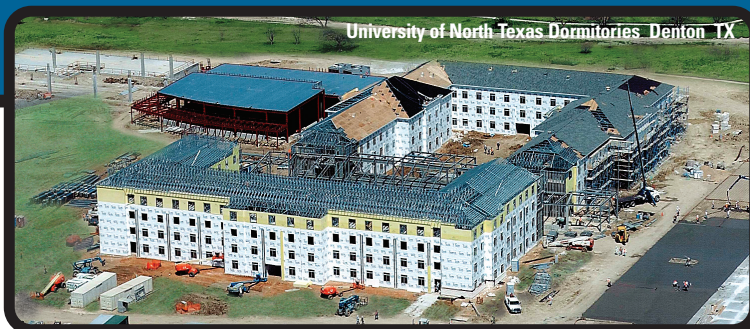
The structural building components industry operates in a number of different modes in its relationships with its customers regarding truss design:

- Building Designer/Builder/Owner submits a full set of construction documents and loading criteria to truss manufacturer.
- The truss manufacturer receives a roof or floor layout along with minimum loading criteria.
- The truss manufacturer builds stock trusses or receives an order for trusses where there are no construction documents and the code minimum required loading criteria are applied.

In many cases, the truss manufacturer, truss designer or truss engineer does not have access to building's complete structural framing information. They must rely on the accurate representation by the Building Designer/Builder/Owner that all load path considerations have been addressed and that the code requirements and loads to be applied to trusses as individual planar components are clearly defined.

The IBC and IRC building codes, in concert with ANSI/TPI 1-2002 Chapter 2, provide guidelines regarding the various building construction design and framing responsibilities.

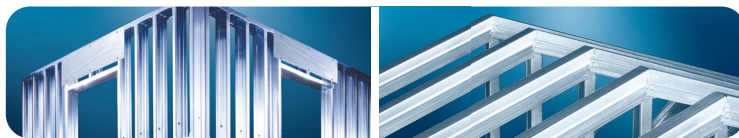
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Familiarity with prescriptive requirements of the code defines quite clearly when the load paths become complex enough that a more detailed look at the flow of loads to the foundation is needed. Good design information and communication enables each member of the construction team to effectively and efficiently build the structure. **SBC**

For more information about how to get involved in the code process, contact WTCA staff at 608/274-4849 or codes@woodtruss.com.

TRUSS LOAD GUIDE (TLG): Guide to Good Practice for Specifying & Applying Loads to Metal Plate Connected Wood Trusses is coming soon! Be sure to visit the WTCA web site (www.woodtruss.com) for more information.

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6300 Enterprise Lane • Suite 200 • Madison, WI 53719
608/310-6706 phone • 608/271-7006 fax
www.sbcmag.info • admgr@sbcmag.info