

Michigan Truss Design Drawing Submittals at Time of Permit Application – One-Step Market

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Introduction:

Component Manufacturers are often asked to provide truss design drawings for a project when the contractor or homeowner applies for a building permit. Building officials prefer to have these drawings in hand, since they are responsible to make sure that all construction documents, truss design drawings (TDD's) included, meet the intent of the applicable building code. Per *Michigan Residential Code (MRC)* Section R106, building officials are required to review all construction drawings and, if found in conformance with the applicable building code, issue a building permit. This *Technical Note* will provide perspective on this process and help all parties be more effective and efficient when working on this issue. This *Technical Note* is written with the 2003 and 2006 MRC as the basis of discussion. All quoted references are from the 2006 MRC.

Issue:

The challenge with providing preliminary TDD's at the time of permit is that in many cases, the contractor or homeowner does not yet know who will be designing/manufacturing the trusses. It is likely, that the contractor has a set of construction drawings from the building owner, has the lot selected and has possibly lined up the framer; but at this stage, contracts for services that happen later in the building process have generally not been awarded. In one-step markets, the contractor will eventually contract with a component manufacturer to design and manufacture the truss package. But at the time the permits need to be pulled, the contractor is more concerned about the development of the building site, getting utilities to the site, and laying the foundation. Components, especially roof trusses, are not high on the list of priorities.

Some jurisdictions allow for deferred submittals, where certain elements of a building are designed after the initial permits have been issued. These provisional permits allow the contractor to begin construction on the site work and foundation, but provide no guarantee that the remainder of the building will be issued a permit, causing the contractor to take on a considerable risk.

As a result, some jurisdictions have come up with a hybrid approach where truss design submittals are deferred, but the design parameters are agreed to at the time the permit is issued. The building permit is issued for the entire building, so the contractor is not taking unnecessary risk, and the building official has approved the parameters of design. Michigan is one such jurisdiction.

Recommendation:

Section R802.10.1 of the 2006 MRC is very specific on the requirements for TDD's. This section specifically requires the TDD's to be provided to and approved by the building official prior to installation. It further states



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that the truss design data sheet may be used as an alternative to the TDD's required as part of the application for permit:

R802.10.1 Truss design drawings. Truss design drawings, prepared in conformance with section R802.10.1, shall be provided to the building official and approved prior to installation. The truss design data sheet, Figure 802.10.1, may be provided to the building official at the time of permit application, as an alternative to design drawings as permitted in section R106.1.4.... Truss design drawings shall be provided with the shipment of trusses delivered to the jobsite. [\[See Appendix B for an expanded explanation on the truss design data sheet mentioned in this section.\]](#)

Roof Loading Data Sheet

Authority: Act 230 PA 1972, as amended
 Completion: Completed prior to application for plan review and building permit. This form is a voluntary form used to assist in the permit approval process.

Jurisdictional information should be included in this space

Applicant's Name:		Date:
Applicant's Address:		Permit Number:
City:	State:	Zip:
Applicant's Signature:		
Job Location:		
Address:		
Township/Village/City:		County:

THIS FORM SHOULD BE COMPLETED BY THE PERMIT APPLICANT, OR DESIGN PROFESSIONAL FOR C_e, C_t, AND I, PLACE AN "X" IN THE APPROPRIATE BOX THAT BEST DESCRIBES THE STRUCTURE.

Ground Exposure, P_g = _____ From Figure R301.2(5) MRC or Figure 1608.2 MBC

Exposure Factor C _e			
Exposure	Fully Exposed ¹	Partially Exposed ²	Sheltered ³
A Large city center with at least 1/2 the buildings exceeding 70 ft. in height.	N/A	1.1	1.3
B Urban and suburban areas, wooded areas or other terrain with closely spaced objects having the size of single-family dwellings or larger.	0.9	1	1.2
C Open terrain with scattered obstructions having heights less than 30 ft. (flat open country)	0.9	1	N/A
D Flat unobstructed areas exposed to wind flowing over open water for a distance of at least 1 mile. (i.e. Great Lakes.)	0.8	0.9	N/A

¹Fully Exposed: Roofs exposed on all sides with no shelter by terrain, higher structures, or trees.
²Partially Exposed: All roofs except those designated as "fully exposed" or "sheltered."
³Sheltered: Roofs located tight among conifers that qualify as obstructions.

Thermal Factor C_t

Thermal Condition ⁴	C _t
All structures except as listed below	1
Structures kept just above freezing and those with cold, ventilated roofs with an R factor of 25 or greater between the ventilated and heated spaces, such as attics	1.1
Unheated structures and those intentionally kept below freezing, such as seasonal building or storage buildings	1.2
Continuously heated greenhouse with a roof R Value less than 2 and having an interior temperature maintained at about 50 degrees 3 ft above the floor during winter months and a temperature alarm system or an attendant to warn of a heating failure.	0.85

⁴These conditions shall be representative of the anticipated conditions during winter months for the life of the structure

Importance Factor

Category	I
I Building and other structures representing low hazard to human life, i.e.: Agricultural, Temporary, and Minor Storage Facilities.	0.8
II All buildings except those listed in Categories III and IV.	1
III Building and other structures representing substantial hazard to human life in the event of failure.	1.1
IV Buildings and other structures designated as essential facilities.	1.2

Attic Live Load

Entire Attic	Y/N
Specific Areas (if yes, list areas below)	Y/N
List Rooms:	

Section R106.1.4 is an amendment to the 2006 MRC that does not appear in the 2006 *International Residential Code*. It is part of the submittal documents section. This Section of the code addresses the items that the building official needs to ascertain compliance with the code and issue building permits. It further clarifies the Section R802.10.1 requirement by stating the following:

R106.1.4. Truss design data. As an alternative to the submission of truss design drawings, the truss design data sheet may be provided to the building official as part of the construction documents at the time of application. Truss design drawings shall be submitted to the building official prior to truss installation as required by section R802.10.1.

The language here clarifies that in Michigan, TDD's are required at the time of permit. In recognizing the difficulty of component manufacturers to comply with this requirement, the truss loading data sheet has been created and may be submitted in lieu of the TDD's at the time of permit. Subsequently, the TDD's are required to be submitted to the building official and approved prior to the installation of trusses. TDD's are also required to be delivered to the job site with the truss delivery.

Appendix A

Background and Analysis:

To fully understand this issue, we need to go back to the administrative section of the building code. Chapter 1 of the 2006 MRC gives direction on such items as construction document submittals, the building permit process and the responsibilities of the building official.

Building Permit Process

With few noted exceptions, any person who wishes to build a building or structure must first obtain the proper building permits from the building official.

R105.1 Required. Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the building official and obtain the required permit.

R105.2 Work exempt from permit. Permits shall not be required for the following. Exemption from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

Building:

1. One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 120 square feet (11.15 m²).
2. Fences not over 6 feet (1829 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.

Building Official Responsibilities

It is the responsibility of the building official to receive applications for building permits along with the necessary construction documents to ascertain compliance with the applicable building code.

R104.2 Applications and permits. The building official shall receive applications, review construction documents and issue permits for the erection and alteration of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

R106.3 Examination of documents. The building official shall examine or cause to be examined construction documents for code compliance.

And if the construction documents are found to be in compliance with the applicable building code, a permit is issued.

R106.3.1 Approval of construction documents. When the building official issues a permit, the construction documents shall be approved in writing or by stamp. One set of construction documents so reviewed shall be retained by the building official. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the building official or his or her authorized representative.

The building official also has the authority to issue a phased approval, or a partial approval. If the construction documents are not available for the entire building, the building official may issue a permit for part of the building and issue a permit for other parts of the building at a later date.

R106.3.3 Phased approval. The building official is authorized to issue a permit for the construction of foundations or any other part of a building or structure before the construction documents for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such permit for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a permit for the entire structure will be granted.

Or, if a set of construction documents are submitted and changes are required, amended documents shall be submitted for approval.

R106.4 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

And in the case of trusses, the roof loading data sheet may be submitted for approval at the time of permit application.

R106.1.4 Truss design data. As an alternative to the submission of truss design drawings, the truss design data sheet may be provided to the building official as part of the construction documents at the time of application. Truss design drawings shall be submitted to the building official prior to truss installation as required by section R802.10.1.

Submittal Documents

Section 106 gives the general requirements for submittal documents. The addition of Section R106.1.4 to the 2006 *MRC* clarifies that truss design drawings are included in the requirements for submittal documents. It further allows the submission of the truss design data sheet in lieu of the TDD's at the time of permit. This is further confirmed by the language in Section R802.10.1.

R106.1 Submittal documents. Construction documents, special inspection and structural program and other data shall be submitted in 1 or more sets with each application for a permit. The construction documents shall be prepared by or under the direct supervision of a registered design professional when required by 1980 PA 299, MCL 339.101 to 339.2721, and known as the Michigan occupational code. Where special conditions exist, the building official is authorized to require additional construction documents to be prepared by a registered design professional.

Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with this code.

R106.1.1 Information on construction documents. Construction documents shall be drawn upon suitable material. Electronic media documents are permitted to be submitted when approved by the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in

detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.

R106.1.2 Manufacturer's installation instructions. Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.

R106.1.4. Truss design data. As an alternative to the submission of truss design drawings, the truss design data sheet may be provided to the building official as part of the construction documents at the time of application. Truss design drawings shall be submitted to the building official prior to truss installation as required by section R802.10.1.

R802.10.1 Truss design drawings. Truss design drawings, prepared in conformance with section R802.10.1, shall be provided to the building official and approved prior to installation. The truss design data sheet, figure R802.10.1, may be provided to the building official at the time of permit application, as an alternative to design drawings as permitted in section R106.1.4.... Truss design drawings shall be provided with the shipment of trusses delivered to the jobsite.

Appendix B

Completing the Truss Design Data Sheet from the 2006 Michigan Residential Code for Truss Drawing Submittals:

The introduction of the *2003 MRC* brought about changes in truss drawing submittal requirements for building permit applications. These provisions are maintained in the *2006 MRC*. As an alternative to submission of truss design drawings, Section R106.1.4 of the *MRC* (or refer to [Roof Design Technical Bulletin 42](#), from the Michigan Department of Consumer and Industry Services) allows the truss design data sheet, Figure R802.10.1, hereafter referred to as the Roof Loading Data Sheet, to be submitted at the time of permit application. According to the *MRC* Figure R802.10.1, the Roof Loading Data Sheet should be completed by the permit applicant or the design professional, henceforth referred to as the building designer. [Appendix B](#) will illustrate how to complete the truss design data sheet.

The Roof Loading Data Sheet is designed to be a checklist for the applicant. Although it refers to factors used to develop snow and wind loads, the questions are explained with simplified definitions relative to the building site. Thus, the truss design data sheet becomes site specific. The reader is cautioned not to simply copy a completed sheet from one site to the next without thoroughly reviewing the document and noting any differences in the site specific data.

A completed example of the Roof Loading Data Sheet is shown in [Figure 1](#). The following are step by step instructions on completing the form:

1. Complete the first section including the Applicant's Name, Applicant's Address, Date, Job Location, Job Address, and signature of the applicant.
2. Determine the ground snow load, P_g , from Figure R301.2 (5) *MRC* and place it in box 13 completing $P_g = _$. The ground snow is given in the *MRC* and is regionally different throughout the state based on a statistical analysis of weather records.
3. The next item is the exposure factor, C_e . This factor is used to calculate the design wind loads and the design roof snow loads. First, determine if the proposed structure is located in an area designated as Exposure A, B, C, or D. Refer to Figures 2-7, reprinted from the *ASCE 7-02* Commentary by permission from ASCE, for illustrations of Exposures B, C, and D. It must be noted that Exposure A is not illustrated because it is no longer used. If a site is located in Exposure A, refer to *ASCE 7-02* to determine loading. If more than two exposures are present on the site, note which side of the structures (north, south, east, or west) are in each exposure. It isn't practical to have more than two exposures. Second, determine if the structure is Fully Exposed, Partially Exposed, or Sheltered. See the footnotes below the table for an explanation of these items. Place an "X" in the box next to the appropriate exposure. Note: *ASCE 7-05*, referenced by the *2006 MRC* and *MBC* does not include Exposure A.
4. The next item is the thermal factor, C_t . This factor is used to calculate the design roof snow load. Place an "X" in the box that best describes the heating and ventilation conditions for the structure. The types of structures are described within the table.
5. The next item is the importance factor, I . This factor is used to calculate the design wind and roof snow loads. Place an "X" in the box that best describes the use of the building.
6. Last, list the areas intended to be used for attic storage. Circle "yes" if the entire attic is intended for storage, then the form is complete. Circle "no" if the entire attic is not intended for storage and continue to the next line. Circle "yes" for specific areas that are intended for attic storage and then list the areas in the space below. The areas listed in this space are described by the rooms directly below the area intended for attic storage. The form is now complete.

Roof Loading Data Sheet

Authority: Act 230 PA 1972, as amended Completion: Completed prior to application for plan review and building permit. This form is a voluntary form used to assist in the permit approval process.	Jurisdictional information should be included in this space
Applicant's Name: <input type="text" value="John Smith"/>	Date: <input type="text" value="1-1-2004"/>
Applicant's Address: <input type="text" value="123 Main Street"/>	Permit Number: <input type="text" value=""/>
City: <input type="text" value="Mytown"/>	State: <input type="text" value="MI"/>
Applicant's Signature: <input type="text" value=""/>	Zip: <input type="text" value="00000"/>
Job Location: <input type="text" value="Lot 00, Mysubdivision"/>	Address: <input type="text" value="123 Main Street"/>
Township/Village/City: <input type="text" value="Mytown"/>	County: <input type="text" value="Mycounty"/>

THIS FORM SHOULD BE COMPLETED BY THE PERMIT APPLICANT, OR DESIGN PROFESSIONAL FOR C_s, C_t, AND I, PLACE AN "X" IN THE APPROPRIATE BOX THAT BEST DESCRIBES THE STRUCTURE.

13 **Ground Snow**, P_g = From Figure R301.2(5) MRC or Figure 1608.2 MBC

14 Exposure Factor C _s						
Exposure		Fully Exposed ¹	Partially Exposed ²	Sheltered ³		
A	Large city center with at least 1/2 the buildings exceeding 70 ft. in height.	N/A	1.1		1.3	
B	Urban and suburban areas, wooded areas or other terrain with closely spaced objects having the size of single-family dwellings or larger.	0.9	1	X	1.2	
C	Open terrain with scattered obstructions having heights less than 30 ft. (flat open country)	0.9	1		N/A	
D	Flat unobstructed areas exposed to wind flowing over open water for a distance of at least 1 mile. (i.e. Great Lakes.)	0.8	0.9		N/A	

¹Fully Exposed: Roofs exposed on all sides with no shelter by terrain, higher structures, or trees.
²Partially Exposed: All roofs except those designated as "fully exposed" or "sheltered."
³Sheltered: Roofs located tight among conifers that qualify as obstructions.

Thermal Factor C_t

15 Thermal Condition ⁴		C _t
All structures except as listed below		1
Structures kept just above freezing and those with cold, ventilated roofs with an R factor of 25 or greater between the ventilated and heated spaces, such as attics		1.1 X
Unheated structures and those intentionally kept below freezing, such as seasonal building or storage buildings		1.2
Continuously heated greenhouse with a roof R Value less than 2 and having an interior temperature maintained at about 50 degrees 3 ft above the floor during winter months and a temperature alarm system or an attendant to warn of a heating failure.		0.85

⁴These conditions shall be representative of the anticipated conditions during winter months for the life of the structure

Importance Factor

16 Category		I
I	Building and other structures representing low hazard to human life, i.e.: Agricultural, Temporary, and Minor Storage Facilities.	0.8
II	All buildings except those listed in Categories III and IV.	1 X
III	Building and other structures representing substantial hazard to human life in the event of failure.	1.1
IV	Buildings and other structures designated as essential facilities.	1.2

Attic Live Load

17 Entire Attic	<input checked="" type="radio"/> Y <input type="radio"/> N
Specific Areas (if yes, list areas below)	<input checked="" type="radio"/> Y <input type="radio"/> N
List Rooms: <input type="text" value="Garage"/>	

Figure 1: Roof Loading Data Sheet, Michigan Department of Consumer and Industry Services.

