

2021 Virginia Construction Code

CHAPTER 23 WOOD

SECTION 2303 MINIMUM STANDARDS AND QUALITY

2303.1 General.

Structural sawn lumber; end-jointed lumber; *prefabricated wood I-joists*; *structural glued-laminated timber*; *wood structural panels*; fiberboard sheathing (where used structurally); *hardboard* siding (where used structurally); *particleboard*; *preservative-treated wood*; structural log members; *structural composite lumber*; round timber poles and piles; *fire-retardant-treated wood*; hardwood plywood; wood trusses; joist hangers; nails; and staples shall conform to the applicable provisions of this section.

2303.1.1 Sawn lumber.

Sawn lumber used for load-supporting purposes, including end-jointed or edge-glued lumber, machine stress-rated or machine-evaluated lumber, shall be identified by the grade *mark* of a lumber grading or inspection agency that has been approved by an *accreditation body* that complies with [DOC PS 20](#) or equivalent. Grading practices and identification shall comply with rules published by an agency approved in accordance with the procedures of [DOC PS 20](#) or equivalent procedures.

2303.1.1.1 Certificate of inspection.

In lieu of a grade *mark* on the material, a certificate of inspection as to species and grade issued by a lumber grading or inspection agency meeting the requirements of this section is permitted to be accepted for precut, remanufactured or rough-sawn lumber and for sizes larger than 3 inches (76 mm) nominal thickness.

2303.1.1.2 End-jointed lumber.

Approved end-jointed lumber is permitted to be used interchangeably with solid-sawn members of the same species and grade. End-jointed lumber used in an assembly required to have a *fire-resistance rating* shall have the designation "Heat Resistant Adhesive" or "HRA" included in its grade *mark*.

2303.1.2 Prefabricated wood I-joists.

Structural capacities and design provisions for *prefabricated wood I-joists* shall be established and monitored in accordance with [ASTM D5055](#).

2303.1.3 Structural glued-laminated timber.

Glued-laminated timbers shall be manufactured and identified as required in [ANSI/APA 190.1](#) and [ASTM D3737](#).

2303.1.4 Structural glued cross-laminated timber.

Cross-laminated timbers shall be manufactured and identified in accordance with [ANSI/APA PRG 320](#).

2303.1.5 Wood structural panels.

Wood structural panels, where used structurally (including those used for siding, roof and wall sheathing, subflooring, *diaphragms* and built-up members), shall conform to the requirements for their type in [DOC PS 1](#), [DOC PS 2](#) or [ANSI/APA PRP 210](#). Each panel or member shall be identified for grade, bond classification, and *Performance Category* by the trademarks of an *approved* testing and grading agency. The *Performance Category* value shall be used as the "nominal panel thickness" or "panel thickness" whenever referenced in this code. *Wood structural panel* components shall be designed and fabricated in accordance with the applicable standards listed in [Section 2306.1](#) and identified by the trademarks of an *approved* testing and inspection agency indicating conformance to the applicable standard. In addition, *wood structural panels* where permanently exposed in outdoor applications shall be of exterior type, except that *wood structural panel* roof sheathing exposed to the outdoors on the underside is permitted to be Exposure 1 type.

2303.1.6 Fiberboard.

Fiberboard for its various uses shall conform to [ASTM C208](#). *Fiberboard* sheathing, where used structurally, shall be identified by an *approved* agency as conforming to [ASTM C208](#).

2303.1.6.1 Jointing.

To ensure tight-fitting assemblies, edges shall be manufactured with square, shiplapped, beveled, tongue-and-groove or U-shaped joints.

2303.1.6.2 Roof insulation.

Where used as roof insulation in all types of construction, *fiberboard* shall be protected with an *approved roof covering*.

2303.1.6.3 Wall insulation.

Where installed and fireblocked to comply with [Chapter 7](#), *fiberboards* are permitted as wall insulation in all types of construction. In *fire walls* and *fire barriers*, unless treated to comply with [Section 803.1](#) for Class A materials, the boards

Copyright © 2024 International Code Council, Inc., or its licensors (ALL RIGHTS RESERVED).

Accessed by Venkatesh Shanmugam on 11/14/2024 pursuant to License Agreement with ICC. No further reproduction or distribution authorized. Any Unauthorized reproduction or distribution is a violation of the federal copyright, and subject to civil and criminal penalties thereunder.

shall be cemented directly to the concrete, masonry or other noncombustible base and shall be protected with an *approved* noncombustible veneer anchored to the base without intervening airspaces.

2303.1.6.3.1 Protection.

Fiberboard wall insulation applied on the exterior of foundation walls shall be protected below ground level with a bituminous coating.

2303.1.7 Hardboard.

Hardboard siding shall conform to the requirements of [ANSI A135.6](#) and, where used structurally, shall be identified by the *label* of an *approved agency*. *Hardboard* underlayment shall meet the strength requirements of $\frac{7}{32}$ -inch (5.6 mm) or $\frac{1}{4}$ -inch (6.4 mm) service class *hardboard* planed or sanded on one side to a uniform thickness of not less than 0.200 inch (5.1 mm). Prefinished *hardboard* paneling shall meet the requirements of [ANSI A135.5](#). Other basic *hardboard* products shall meet the requirements of [ANSI A135.4](#). *Hardboard* products shall be installed in accordance with manufacture's recommendations.

2303.1.8 Particleboard.

Particleboard shall conform to [ANSI A208.1](#). *Particleboard* shall be identified by the *grademark* or certificate of inspection issued by an *approved agency*. *Particleboard* shall not be utilized for applications other than indicated in this section unless the *particleboard* complies with the provisions of [Section 2306.3](#).

2303.1.8.1 Floor underlayment.

Particleboard floor underlayment shall conform to Type PBU of [ANSI A208.1](#). Type PBU underlayment shall be not less than $\frac{1}{4}$ -inch (6.4 mm) thick and shall be installed in accordance with the instructions of the Composite Panel Association.

2303.1.9 Preservative-treated wood.

Lumber, timber, plywood, piles and poles supporting permanent structures required by [Section 2304.12](#) to be preservative treated shall conform to [AWPA U1](#) and [M4](#). Lumber and plywood used in permanent wood foundation systems shall conform to [Chapter 18](#).

2303.1.9.1 Identification.

Wood required by [Section 2304.12](#) to be preservative treated shall bear the *qualitymark* of an inspection agency that maintains continuing supervision, testing and inspection over the quality of the *preservative-treated wood*. Inspection agencies for *preservative-treated wood* shall be *listed* by an *accreditation body* that complies with the requirements of the American Lumber Standards Treated Wood Program, or equivalent. The *quality mark* shall be on a stamp or *label* affixed to the *preservative-treated wood*, and shall include the following information:

1. Identification of treating manufacturer.
2. Type of preservative used.
3. Minimum preservative retention (pcf).
4. End use for which the product is treated.
5. AWPA standard to which the product was treated.
6. Identity of the accredited inspection agency.

2303.1.9.2 Moisture content.

Where *preservative treated wood* is used in enclosed locations where drying in service cannot readily occur, such wood shall be at a moisture content of 19 percent or less before being covered with insulation, interior wall finish, floor covering or other materials.

2303.1.10 Structural composite lumber.

Structural capacities for *structural composite lumber* shall be established and monitored in accordance with [ASTM D5456](#).

2303.1.11 Structural log members.

Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with [ASTM D3957](#). Such structural log members shall be identified by the *grademark* of an *approved* lumber grading or inspection agency. In lieu of a *grade mark* on the material, a certificate of inspection as to species and grade issued by a lumber grading or inspection agency meeting the requirements of this section shall be permitted.

2303.1.12 Round timber poles and piles.

Round timber poles and piles shall comply with [ASTM D3200](#) and [ASTM D25](#), respectively.

2303.1.13 Engineered wood rim board.

Engineered wood rim boards shall conform to [ANSI/APA PRR 410](#) or shall be evaluated in accordance with [ASTM D7672](#). Structural capacities shall be in accordance with [ANSI/APA PRR 410](#) or established in accordance with [ASTM D7672](#). Rim boards conforming to [ANSI/APA PRR 410](#) shall be marked in accordance with that standard.

2303.2 Fire-retardant-treated wood.

Copyright © 2024 International Code Council, Inc., or its licensors (ALL RIGHTS RESERVED).

Accessed by Venkatesh Shanmugam on 11/14/2024 pursuant to License Agreement with ICC. No further reproduction or distribution authorized. Any Unauthorized reproduction or distribution is a violation of the federal copyright, and subject to civil and criminal penalties thereunder.

Fire-retardant-treated wood is any wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with [ASTM E84](#) or [UL 723](#), a *listed flame spread index* of 25 or less. **Additionally, the ASTM E84 or UL 723 test shall be continued** for a 20-minute period **and** the flame front shall not progress more than 10¹/₂ feet (3200 mm) beyond the centerline of the burners at any time during the test.

2303.2.1 Pressure process.

For wood products impregnated with chemicals by a pressure process, the process shall be performed in closed vessels under pressures not less than 50 pounds per square inch gauge (psig) (345 kPa).

2303.2.2 Other means during manufacture.

For wood products impregnated with chemicals by other means during manufacture, the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product. The use of paints, coating, stains or other surface treatments is not an approved method of protection as required in this section.

2303.2.3 Fire testing of wood structural panels.

Wood structural panels shall be tested with a ripped or cut longitudinal gap of ¹/₈ inch (3.2 mm).

2303.2.4 Labeling.

In addition to the labels required in [Section 2303.1.1](#) for sawn lumber and [Section 2303.1.5](#) for *wood structural panels*, each piece of fire-retardant-treated lumber and *wood structural panels* shall be labeled. The label shall contain the following items:

1. The identification mark of an approved agency in accordance with [Section 1703.5](#).
2. Identification of the treating manufacturer.
3. The name of the fire-retardant treatment.
4. The species of wood treated.
5. *Flame spread* and *smoke-developed index*.
6. Method of drying after treatment.
7. Conformance with appropriate standards in accordance with [Sections 2303.2.5](#) through [2303.2.8](#).
8. For *fire-retardant-treated wood* exposed to weather, damp or wet locations, include the words "No increase in the *listed* classification when subjected to the Standard Rain Test" ([ASTM D2898](#)).

2303.2.5 Strength adjustments.

Design values for untreated lumber and *wood structural panels*, as specified in [Section 2303.1](#), shall be adjusted for *fire-retardant-treated wood*. Adjustments to design values shall be based on an approved method of investigation that takes into consideration the effects of the anticipated temperature and humidity to which the *fire-retardant-treated wood* will be subjected, the type of treatment and redrying procedures.

2303.2.5.1 Wood structural panels.

The effect of treatment and the method of redrying after treatment, and exposure to high temperatures and high humidities on the flexure properties of fire-retardant-treated softwood plywood shall be determined in accordance with [ASTM D5516](#). The test data developed by [ASTM D5516](#) shall be used to develop adjustment factors, maximum loads and spans, or both, for untreated plywood design values in accordance with [ASTM D6305](#). Each manufacturer shall publish the allowable maximum loads and spans for service as floor and roof sheathing for its treatment.

2303.2.5.2 Lumber.

For each species of wood that is treated, the effects of the treatment, the method of redrying after treatment and exposure to high temperatures and high humidities on the allowable design properties of fire-retardant-treated lumber shall be determined in accordance with [ASTM D5664](#). The test data developed by [ASTM D5664](#) shall be used to develop modification factors for use at or near room temperature and at elevated temperatures and humidity in accordance with [ASTM D6841](#). Each manufacturer shall publish the modification factors for service at temperatures of not less than 80°F (27°C) and for roof framing. The roof framing modification factors shall take into consideration the climatological location.

2303.2.6 Exposure to weather, damp or wet locations.

Where *fire-retardant-treated wood* is exposed to weather, or damp or wet locations, it shall be identified as "Exterior" to indicate there is no increase in the *listed flame spread index* as defined in [Section 2303.2](#) when subjected to [ASTM D2898](#).

2303.2.7 Interior applications.

Interior *fire-retardant-treated wood* shall have moisture content of not over 28 percent when tested in accordance with [ASTM D3201](#) procedures at 92-percent relative humidity. Interior *fire-retardant-treated wood* shall be tested in accordance with [Section 2303.2.5.1](#) or [2303.2.5.2](#). Interior *fire-retardant-treated wood* designated as Type A shall be tested in accordance with the provisions of this section.

Copyright © 2024 International Code Council, Inc., or its licensors (ALL RIGHTS RESERVED).

Accessed by Venkatesh Shanmugam on 11/14/2024 pursuant to License Agreement with ICC. No further reproduction or distribution authorized. Any Unauthorized reproduction or distribution is a violation of the federal copyright, and subject to civil and criminal penalties thereunder.

2303.2.8 Moisture content.

Fire-retardant-treated wood shall be dried to a moisture content of 19 percent or less for lumber and 15 percent or less for *wood structural panels* before use. For wood kiln-dried after treatment (KDAT), the kiln temperatures shall not exceed those used in kiln drying the lumber and plywood submitted for the tests described in [Section 2303.2.5.1](#) for plywood and [2303.2.5.2](#) for lumber.

2303.2.9 Types I and II construction applications.

See [Section 603.1](#) for limitations on the use of *fire-retardant-treated wood* in buildings of Type I or II construction.

2303.3 Hardwood and plywood.

Hardwood and decorative plywood shall be manufactured and identified as required in [HPVA HP-1](#).

2303.4 Trusses.

Wood trusses shall comply with [Sections 2303.4.1](#) through [2303.4.7](#).

2303.4.1 Design.

Wood trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other *approved* framing devices.

2303.4.1.1 Truss design drawings.

The written, graphic and pictorial depiction of each individual truss shall be provided to the *building official* for approval prior to installation. Truss design drawings shall be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the following information:

1. Slope or depth, span and spacing.
2. Location of all joints and support locations.
3. Number of plies if greater than one.
4. Required bearing widths.
5. Design *loads* as applicable, including:
 - 5.1. Top chord *live load*.
 - 5.2. Top chord *dead load*.
 - 5.3. Bottom chord *live load*.
 - 5.4. Bottom chord *dead load*.
 - 5.5. Additional *loads* and locations.
 - 5.6. Environmental design criteria and *loads* (such as wind, rain, snow, seismic).
6. Other lateral *loads*, including *drag strut loads*.
7. Adjustments to wood member and metal connector plate design value for conditions of use.
8. Maximum reaction force and direction, including maximum uplift reaction forces where applicable.
9. Joint connection type and description, such as size and thickness or gage, and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.
10. Size, species and grade for each wood member.
11. Truss-to-truss connections and truss field assembly requirements.
12. Calculated span-to-deflection ratio and maximum vertical and horizontal deflection for live and total *load* as applicable.
13. Maximum axial tension and compression forces in the truss members.
14. Required permanent *individual truss member* restraint location and the method and details of restraint *and diagonal* bracing to be used in accordance with [Section 2303.4.1.2](#).

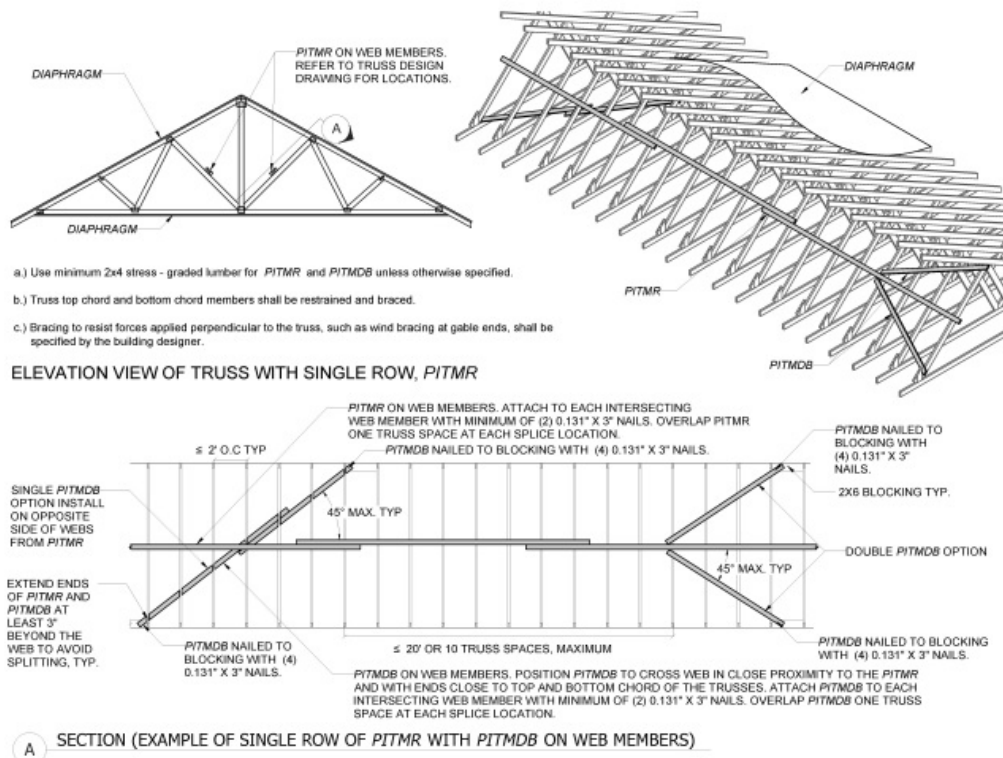
2303.4.1.2 Permanent individual truss member restraint (PITMR) and permanent individual truss member diagonal bracing (PITMDB).

Where the truss design drawings *designate the need for permanent individual truss member restraint*, it shall be accomplished by one of the following methods:

1. *PITMR and PITMDB* installed using standard industry lateral restraint *and diagonal* bracing details in accordance with [TPI 1](#), [Section 2.3.3.1.1](#), accepted engineering practice, or [Figures 2303.4.1.2\(1\), \(3\), and \(5\)](#).
2. *Individual truss member reinforcement in place of the specified lateral restraints (i.e., buckling reinforcement such as T-reinforcement, L-reinforcement, proprietary reinforcement, etc.)* such that the buckling of any individual truss member is resisted internally by the individual truss. The buckling reinforcement of individual *truss* members shall be installed as shown on the truss design drawing, on supplemental truss member buckling reinforcement details provided by the truss designer or in accordance with [Figures 2303.4.1.2 \(2\) and \(4\)](#).
3. A project-specific *PITMR and PITMDB design* provided by any *registered design professional*.

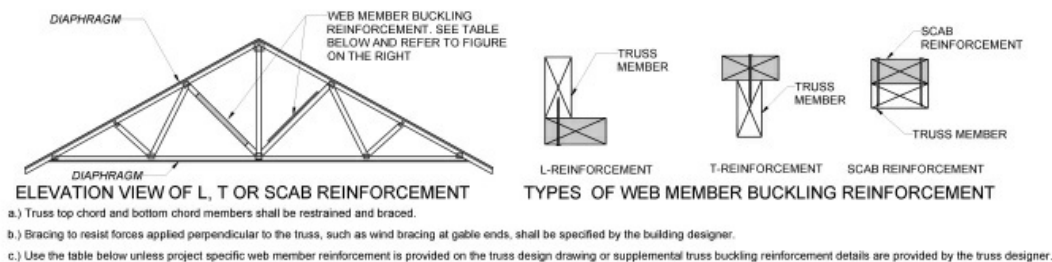
Copyright © 2024 International Code Council, Inc., or its licensors (ALL RIGHTS RESERVED).

Accessed by Venkatesh Shanmugam on 11/14/2024 pursuant to License Agreement with ICC. No further reproduction or distribution authorized. Any Unauthorized reproduction or distribution is a violation of the federal copyright, and subject to civil and criminal penalties thereunder.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE 2303.4.1.2 (1)
PITMR AND PITMDB FOR TRUSS WEB MEMBERS REQUIRING ONE ROW OF PITMR



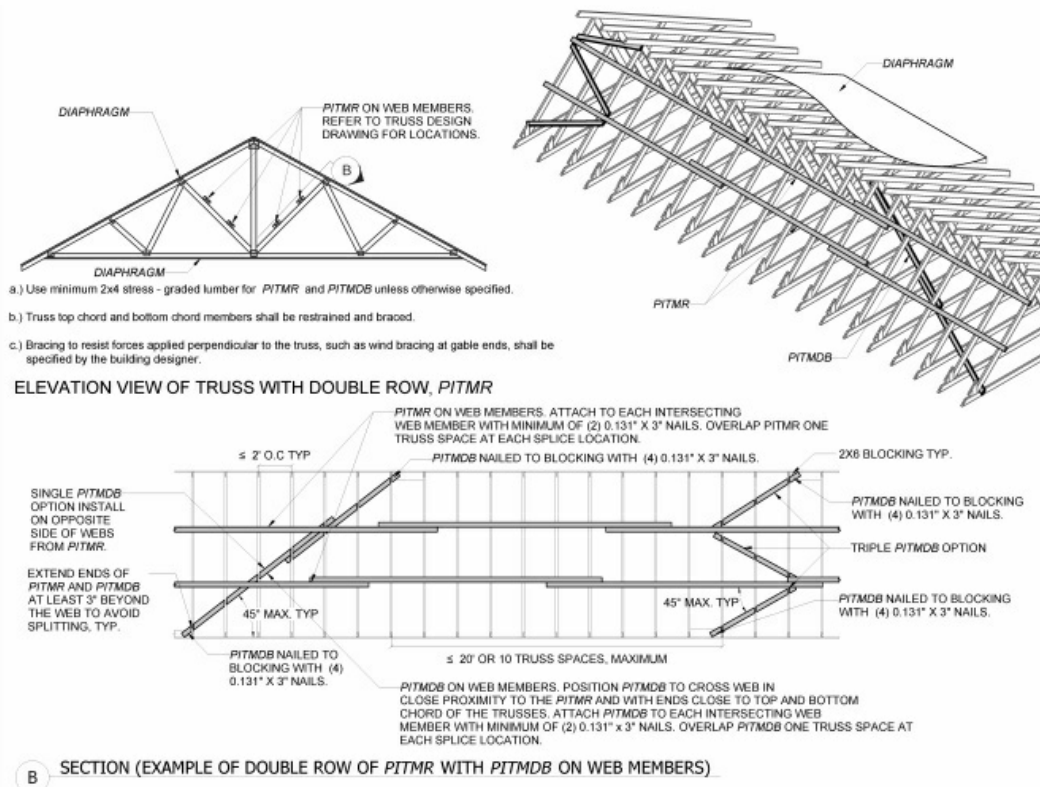
NUMBER OF ROWS OF PITMR SPECIFIED ON WEB MEMBER	SIZE OF TRUSS WEB	TYPE AND SIZE OF WEB REINFORCEMENT ¹ FOR T, L OR SCAB ²	GRADE OF WEB REINFORCEMENT	MINIMUM LENGTH OF WEB REINFORCEMENT	MINIMUM CONNECTION OF WEB REINFORCEMENT TO WEB
ONE	2x4	2x4	Same species and grade or better than web member	90% of web or extend to within 6" of end of web member, whichever is greater	(0.131" x 3") nails at 6" on-center ²
	2x6	2x6			
	2x8	2x8			

¹Maximum allowable web length is 14'

²Attach Scab reinforcement to web with two rows of minimum 0.131" x 3" nails at 6" on-center

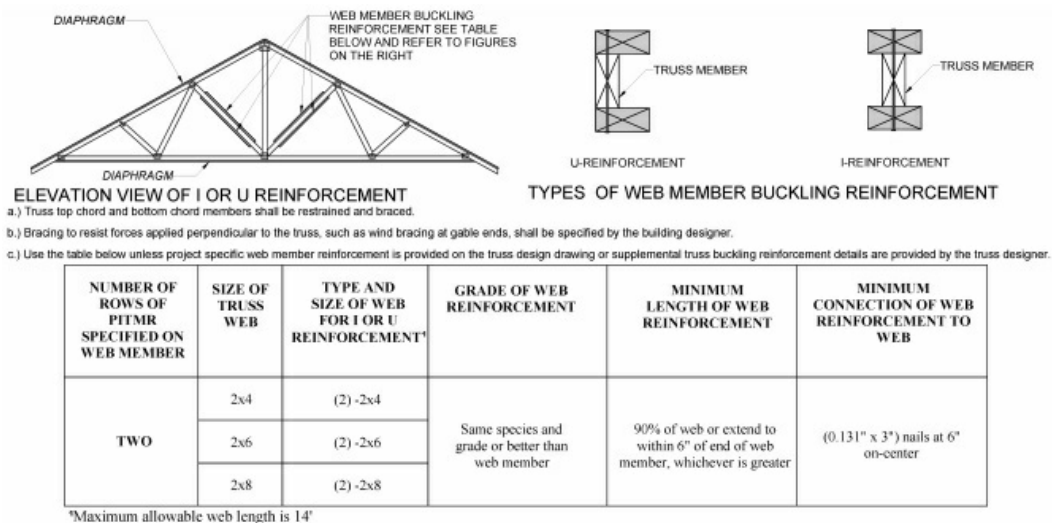
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE 2303.4.1.2(2)
ALTERNATIVE INSTALLATION USING BUCKLING REINFORCEMENT FOR TRUSS WEB MEMBERS IN LIEU OF ONE ROW OF PITMR



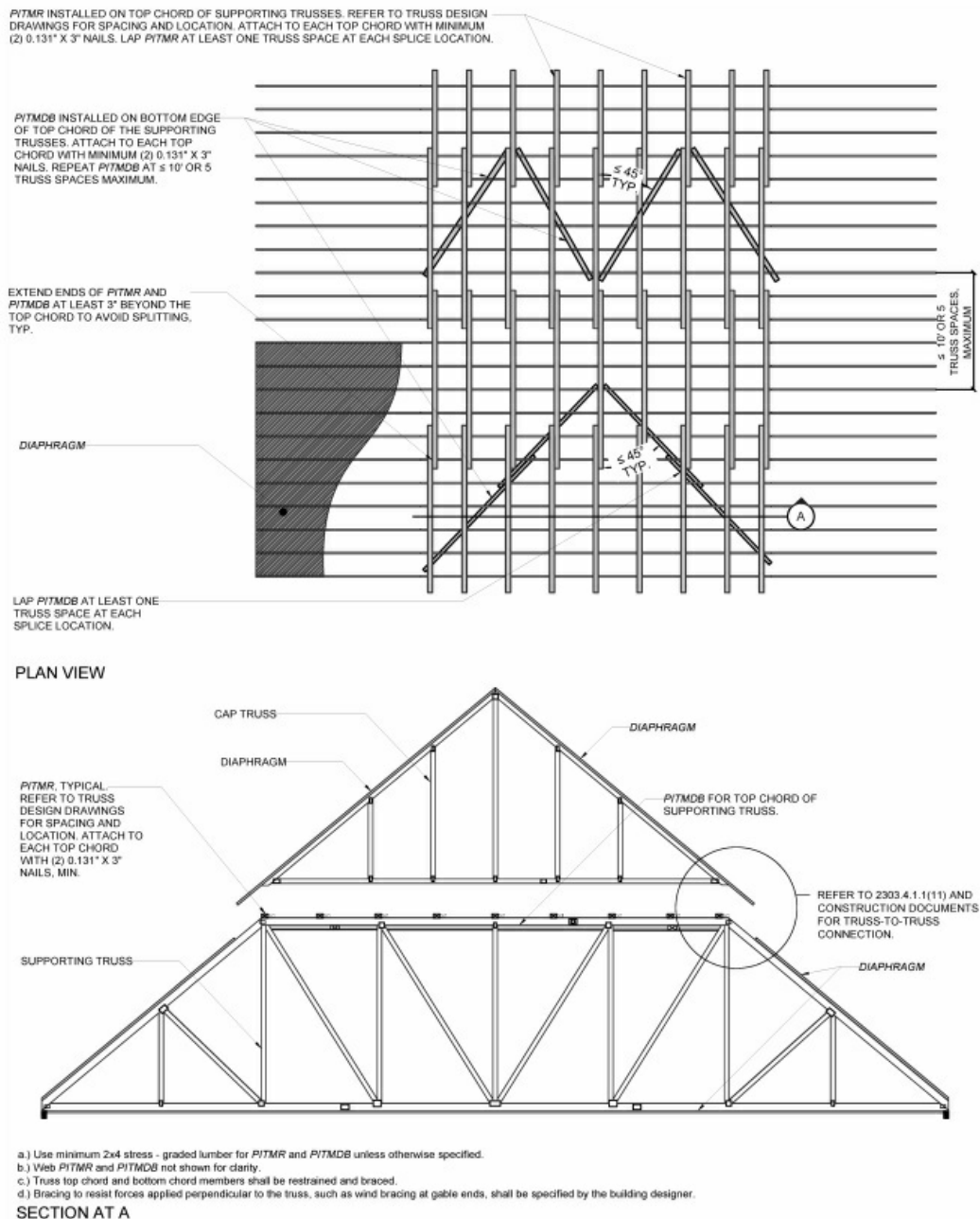
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE 2303.4.1.2(3)
PITMR AND PITMDB FOR TRUSS WEB MEMBERS REQUIRING TWO ROWS OF PITMR



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE 2303.4.1.2(4)
ALTERNATIVE INSTALLATION USING BUCKLING REINFORCEMENT FOR TRUSS WEB MEMBERS IN LIEU OF TWO ROWS OF PITMR



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE 2303.4.1.2(5)
PITMR AND PITMDB FOR FLAT PORTION OF TOP CHORD IN A PIGGYBACK ASSEMBLY

2303.4.1.2.1 Trusses installed without a diaphragm.

Trusses installed without a *diaphragm* on the top or bottom chord shall require a project specific *PITMR* and *PITMDB* design prepared by a *registered design professional*.

Exception: Group U occupancies.

2303.4.1.3 Trusses spanning 60 feet or greater.

The *owner* or the *owner's* authorized agent shall contract with any qualified *registered design professional* for the design of the temporary installation restraint and *diagonal* bracing and the *PITMR* and *PITMDB* for all trusses with clear spans 60 feet (18 288 mm) or greater.

2303.4.1.4 Truss designer.

The individual or organization responsible for the design of trusses.

2303.4.1.4.1 Truss design drawings.

Where required by the *registered design professional*, the *building official* or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Copyright © 2024 International Code Council, Inc., or its licensors (ALL RIGHTS RESERVED).

Accessed by Venkatesh Shanmugam on 11/14/2024 pursuant to License Agreement with ICC. No further reproduction or distribution authorized. Any Unauthorized reproduction or distribution is a violation of the federal copyright, and subject to civil and criminal penalties thereunder.

Exceptions:

1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.
2. Where a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.

2303.4.2 Truss placement diagram.

The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams that serve only as a guide for installation and do not deviate from the *permit* submittal drawings shall not be required to bear the seal or signature of the truss designer.

2303.4.3 Truss submittal package.

The truss submittal package provided by the truss manufacturer shall consist of each individual truss design drawing, the truss placement diagram, the permanent *individual truss member* restraint/bracing method and details and any other structural details germane to the trusses; and, as applicable, the cover/truss index sheet.

2303.4.4 Anchorage.

The design for the transfer of *loads* and anchorage of each truss to the supporting structure is the responsibility of the *registered design professional*.

2303.4.5 Alterations to trusses.

Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a *registered design professional*. Alterations resulting in the addition of *loads* to any member (for example, HVAC equipment, piping, additional roofing or insulation) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2303.4.6 TPI 1 specifications.

In addition to [Sections 2303.4.1](#) through [2303.4.5](#), the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with [TPI 1](#). Job-site inspections shall be in compliance with [Section 110.4](#), as applicable.

2303.4.7 Truss quality assurance.

Trusses not part of a manufacturing process in accordance with either [Section 2303.4.6](#) or a referenced standard, which provides requirements for quality control done under the supervision of a third-party quality control agency, shall be manufactured in compliance with [Sections 1704.2.5](#) and [1705.5](#), as applicable.

2303.5 Test standard for joist hangers.

Joist hangers shall be in accordance with [ASTM D7147](#).

2303.6 Nails and staples.

Nails and staples shall conform to requirements of [ASTM F1667](#), including Supplement 1. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as follows: 80 kips per square inch (ksi) (551 MPa) for shank diameters larger than 0.177 inch (4.50 mm) but not larger than 0.254 inch (6.45 mm), 90 ksi (620 MPa) for shank diameters larger than 0.142 inch (3.61 mm) but not larger than 0.177 inch (4.50 mm) and 100 ksi (689 MPa) for shank diameters of not less than 0.099 inch (2.51 mm) but not larger than 0.142 inch (3.61 mm). Staples used for framing and sheathing connections shall have minimum average bending moments as follows: 3.6 in.-lbs (0.41 N-m) for No. 16 gage staples, 4.0 in.-lbs (0.45 N-m) for No. 15 gage staples, and 4.3 in.-lbs (0.49 N-m) for No. 14 gage staples.

2303.7 Shrinkage.

Consideration shall be given in design for the effects of wood cross-grain dimensional changes that occur as a result of changes in the wood moisture content after installation.