



DrJ Research Report

DRR 1604-03

1-1/2" Cantilevered Floor Trusses
Parallel or Perpendicular to Foundation
Wall

**Structural Building Components
Association**

Code Compliance Process:

**Use of cantilevered sill plates
with metal plate connected wood
trusses to align with varying
thicknesses of exterior
sheathing**

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October 16, 2020



REPORT HOLDER
INFORMATION:

Structural Building Components Association

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sbcindustry.com

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 17 53 - Shop-Fabricated Wood Trusses

1 PRODUCT EVALUATED¹

- 1.1 Use of cantilevered sill plates with metal plate connected wood trusses to align with varying thicknesses of exterior sheathing

2 APPLICABLE CODES AND STANDARDS^{2,3}

2.1 Codes

- 2.1.1 *IBC—12, 15, 18: International Building Code®*
- 2.1.2 *IRC—12, 15, 18: International Residential Code®*

2.2 Standards and Referenced Documents

- 2.2.1 ANS/AWC NDS: National Design Specification (NDS) for Wood Construction
- 2.2.2 TPI 1: National Design Standard for Metal-plate-connected Wood Truss Construction

3 EVALUATION SCOPE

- 3.1 This research report addresses the general construction framing details for cantilevered sill plates supporting metal plate connected wood trusses installed parallel or perpendicular to the foundation walls where there is a potential for discontinuous planes between the exterior wall above the sill plate and the foundation insulation planes.
- 3.2 This report is based on the following assumptions
 - 3.2.1 Exterior wall sheathing is any thickness to align the exterior face of the sheathing with the exterior face of the sheathing below. Exterior sheathing assumed to be 7/16" wood structural panel (WSP).
 - 3.2.2 Basement continuous insulation is installed on the exterior of the foundation and does not exceed 2".
 - 3.2.3 Floor system is bottom chord bearing metal plate connected wood trusses.

¹ Building codes require data from valid [research reports](#) be obtained from [approved sources](#). Work of licensed [registered design professionals](#) (RDPs) meets the [code requirements](#) for approval by the [building official](#).

Building official approval of a licensed RDP is performed by verifying the RDP and/or their business entity complies with all professional engineering laws of the relevant [jurisdiction](#). Therefore, the work of licensed RDPs is accepted by [building officials](#), except when plan (i.e. peer) review finds an error with respect to a specific section of the code. Where this DRR is not approved, the [building official](#) responds in writing stating the reasons for [disapproval](#).

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, visit drjengineering.org or call us at 608-310-6748.

² Unless otherwise noted, all references in this DRR are from the 2018 version of the codes and the standards referenced therein (e.g., *ASCE 7*, *NDS*, *ASTM*). This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein.

³ All terms defined in the applicable building codes are italicized.



- 3.2.4 The sill plate does not overhang the foundation by more than 1⁹/₁₆".
- 3.3 Specific code compliance considerations, including insulation, water resistant barrier, and air barrier, are outside of the scope of this research report.
- 3.4 Any code compliance issues not specifically addressed in this section are outside the scope of this DRR.
- 3.5 Any engineering evaluation conducted for this DRR was performed on the dates provided in this DRR and within DrJ's professional scope of work.

4 APPLICATIONS

4.1 General Requirements

- 4.1.1 All wall assembly components shall be approved, installed, and inspected in accordance with the applicable building code, approved construction documents, manufacturer installation instructions, and good practice.
- 4.1.2 This research report functions as the "manufacturer's recommendation" for metal plate connected wood trusses for situations where there is a sill plate cantilever of 1⁹/₁₆" or less.
 - 4.1.2.1 Where [IRC Section R502.3.3](#) provides prescriptive information regarding floor cantilevers for sawn lumber and [IRC Section R502.7](#) provides prescriptive information for lateral restraint at supports for sawn lumber, it defers to manufacturer recommendations for engineered products in Exception 1:

IRC Section R502.7 Exception 1 Trusses, structural composite lumber, structural glued-laminated members and I-joists shall be supported laterally as required by the manufacturer's recommendations.
 - 4.1.2.2 [IRC Section R502.7.1](#) provides prescriptive information for bridging yet also defers to manufacturer recommendations for engineered products in the Exception:

IRC Section R502.7.1 Exception Trusses, structural composite lumber, structural glued-laminated members and I-joists shall be supported laterally as required by the manufacturer's recommendations.

4.2 Terminology

- 4.2.1 **Band, Rim or Header Joist** – Not defined, but shown on [IRC Figure R502.2](#). In the case of sawn lumber and I-joists, it is a full depth framing member that provides lateral support for the ends of the joists perpendicular to the foundation.
- 4.2.2 **Bottom Chord Bearing** – (BCSI) Bearing condition of a truss that is supported on its bottom chord.
- 4.2.3 **Continuous Insulation** – ([IRC Chapter 2](#)) Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.
- 4.2.4 **Ribbon (Band)** – (BCSI) Framing member installed on the edge of the exterior perimeter, usually tying the ends of the floor trusses together. Note: structural sheathing, blocking panels, or a rim board may be required, in addition to the ribbon, to transfer all the lateral loads (see BCSI-B7).
- 4.2.5 **Sill Plate** – Not defined, but shown in [IRC Figure R502.2](#). It is attached to the foundation using anchor bolts and the floor system is, in turn, attached to the sill plate

5 INSTALLATION

- 5.1 Installation shall comply with the manufacturer's installation instructions and this DRR. In the event of a conflict between the manufacturer's installation instructions and this DRR, the more restrictive shall govern.

5.2 Installation Procedure

- 5.2.1 The connection of the trusses to the sill plate as close to the line of anchor bolts in the sill plate as practical to avoid any potential for parallel to grain bending in the sill plate when the connection is loaded in uplift.
- 5.2.2 A cantilever of sill plate and floor truss (perpendicular) of 1⁹/₁₆" or less:
 - 5.2.2.1 The bottom cord truss and sill plate equals 3" and transfers load into the truss bottom chord and into foundation, Figure 1 allowing up to a 1¹/₂" cantilever.
- 5.2.3 A cantilever of sill plate and ladder truss (parallel) of 1⁹/₁₆" or less:
 - 5.2.3.1 The ladder truss is 3¹/₂" wide and 2" bears on the sill plate over the foundation, Figure 1.
- 5.2.4 The difference between 1¹/₂" and 1⁹/₁₆" in the cantilever is negligible. This situation also does not require any special truss design as do longer cantilever conditions.

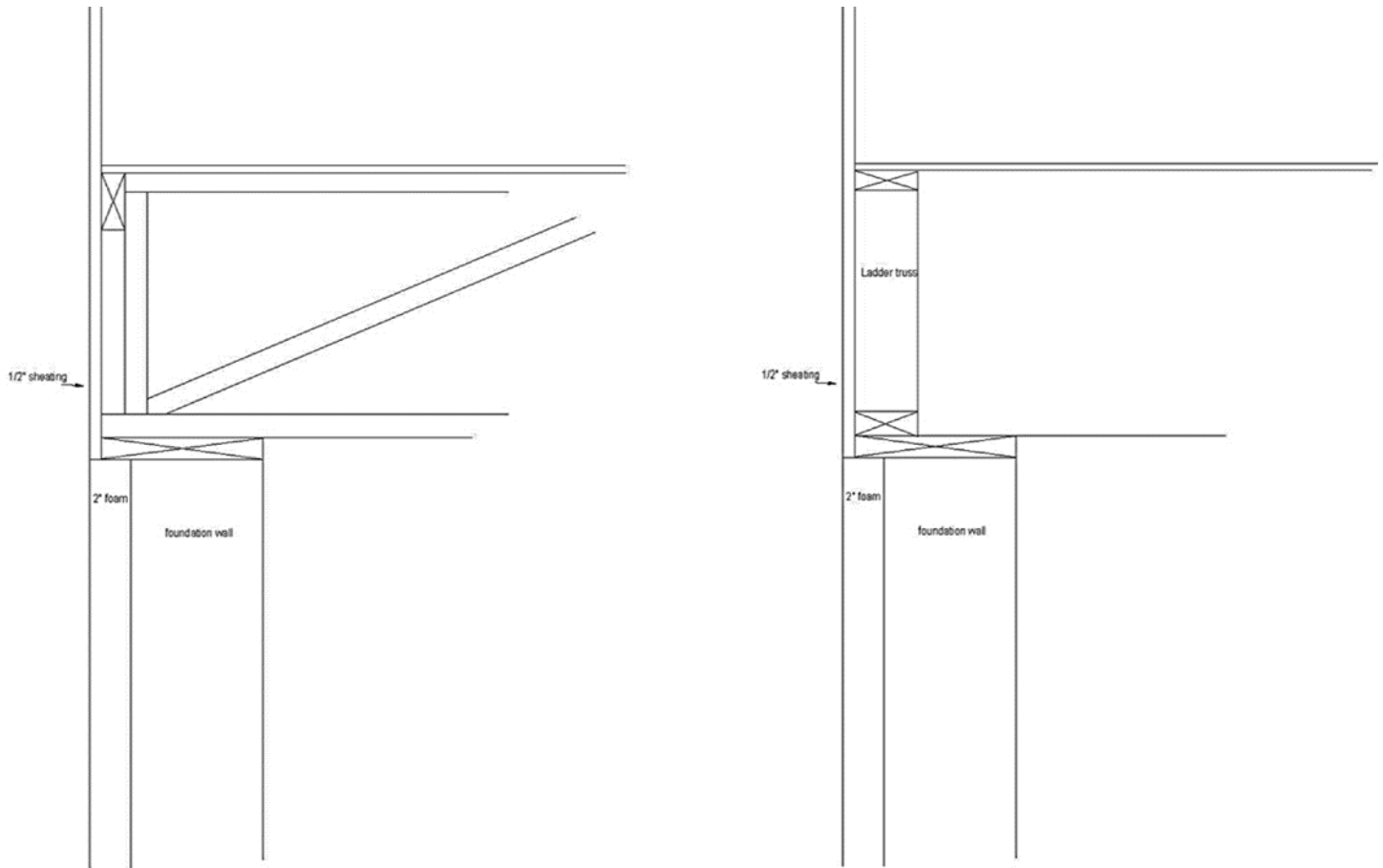


FIGURE 1. TRUSS DETAIL – PERPENDICULAR TO FOUNDATION & PARALLEL TO FOUNDATION

- 5.2.5 Connection of the trusses to the sill plate and the sill plate to the foundation are required per the applicable building code.



6 TEST ENGINEERING SUBSTANTIATING DATA

- 6.1 *Building Component Safety Information (BCSI)*
- 6.2 Structural Building Components Association (SBCA)
- 6.3 The Truss Plate Institute (TPI)
- 6.4 Some information contained herein is the result of testing and/or data analysis by other sources which conform to IBC Section 1703 and relevant professional engineering law. DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.
- 6.5 Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *IBC*, *IRC*, *NDS®*, and *SDPWS*). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.

7 FINDINGS

- 7.1 Sill plates supporting metal plate connected wood truss floor systems as described in this report may be cantilevered up to 1⁹/₁₆" without requiring design of the trusses for a cantilevered condition.
- 7.2 Truss to sill plate uplift connections, where required, are made per the applicable building code for the non-cantilevered condition. No additional design for the connection is required.
- 7.3 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.9 are similar) states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code...Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.

- 7.4 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this evaluation, they are listed here.
 - 7.4.1 No known variations

8 CONDITIONS OF USE

- 8.1 Where required by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this DRR and the installation instructions shall be submitted at the time of permit application.
- 8.2 Any generally accepted engineering calculations needed to show compliance with this DRR shall be submitted to the AHJ for review and approval.
- 8.3 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the Building Designer (e.g., owner or registered design professional).
- 8.4 At a minimum, this product shall be installed per Section 5 of this DRR.
- 8.5 This product is manufactured under a third-party quality control program in accordance with IBC Section 104.4 and 110.4 and IRC Section R104.4 and R109.2.



8.6 The actual design, suitability, and use of this DRR, for any particular building, is the responsibility of the owner or the owner's authorized agent. Therefore, the DRR shall be reviewed for code compliance by the building official for acceptance.

9 REVIEW SCHEDULE

9.1 For the most recent version or current status of this DRR, visit drjengineering.org or contact [DrJ Engineering](#).