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NOTICE





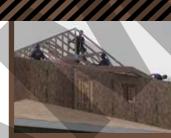


BUILDING COMPONENT SAFETY INFORMATION

Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses











Use of the words above in any language should tell the reader that an unsafe condition or action will greatly increase the probability of an accident occurring that results in serious personal injury or death. Disregarding or ignoring handling, installing, restraining and bracing safety recommendations is the major cause of Structural Building Component erection/installation accidents.

The erection/installation of Structural Building Components is inherently dangerous and requires, above all, careful planning and communication between the Contractor involved with the erection/installation, installation crew and the crane operator. Depending on the experience of the Contractor, it is strongly recommended that a meeting be held with all onsite individuals involved in the lifting/hoisting, installing and temporary/ permanent restraint/bracing operations to review the provisions of the Building Component Safety Information (BCSI) book, the Truss Design Drawings, the Construction Documents (i.e., architectural/structural plans and specifications), the Truss Placement Diagram (if/when required by the Contract), OSHA jobsite lifting and fall protection requirements (see BCSI-B11), the erection plan and installation plan (if provided) and site-specific environmental issues.

It is recommended that this review process be followed before any Truss handling operations are performed. It is also recommended that this meeting be held before any Truss handling at each new jobsite and be repeated for any individuals newly assigned to the erection/installation operation. Proper restraint and Bracing of Trusses requires an understanding of triangulation in the various planes perpendicular to the planes of the members of the Trusses. This understanding is essential for a safe installation. The Contractor involved with the erection/installation shall be familiar with general Lateral Restraint and Bracing concepts as discussed in the above-referenced industry publications. These recommendations are not intended to be interpreted as superior to the Building Designer's design specification for handling, installing, restraining and Bracing Trusses, nor are they intended to preclude the use of other equivalent methods for restraining/Bracing and providing stability for the walls, columns, floors, roof and all the interrelated Structural Building Components as determined by the Contractor.

A WARNING The handling, storing, installing, restraining and Bracing of Trusses requires specialized training, clearly implemented procedures, and careful planning and communication among the Contractor, all installation crews and any crane operators. Property damage and/or serious bodily injury is one possible result when handling and installing Trusses without appropriate training, planning and communication.

Prior to Truss installation, it is recommended that the documents be examined and disseminated to all appropriate personnel. In addition to proper training and a clear understanding of the installation plan, any applicable fall protection requirements and the intended restraint/Bracing requirements shall be understood.

Examine the structure, including the framing system, bearing locations, and related installation locations and begin Truss installation only after any unsatisfactory conditions have been corrected. Do not cut, modify, or repair components. Report any damage before installation.

The information in this book is offered as a minimum guideline only. Nothing contained in BCSI shall be construed in any manner as expanding the scope of responsibility of, or imposing any additional liabilities on the Truss Manufacturer.

Every project has different site conditions that can have a specific effect on the erection process. Before the first Truss is erected, every individual involved shall understand the plan for hoisting and Truss setting and the intended temporary restraint and Bracing requirements for a safe, efficient and accident-free jobsite.

PRECAUTIONARY NOTE TO USERS OF BCSI.

This Guide to Good Practice for Handling, Installing, Restraining & Bracing Metal Plate Connected Wood Trusses (BCSI) may be edited, changed, revised or withdrawn at any time. Purchasers and users of this guide are advised to visit the products section of sbcindustry.com to confirm that this edition is the most current information available. Use only the latest edition. Additionally, errata and updates are published periodically and are available at sbcindustry.com/bcsi.php.

EDITOR'S NOTE: Capitalized terms found throughout this document are defined in the "Glossary of Terms" (see pages 93-98).

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BUILDING COMPONENT SAFETY INFORMATION

Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses

PRODUCED BY STRUCTURAL BUILDING COMPONENTS ASSOCIATION

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INTRODUCTION

The Structural Building Components Association (SBCA) and Truss Plate Institute (TPI) have each adopted policies to promote handling, installing, restraining and bracing guidelines for Metal Plate Connected Wood Trusses that are simple, safe, proven methods consistent with accepted framing construction practices in the field. The intention of this Building Component Safety Information (BCSI) book is to implement those policies.

The methods and procedures in BCSI are intended to ensure that the overall construction techniques employed will put floor and roof Trusses in place safely. These recommendations for handling, installing, restraining and Bracing Trusses are based upon the collective experience of leading personnel involved with Truss design, manufacturing and installation, but must, due to the nature of responsibilities involved, be presented only as a guide for use by a qualified Building Designer and/ or Contractor. These recommendations are not intended to be interpreted as superior to the Building Designer's design specification for handling, installing, restraining and Bracing Trusses, nor are they intended to preclude the use of other equivalent methods for restraining/Bracing and providing stability for the walls, columns, floors, roofs and all the interrelated Structural Building Components as determined by the Contractor. Thus, SBCA and those who participated in the development of this guide expressly disclaim any responsibility for damages arising from the use, application or reliance on the recommendations and information contained herein.

PUBLICATIONS BACKGROUND

The first edition of the BCSI book (BCSI 1-03) was developed by SBCA and TPI to replace HIB-91, Commentary and Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses. The BCSI book was developed using DSB-89, Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses; HIB-91; HIB-91 (Summary Sheet); HIB-98, Recommendations for Handling, Installing and Temporary Bracing of Metal Plate Connected Wood Trusses Used in Post-Frame Construction; and several bracing, warning and safety documents existing at the time. The consistent message throughout all of these documents is that proper Truss handling, installing, restraining and Bracing are crucial for consistent jobsite safety and acceptable structural performance. More information regarding the design and manufacture of metal plate connected wood Trusses is provided in ANSI/ TPI 1-2014, National Design Standard for Metal Plate Connected Wood Trusses, and the 3rd edition of the Metal Plate Connected Wood Truss Handbook published by SBCA.

The sections of this book are available as B-Series Summary Sheets. Each Summary Sheet condenses the information contained in the corresponding section of this book into a few pages that emphasize the main points using a graphical representation of the text as fully as possible. The goal is to provide clear, concise information for jobsite users so they can implement the handling, installing, restraining and Bracing concepts contained herein more easily.

The B-Series Summary Sheets include:

BCSI-B1 Summary Sheet - Guide for Handling, Installing, Restraining & Bracing of Trusses: This guide for builders features proper techniques for unloading, storing, lifting, erecting, installing, restraining and Bracing Trusses. It includes specific information for protecting Trusses from weather and damage at the jobsite, how to lift bundles and individual Trusses by crane, restraining/Bracing guidelines to prevent Trusses from toppling during erection, installation tolerances to keep the Trusses in plane and plumb and basic Construction Loading and materials placement recommendations. Numerous graphics accompanied by written instructions provide an easy-to-follow reference. A supplemental warning tag can be attached to individual Trusses urging erection/installation Contractors to refer to BCSI-B1 for more Bracing information.

BCSI-B2 Summary Sheet - Truss Installation & Temporary Restraint/Bracing: Temporary restraint/Bracing is an important, yet often overlooked, element of safe Truss installation. BCSI-B2 provides options for safe temporary restraint/Bracing installations and strongly emphasizes how all Lateral Restraint needs to be stabilized with Diagonal Bracing, while showing how to get the first five Trusses erected, restrained and Braced efficiently and safely for the benefit of the crew and the project.

BCSI-B3 Summary Sheet - Permanent Restraint/Bracing of Chords & Web Members: Permanent Bracing must provide sufficient support at right angles to the plane of the Truss to hold every Truss member in the position assumed for it in the design. BCSI-B3 reviews the various planes of the Truss that typically must be restrained/Braced and provides installation guidelines for Gable End Frame restraint/Bracing, individual chord and web member Permanent restraint/Bracing, web member reinforcement and Permanent restraint/Bracing for special conditions.

BCSI-B4 Summary Sheet - Construction Loading:
During construction, Trusses must not support any loads from equipment or construction materials until the Truss assembly is properly restrained and braced. This document provides safe stack heights for several materials and illustrates good and bad loading practices.

BCSI-B5 Summary Sheet - Truss Damage, Jobsite Modifications & Installation Errors: Trusses are engineered components that can be damaged through mishandling, jobsite modification or improper installation. This Summary Sheet provides information on what to do if Trusses become damaged during the construction process.

The following B-Series Summary Sheets were specifically created for special conditions that are encountered during the Truss installation and Bracing process:

BCSI-B7 Summary Sheet - Guide for Handling, Installing and Bracing of 3x2 and 4x2 Parallel Chord Trusses: Floor Trusses are more stable during installation because they are built with the wide-face of the lumber oriented horizontally. Nevertheless, it is important to observe good installation, restraint and Bracing practices so floor systems are installed safely and successfully, and offer better long-term floor performance.

BCSI-B8 Summary Sheet - Using Toe-Nailed Connections to Attach Trusses at Bearing Locations: Toe-nailing is commonly used to attach Metal Plate Connected Wood Trusses (MPCWT) and other wood-based framing components to their supports. BCSI-B8 contains guidelines for using toe-nailed Connections and provides uplift and lateral resistance capacities for these Connections. Connection options are also discussed for when toe-nailing is not enough.

BCSI-B9 Summary Sheet - Multi-Ply Girders:

Multiple-ply Girder Trusses consist of two or more individual Trusses that must be attached together to act as a single member. **BCSI-B9** discusses various attachment methods and types of fasteners.

BCSI-B10 Summary Sheet - Post Frame Truss Installation, Restraint & Bracing: Metal Plate Connected Wood Trusses are commonly used in post frame construction. This Summary Sheet provides guidelines for the proper handling, installing, restraining and Bracing of flat Bottom Chord MPCWT spaced > 2' to 12' on-center in engineered post frame building system applications.

BCSI-B11 Summary Sheet - Fall Protection & Trusses: Trusses are NOT designed to be fall protection anchors. BCSI-11 provides general guidelines to assist framing crews to safely and efficiently install Trusses while meeting OSHA's fall protection guidelines.

All BCSI Summary Sheets are viewable online and are available at sbcindustry.com/bcsi.php.

IMPORTANT NOTE REGARDING ON-CENTER SPACING

BCSI is primarily directed toward Truss installations in which the on-center (oc) spacing is 24" or less. The exception to this is BCSI-B10, which covers spacings >24" oc to 12'. Truss spacing of 19.2", 16" and 12" oc are occasionally used. These closer oc spacings are acceptable using the handling, installing and Bracing criteria of this book.

SI UNIT CONVERSIONS

1'' = 25.4mm

1' = 0.305 m

1 lb/ft = 0.01459 kN/m

 $1 \text{ lb/ft}^2 = 0.0479 \text{ kN/m}^2$

JOBSITE PACKAGE COVER SHEET

SBCA has created a "JOBSITE PACKAGE" cover sheet that may be included with a jobsite package for each job. The jobsite package typically provides one or more of the BCSI Summary Sheets, the Truss Design Drawings for the project, the Truss Placement Diagram (if/when required by the Contract) and other key information as determined by the Truss Manufacturer.



CHECKLIST FOR HANDLING & INSTALLING TRUSSES

SBCA has also created the "Checklist for Handling and Installing Trusses" that may also be included with a jobsite package. An example of this Checklist is provided below.



Review all the information provided in the JOBSITE PACKAGE to ensure compliance with industry recommendations.

Property damage, serious bodily injury and/or death are possible when Trusses are improperly handled, installed, restrained and/or braced. Installation of Trusses can be dangerous, particularly long span Trusses (i.e., Trusses with clear spans 60' and greater). Use the following checklist when handling and erecting Trusses:

- ☐ Inspect the Trusses at the time of delivery and after installation for:
 - (1) Conformance with the Truss Design Drawings
 - (2) Dislodged/missing connector plates
 - (3) Cracked, dislodged or broken members
 - (4) Any other damage that may impair the structural integrity of the Trusses

Notify the Truss Manufacturer if Truss repairs are needed. After installation, if damage to the Trusses

is discovered that could weaken them, temporarily brace or support the Trusses to prevent further damage. Make sure the area remains clear of plumbing, electrical, mechanical runs, etc. until the required repairs have been properly completed.

DO NOT cut, drill, relocate, add or remove any Truss member or Metal Connector Plate until you have received instructions from the Truss Manufacturer.

- Protect Trusses from weather, corrosion, Lateral Bending, damage and deterioration when stored at the jobsite. When Trusses are stored at the site, use Blocking, stringers, pallets, platforms or other means of support to keep the Trusses off of the ground or in a braced upright position to avoid damage.
 Carefully review the Truss Design Drawings, the Truss Placement Diagram (if required by Contract) and all
- Examine the Building, the Building's structural framing system, bearing locations and related installation conditions. Begin installing Trusses only after any unsatisfactory conditions have been corrected.

installing Trusses.

JOBSITE PACKAGE documents prior to handling and

- Properly connect all beams and components that support Trusses prior to installing the Trusses.
- Girder Trusses may consist of more than one Truss. Review the Truss Design Drawings to determine the proper number of plies and the correct attachment methods to be used at the jobsite.
- Use a Spreader Bar 1/2 to 2/3 of the Truss Span for Trusses over 30' but less than 60' and 2/3 to 3/4 of the Truss Span for Trusses up to and over 60'.
- Install Lateral Restraint and Diagonal Bracing in accordance with the guidelines in the JOBSITE PACK-AGE to prevent Trusses from toppling during installation. Erect Trusses using the design spacing indicated, keeping the Trusses vertical and parallel to one another. Anchor Trusses securely at bearing points. Install Trusses no more than plus or minus 1/4" from Truss Placement Diagram location.
- Refer to the Construction Documents, the Truss Design Drawings or the Truss Placement Diagram (if required by Contract) for the hanger locations. Hangers shall be correctly attached. Refer to hanger manufacturer's specifications for installation information.
- ☐ Install all Permanent Individual Truss Member Restraint and bracing or member reinforcement depicted on the Truss Design Drawings, BCSI-B3 and the construction documents.

☐ Comply with the Owner's or the Owner's retained Registered Design Professional's Permanent Building Stability Bracing, Anchorage, Connections and field assembly requirements. This information is typically provided in the Construction Documents.	REQUIRED INFORMATION IN THE CONSTRUCTION DOCUMENTS
 □ Install Structural Sheathing as soon as possible. Trusses hold their profiles best when they have been properly plumbed, restrained and braced with Structural Sheathing. Sheath early sheath often! □ During construction, distribute material and equipment loads (e.g., plywood, drywall, roofing, tools, etc.) on the Trusses to stay within the design load limit for each Truss. Make sure the Trusses are adequately restrained and braced BEFORE placing any Construction Loads on them. Only install HVAC units, fire sprinklers, etc., on Trusses if the Trusses have been designed to accommodate these specific loads. Review the Truss Design Drawings for the assumed loads and locations. Note: Temporarily braced structures are NOT suitable for use or occupancy. Restrict access to construction personnel only. DO NOT inhabit or store anything of value in temporarily braced structures. 	Be sure to specify the following in the Construction Documents: Trusses with clear spans of 60' or greater require that the Owner contract with a Registered Design Professional for the design of the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint/Bracing. Trusses with clear spans of 60' or greater require that the Owner contract with a Registered Design Professional to provide special inspections to assure that the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint/Bracing is installed properly. The following information is required in the Construction Documents for developing the design of the Trusses for the Building: All Truss and Structural Element orientations and locations
BUILDING DESIGNER INFORMATION	☐ Information to fully determine all Truss profiles
The following information is provided to help guide the Building Designer when using Trusses. There are two situations under which building construc-	 All Structural Element and Truss support locations and bearing conditions (including the allowable bearing stress) The location, direction, and magnitude of all dead,
 Structures that require a Registered Design Professional (RDP) Structures that DO NOT require a RDP For Structures that require a RDP, the Building Designer 	live, and lateral Loads applicable to each Truss including, but not limited to, Loads attributable to: roof, floor, partition, mechanical, fire sprinkler, attic storage, rain and ponding, wind, snow (including snow drift and unbalanced snow), seismic, and any other Loads on the Truss.
is defined as: The Registered Design Professional who contracts with the Owner for the design of the Building Structural System and/or who is responsible for the preparation of the Construction Documents.	 □ All Anchorage designs required to resist uplift, gravity, and lateral loads □ Truss-to-Structural-Element Connections, but not Truss-to-Truss Connections
For Structures that DO NOT require a RDP, the Building Designer is defined as:	 Permanent Building Stability Bracing, including Truss Anchorage Connections to the Permanent Building Stability Bracing
The Owner of the Building or the person that contracts with the Owner for the design of the Building Structural System and/or who is responsible for the preparation of the Construction Documents	 □ Criteria related to serviceability issues including: − Allowable vertical, horizontal or other required deflection criteria

- Any Truss camber requirements

 Any dead Load, Live Load and in-service creep deflection criteria for flat roofs subject to ponding loads

 Any differential deflection criteria from Truss-to-Truss or Truss to adjacent structural member 	☐ Substitution with Reinforcement - Permanent Individual Truss Member Restraint shall be permitted to be replaced with reinforcement designed to prevent buck-
Any deflection and vibration criteria for floor Trusses including:	ling (e.g., buckling reinforcement by T-Reinforcement or L-Reinforcement, proprietary reinforcement, etc.).
 Any strongback bridging requirements 	☐ Project-Specific Design - A project-specific Truss
 Any dead Load, Live Load, and in-service creep deflection criteria for floor Trusses supporting stone or ceramic tile finishes 	member Permanent Lateral Restraint/Bracing design for the roof or floor Framing Structural System shall be permitted to be specified by the Building Designer or any Registered Design Professional.
Moisture, temperature, corrosive chemicals and gases expected to result in:	The method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss Top Chord,
- Wood moisture content exceeding 19%	Bottom Chord and web members shall be permitted to be specified by any Registered Design Professional.
– Sustained temperatures exceeding 150°F,	If a specific Permanent Bracing design for the roof
 Corrosion potential from wood preservatives or other sources that may be detrimental to Trusses 	or floor Framing Structural System is not provided by the Owner or any Registered Design Professional, the method of Permanent Individual Truss Member Restraint
METHOD OF RESTRAINT	and Diagonal Bracing for the Truss Top Chord, Bottom Chord and web members shall be in accordance with
The method of Permanent Individual Truss Member Restraint/Bracing and the method of Anchoring or restrain-	BCSI-B3 and/or BCSI-B7.
ing to prevent lateral movement of all Truss members	Note: This section on Method of Restraint is based on
acting together as a system shall be accomplished by:	the provisions for wood Trusses as provided in Section 2303.4 of the 2018 International Building Code® (IBC®).
Standard Industry Details - Standard industry Lateral Restraint and Diagonal Bracing details in ac-	The text provided here is taken directly from Section 2.3.3.1 of ANSI/TPI 1-2014, National Design Standard
cordance with BCSI-B3: Permanent Restraint/ Bracing of Chords and Web Members and/or	for Metal Plate Connected Wood Truss Construction.
BCSI-B7: Guide for Handling, Installing & Bracing of 3x2 and 4x2 Parallel Chord Trusses of the	
Building Component Safety Information (BCSI).	

BCSI

ACRONYMS AND INITIALISMS

BCTLR: Bottom Chord Temporary Lateral Restraint

BCPLR: Bottom Chord Permanent Lateral Restraint

BCSI: Building Component Safety Information

BCSI B Series Summary Sheet: Building Component Safety Information Series

Summary Sheet

CLB: Continuous Lateral Brace

CLR: Continuous Lateral Restraint

OC: On-center (spacing)

OSB: Oriented Strand Board

OSHA: Occupational Safety & Health Administration

PBSB: Permanent Building Stability Bracing

PCT: Parallel Chord Trusses

PITMR: Permanent Individual Truss Member Restraint

PSF: Pounds per Square Foot

RDP: Registered Design Professional

SBCA: Structural Building Components Association

TCTLR: Top Chord Temporary Lateral Restraint

TDD: Truss Design Drawing

TPD: Truss Placement Diagram

TPI: Truss Plate Institute