SBC ASSOCIATION

Research Report

Position Statement on Sealed Truss Placement Diagrams for the State of California (including Los Angeles)

SRR No. 1505-07

Structural Building Components Association (SBCA)

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SBCA is an APPROVED SOURCE

This research report is based on practical scientific research (literature review, testing, analysis, etc.), with the goal of supporting strategic needs for code and standards development and market expansion. This research report complies with the following sections of the building code:

- *IBC* Section 104.11.1 and Section 1703.4.2 – "**Research reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved sources*."
- *IBC* Section 202 – "**APPROVED SOURCE.** An independent person, firm or corporation, *approved* by the *building official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses."

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Introduction:

It can be often misunderstood whether Truss Designers have the responsibility to seal a Truss Placement Diagram (TPD). The purpose of this research report is to provide the relevant code sections from the International Building Code (*IBC*) and the California Building Code for a thorough analysis and interpretation. To be clear, the TPD is not to be viewed as an engineering document except as stated below in our analysis. Rather, it is provided to assist the installer in properly locating the trusses within the structure. All the necessary truss engineering and analysis is found on the Truss Design Drawings (TDD).

If a TPD is provided, it is recommended that the Building Designer review and approve the TPD to ensure that the intended load paths have not been altered. If Truss Design Engineers were to seal a TPD, it has been suggested that they could inappropriately be held responsible for ensuring the proper flow of loads through the truss to the bearing and support structure below the truss and into the foundation. Truss Design Engineers would only undertake Building Designer responsibilities under a special set of circumstances, including that he/she is professionally capable of taking on such responsibility and that he/she are properly compensated for the work.

Key Definitions:

Definitions related to trusses – not defined in the California Building Code:

TRUSS PLACEMENT DIAGRAM (TPD) – The illustration supplied by the Truss Manufacturer identifying the location assumed for each Truss, and which references each individually designated Truss Design Drawing (see Section 2303.4.2)

Definitions Included in the California Building Code:

TRUSS DESIGN DRAWING (TDD) – The graphic depiction of an individual truss, which describes the design and physical characteristics of the truss (Section 2303.4.1.1)

TRUSS DESIGNER – The individual or organization responsible for the design of trusses (Section 2303.4.1.4)

CONSTRUCTION DOCUMENTS – Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Construction drawings shall be drawn to an appropriate scale (Chapter 2)

REGISTERED DESIGN PROFESSIONAL (RDP) – An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed (Chapter 2)

Unique Definitions for Structures that require a RDP:

BUILDING DESIGNER – The Owner of the Building contracts with a Registered Design Professional for the design of the Building Structural System and who is responsible for the Construction Documents.[1]

TRUSS DESIGN ENGINEER – The individual or organization responsible for the design of Trusses. Each individual truss design drawing shall bear the seal and signature of the Truss Design Engineer.[2]

Unique Definitions for Structures that do not require a RDP:

BUILDING DESIGNER – The Owner of the Building or the individual or organization that contracts with the Owner for the design of the Building Structural System and/or who produces the Construction Documents.[3]

TRUSS DESIGNER – The individual or organization responsible for the design of trusses.[4]

[1] Adapted from IBC Section 106.1
[2] Adapted from IBC Section 2303.4.1.4
[3] Adapted from IBC Section 106.1
[4] Adapted from IBC Section 2303.4.1.4

Background:

Certain jurisdictions in California are requesting engineering seals on TPDs (also known as a truss placement plan, truss layout, framing plan or framing layout). The following information should be used to provide insight into why component manufacturers should seriously consider all the ramifications of providing seals on TPD for projects governed by the 2013 California Code of Regulations, Title 24, also referred to as the *California Building Code.*

This information is based on the *California Professional Engineers Act*[5]*, Rules of the Board for Professional Engineers and Land Surveyors*[6] and the *2013 California Building Code*[7].

The code language regarding Truss Placement Diagrams in the 2012 and 2015 *IBC* is included in the 2013 *California Building Code.* It was introduced in the 2006 *IBC* (S165-04/05). The original code change proposal only included a definition of a TPD:

> **2303.4.2 Truss placement diagrams**. Diagrams supplied by the truss manufacturer that identify the individually designated truss design drawings do not require the seal of a truss design engineer.

The rationale for this addition to the code in S165-04/05 is as follows:

> The intent of adding a definition of the term 'truss placement diagram' is to minimize the confusion that exists in the construction industry between a variety or terms that can mean the same thing, such as “construction documents”, “shop drawings,” etc. The term 'truss placement diagram' has been used by the truss industry and is very specific. This change, along with the clarification of the term 'truss design drawing,' will provide for much greater clarity and easier communication.

The original submission of a definition for a TPD was modified during the hearing process. The modification resulted in the code language in the 2006 *IBC*, however, the rationale for this modified code change was not revised.

> **2303.4.1.3 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 shall not be required to bear the seal or signature of the truss designer.
>
> **Exception:** When the Truss Placement Diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.

In the 2009 *IBC* the truss section was reorganized (S66–06/07). The requirement regarding TPD was revised as well (S217-07/08) as proposed by the National Council of Structural Engineers Associations (NCSEA). This revised language accepted for the 2009 *IBC* is also included in the 2012 and 2015 *IBC:*

> **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.

The rationale for the change proposed by S217-07/08 is as follows:

> The truss placement diagram is an erection diagram that replicates the information on the approved construction documents per Section 106.3. As it requires no engineering input, direct supervision and the signature and seal of a registered design professional is not required.

The Commentary to the 2012 *IBC* Section 2303.4.2 confirms the original intent of the code change.

> This section describes and defines the term "truss placement diagram." It is intended to minimize the confusion that exists in the construction industry between a variety of terms that are often used interchangeably, such as "installation documents," "construction documents," "shop drawings," etc. The term "truss placement diagram" is preferred by the truss industry and is very specific. The section

[5] http://www.bpelsg.ca.gov/laws/pe_act.pdf
[6] http://www.bpelsg.ca.gov/laws/boardrules.pdf
[7] http://www.bsc.ca.gov/Home/Current2013Codes.aspx The 2013 triennial edition with supplements & errata of the California Code of Regulations, Title 24 (California Building Standards Code) applies to all occupancies that applied for a building permit on or after January 1, 2014 (or July 1, 2014), and remains in effect until the effective date of the 2015 triennial edition.

requires a truss placement diagram to identify the location of each truss and references the corresponding truss design drawing to facilitate inspection and proper installation.

Analysis:

2013 California Building Code

The 2013 California Building Code is modeled after the 2012 *IBC* and as such, includes deviations in language and amendments to the IBC in some sections. The following references are the same in the 2012 *IBC* and 2013 California Building Code and are the relevant sections that lay out the differences between TDDs and TPDs:

> **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.
>
> **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. When 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.
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> *[DSA-SS, DSA-SS/CC and OSHPD 1, 2 & 4] Exceptions 1 and 2 are not permitted by DSA and OSHPD.*

> **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.
>
> *[DSA-SS, DSA-SS/CC and OSHPD 1, 2 & 4] include additional requirements not germane to this discussion.*

The *2013 California Building Code* provides that the plans and specifications for a project shall be prepared by a licensed architect or engineer where required by the law of the jurisdiction in which the project is being constructed. In particular, it states:

> **107.1 General.** Submittal documents consisting of construction documents, statement of special inspections, geotechnical report and other data shall be submitted in two or more sets with each permit application. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. 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 review of construction documents is not necessary to obtain compliance with this code.

The plans and specifications should in turn clearly define the scope of the work proposed by the Building Designer:

> **107.2.1 Information on construction documents.** Construction documents shall be dimensioned and drawn upon suitable material. Electronic media documents are permitted to be submitted where 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.

California Statutes for Professional Engineering

The California professional engineering law and the *California Building Code* provide the basis upon which to evaluate the need to provide an engineer's seal on a TPD. Based on this evaluation, a TPD does not require a professional engineer's seal for any building projects, including DSA-SS, DSA-SS/CC and OSHPD.

Requiring the TPD to be sealed, where it is not prepared by an engineer or under his/her immediate personal supervision, is contrary to California law which states:

> **Rules of the Board for Professional Engineers and Land Surveyors**

411. Seal and Signature. ...(g) (1) All professional engineering plans, specifications, reports, or documents (hereinafter referred to as "documents") shall be signed and sealed in accordance with the requirements of the Professional Engineers Act and any other laws related to the practice of professional engineering and shall be signed and sealed in a manner such that all work can be clearly attributed to the licensee(s) in responsible charge of the work.

Professional Engineers Act
Section 6735 (a) All civil (including structural and geotechnical) engineering plans, calculations, specifications, and reports...shall be prepared by, or under the responsible charge of, a registered civil engineer and shall include his or her name and license number.

ANSI/TPI 1-2007

In preparing the construction documents, the Building Designer needs to provide the Truss Designer with the information necessary to properly design the trusses for the building. According to *ANSI/TPI 1-2007*, which is referenced by *2013 California Building Code, includes* the following regarding the use of a TPD in Chapter 2, related to the two conditions listed in Section 2.3 and Section 2.4:

Truss Placement Diagram: Illustration identifying the assumed location of each Truss.

2.3 RESPONSIBILITIES WHERE THE LEGAL REQUIREMENTS MANDATE A REGISTERED DESIGN PROFESSIONAL FOR BUILDINGS
2.3.5.4 Truss Placement Diagram. When the Truss Placement Diagram serves only as a guide for Truss installation, it does not require the seal of the Truss Design Engineer.
2.3.6.4 Truss Placement Diagram. Where required by the Construction Documents or Contract, the Truss Manufacturer shall prepare the Truss Placement Diagram that identifies the assumed location for each individually designated Truss and references the corresponding Truss Design Drawing. The Truss Placement Diagram shall be permitted to include identifying marks for other products including Structural Elements, so that they may be more easily identified by the Contractor during field erection. When the Truss Placement Diagram serves only as a guide for Truss installation and requires no engineering input, it does not require the seal of any Truss Design Engineer or Registered Design Professional.
2.3.6.5 Required Documents. The Truss Manufacturer shall supply to the Contractor the Truss Submittal Package, including the Truss Design Drawings sealed by a Truss Design Engineer, a Truss Placement Diagram, if required by the Construction Documents or Contract, and the required Permanent Individual Truss Member Restraint and the method to be used per Section 2.3.3.

2.4 RESPONSIBILITIES WHERE THE LEGAL REQUIREMENTS DO NOT MANDATE A REGISTERED DESIGN PROFESSIONAL FOR BUILDINGS
2.4.5.3 Truss Placement Diagram. When the Truss Placement Diagram serves only as a guide for Truss installation, it does not require the seal of the Truss Design Engineer.
2.4.6.4 Truss Placement Diagram. Where required by the Construction Documents or Contract, the Truss Manufacturer shall prepare the Truss Placement Diagram that identifies the assumed location for each individually designated Truss and references the corresponding Truss Design Drawing. The Truss Placement Diagram shall be permitted to include identifying marks for other products including Structural Elements, so that they may be more easily identified by the Contractor during field erection.
2.4.6.5 Required Documents. The Truss Manufacturer shall supply to the Contractor the Truss Submittal Package, including the Truss Design Drawings, a Truss Placement Diagram, if required by the Construction Documents or Contract, and the required Permanent Individual Truss Member Restraint and the method to be used per Section 2.4.3.

Truss Design and Preparation of Truss Design Drawings

Assuming the requisite information is provided within the construction documents issued by the RDP or Building Designer, the Truss Designer's sole responsibility is to properly design the individual trusses according to this information. Once designed, a truss is then depicted on a TDD. The Truss Designer is therefore specifically responsible for the single truss design depicted on each TDD.

Who Typically Prepares Truss Placement Diagrams?

Assuming the requisite information is provided in the construction documents, TPD are prepared by component manufacturer personnel who are not typically Truss Designers. The individuals preparing TPD are trained individuals who work as truss technicians, truss take-off specialists or truss salespeople. As TPD are typically prepared outside the Truss Designer's scope of work, they may not be reviewed or even seen by the Truss Designer. TPD are generally not prepared within the typical duties of the Truss Designer and are therefore not prepared under the Truss Designer's direct supervision.

To Require Truss Placement Diagrams to be Sealed Would Violate California Law.
Because TPD are generally neither created by nor created under the immediate personal supervision of a licensed design professional, they cannot be sealed. Requesting a Truss Design Engineer to seal a non-registered person's work is illegal in California per the *Rules of the Board for Professional Engineers and Land Surveyors* and the *Professional Engineers Act* which state in pertinent part:

> **411. Seal and Signature. ...(g)** (1) All professional engineering plans, specifications, reports, or documents (hereinafter referred to as "documents") shall be signed and sealed in accordance with the requirements of the Professional Engineers Act and any other laws related to the practice of professional engineering and shall be signed and sealed in a manner such that all work can be clearly attributed to the licensee(s) in responsible charge of the work.
>
> **Section 6735 (a)** All civil (including structural and geotechnical) engineering plans, calculations, specifications, and reports...shall be prepared by, or under the responsible charge of, a registered civil engineer and shall include his or her name and license number.

Why are Truss Placement Diagrams Prepared?
TPDs are intended to assist customers, erectors and code enforcement officials in positioning or locating the trusses and related structural components supplied by the component manufacturer.

Their function is to serve as detailed installation instructions. They indicate the component manufacturer's assumed location for each truss or related component that has been designed and manufactured.

For example, a truss or related structural building component is no different than a window that is manufactured and in turn installed within a building. A window may be a highly engineered component of a house with specific installation specifications and instructions. However, there is no requirement to provide an engineer's seal on the installation instructions for windows.

Findings:
The 2013 California Building Code specifies in Section 2303.4.2 that a Truss Placement Plan does not require the seal of the truss designer when the TDD serves as a guide for installers. It is the responsibility of the Building Designer to review the TPD, if provided, and verify that it does not deviate from the permit submittal documents.

Conclusion:
Truss Design Engineers should not be asked by RDPs, Building Designers or Building Code Officials to seal TPDs.

References:
ANSI/ TPI, National Design Standard for Metal Plate Connected Wood Truss Construction, Truss Plate Institute, 2007
International Building Code, International Code Council, 2006, 2009, 2012, 2015

California Code of Regulations, Title 24 (California Building Standards Code), International Code Council, 2013[8].

California Professional Engineers Act[9], Rules of the Board for Professional Engineers and Land Surveyors[10]

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View all SBCA Research Reports at www.sbcindustry.com/research-reports

[8] http://www.bsc.ca.gov/Home/Current2013Codes.aspx. The 2013 triennial edition with supplements & errata of the California Code of Regulations, Title 24 (California Building Standards Code) applies to all occupancies that applied for a building permit on or after January 1, 2014 (or July 1, 2014), and remains in effect until the effective date of the 2015 triennial edition.
[9] http://www.bpelsg.ca.gov/laws/pe_act.pdf
[10] http://www.bpelsg.ca.gov/laws/boardrules.pdf