
OPEN WEB STEEL JOISTS AND JOIST GIRDERS: 2025 CBC

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PURPOSE

This Interpretation of Regulations (IR) clarifies the process and criteria under which DSA will accept open web steel joists (OWSJ) on construction projects under DSA jurisdiction.

SCOPE

This IR is applicable to the design, fabrication, and installation of OWSJ, which include both steel joist and joist girders, defined generally by the Steel Joist Institute (SJI) as “open web, in-plane load carrying steel members utilizing hot-rolled or cold-formed steel.” DSA requirements for the submission, review, approval, testing, and inspection of OWSJ are covered.

BACKGROUND

California Building Code (CBC), Section 2207A defines requirements pertaining to the design, manufacture, and use of OWSJ and adopts the following:

- SJI 100: Standard Specification for K-Series, LH-Series, and DLH-Series Open Web Steel Joists and for Joist Girders (SJI 100).
- SJI 200: Standard Specification for CJ-Series Composite Steel Joists (SJI 200).

Frequently used terms in this IR are defined in the Glossary below.

1. QUALIFIED MANUFACTURERS

The OWSJ manufacturer shall be a current member in good standing with SJI and have a valid certification as an approved fabricator by one of the following organizations:

1.1 International Accreditation Service, Inc (IAS). Approval is based on compliance with IAS AC 172: Accreditation Criteria for Fabricator Inspection Programs for Structural Steel and is listed as “Fabricator Inspection” accreditation on the IAS website.

1.2 American Institute of Steel Construction (AISC). Approval is based on the AISC certification program and is listed as “Building Fabricator” certification on the AISC website.

1.3 American Welding Society (AWS). Approval is based on the AWS facility accreditation program and is listed as “Certified Welding Fabricator” certification on the AWS website.

2. APPROVAL PROCESS

The approval of OWSJ for use on a specific project is typically a four-phase process. The phases outlined in this IR constitute a deferred submittal process in accordance with California Administrative Code (CAC), Section 4-317(g).

As an alternative to the deferred submittal process and at the discretion of the project applicant, the information in the joist approval document described in Section 4 below may be incorporated into the construction documents described in Section 3 below. In this case, the review and approval of construction documents and joist documents is combined, and a deferred submittal is not required.

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There are specific requirements and responsibilities for the joist manufacturer, joist engineer, project design professionals, inspectors, and DSA in the four phases described below.

2.1 Review and Approval of Construction Documents

The project design professionals work with DSA to submit and obtain approval of the construction documents in accordance with the electronic plan review procedure. Refer to Section 3 below and *Procedure (PR) 18-04: Electronic Plan Review for Design Professionals*, Sections 1, 2, 3, and 4.

2.2 Review and Approval of Joist Documents

The joist manufacturer, joist engineer, and project design professionals work with DSA to submit and obtain approval of the joist documents in accordance with Section 4 below and PR 18-04 Section 5.

2.3 Joist Fabrication

After DSA approval of the joist documents, the joist manufacturer may proceed with fabrication of the OWSJ under the oversight of the fabrication special inspector. During fabrication any change or deviation from the DSA-approved joist documents requires DSA approval of a construction change document (CCD). The process of submitting and obtaining approval of a CCD requires contributions from the joist engineer and project design professionals in addition to the joist manufacturer. Refer to Section 5 below.

2.4 Field Installation

After fabrication and delivery, OWSJ erection at the job site is subject to inspection by both the project inspector and the field welding special inspector. Refer to Section 6.5 below.

3. REVIEW AND APPROVAL OF CONSTRUCTION DOCUMENTS

This phase typically occurs before a contract is awarded to a qualified joist manufacturer. The steps and requirements for this phase are described in this section.

3.1 Construction Document Preparation

The project design professionals prepare construction documents for the project. In addition to the requirements of CBC Section 2207A.2, the portion of the construction documents pertaining to OWSJ must also include the following:

3.1.1 Structural framing plan illustrating the layout of OWSJ and all supporting elements.

3.1.2 Details of construction for the joist-to-building structure connections.

3.1.3 Details of construction for the joist bridging-to-building structure connections.

3.1.4 Details of construction for the joist-to-joist girder connections.

3.1.5 Loading diagrams for all OWSJ in accordance with CBC Section 2207A.2, Item 1. See Figure 3.1 below for an example loading diagram. Any deflection requirements applicable to the defined load cases or combinations must also be defined.

3.1.6 SJI joist designation for each joist in compliance with CBC Section 2207A.2.

3.1.7 Specifications requiring that the OWSJ manufacturer comply with the qualifications of Section 1 above.

3.1.8 Specifications and form *DSA-103: List of Required Structural Tests and Special Inspections* defining testing and inspection requirements for OWSJ per Section 6 below and complying with CBC Sections 1704A.2.3 and 1704A.3.

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3.1.9 General note on the construction drawings the same or similar as the following:

“Mechanical, electrical, and plumbing units and systems shall be coordinated with the joist manufacturer’s drawings prior to field installation. Field modification of steel open web joists is prohibited without the prior approval of DSA.”

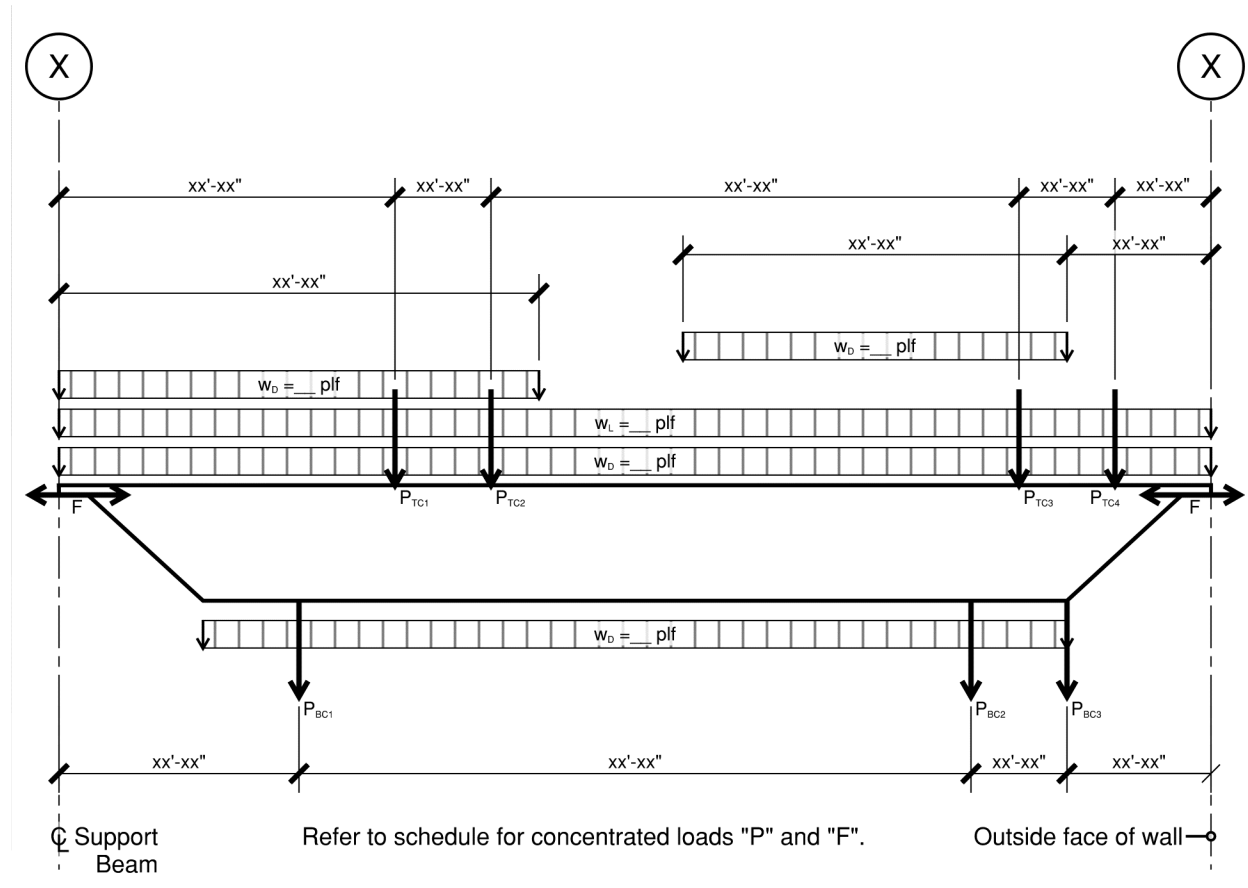


Figure 3.1: Example OWSJ Loading Diagram

3.2 Coordination

The project design professionals should closely coordinate OWSJ design including all connections, non-standard products, and details with a qualified OWSJ manufacturer prior to the submission of the construction documents to DSA for review.

3.3 Submission, Review, and Approval

The project design professional submits an application and construction documents to DSA for review and approval. Refer to *PR 17-03: Project Submittal Appointment Process* and PR 18-04 Sections 1 and 2. After completion of the plan review and back check as described in PR 18-04 Sections 3 and 4, the approved construction documents will bear the DSA identification stamp.

4. REVIEW AND APPROVAL OF JOIST DOCUMENTS

This phase will commonly occur after the contract has been awarded to a qualified joist manufacturer. As such, it constitutes a deferred submittal in accordance with CAC Section 4-317(g) and as described in PR 18-04 Section 5. The steps and requirements for this phase are described in this section.

OPEN WEB STEEL JOISTS AND JOIST GIRDERS: 2025 CBC**4.1 Joist Document Preparation**

The joist manufacturer prepares joist documents for DSA review and approval in accordance with the requirements of the DSA-approved project construction documents and working in a fully coordinated effort with the project design professionals.

4.1.1 If modification of the construction documents approved by DSA per Section 3 above is required during the preparation of the joist documents, the project design professionals shall prepare and submit a CCD to DSA for review and approval in accordance with *IR A-6: Construction Change Document Submittal and Approval Process*. Such changes may include, but are not limited to, joist designation, joist depths, layout, framing plans, loads, joist to building structure connections, etc.

4.1.2 The joist documents will include the components described in this section. In accordance with PR 18-04 Section 5, the submission to DSA must be organized into two separate electronic files: the supporting document file and the approval document file. There are no page or sheet size requirements for either file.

4.1.3 The supporting document file must comply with PR 18-04 Section 5.2.3 and contain the following components:

4.1.3.1 Calculations per CBC Section 2207A.3, stamped and signed by the joist engineer per CBC Section 2207A.4.1.

4.1.3.2 Any product data, test data, reports, or other documentation not identified in Section 4.1.4 below that the manufacturer submits in support of the OWSJ design.

4.1.4 The approval document file must comply with PR 18-04 Section 5.2.2 and contain the joist drawings. In addition to the requirements of CBC Section 2207A.2, the approval document file must include the following:

4.1.4.1 Joist profiles with member sizes and joist member connection details, stamped and signed by the joist engineer per CBC Section 2207A.4.1.

4.1.4.2 Details of construction for joist chord bridging and its connections to the joist chords per CBC Section 2207A.4, stamped and signed by the joist engineer.

4.1.4.3 Details of construction for joist chord bracing as required by the design or per CBC Section 2207A.6, stamped and signed by the joist engineer.

4.1.4.4 Composite joists shear stud installation plans with sizes, quantity, and locations of all shear connectors on the composite steel joists, stamped and signed by the joist engineer.

4.1.4.5 Details of construction for joist chord splices, stamped and signed by the joist engineer.

4.1.4.6 Joist placement plan(s) per CBC Section 2207A.4.

4.1.4.6.1 Joist placement plans must show the joist layout as a direct overlay of the framing plans described in Section 3.1.1 above. Joist placement plans need not be signed and stamped by the joist engineer. When not stamped and signed, the joist placement plan sheet cannot include details or other information that would otherwise require the stamp and signature.

4.1.4.6.2 The joist placement plan is only intended as a tool for the joist manufacturer to communicate to field installers where specific joists, designed by the joist engineer, are located on the DSA-approved framing plans.

4.1.4.7 At the manufacturer's option, the joist drawings may specify alternative member thicknesses or weld sizes that may be substituted during manufacturing. When design alternatives are approved in the joist documents, they need not be approved again as revisions per Section 5.2 below.

OPEN WEB STEEL JOISTS AND JOIST GIRDERS: 2025 CBC**4.2 Review and Acceptance by Project Design Professionals**

The manufacturer submits the joist documents to the project design professionals for review and approval. This process may take multiple exchanges between the project design professionals and the OWSJ manufacturer to finalize the joist documents prior to submission to DSA.

4.2.1 The project design professionals and the OWSJ manufacturer, working together, shall coordinate the documents including, but not necessarily limited to, the following:

4.2.1.1 Mechanical, electrical, and plumbing (MEP) equipment: roof mounted, floor mounted, and suspended components.

4.2.1.2 MEP distributions systems (e.g., ducts, pipes, conduits, etc.).

4.2.1.3 Roof pitch or slopes.

4.2.1.4 Top elevations of support elements to ensure proper seating of OWSJ (e.g., top of steel girders, concrete walls, masonry walls and pilasters, etc.).

4.2.2 When the project design professionals approve the joist documents, they shall sign a statement of general conformance (SoGC) per *IR A-18: Use of Construction Documents Prepared by Other Design Professionals*.

4.2.2.1 The design professional in general responsible charge shall sign the SoGC in Part 5 of the form *DSA 140: Application for Submittal of Post-Approval Document* in accordance with IR A-18 Section 2.3.2.

4.2.2.2 The structural engineer of record (SEoR) shall affix and sign a SoGC to the first sheet of the joist drawings in accordance with IR A-18 Section 2.3.3.

4.2.3 The design professional shall prepare the DSA 140 and submit the joist documents to DSA for review and approval in accordance with CAC Section 4-317(g).

4.3 DSA Review and Approval

The DSA review and approval process may require cycles of plan review comments and corrections to the joist documents if DSA determines the initial submission to be incomplete or not code compliant. Each revised version of the package is subject to the actions required by Section 4.2 above prior to being resubmitted to DSA.

4.3.1 DSA review of the joist calculations typically includes verification of input and output. Each of the following must be demonstrated:

4.3.1.1 The manufacturer is a member of SJI, which (per SJI 100 Section 4.7.1) includes SJI verification of the joist design calculation methodology (e.g., software) used by the manufacturer to design joists.

4.3.1.2 The composite joist designation CJ is specified in accordance with SJI 200 containing the standard specification, weight tables, and bridging tables such that the design loads are not greater than the safe factored uniformly distributed joist loads listed therein.

4.3.1.3 The joist designation K, LH, DLH, or Joist Girder listed in SJI 100 containing the standard specification and load tables such that the design loads are not greater than the load tables listed therein.

4.3.1.4 The effect of joint eccentricity is accounted for in the OWSJ design.

Exception: The effect of eccentricity on LH-series joists, DLH-series joists, and joist girders may be neglected when permitted by SJI 100 Section 4.5.4.

4.3.2 The project design professionals shall coordinate with the manufacturer to resolve DSA plan review comments in accordance with PR 18-04 Section 5.4.

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4.3.3 When DSA determines the joist documents are complete and code compliant, it will affix its approval stamp to the approval document described in Section 4.1.4 above.

5. FABRICATION OF JOISTS

Fabrication of OWSJ is not permitted until the joist documents have been approved by DSA per Section 4.3 above. The steps and requirements for this phase are described in this section.

5.1 Fabrication and Inspection

In accordance with their standard practices, the manufacturer typically prepares shop orders or shop drawings from the DSA-approved construction documents and DSA-approved joist documents.

5.1.1 Prior to fabrication, a fabrication special inspector shall be designated who is either employed by the laboratory of record (LoR) or contracted directly with the school district (and approved by DSA on a project-specific basis). Refer to the definition of fabrication special inspector in the Glossary below.

5.1.2 The manufacturer shall notify the project design professional, project inspector, and fabrication special inspector of the fabrication schedule. Fabrication may not start without the presence of the fabrication special inspector.

5.1.3 The fabrication special inspector provides inspection during OWSJ manufacturing in accordance with Section 6 below.

5.1.4 At the completion of fabrication, the manufacturer shall submit a certificate of compliance per CBC Section 2207A.5 to the school district, the project design professional, and DSA.

5.2 Revisions

If revisions to the approved joist documents are necessary, the manufacturer shall obtain DSA approval of the revisions prior to fabricating the affected joists as follows:

5.2.1 Manufacturer notifies the fabrication special inspector of changes being proposed.

5.2.2 Manufacturer submits revised joist documents to the project design professionals for review and approval. The revised joist documents must include all the items listed in Section 4.1 above for the affected joists.

5.2.3 If the project design professionals accept the revised joist documents, they prepare a CCD including a signed statement of general conformance in accordance with Section 4.2.2 above.

5.2.4 The project design professional submits the revised joist documents as a CCD to DSA for review and approval in accordance with IR A-6.

5.2.5 DSA reviews the CCD and, when the revised joist documents are determined to be complete and code compliant, affixes the DSA approval stamp. This step will require a response to plan review comments and resubmission if the initial CCD submission is not approved.

5.2.6 The manufacturer proceeds with fabricating the subject joists in accordance with the DSA-approved CCD.

5.2.7 If the scope of changes exceeds that appropriate for a CCD, DSA will require the revised documents be submitted, reviewed, and approved as a Revision. The procedural requirements of a Revision are the same described above for CCD. If there is uncertainty concerning the appropriate post-approval document type, the design professional should consult the DSA field engineer for direction.

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6. TESTING AND INSPECTION

Testing and inspection must comply with CBC Section 1705A.2 and be performed in accordance with CAC Sections 4-333 and 4-335, and *IR 17-3: Structural Welding Inspection*.

6.1 Unidentified Steel

All steel must be identified by the fabrication special inspector per CBC Section 1705A.2.4. Unidentified steel must be tested per CBC Section 2201A.2.

6.2 Composite Joists

Shear studs must conform to the requirements of AISC 360: Specification for Structural Steel Buildings, Section A3.6 and be sampled and tested per CBC Section 2216A.2.

6.3 Shop Fabrication

Inspection of shop fabrication must comply with CBC Section 1705A.2.4. The special inspector shall place a distinguishing mark or tag on each inspected joist or joist girder. This mark or tag must remain on the joist or joist girder throughout the jobsite receiving and erection process. At a minimum the distinguishing mark must include the special inspector's initials and date.

6.4 Welding

Inspection of shop and field welding must comply with CBC Section 1705A.2.4, *IR 17-2: Nondestructive Testing (NDT) of Structural Welds*, and *IR 17-3*. Additional requirements for welding inspection are as follows:

6.4.1 The cost of inspection must be paid by the owner (i.e., the school district).

6.4.2 Each fabrication special inspector and field welding special inspector shall hold a current certification as an AWS Certified Welding Inspector (CWI) in accordance with AWS QC1: Specification for AWS Certification of Welding Inspectors.

6.4.3 Welding procedure specifications must be prequalified or qualified by test per AWS D1.1: Structural Welding Code, Sections 5 and 6 respectively, and SJI 100 or SJI 200 as applicable.

6.5 Inspection of Field Erection

Working from the DSA-approved construction documents, joist documents, and any CCD, the project inspector shall verify joist size, fabrication special inspector's tag or mark, and placement in the field. Working from the same DSA-approved documents, the field welding special inspector shall inspect field welding of attachments of the OWSJ.

REFERENCES:

2025 California Code of Regulations (CCR) Title 24

Part 1: California Administrative Code (CAC), Sections 4-316, 4-317, 4-333, and 4-335.

Part 2: California Building Code (CBC), Sections 1704A.2.3, 1704A.3, 1705A.2, 1705A.2.4, 2201A.2, 2207A (inclusive of all subsections), and 2216A.2.

This IR is intended for use by DSA staff and by design professionals to promote statewide consistency for review and approval of plans and specifications as well as construction oversight of projects within the jurisdiction of DSA, which includes State of California public schools (K–12), community colleges and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

This IR is subject to revision at any time. Please check DSA's website for currently effective IRs. Only IRs listed on the webpage at www.dgs.ca.gov/dsa/publications at the time of project application submittal to DSA are considered applicable.

OPEN WEB STEEL JOISTS AND JOIST GIRDERS: 2025 CBC**GLOSSARY****Fabrication Special Inspector**

An AWS certified welding inspector who provides special inspection during the fabrication of OWSJ. The inspector may contract directly with the school district and be independently approved for the project by DSA, or the inspector may be employed by the LoR as set forth in CAC Section 4-335.

Field Welding Special Inspector

An AWS certified welding inspector who provides special inspection of field welding. The inspector may contract directly with the school district and be independently approved for the project by DSA, or the inspector may be employed by the LoR as set forth in CAC Section 4-335.

Joist Documents

The joist placement drawings, calculations, joist profiles with member sizes and connection details, etc. as prepared by the joist manufacturer and required by CBC Sections 2207A.3 and 2207A.4. The joist documents may be submitted to DSA as a deferred submittal in accordance with CAC Section 4-317(g).

Joist Engineer

A California registered professional engineer retained by the joist manufacturer who is responsible for the design of the OWSJ and who stamps and signs the joist documents.

Joist Manufacturer

The fabricator who manufactures the members and components of OWSJ and uses those members and components to fabricate on a continuing basis OWSJ of the K-Series, LH-Series, DLH-Series, CJ-Series, and/or Joist Girders conforming to SJI 100 or SJI 200 as applicable.

Project Design Professional

The architect or structural engineer in general responsible charge of a project in accordance with CAC Section 4-316(a) and the structural engineer with delegated responsibility in accordance with CAC Section 4-316(b). These individuals are sometimes referred to as the architect of record and structural engineer of record, and both are intended when this term is used in the plural form in this IR.

Shop Order/Drawings

Fabrication plans and details prepared by the manufacturer to facilitate fabrication of OWSJ.