

TOOLBOX TALK #6

Temporary Support of Structural Steel Frames

(10 minutes)



TOOLBOX TALKS

If you're using structural steel, the *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22) applies to your contract.

Simply put, the AISC Code defines who's in charge of what, when, where—including before any potential conflict arises—and other members of your project team are already using it in their own contracts. Download it for free at aisc.org/code.

Section 7 of the Code provides the requirements for temporary support of structural steel frames and should be referenced during preconstruction for managing steel erection with your fabricator and/or erector.

ODRC: Owner's designated representative for construction

ODRD: Owner's designated representative for design

QUESTION: What responsibilities does the erector have for temporary supports during erection?

The *Code* says...

7.10. Temporary Support of Structural Steel Frames

- 7.10.1. The *ODRD* shall identify the following in the *contract documents*:
- The lateral force-resisting system and connecting diaphragm elements that provide for lateral strength and stability in the completed structure.
 - Any special erection conditions or other considerations that are required by the design concept, such as the use of shores, jacks, or loads that must be adjusted as erection progresses to set or maintain *camber*, position within specified tolerances, or prestress

Commentary:

The intent of Section 7.10.1 of the *Code* is to alert the *ODRC* and the *erector* of the means for lateral force resistance in the completed structure so that appropriate planning can occur for construction of the building. Examples of a description of the lateral force-resisting system as required in Section 7.10.1(a) are shown in the following.

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Example 1 is an all-steel building with a composite metal deck and concrete floor system. All lateral force resistance is provided by welded moment frames in each orthogonal building direction. One suitable description of this lateral force-resisting system is as follows:

All lateral force resistance and stability of the building in the completed structure is provided by moment frames with welded beam-to-column connections framed in each orthogonal direction (see plan sheets for locations). The composite metal deck and concrete floors serve as horizontal diaphragms that distribute the lateral wind and seismic forces horizontally to the vertical moment frames. The vertical moment frames carry the applied lateral loads to the building foundation.

Example 2 is a steel-framed building with a composite metal deck and concrete floor system. All beam-to-column connections are simple connections and all lateral force resistance is provided by reinforced concrete shear walls in the building core and in the stairwells. One suitable description of this lateral force-resisting system is as follows:

All lateral force resistance and stability of the building in the completed structure is provided exclusively by cast-in-place reinforced concrete shear walls in the building core and stairwells (see plan sheets for locations). These walls provide all lateral force resistance in each orthogonal building direction. The composite metal deck and concrete floors serve as horizontal diaphragms that distribute the lateral wind and seismic forces horizontally to the concrete shear walls. The concrete shear walls carry the applied lateral loads to the building foundation.

See also Commentary Section 7.10.3.

Section 7.10.1(b) is intended to apply to special requirements inherent in the design concept that could not otherwise be known by the *erector*. Such conditions might include designs that require the use of shores or jacks to impart a load or to obtain a specific elevation or position in a subsequent step of the erection process in a sequentially erected structure or member. These requirements would not be apparent to an *erector* and must be identified so the *erector* can properly bid, plan, and perform the erection.

The *erector* is responsible for installation of all members (including cantilevered members) to the specified plumbness, elevation, and alignment within the erection tolerances specified in *this Code*. The *erector* must provide all temporary supports and devices to maintain elevation or position within these tolerances. This work is part of the means and methods of the *erector* and the *ODRD* need not specify these methods or related equipment.

See also the preset elevation requirements for cantilevered members in Section A4 of ANSI/AISC 360.

- 7.10.2. The *ODRC* shall indicate to the *erector* prior to bidding, the installation schedule for non-structural steel elements of the lateral force-resisting system and connecting diaphragm elements identified by the *ODRD* in the contract documents.

Commentary:

See Commentary Section 7.10.3.

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- 7.10.3. Based upon the information provided in accordance with Sections 7.10.1 and 7.10.2, the *erector* shall determine the need for, furnish, and install all temporary supports, such as temporary guys, cables, beams, falsework, cribbing, erection aids, or other elements required for the erection operation. If the selection or design of such temporary supports is necessary, this shall be the responsibility of the *erector*. These temporary supports shall be sufficient to secure and maintain the stability of the bare *structural steel* framing, or any portion thereof, against loads that are likely to be encountered during erection, including those due to wind and those that result from erection operations.

The *erector* need not consider loads during erection that result from the performance of work by, or the acts of, others, except as specifically identified by the *ODRD* or the *ODRC*. Further, the *erector* need not consider those loads that are unpredictable, such as loads due to hurricane, tornado, earthquake, explosion, or collision.

Temporary supports that are required during or after the erection of the *structural steel* frame for the support of loads caused by non-*structural steel* elements, including cladding, interior partitions, and other such elements that will induce or transmit loads to the *structural steel* frame during or after erection, shall be the responsibility of others.

Commentary:

Many *structural steel* frames have lateral force-resisting systems that are activated during the erection process. Such lateral force-resisting systems may consist of welded moment frames, braced frames, or, in some instances, columns that cantilever from fixed-base foundations. Such frames are normally braced with temporary guys that, together with the steel deck floor and roof diaphragms or other diaphragm bracing that may be included as part of the design, provide stability during the erection process. The guy cables are also commonly used to plumb the *structural steel* frame. The *erector* normally furnishes and installs the required temporary supports and bracing to secure the bare *structural steel* frame, or portion thereof, during the erection process. When *erection bracing drawings* are required in the *contract documents*, those drawings show this information. The need for and selection or design of temporary supports should be based on industry standards such as AISC Design Guide 10, *Erection Bracing of Low-Rise Structural Steel Frames...*

- 7.10.4. All temporary supports that are required for the erection operation and furnished and installed by the *erector* shall remain the property of the *erector* and shall not be modified, moved, or removed without the consent of the *erector*. Temporary supports provided by the *erector* shall remain in place until the portion of the *structural steel* frame that they brace is complete and the lateral force-resisting system and connecting diaphragm elements identified by the *ODRD* in accordance with Section 7.10.1 are installed. Temporary supports that are required to be left in place after the completion of *structural steel* erection shall be removed when no longer needed by the *ODRC* and returned to the *erector* in good condition.

Need help
understanding
the Code?



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