

REVISION OF SECTION 509  
ERECTION OF STEEL STRUCTURES

**NOTICE**

This is a standard special provision that revises or modifies CDOT's *Standard Specifications for Road and Bridge Construction*. It has gone through a formal review and approval process and has been issued by CDOT's Project Development Branch with formal instructions for its use on CDOT construction projects. It is to be used as written without change. Do not use modified versions of this special provision on CDOT construction projects, and do not use this special provision on CDOT projects in a manner other than that specified in the instructions unless such use is first approved by CDOT's Standards and Specifications Unit. The instructions for use on CDOT construction projects appear below.

Other agencies which use the *Standard Specifications for Road and Bridge Construction* to administer construction projects may use this special provision as appropriate and at their own risk.

**Instructions for use on CDOT construction projects:**

Use on projects having structural steel members that bear on the substructure of a bridge. This specification should be used in conjunction with the Standard Special Provision, Revision of Section 601, Forms and Falsework.

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Section 509 of the Standard Specifications is hereby revised for this project as follows:

In subsection 509.27, delete the first six paragraphs and replace with the following:

Structural steel members shall be erected to prevent damage to all elements of the structure and in a safe manner. Structural steel members to which the erection specification applies are those members that bear on the substructure of a bridge. The primary members such as beams and girders shall be temporarily anchored and braced as they are erected to preclude detrimental movement in any direction, and to prevent overturning and buckling. Struts, bracing, tie cables, and other devices used for temporary restraint shall be considered falsework and shall be designed to resist all loads imposed during each stage of construction until the deck concrete has attained the Field Compressive Strength shown in Table 601-1.

No fewer than two steel girders shall be erected when girders are initially placed in any span, unless the Engineer provides a written waiver to this requirement. Diaphragms and cross frames between girders shall be connected to the girders and all diaphragm or cross frame connection bolt holes filled with bolts that are at least snug tight during erection. The Contractor's Engineer shall specify bolt torque requirements, if any, prior to releasing girders from the crane. Steel box girders need not be erected in pairs.

At least one week prior to the Pre-Erection Conference, the Contractor shall approve, sign and submit an Erection Plan to the Engineer for record purposes only. The Erection Plan shall be stamped "Approved for Construction" and signed by the Contractor. The Erection Plan will not be approved by the Engineer. If falsework drawings are required, they shall conform to and be submitted in accordance with subsection 601.11.

The Erection Plan and procedure shall provide complete details of the erection process with dimension tolerances including:

- (1) Temporary falsework support, struts, bracing, tie cables and other devices, material properties and specifications for temporary works, bolt torque requirements prior to releasing girders from the cranes (if required), connection details and attachments to other structure components or objects;
- (2) Procedure and sequence of operations, including a detailed schedule with completion times for work items that complies with the working hour limitations;
- (3) Minimum load chart lift capacity, outrigger size and reactions for each crane;
- (4) Assumed loads and girder weights, lift points, lifting devices, spreaders, and angle of lifting cables.
- (5) Girder stresses at critical points along the girder length during progressive stages of erection shall be investigated to assure that the structural integrity and stability of the girders is maintained. Stresses at lift points induced as a result of lifting shall be investigated and adequate bracing provided as indicated by the analysis.
- (6) Locations of cranes, trucks delivering girders, and the location of cranes and outriggers relative to other structures, including retaining walls, wing walls and utilities.
- (7) Drawings, notes, catalog data showing the manufacturer's recommendations or performance tests, and calculations clearly showing the above listed details, assumptions, and dimensions.
- (8) Contingency plans detailing what measures the Contractor will take in case of inclement weather (forecast or actual), equipment failure, delivery interruption, and slower than planned production.

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A Pre-Erection Conference will be held at least one week prior to the beginning of erection. The Engineer, Contractor, erection subcontractor, and the Contractor's Engineer shall attend the meeting. The erection subcontractor shall demonstrate his knowledge and familiarity of where the piece marks are located on the components to be erected, their orientation in the erected structure, and the shop drawing piece mark convention used by the girder fabricator at the Pre-Erection Conference. The girder fabricator shall participate in the conference, by way of speaker telephone, during only that portion in which the piece marks are discussed. The girder fabricator shall state whether the erection subcontractor has demonstrated a correct understanding of the piece marks, and if not, correct any misunderstanding.

Additional Pre-Erection conferences may be required for subsequent phases of construction, or for phases that differ from the original construction plan, as directed by the Engineer. Additional conferences may also be requested by the Contractor, and approved by the Engineer.

The Contractor shall submit a final Erection Plan to the Engineer prior to girder erection for record purposes only. The Contractor's Engineer shall sign and seal (1), (5), and (7) listed above in the final Erection Plan. The final Erection Plan shall be stamped "Approved for Construction" and signed by the Contractor.

When a bridge spans traffic of any kind, except for construction traffic and the Contractor's employees, the Contractor's Engineer shall inspect and provide written approval of the erected girders prior to opening the area beneath the girders to traffic. For this specification, traffic is defined as the vehicles, railroad, pedestrians, and watercraft moving along a route. The Contractor shall perform daily inspections of the erected girders and other permanent and temporary bridge elements until the deck concrete has attained the Field Compressive Strength. The Contractor's Engineer shall provide an inspection form to the Engineer and the Contractor that lists the items the Contractor will document during the daily inspection of the erected girders. The inspection form shall include inspection items specific to each bridge being constructed. The Contractor shall provide the Engineer and the Contractor's Engineer with written documentation of these inspections within 24 hours of each inspection.

All temporary struts, bracing, tie cables, other devices and extra material required shall be removed upon completion of the structure.

Delete subsection 509.27 (d) and replace with the following:

(d) *Falsework*. Falsework shall conform to subsection 601.11.

In subsection 509.33, delete the last paragraph and replace with the following:

All costs associated with the preparation and implementation of the Erection Plan will not be paid for separately, but shall be included in the work.