


MANUAL CHANGE TRANSMITTAL		NO. 21-3
TITLE: Department of Transportation <i>Construction Manual</i>	APPROVED BY:  Ramon Hopkins, Chief Division of Construction	DATE ISSUED: 5-4-2021
SUBJECT AREA Sections 4-47, 4-56	ISSUING UNIT Division of Construction	
SUPERSEDES Sections 4-47 of July 2019, and 4-56 of July 2019	DISTRIBUTION All Requested Manual Holders	

The purpose of this manual change transmittal is to announce updates and corrections to the Caltrans *Construction Manual*. Please note the updates, and print new sections for your manual as needed. Updated sections are published on <http://www.dot.ca.gov/hq/construc/constmanual/> and are indicated by the date listed in the right-hand column on that page. Content changes, not including edits for clarity, are enumerated:

Section 4-47, “Earth Retaining Systems”

The change in 4-4701 aligns with the Structure Design removal of crib walls as an earth retaining alternative. All crib wall standards, including timber, metal bin and concrete, have been phased out of our documents for new construction.

Section 4-56, “Overhead Sign Standards, Structures, and Poles”

Changeable message signs now are defined by one of four structure types. Section 4-5603A, “Overhead Sign Structures,” updates location for technical guidance for overhead structures.

Chapter 4

Construction Details

Section 47 Earth Retaining Systems

4-4701 General

4-4702 Payment

Section 47 Earth Retaining Systems

4-4701 General

Earth retaining systems include mechanically stabilized embankments, Type 6 retaining walls, and alternative earth retaining systems. For guidance, refer to Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2, available at:

<https://dot.ca.gov/programs/engineering-services/manuals>

4-4702 Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications*.

Chapter 4

Construction Details

Section 56 Overhead Sign Structures, Standards, and Poles

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- 4-5602 Before Work Begins**
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Section 56 Overhead Sign Structures, Standards, and Poles

4-5601 General

This section provides inspection guidelines for items associated with constructing overhead sign structures, and fabricating and installing standards and poles. Section 56, “Overhead Sign Structures, Standards, and Poles,” of the *Standard Specifications* provides requirements for doing this work.

Overhead sign structures vary from simple trusses to complicated sign bridges containing changeable message signs.

The majority of overhead sign structures fit into one of four categories:

1. Truss
2. Versatile truss
3. Tubular
4. Bridge Mounted Sign

Technical and administrative guidance regarding sign structures is covered in detail in Structure Construction’s *Bridge Construction Records and Procedures* manual at:

<https://dot.ca.gov/programs/engineering-services/manuals>

The *Overhead Sign Structures Guide* provides additional guidance for activities such as reviewing shop drawings, inspection, and testing. The manual is available at:

<http://des.onramp.dot.ca.gov/structure-construction/structure-construction-technical-manuals>

Section 3-703, “Public Safety,” of this manual contains guidelines for work that temporarily impairs horizontal and vertical bridge clearance.

Refer to the contract specifications, Sections 3-604, “Buy America,” and 6-202, “Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products,” of this manual regarding Buy America requirements. Requirements for mandatory use of domestic materials are found in Section 6-1.04, “Buy America,” of the *Standard Specifications*.

The resident engineer, district Construction personnel, and Structure Construction personnel must apply the correct inspection to ensure the contractor installs sign structures, standards, and poles to function properly.

Structure Construction is responsible for reviewing and authorizing all sign structure shop drawings on contracts administered by Caltrans. The district area Construction manager will contact the local Structure Construction area manager or senior bridge engineer before the preconstruction meeting to arrange for the review of the sign structure shop drawings submitted by the contractor. Structure Construction personnel review shop drawings for standard sign structures and coordinate, when

needed, with the appropriate structure design engineer for review of shop drawings for nonstandard sign structures.

The Division of Engineering Services provides technical support to Structure Construction personnel upon request. Send a copy of the shop drawings to Structure Policy and Innovation if technical assistance is needed. Section 168, "Signs," of the *Bridge Construction Records and Procedures* manual, Vol. 2, and the *Overhead Sign Structures Guide* provide guidance for reviewing shop drawings.

4-5602 Before Work Begins

Before work begins, do the following:

- Review the project plans, specifications, and standard plan details to determine the types of sign structures, standards, and poles to be installed and any special requirements included in the contract. Obtain and review as-built drawings for the structures to be modified. Record on the plans any unusual items covered in the specifications but not shown on the plans. Additionally, in the margin of the plan sheet containing a pole schedule, it can be useful to indicate foundation sizes, bolt sizes, and bolt circles.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes applicable components of sign structures, standards, and poles. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- If required, before the manufacturers furnish the materials, obtain from Materials Engineering and Testing Services (METS) an approval of foreign manufacturers. Refer to Section 6-1.04C, "Steel and Iron Materials," of the *Standard Specifications*, which covers the use of foreign materials.
- Refer to the contract specifications and Section 3-604, "Buy America," of this manual regarding provisions of the Buy America requirements.
- Obtain shop drawings including, but not limited to, anchor bolt layouts, shop details, erection plans, and equipment lists for sign structures as required by the contract. With the assistance of the structure representative, review these shop drawings and authorize them if they comply with the contract. After review, and correction if necessary, return one set of the shop drawings to the contractor with the following statement: "The plans are authorized pursuant to Section 5-1.23, "Submittals," of the *Standard Specifications*."
- Do a field review of all sign structure locations, and check for possible conflicts with other structures, electrical and irrigation lines, and underground and overhead utilities. Verify that existing structures to be modified agree with as-built drawings. Verify adequate horizontal and vertical sight distance. Trees or other landscape features may need to be trimmed or removed to obtain adequate sight distance. Advise the contractor of any changes and, if necessary, prepare change orders. In addition, because relocating signs can impair or nullify their effectiveness, consult with the district Traffic Unit whenever changes must be made or the effectiveness of any signage is questionable.

- After control stakes have been placed, ensure the markings have the following:
 1. The correct span lengths.
 2. The correct elevation of footing pedestals (usually 3 inches above the finished grade or the top of curbs).
 3. The minimum vertical clearance shown on the plans.
 4. The required cover over the tops of footings.
- To ensure incorporation into the work during shop fabrication, verify that the structure representative has given the source inspector any changes that revise materials, specifications, or structural design. Normally, METS is notified of any changes through the receipt of a copy of the change order. However, allow sufficient lead time for the normal distribution of change orders. If changes are underway based on a prior authorization, the resident engineer, through the structure representative, may need to send the revised specifications or drawings directly to METS in advance of the approved change order. Resident engineers should call METS to confirm receipt of the changes.
- Review the contract for any requirements for Department-furnished material. Resident engineers must ensure that Department-furnished sign materials have been ordered and will be ready for timely delivery. Make a physical inspection and inventory to confirm that all Department-furnished sign materials are delivered in good condition. After delivery, the contractor is responsible for any damage to Department-furnished materials.

4-5603 During the Course of Work

During the work, do the following:

- Inspect sign structures, standards, and poles.
- Inspect underground work while it is underway because when the work is complete an inspection cannot be done without extensive rework. Include in the inspection the excavation, placement of conduit, and placement of concrete for signal standards, pole bases, and similar items.
- If communication cables or utility pipelines are encountered, contact a representative of the utility owner.
- Continuously record all changes into the as-built plans.

4-5603A Overhead Sign Structures

For sign structures, do the following:

Sign structures often involve details that are critical to the structure's permanence. Maintaining sign structures is expensive. Attention to detail during construction can mitigate future problems.

The resident engineer has final responsibility for making sure that sign structures are constructed in accordance with the contract. The resident engineer also has final responsibility for making any changes that are necessary to serve the public as the

designer intended. To perform the required duties properly, the resident engineer must obtain the relevant technical data. For overhead signs and bridge-mounted signs, Sections 56-2.03, *Overhead Sign Structures – Construction*,” and 170, *“Structural Steel,”* of the *Bridge Construction Records and Procedures* manual, *Vol. 2*, will provide the information.

Construction inspectors should check the following items or perform the following:

- Upon delivery, check the materials’ identification marks or inspection tags using Form TL-0624, *“Inspection Release Tag,”* and match these marks and tags against those listed in Form TL-0029, *“Report of Inspection of Material.”* Refer to Section 6-2, *“Acceptance of Manufactured or Fabricated Materials and Products,”* of this manual for more explanation. METS will check items for compliance with specifications. These items can also be checked at the source during fabrication. This check will include determining the adequacy of work quality for activities such as welding, painting, and galvanizing and ensuring the use of the proper materials. For changeable message signs, METS will also check that all control components are connected and operating properly before release to the job site.
- Require the repair of any minor damage to galvanizing or coatings, as specified in Section 75-1.02B, *“Galvanizing,”* of the *Standard Specifications*.
- Determine that METS has inspected and approved anchorage devices for bridge-mounted signs. Verify that anchorage devices are installed as recommended by the manufacturer, as shown on the plans, and as specified. For more information on anchorage devices, refer to Section 135, *“Miscellaneous Construction Materials,”* of the *Bridge Construction Records and Procedures* manual, *Vol. 2*.
- Ensure the proper type of bolts in field connections. Observe the installation of high-strength bolts to ensure the correct method and sequence for tightening. Refer to Section 170, *“Structural Steel,”* of the *Bridge Construction Records and Procedures* manual, *Vol. 2*, for the specifications of the American Society for Testing and Materials for high-strength bolts.
- METS inspects welding at the fabrication plant. If welding will be performed at the job site, contact METS for assistance. Also, at the job site, check for visible defects. During sign erection, ensure a proper fit between the post and the sign frame. Also, verify the provision of the proper minimum clearances.
- Verify that the surface finishes of all metal parts of sign structures meet specifications. Inspect portions of the work completed in the field.
- Verify that the construction of footing pedestals complies with specifications. It is particularly critical that the contractor correctly position and align anchor bolts for sign bridges.
- To ensure the minimum horizontal and vertical clearances, verify that the location and elevation of the footing pedestals are correct.
- Verify that the contractor performs electrical work according to the specifications.
- Verify that the contractor performs field painting, including touch-up, according to the specifications.

- Whenever an installation exceeds the scope of knowledge of available personnel, request assistance from, or consult with, other units. For instance, you may call upon mechanical and electrical engineers from Structure Design for assistance with changeable message signs.
- Report any temporary or permanent changes to horizontal and vertical clearances to the Transportation Permits Branch in accordance with Section 3-703A, “Temporary Clearance and Bridge Permit Rating Changes,” of this manual.
- Ensure adherence to the public safety requirements of the special provisions regarding permanent obstacles that are temporarily unprotected.

4-5603B Standards

For standards, do the following:

- Where areas behind asphalt concrete dikes are filled with dirt to the level of the top of the dikes, verify that the contractor also sets standards and pull boxes to the top of the dikes.
- When standards are laid out, ensure no obstructions will prevent vehicular or pedestrian traffic from seeing signal faces. Standards with push buttons must be no more than 5 feet from crosswalks and the push buttons must be on the side of the standard nearest the crosswalk.

When the standards are set, verify that washers are used between the bottom and top, and on both sides of slip-base plates. Before standards are erected, make sure that all leveling and top nuts are properly torqued. When using slip-base inserts, verify that the contractor assembles the top and bottom plates and torques the bolts before placing the standard on the top plate of the slip-base assembly. For the location of standards with slip bases or slip-base inserts, refer to Section 9-11.4, “Slip Bases,” of the *Traffic Manual*. If the exception areas as listed in Section 9-11.4 apply to a planned slip-base standard, contact the designer about a change order.

- Ensure electroliers on structures are located with regard to bridge rail plans so that anchor bolts may be placed where the bridge rail gap will be. Ideally, keep electrolier bases at least 5 feet from expansion joints. This practice prevents extra stresses from the electrolier at these critical structural locations.
- A slight rake of the standard about 3 degrees from the roadway prevents the impression that the standard is leaning toward the highway. If the rake is not correct, make sure that the contractor rakes the standard by plumbing the side of the tapered standard from the road.
- Before accepting a project, verify that the grounding of standards complies with specified methods.

4-5604 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Review the contractor's quality control program submittal for sign structures.
- Verify that the contractor's quality control records are submitted in a timely manner and that results comply with contract requirements.
- Make sure that the contractor does required nondestructive testing and that you select the random locations for nondestructive testing when specified.

4-5605 Payment

For details of measurement and payment, review contract specifications. Make any necessary measurements and counts.

Refer to Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications*, for information about standard deductions taken for Caltrans doing inspection or testing at material sources.