



Railings and Barriers – Metal Railings and Barriers – California Bridge Rails, Chain Link Railings, Cable Railings, and Tubular Railings

Revision and Approval

Revision	Date	Nature of Changes	Approved By
0	12-22-2022	Original Issue	Richard Foley

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Background

This process establishes Structure Construction (SC) responsibilities and procedures for:

- Review and authorization of submittals, quality assurance, materials, and construction for California bridge rails and tubular railings, as well as payment for California bridge rails.
- Review and authorization of materials and construction for chain link railings and cable railings. There are no submittal requirements for these sections. However, all materials and construction must comply with the applicable *Standard Plans*.

Additional unique guidance related to this Bridge Construction Memo (BCM) is detailed in:

- [BCM C-13](#), *Permanent Reference Elevations*
- [BCM 52-1](#), *Reinforcement - General*
- [BCM 52-2](#), *Reinforcement – Epoxy-Coated Reinforcement and Epoxy-Coated Prefabricated Reinforcement*

Additional unique guidance for field repair or shop galvanizing is detailed in:

- [BCM 75](#), *Miscellaneous Metal*

Prior to reviewing this BCM, it is essential to review the following [Contract Specifications \(CS\)](#), Sections:

- 83-1, Railings and Barriers – General
- 83-2.01, Railings and Barriers – Metal Railings and Barriers – General
- 83-2.05, Railings and Barriers – Metal Railings and Barriers –California Bridge Rails
- 83-2.06, Railings and Barriers – Metal Railings and Barriers –Chain Link Railings
- 83-2.07, Railings and Barriers – Metal Railings and Barriers –Cable Railings
- 83-2.08, Railing and Barriers – Metal Railings and Barriers –Tubular Railings,

which includes sections that this BCM is based on as identified in the title block above. Information in the CS typically will not be repeated in the text of this BCM.

Process Inputs

1. Contract work that includes California bridge rails, chain link railings, cable railings, or tubular railings
2. Submittals:
 - a. Shop drawings for California bridge rails and tubular railings
 - b. Concrete mix designs
 - c. [Form CEM 3101](#), *Notice of Materials to be Used*

Procedure

1. All work associated with this process is charged as [Project Direct – Construction](#).
2. Inspection of field work for this process is:
 - a. [Benchmark](#) for verification of layout and completed railings.
 - b. [Intermittent](#) for placement of bar reinforcing steel, installation of posts and railings, and during concrete curing.
 - c. [Continuous](#) for concrete placement.
3. Before construction begins, the Structure Representative (SR) or delegate must:
 - a. Review the contract documents for material requirements and discuss with the Materials Engineering and Testing Services (METS) Representative ([METS Rep](#)) and the Contractor.
 - b. Review the *Construction Manual*, Chapter 4, *Construction Details*, [Section 4-83](#), *Railings and Barriers*, with an emphasis on [Section 4-8303C](#),

Pipe Handrailing, Steel Bridge Railing, Cable Railing, Metal Railing (Tubular), and Chain Link Railing.

- c. Review the applicable [Standard Plans](#) related to Metal Railings and Barriers, which include sheets B11-7 through B11-52, and B11-65 through B11-78.
 - d. Review the [Outline of Field Construction Practices](#), Section 40, *Barrier Railing*.
 - e. Review and authorize shop drawing submittals for California bridge rails and/or tubular railings.
 - i. Verify whether the CS requires the tubing for railings to be shop bent or fabricated to fit the horizontal curvature.
 - f. Review and authorize concrete mix design submittals in accordance with [BCM 90-1](#), *Concrete – General*.
 - g. Review Form CEM-3101, *Notice of Materials to be Used*, and discuss requirements with the [METS Rep](#); notify the Contractor of any discrepancies.
 - h. Perform field surveying to obtain as-built bridge deck/top of rail elevations and determine adjustments to obtain smooth railing profile from specific grade points.
 - i. For additional guidance on this process, review [BCM 83-3](#), *Railings and Barriers – Concrete Barriers*.
 - i. Determine locations of permanent reference elevation points and field mark these locations. Refer to [BCM C-13](#), *Permanent Reference Elevations*, for guidance.
4. During construction, the SR or delegate must:
- a. Verify that the Contractor's railing layout (geometry, expansion joints, auxiliary structures, sidewalks, etc.) conforms to the contract documents.
 - b. Verify that bar reinforcing steel is placed properly in accordance with contract documents and BCM 52-1, *Reinforcement – General*.
 - c. Verify that epoxy-coated reinforcement (in freeze-thaw area) is placed in accordance with BCM 52-2, *Reinforcement – Epoxy-Coated Reinforcement and Epoxy-Coated Prefabricated Reinforcement*.
 - d. Verify that anchorage assemblies and post pockets are located and installed in accordance with the contract documents.
 - e. Verify that electrical conduits and other utilities are placed in accordance with the contract documents.
 - f. Verify plumbness and alignment of forms and/or railings are within tolerances detailed in the CS.

- i. Note that the orientation of posts for California bridge rails and tubular bicycle railings is normal to the profile grade.
 - ii. Verify whether the CS requires vertical adjustment of the railing to compensate for camber and dead load deflection; if required, provide values to the Contractor before the railing is installed.
 - g. Verify the concrete is placed in accordance with [BCM 51-1.03\(C-D\)](#), *Concrete Structures – General – Construction – Preparation and Placing Concrete*; and cured in accordance with BCM 90-1, *Concrete – General*.
 - i. Note unique requirements in the CS for curing mortar, and for curing concrete in freeze-thaw areas.
 - h. Verify that the railings present a smooth and uniform appearance in their final position.
 - i. Verify that protection systems are provided for public and workers' safety and for environmental compliance.
 - j. Mark the permanent reference elevation points at the top of the outside rail anchor bolts in accordance with [BCM C-13](#), *Permanent Reference Elevations* and the [SC Bridge Construction Survey Manual](#).
 - k. Document all inspection, construction, and quality assurance activities, pertinent to this BCM, in the daily reports per [BCM C-7](#), *Daily and Weekly Reports*.
5. Following construction, the SR or delegate must:
- a. Measure along the completed lengths of rail to determine the monthly payment quantities described in the contract documents.
 - b. Survey elevations of permanent reference points and document the information on the as-built plans per [BCM C-13](#), *Permanent Reference Elevations*.
 - c. File all test results and daily reports in the appropriate category in the project records as specified in the *Construction Manual*, [Section 5-102](#), *Organization of Project Documents*.

Process Outputs

1. Authorized shop drawing submittals for California bridge rails and/or tubular rails
2. Authorized concrete mix design submittals
3. Completed bridge railings and barriers meeting contract requirements
4. Permanent reference locations and elevations

Attachments

None