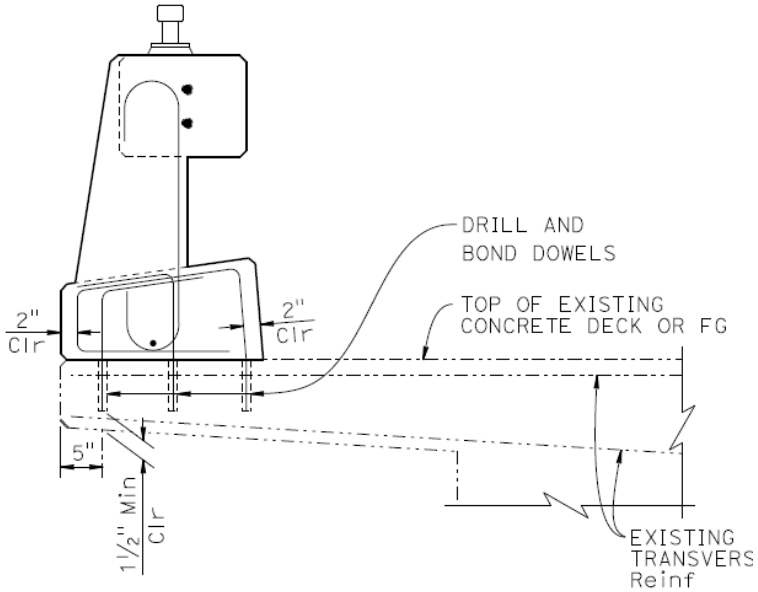
User Guide to Bridge Standard Detail Sheets Section 16 – Barriers & Railings
Concrete Barrier Type 85 Retrofit

Bridge Standard Detail Sheet (XS) Number
xs16-046

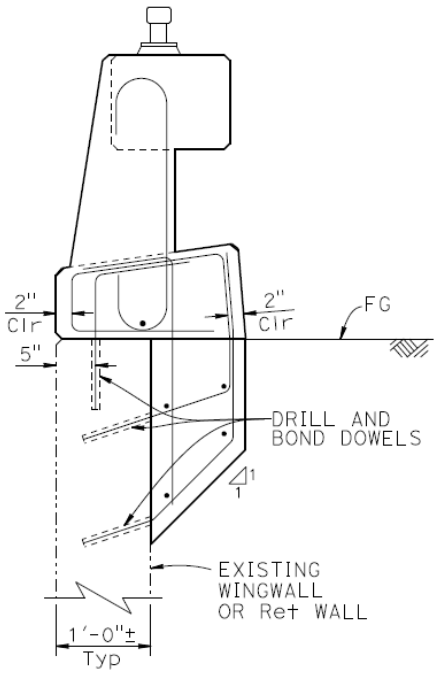
Description of Component
TL-4 rating, applicable for high-speed locations, greater than 45 mph.

Box Girder Bridge Deck Overhang Shown, PC Girder Bridge Deck Overhang, and Slab Bridge Deck similar.

New ES may differ from the existing ES as the Type 85 Retrofit footprint may be wider.



Type 85 (Mod) retrofit on overhang



Type 85A (Mod) retrofit on existing wingwall or retaining wall

Last Revised: 01-15-2025

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Standard Drawing Features

- Notes
- Type 85 (Mod)
- Type 85A (Mod)
- Section A-A and Section B-B at the approach end block.
- Expansion joint detail

Design / General Notes

Design Criteria:

AASHTO LRFD Bridge Design Specifications 8th edition with California Amendments:

Live Loading

- HL 93 and permit design load

Vehicular Collision Force

- MASH Test Level 4

Concrete

- f_y = 60 ksi (ASTM A706/706M, Grade 60)
- f'_c = 3.6 ksi

Designer must verify the following:

1. Designers must ensure that any supporting structures, such as the bridge deck, overhang, wingwall, and /or retaining wall meet the strength requirements in the AASHTO LRFD Bridge Design Specifications Section 13, Railings, and Appendix A13 and as amended by Caltrans' California Amendments.

   There are three overhang design cases per AASHTO LRFD Bridge Design Specifications Appendix A13:

   Case1: Extreme Event II (transverse and longitudinal forces)

   Case 2: Extreme Event II (vertical forces)

   Case 3: Strength I

   The clearance to reinforcement in the concrete curb is 2 inches at the traffic face and back face, and 1 inch on the top. The clearance to reinforcement in the concrete transition end blocks at the approach and departure ends is 1 inch at the traffic face, the back face, and the top.

2. Consult with the Bridge Railing Specialist for an exception to the minimum 7½ inches deck thickness at the drill and bond dowel location shown.

For projects located in a corrosive environment, refer to the AASHTO LRFD Bridge Design Specification Section 5.10.1 for using epoxy-coated rebar and Standard Specifications section 52-2. Use stainless steel for drill & bond reinforcement to avoid increasing the embedment length of epoxy-coated drill and bond dowels by 50 percent.

Crashworthiness:

Concrete Barrier Type 85 Retrofit was designed and checked as a new MASH-compliant bridge railing; its crashworthiness is based on the Concrete Barrier Type 85 Crash Test.

A link to the site for Vehicular Crash Tests of the Concrete Barrier Type 85 Bridge Railing Research Results will be updated after the crash test report is posted online. The Final Crash Test Report for Concrete Barrier Type 85 and other general information will be posted to the Division of Research and Innovation and Systems Information webpage for Research Final Reports in the Geotechnical and Structures subsection when available. More information regarding MASH Implementation by Caltrans can be found at the Implementation of the Manual for Assessing Safety Hardware (MASH).

Utilities and Overlays:

Only two 1 ½ inches diameter conduits are permitted in the taller half of the concrete curb (front-to-back from 12 inches to 9 inches).

If an overlay is being added to the bridge deck or approach slab on the same contract that the bridge railing is being constructed, then the concrete curb should be constructed to an additional height equal to the depth of the overlay so that, after the overlay is placed, the height of the traffic face of the concrete curb is 12 inches above the Finish Grade of the overlay, and the height of the vehicular railing will still measure 3 feet – 0 inches above the finish grade, which in this case is measured from the top of the overlay instead of the concrete bridge deck. Attention is needed for lengthening curb reinforcement that connects to the deck reinforcement if overlay considerations are required during the design phase.

If an overlay is planned for an existing bridge deck with an existing Concrete Barrier Type 85 Retrofit Bridge Railing, then consider the following options:

- No overlay.

- Taper the overlay down to the minimum depth permissible for the specific type of overlay and stop at least 3 feet – 0 inches away measured transversely from the traffic side toe of the concrete curb of the bridge rail.
- If overlay is required to extend all the way to the existing curb face such as in a marine or freeze-thaw environment where it is needed to seal the deck surface, then taper down the depth of the overlay starting at the Edge of Travelled Way down to the minimum depth that the type of overlay can be placed, then at that point start to remove surface of the deck shoulder down to the equivalent of the minimum possible overlay depth (as thin as allowable, but not to exceed 1-inch) at the toe of the curb of the barrier so that the minimum depth of the overlay can be placed all the way to the toe without reducing the 3 feet – 0 inch height of the bridge rail measured from the finish grade of the overlay (this will minimize the area of deck shoulder that needs some minimal depth of bridge deck surface removal). If this is not possible, then the existing bridge rail may have to be replaced in conjunction with an overlay placed all the way to the toe of the bridge rail. Note that if a policy or the existing bridge condition does not permit removing a portion of the top of the bridge deck surface for any specified reason, then the overlay options are limited to either no overlay, or no overlay within 3 feet – 0 inches from the toe of the bridge rail or overlay all the way to the toe of the bridge rail in conjunction with a bridge rail replacement.
- If the shoulder is narrow which leaves little or no distance to taper down the overlay depth, then choose an overlay material that can be applied in the thinnest possible depth section and only remove the minimum area and minimum depth of deck surface close to the toe of the bridge rail in order to preserve the 3 feet – 0 inch height of the existing vehicular rail and the 3 feet – 6 inch height of the bicycle railing. When the existing bridge condition does not permit removing a portion of the top of the bridge deck surface for any specified reason, then the overlay options are limited to either no overlay, or no overlay within 3 feet – 0 inches from the toe of the bridge railing, or overlay all the way to the toe of the bridge railing in conjunction with a bridge railing replacement where the height of the bridge rail curb is increased by the equivalent height of the overlay but not to exceed 2 inches whereby the height of the vehicular bridge rail will be the standard 3 feet – 0 inches above the top of the overlay.

Additional Drawings Needed to Complete PS&E

1. For details not shown, see Standard Plans for Concrete Barrier Type 85, B11-83, B11-83A, B11-84, B11-85, and B11-87.

2. Dimensions may vary with roadway/bridge cross slope and with certain thicknesses of surfacing. See as-built plans.
3. If the bridge rail concrete transition end blocks for the project are going to connect to something other than the guardrail transition in the Standard Plans for either Transition Railing (Type AGT) at approach end block or Midwest Guardrail System at departure end block, then special designed details will be required.

Contract Specifications

Caltrans Standard Specifications: Section 51 Concrete Structures, Section 52 Reinforcement, Section 55 Steel Structures, Section 59 Structural Steel Coatings, Section 75 Miscellaneous Metal, Section 83 Railings and Barriers, and Section 91 Paint, and if a special design is done to add chain link railing (such as, if the bridge goes over railroad tracks or if bridge is in an urban area or where a large volume of pedestrian traffic is anticipated, or other factors that may determine need for chain link railing) then also Section 83-2.06 Chain Link Railing.

Restrictions on Use of Standard Drawings

- A special design is required to mount a chain link railing to the Type 85 Retrofit. Chain link railing should only be added to Type 85 Retrofit for specific lengths where required over railroad tracks or over or adjacent to locations with security concerns.

- Do not place the electrolier at the expansion joint post.

Special Considerations

Aesthetics:

Aesthetic see-through bridge railings such as the Type 85 Retrofit are preferred by the California Coastal Commission for use within the Coastal Zone and may also be selected for any location where a Context Sensitive Solution is warranted.

With regard to aesthetics:

- Aesthetic metal bar design can be added in between the top & bottom beam if a custom artistic design is desired. This could be done to match a design of a custom pedestrian or bicycle railing on the bridge or to match or complement some feature on or near the bridge.

Concrete Barrier Type 85 Retrofit

The height above Finish Grade for bridge railing at completion of construction contract cannot be less than the heights shown on the Bridge Standard Detail Sheets for Concrete Barrier Type 85 Retrofit. Fixed objects, such as bridge-mounted signs, must be placed on a corbel or pedestal on an outcropped portion of the deck overhang on the back side of the bridge rail and will require special design and details. For special situations, contact both the Signs and Overhead Structures Technical Specialist and the Bridge Railing Technical Specialist in the Caltrans, Division of Engineering Services, Office of Design and Technical Services by email at DES Design and Technical Services.

If scuppers are desired/needed then contact the Bridge Railing Technical Specialist by email at DES Design and Technical Services. Also note that deck drainage can only be allowed to drop off the edge of deck by means of scuppers or down-drains if the Environmental Document allows it, and if there are no vehicular lanes/railroad tracks/bicycle path/walkway/or boating waterway directly below.

All project-specific modifications to Bridge Standard Details Sheet, XS 16-046, Concrete Barrier Type 85 Retrofit must be reviewed by the Bridge Railing Technical Specialist in the Caltrans/Division of Engineering Services/Office of Design and Technical Services. Please contact the Office of Design and Technical Services.