# Standard Plan Sheet Numbers

RSP B11-58, RSP B11-59 & RSP B11-59A

# Implementation

New 2023 Revised Standard Plans are to be implemented in January 2024 and to replace the 2023 Standard Plans that were posted in mid-July 2023.

# Description of Component



**Replaces Concrete Barrier Type 26**

**MASH 2016 compliant, per FHWA Letter of Eligibility B-259**

Combination railing (vehicular/pedestrian) approved for TL-2 low-speed locations only (speeds less than or equal to 45 mph)

Concrete barrier with integral raised concrete sidewalk, connected to bridge deck, wingwall, or retaining wall.

Vertical concrete parapet height is 2 feet – 8 inches above the top of sidewalk.

The traffic-face of sidewalk curb is 8-inches above the Finish Grade of either the bridge deck or the deck overlay if an overlay is to be placed on the same contract (overlay not to exceed 2 inches). From the traffic face of the sidewalk curb, the top of the sidewalk slopes up at 1.5% toward the edge of deck (EOD). The 1.5% cross slope of the top surface of the sidewalk gives 0.5% construction tolerance to ensure that the constructed integral raised sidewalk does not exceed the maximum cross slope of 2% per ADA law and accessibility guidelines and policies. Tubular Hand Railing or Chain Link Railing is required to meet 42-inch minimum height requirement for pedestrians, but Std Plan B11-51 is for a 48-inch height. If the Chain Link Railing option is used, its height will be significantly taller than 42-inches, see Standard Plans for details. Aesthetic treatment can be applied to both the back face and the traffic face of vertical parapet.

# Standard Drawing Features

All three of the Revised Standard Plans sheets must be included in the contract plans:

RSP B11-58 Details No. 1

* Typical Section, Elevation View and Plan View.

RSP B11-59 Details No. 2

* Sections, Pedestal Details, Wing Wall connection and Approach Slab

RSP B11-59A Details No.3

Includes MASH compliant details for approach end block details and features the vertical slotted holes to aid with constructability of the thrie beam rail. The attachment of guardrail end cap and thrie beam barrier guardrail shall be placed so that the top is at 34” above top of sidewalk. The end of the approach end block tapers up in height to 35” above top of sidewalk.

# Design/General Notes

Design Criteria:

AASHTO LRFD Bridge Design Specifications 6th edition:

 $f’\_{c} = 3.6 ksi$

 $f\_{y} = 60 ksi (ASTM A706/706M)$

 n= 8

Bridge rail rated Test Level 2 (TL-2).

Designers must ensure that any supporting structures, such as the bridge deck, wingwall, retaining wall, or bridge deck overhang, meet the requirements in the AASHTO LRFD Bridge Design Specifications, Appendix in Section 13, Railings, as amended by Caltrans California Amendments. Bridge deck overhang to be designed to handle the transfer of bridge rail impact loads at Test Level 4 (TL-4) per “Section 9.4.3.2 Additional Requirements for Overhangs” of Bridge Design Memo 9.4.

Supporting elements, such as the deck or overhang, must be designed to:

Case 1: Extreme Event II (transverse and longitudinal force)

Case 2: Extreme Event II (vertical forces)

Case 3: Strength I

The clearance to reinforcement in the sidewalk and parapet is 2 inches, as noted on the plans. (Concrete Barrier Type 26 has 1 inch clearance).

For projects located in a corrosive environment, refer to the AASHTO LRFD Bridge Design Specification Section 5.10 for using epoxy coated rebar and Standard Specifications 2022 section 52-2.

Sidewalk Design:

Per the Caltrans [Highway Design Manual (HDM), Section 208.4 Bridge Sidewalks](https://dot.ca.gov/-/media/dot-media/programs/design/documents/hdm-complete-14dec2018.pdf#page=143):

“Sidewalks on bridges should be provided wherever there are sidewalks or other pedestrian facilities that follow the highway. The minimum width of a bridge sidewalk shall be 6 feet. The recommended width should be 8 feet for pedestrian comfort. Bridge sidewalks in area types (see Index 81.2) with high levels of pedestrian activity may need to be greater than 8 feet.”

The 6 feet minimum width of bridge sidewalk noted in Section 208.4 of the Highway Design Manual refers to the walking surface at the top of the sidewalk and does not include the 2-inch width for the slope of the sidewalk curb face next to the roadway shoulder. Similarly, the recommended 8 feet sidewalk width noted in Section 208.4 of the Highway Design Manual refers to the walking surface at the top of the sidewalk and does not include the 2-inch width for the slope of the sidewalk curb face next to the roadway shoulder. Refer to TYPE H CURB detail on Std. Plan A87A “CURBS AND DRIVEWAYS”.

**Crashworthiness:**

Refer to the [Division of Research, Innovation and System Information](https://dot.ca.gov/programs/research-innovation-system-information/research-final-reports) for crash test videos, Compliance Crash Testing of the Type 732SW Bridge Rail, Final Report, FHWA Letter of Eligibility B-259 and other general information.

Fixed objects, such as lighting standards or bridge mounted signs, must be placed on a corbel on the back side of the concrete barrier. Typical details are shown on the plans. For special situations, contact the Signs and Overhead Structure Technical Specialist.

Pedestrian Accessibility:

Concrete Barrier Type 732SW complies with the pedestrian accessibility guidelines in [Design Information Bulletin 82 (DIB 82)](https://dot.ca.gov/-/media/dot-media/programs/design/documents/dib82-06-a11y.pdf).

Bridge deck joints shall continue through the barrier and must be armored to comply with the requirements in DIB 82 for allowable change in horizontal and vertical elevations in pedestrian walkways. See, “Joint Armor for Pedestrian Walkways” detail on [Bridge Standard Details, XS8-050 sheet](https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/engmanualsbridgestanddetail/chap-8/201810-xs8-050-a11y.pdf) and the Bridge Standard Details, xs8-050 User Guide. If the Maximum Movement Rating is more than 2 inches, contact the Bridge Joint Seals and Bearings Specialist or email the Office Chief of the DES/BD/ Office of Technical Policies and Guidance (OTPG) with “Attention: Caltrans Bridge Joints and Bearings Specialist”.

Utilities and Overlays:

Provide two- 4 inch conduits for future use as shown on the plans. Designers shall consider cross-slope, super elevation and other factors to ensure that there is adequate cover over planned or future conduits.

No conduits are permitted in the concrete parapet or in the deck overhang directly below the concrete parapet, but conduits are permitted in the integral raised sidewalk of the concrete barrier as noted and as shown on the Revised Standard Plans for Type 732SW. Provide two 4-inch conduits for future use as shown on the plans. Designers shall consider cross-slope of the sidewalk, super elevation of the bridge deck, whether an overlay is going to be placed on the bridge deck in front of Type 732SW integral raised sidewalk (in which case the sidewalk must be constructed deeper so that the height of the sidewalk curb will still be 8 inches above the top of the Finish Grade of the deck overlay), the minimum distance that conduits must be clear of the sidewalk curb face per the Revised Standard Plans for the Type 732SW, the minimum distance that conduits must be clear of the traffic face of the vertical parapet portion of the bridge rail per the Revised Standard Plans for the Type 732SW, the minimum 2 inches of clear space required between the outside edges of adjacent conduits, and other factors to ensure that there is adequate cover over and adequate spacing of planned or future conduits. Due to these considerations, designers may have to reduce the size and or number of conduits from the maximum allowable number and size of conduits shown in the NOTES on the Revised Standard Plans for the Type 732SW. For each additional foot of sidewalk width above the minimum sidewalk width noted on the Revised Std. Plan sheets, one additional 4-inch nominal diameter (or smaller) conduit can be added.

If a deck overlay is being added to the bridge deck or approach slab on the same contract that the bridge rail is being constructed, then the concrete sidewalk curb should be constructed to an additional height equal to the depth of the overlay so that (not to exceed 2 inches in additional curb height), after the overlay is placed, the height of the concrete curb is 8 inches above the Finish Grade (FG) of the deck overlay instead of the concrete bridge deck, and the height of the vehicular rail parapet on the integral raised sidewalk will measure 2 feet – 8 inches above the top of the sidewalk. It’s important to note that the anchor bolts will need to be lengthened in this case by an amount equivalent to the depth of the overlay placed against the sidewalk curb face of the Type 732SW bridge rail.

If a deck overlay is planned for an existing bridge deck with an existing Concrete Barrier Type 732SW Bridge Rail, then consider the following options:

* No deck overlay.
* Taper the deck overlay down to the minimum depth permissible and stop at least 3 feet – 0 inches away measured transversely from the traffic side toe of the integral raised concrete sidewalk curb of Type 732SW.
* If need deck overlay to extend all the way to the existing Type 732SW curb face such as in a marine environment or in snow country 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 so that it is 2 inches depth or less at the curb face in order for the remaining sidewalk curb height to be 6 inches or more above the top of overlay. If this is not possible, then may have to replace the existing bridge rail in conjunction with an overlay placed all the way to the toe of the bridge rail in which case the overlay depth would be added to the height of the raised integral concrete sidewalk of the Type 732SW so that the Type 732SW’s integral sidewalk curb height above the top of the overlay Finish Grade was 8 inches (make sure to take into consideration how this additional weight affects the superstructure/substructure design). If the shoulder is narrow which leaves little or no distance to taper down the deck overlay depth, then choose an overlay material that can be applied in a 2 inch or less depth against the toe of the bridge rail’s integral raised sidewalk in order to preserve a minimum of 6 inches in height of the existing Concrete Barrier Type 732SW sidewalk curb.

# Additional Drawings Needed to Complete PS&E

[Bridge Standard Details, XS8-050, Joint Armor for Pedestrian Walkway details](https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/engmanualsbridgestanddetail/chap-8/201810-xs8-050-a11y.pdf).

If the bridge rail (with integral raised sidewalk) concrete transition end blocks for a project are going to connect to something other than the guardrail transition Standard Plans for either Thrie Beam Barrier guardrail or Midwest Guardrail System (MGS) guardrail, then special designed detail drawings 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, Section 91 Paint, and Section 83-1.021 Chain Link Railing if chain link railing shall be added to Type 732SW.

# Restrictions on Use of Standard Drawings

* Sound walls cannot be mounted on top of Concrete Barrier Type 732SW.
* Concrete Barrier Type 732SW cannot be used in locations where the posted speed limit is more than 45 mph.
* A special design is required for retrofitting this bridge rail with integral raised sidewalk onto an existing bridge deck, existing retaining wall, or existing barrier moment slab. Carbon-fiber-reinforced polymers (CFRP) near surface deck strengthening may be required if the Type 732SW is desired to be added to an existing bridge. Type 732SW cannot be retrofitted onto the top of an existing retaining wall unless the existing retaining wall was designed for the transfer of vehicular impact loading or if a full design analysis of the existing retaining wall is done to determine if it can handle the transfer of the vehicular impact loading from Type 732SW. If Type 732SW is desired as a bridge rail at the top of an existing retaining wall that was not designed for the transfer of vehicular impact loading, then either the Type 732SW will have to be mounted on a concrete barrier moment slab that extends over the top of the existing retaining wall or be mounted on a structure approach slab that extends over the top of the existing retaining wall or wing wall.
* The clear openings for the pedestrian railing (pedestrian handrailing or chain link railing) are in conformance with the size limits set forth in Section 13 of the AASHTO LRFD Bridge Design Specifications along with Section 13 of the California Amendments.

# Special Considerations

Aesthetics:

* + The tubular hand rail requires a galvanized coating. Galvanized tubular hand rail can be painted. There are no restrictions on choice of paint color for the steel elements, except that yellow cannot be used because the MUTCD reserves that color for the median striping (cannot have a yellow-colored bridge rail at outside edge of structure/roadway). Common choices are: the galvanized dull grey (unpainted), the galvanized chrome grey (unpainted), Natina Stain (rusty brown or mottled rusty brown) over the galvanized steel railing, or white, light blue, green, black, brown or Golden Gate international orange paint over the galvanized steel railing. If a Context Sensitive Solution is desired for the tubular hand railing, then a special design could be done for the hand railing itself. If so, the special design railing must comply with the design capacity and clear opening requirements shown in Section 13 RAILINGS of the AASHTO LRFD Bridge Design Specifications with California Amendments.
* Concrete parapet of Type 732SW can have color added by either staining the concrete surface or adding dye to the concrete mix, or both. When adding color to concrete barrier surface, stain should be used. Stain penetrates into the surface so if the concrete surface is lightly impacted the color will still remain, whereas paint is only adhered to the surface and will scrape off even if lightly impacted. Paint on concrete peels over time and more rapidly in harsh environments.
* Architectural texture can be added to the surface of concrete parapet of the Type 732SW, but the depth of texture must be added to the outside of the cross section of the standard details for the concrete barrier (so a textured barrier will be wider than the standard barrier and this may affect the bridge width). If texture is planned for the traffic side of Type 732SW parapet, it can only have very little texture depth, and if it has any texture it needs to also be a smooth texture design so that tires will not climb the face of concrete parapet or vehicles shall not snag onto the face of the concrete parapet. If architectural texture is desired, contact the Bridge Railing Technical Specialist.
* The vehicular railing height and the pedestrian hand railing height above the top of integral raised sidewalk for the parapet portion of the bridge railing at completion of construction contract cannot be less than the heights shown on the Revised Standard Plan sheets for Type 732SW (32-inch vehicular rail height and 48-inch pedestrian railing height), but the tubular pedestrian hand railing can be taller than 4-inches if desired (which would require a special design).

All project-specific modifications to Concrete Barrier Type 732SW must be reviewed by the Bridge Railing Technical Specialist in the Caltrans/Division of Engineering Services/Office of Design and Technical Services. Contact the Bridge Railing Technical Specialist by email at DES Design and Technical Services.