SDG 2:

Preliminary Design

Chapter 2

Tennessee Department of Transportation June 23, 2025

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Version History and Revision Summary

Version history and a summary of revisions are given in the table below. Minor editorial revisions may not be included in the summary.

Version	Revision Summary
04292022	Initial Release
10112023	Revised Appendix A – Elevation View , Plan View, and General Notes; Added Version History and Revision Summary; Revised Table 2; Revised Sections 2-103.00, 2-105.00, 2-106.00, 2-108.00, 2-203.00
08272024	Revised Sections 2-101.00, 2-108.00, and Appendix A
02032025	Revised Section 2-107.00, Table 2, Appendix A (General Notes), and Works Cited
06232025	Added Section 2-104.01, Revised 2-108.00 and Appendix A

Section 1 Design Elements

The key design element for preliminary bridge design is the preliminary layout. The preliminary layout is derived from roadway information from the line and grade field review plans provided by Preconstruction Design for all types of grade crossings. For hydraulic crossings, the Hydraulic Design Section will provide the hydraulic layout to the Structures Section. The Hydraulic Design Section may provide a draft hydraulic layout initially (one that is not stamped and is subject to change.) The Hydraulic Design Section shall be consulted before significant changes are made to details shown on the hydraulic layout.

The preliminary layout is typically one or two sheets and consists of: elevation view, plan view, typical cross-section, general notes, grade sketch, and other relevant information. See Appendix A for a preliminary layout checklist.

2-101.00 Bridge Widths

Bridge widths shall generally match the roadway typical section to include the traffic lanes, full width shoulders, turn lanes, medians, and the width of the top of parapets, bridge rails, and median barriers. STD-1-1SS parapets, portable barrier rails, and median barriers are all wider at the bottom than at the top, and in some cases will require the edge of shoulder to be defined at the bottom instead of the top of each. The requirements are:

For shoulder widths of 6'-0" or less:
Contact Engineering Division – Production Support for guidance on setting the edge of shoulder location. They will evaluate if the reduced shoulder width would have an adverse impact on the design.

For shoulder widths greater than 6'-0":
The shoulder width shall be measured to the top inside face of the parapet, bridge rail, or median barrier. For STD-1-1SS parapets, the top of the parapet is 7 ½" wide. The STD-1-1SS wingposts are 7" wider at the top than the rest of the parapet. This 7" encroachment on the shoulder is acceptable.

Roadway widths given on the bridge layout sheets shall include all traffic lanes, turn lanes, medians, and all full shoulder widths regardless of where the edge of shoulder is defined.

Roadways with sidewalks typically also have curbs and gutters. The curb width is 6", and the gutter width is 2'-0". Do not place curbs and gutters on bridges. In order to allow water flowing in the gutter (outside the bridge limits) and along the sidewalk (on the bridge) to continue flowing

in the same line of direction, provide 2'-0" of bridge width to account for the gutter width. Also, add 6" to the sidewalk width shown on the roadway plans to account for the curb width.

When the deck drain design is received from the Hydraulic Design Section, verify that drains are not located over roadways, sidewalks, multi-use paths, greenways, railroads, bents, or piers. Sidewalks and any barriers not located along the slab edges prevent the use of parapet drains. Type 2 grate drains with downspouts are required in these cases when drains are necessary. When these drains conflict with beam top flanges, they shall be rotated 180 degrees if doing so eliminates the conflict and the slope within the drain still allows it to drain freely. Otherwise, the beam location must be changed to eliminate the conflict.

2-102.00 Geometry

Wherever roadway grade and alignment will permit, the following criteria will result in the optimum structure from the standpoint of ease of construction, ease of design, economy, and safety: skew should approach 90 degrees where possible, alignment should be on a tangent, and grade should be moderate. The Structures Section measures skew between the substructure centerline and the centerline of survey or a tangent line to a curved centerline of survey. This is the complimentary angle to the skew angle as defined by AASHTO.

1. Cross-Slope - The bridge cross-slope shall conform to that of the roadway pavement, except the shoulders should normally have the same cross-slope as the traffic lanes to avoid unnecessary breaks in the slope across the bridge deck. If water is crossing three or more lanes, consult the Hydraulic Design Section for guidance. Superelevation transitions should be avoided on bridges wherever possible in order to facilitate deck drainage and construction.
2. Grades - Sag vertical curves, grades flatter than 1%, and superelevation transitions resulting in a zero cross-slope may present significant design and safety challenges when located on bridge decks. While it may be impossible to avoid these elements due to other restricting factors such as constricted right-of-way or clearance requirements, reasonable effort should be made to avoid including them on bridge decks when possible. Consult with the Design Manager and the Regional Preconstruction staff as soon as issues are discovered.

2-103.00 Expansion Joints

Bridges shall be continuous from abutment to abutment with no expansion joints in the slab whenever possible without exceeding pile deflection limits or other project-specific design criteria. For longer bridges, expansion joints may be required due to the anticipated thermal movement. When integral abutments on piles are used, expansion joints are typically not

required for prestressed concrete beam bridges less than 800 feet in length and steel girder bridges less than 425 feet in length.

When an expansion joint is required and the total required movement at the joint does not exceed 4 inches, specify a 4" strip-seal expansion joint on the plans (even if all 4 inches of movement is not required.) Strip-seal expansion joints shall be in accordance with Standard Drawings STD-3-1 and STD-3-2. The contractor shall submit shop drawings for strip-seal expansion joints for review and approval.

When an expansion joint is required and the total required movement at the joint exceeds 4 inches, a modular expansion joint is required. Modular expansion joints are proprietary joints and therefore do not have accompanying TDOT Standard Drawings. The contractor shall submit shop drawings for modular expansion joints for review and approval. Joint openings shall be rounded up to an even opening width.

2-104.00 Parapets and Bridge Rails

Parapets are solid barriers. Bridge rails consist of horizontal rails and vertical posts. For new bridge construction and widenings, specify one of the parapets or bridge rails in Table 1. Note that the parapet and bridge rail height requirement for bike lanes is 42" (AASHTO 13.9.2). When bike lanes are present, ensure that this requirement is met.

Name	Type	Notes
STD-1-1SS	parapet	This parapet is the default choice when no sidewalk is present.
STD-7-1	bridge rail	This bridge rail is for use as directed by Hydraulics when flood water is permitted to overtop the roadway.
STD-11-1	parapet	This parapet is the default choice when a sidewalk is present.
STD-11-2	bridge rail	This bridge rail is for use in special cases for aesthetics when the maximum design speed is 45 mph or less.
STD-11-3	bridge rail	This bridge rail is for use in special cases for aesthetics when a sidewalk is present and the maximum design speed is 45 mph or less.
STD-11-4	bridge rail	This bridge rail is for use in special cases for aesthetics. Also see STD-11-4A for additional details.

Table 1. Parapets and Bridge Rails

2-104.01 Conduits

Bridges with structural lighting have conduit for the lighting embedded inside the parapets or bridge rails. Bridges with navigational lighting have conduit for the lighting embedded in the bridge deck. Occasionally, embedded conduits are desired to carry utilities across a bridge. No more than two embedded conduits shall be used in any parapet, bridge rail, or slab. Embedded

conduits shall be 2" diameter (or smaller) Schedule 40 PVC. If more and/or larger conduits are desired, they shall be supported by a hanger system that is attached to the bridge deck (not the beams/girders) and located between two beam/girder lines. See TDOT Chapter 1680-6-1 for all requirements for utility installation on bridges. For bridges with sidewalks, conduits may be embedded in the sidewalk with approval of the Director.

2-105.00 Aesthetics

A well-proportioned, aesthetically pleasing bridge generally has a slender appearance and smooth lines. If possible, the bridge should complement the roadway setting and blend with the natural surroundings. An aesthetically pleasing appearance can usually be achieved with an insignificant increase in bridge cost. For special cases, aesthetic treatments can be added to projects. Consult with the Director for more information.

When designing hammerhead bents, the optimal slope of the bottom of the cap for aesthetics is 1V:4H. Round columns are generally more efficient and are aesthetically better than square or rectangular columns. However, round columns are not practical in every situation. Columns shall be equally spaced and cap cantilevers shall be equal in length unless exceptions are given by the Director.

2-106.00 Span Arrangements

When flexibility for locating substructures is available, it is desirable to provide span ratios (end span/interior span) that produce approximately equal total design moments in all spans. The ideal span length ratios are given in Figure 1. These span ratios are not mandatory. End spans shall have sufficient length to avoid uplift forces at the abutments at the applicable service and strength limit states.

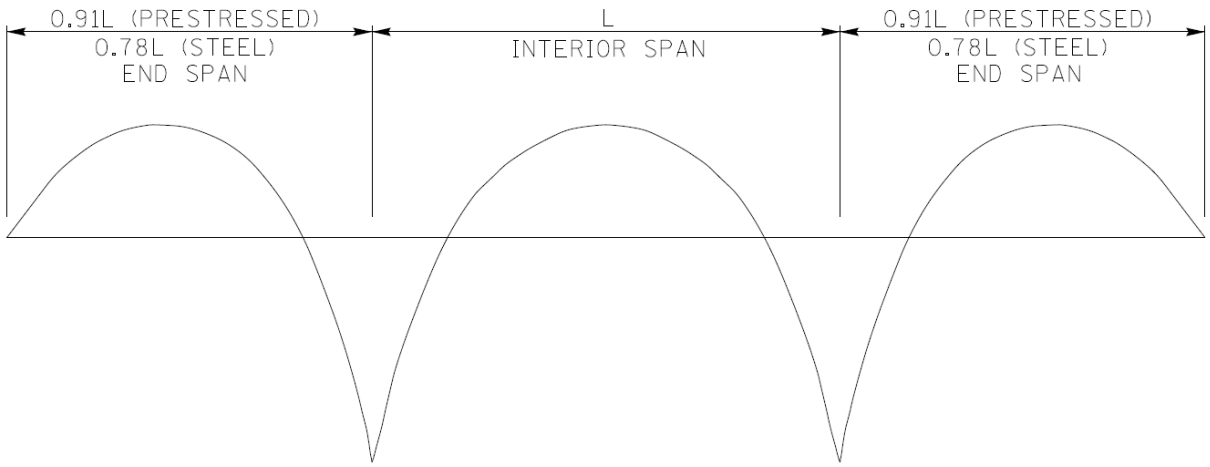

Figure 1. Design Moment Diagram for Ideal Span Ratios

2-107.00 Design Loads

All vehicular traffic bridges shall be designed for the HL-93 live load increased by 10% (multiplied by 1.1) in addition to all load factors specified by AASHTO for all applicable load combinations. Design dead loads shall include 35 psf for a future asphalt wearing surface.

2-108.00 Structure Type

Structure type selection is influenced by design criteria such as: traffic, span lengths, economy, geometry, location, and aesthetics. Prestressed concrete beams are significantly less expensive than steel girders. Therefore, prestressed concrete beams shall be used unless steel girders are required due to the aforementioned design criteria or any other design criteria defined by the Design Manager. Accelerated Bridge Construction (ABC) techniques are now being considered for bridges where location constraints and time of construction closure are predominating factors for a project. Timber shall not be used for any bridge component that will be part of the finished bridge without permission from the Director.

When selecting prestressed concrete beams, designers may refer to Table 2 or Section 6.9 of the PCI Bridge Design Manual 3rd Edition – Preliminary Design Charts. Please note that it is office policy that the BT-54 bulb-tee beam is generally preferred over the Type IV I-beam for the applicable span range. Use BT-54 bulb-tee beams instead of Type IV I-beams unless specific drainage design, horizontal curvature, or phase-construction limitations impact the design. I-beams are preferred over box beams based on cost when feasible. The use of bulb-tee beams with 8” webs and wide bulb-tee beams shall be reserved for bridges where more economical beams are not an option due to span lengths or vertical clearance requirements.

Beam Type	Size	Depth	Approximate Span Range
AASHTO I-Beam	Type I	28"	28' to 38'
	Type II	36"	38' to 57'
	Type III	45"	57' to 75'
	Type IV*	54"	75' to 95'
Box Beam**	Width: 36" or 48"	Varies from 12" to 66"	28' to 115'
Bulb-Tee Beam (6" Web)	BT-54	54"	75' to 105'
	BT-63	63"	95' to 125'
	BT-72	72"	115' to 145'
Bulb-Tee Beam (8" Web)	BT-54	54"	85' to 115'
	BT-63	63"	105' to 135'
	BT-72	72"	125' to 155'
Wide Bulb-Tee Beam	WBT-42	42"	80' to 110'
	WBT-54	54"	100' to 130'
	WBT-66	66"	120' to 150'

Table 2. Approximate Span Ranges for Various Beams

* BT-54 beams are preferred over Type IV I-beams.

** I-beams are preferred over box beams.

For steel girders, the following guidelines are applicable:

- For spans up to approximately 100 feet, consider using rolled steel W-shaped girders first, but allow Contractors the option of substituting steel welded plate girders of equal size and strength.
- For spans over approximately 100 feet, consider steel welded plate girders first instead of rolled steel W-shaped girders. For longer spans, rolled steel W-shaped girders will not be an option.

The above recommendations are only approximate. The applicable span lengths are directly affected by the girder spacing. Generally, girder spacings between 8'-0" and 12'-0" are the most economical. The applicable span lengths are also directly affected by span type. Beams used for simple spans and end spans of multi-span continuous bridges will usually have lengths closer to the lower end of the applicable span length range. Beams used for interior spans of multi-span continuous bridges can generally have lengths closer to the higher end of the applicable span length range.

Section 2 Hydraulic Crossings

The Hydraulic Design Section of the Structures Section performs a hydraulic design for all hydraulic crossings with design flows exceeding 500 cfs for the 2% (1 in 50) design flood. The hydraulic layout shall be prepared by the Hydraulic Design Section and furnished to the Structural Design Section for use in preparing the preliminary layout. The hydraulic layout shall include: elevation view, plan view, general notes, grade sketch, low girder elevation, datum elevation, flood elevations, rip-rap type and limits, deck drains, end of bridge flumes, and other relevant information.

2-201.00 Design Flood

The minimum design flood magnitude for hydraulic crossings is the 100-year frequency event for interstate routes and roads with 4 or more lanes as feasible. For state routes, the minimum design flood magnitude is the 10-year frequency event. The design flood is defined as the magnitude of flood wherein the flood elevation equals the overtopping elevation of the roadway. An evaluation is made of the flood hazard to the roadway and the effect of the proposed crossing on the hazard to public safety, the environment, stream stability, and other property. Drainage facilities for secondary and/or low traffic volume systems may be based on lesser floods if the conditions of the site warrant lower standards. For additional information, see Chapter 3 of the TDOT Structural Design Guidelines and "Design Procedures for Hydraulic Structures."

2-202.00 Coordination of Work

A copy of all final preliminary layouts for hydraulic crossings shall be sent to the Hydraulic Design Section for review before being submitted to other Divisions/Sections for review. Changes made in span arrangements, pier locations, pier shapes, end fill locations, grades, etc. shall be discussed with the Hydraulic Design Section to determine if these details are critical factors for the preliminary layout since the original determinations were made with the benefit of field inspection, survey notes, and land use conditions not always available to the structural designer.

2-203.00 Footing Elevations at Hydraulic Crossings

See SDG 10 Section 8 for requirements on setting the top of footing elevations for hydraulic crossings.

Section 3 Roadway Grade Separations

2-301.00 Bridge Lengths

Bridge lengths shall generally be established as the minimum length required by horizontal and vertical clearance controls and end slope conditions.

The slopes under each end of the bridge shall be 2H:1V (2:1) unless otherwise directed by the Geotechnical Section. In seismic design categories C and D, the Geotechnical Section may specify end slopes at the abutments flatter than 2:1 to ensure stability during a seismic event. Check for this information when the foundation report is submitted to the Structures Section.

In the interest of aesthetics and safety, it is advisable to eliminate median piers and end span piers whenever possible. In certain cases, the end span length can be reduced by replacing a negative 6:1 side slope (within the clear zone) with a positive 6:1 side slope and a drainage pipe instead of a ditch. A minimum vertical clearance of 14’-0” must still be provided over the 6:1 side slope within the clear zone. 2:1 slopes are considered non-recoverable and shall not be used inside the clear zone. See Roadway Standard Drawing RD11-SA-1 for more details.

2-302.00 Vertical Clearances

The minimum vertical clearances shall be as given in Table 3, except see section 2-501.00 for the vertical clearance requirements for pedestrian bridges.

Type	Minimum Vertical Clearance	Notes and References
Interstates	16'-6"	Use 17'-0" for the minimum vertical clearance whenever the additional 6" of clearance will not significantly impact the project.
State Routes	16'-6"	https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/design_guidelines/DG-C2.pdf
All Other Roads	16'-6"	Lower clearances for low volume roads are allowed in certain cases, but it requires a joint cost analysis justifying the need for reduction in vertical clearance. Consult Project Development about this.
Shared-Use Paths	10'-0"	https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/design_guidelines/DG-C3.pdf
Equestrian Trails	12'-0"	https://www.fs.fed.us/t-d/pubs/htmlpubs/htm07232816/page07.htm#verti

Table 3. Minimum Vertical Clearance Requirements

The vertical clearances given in Table 3 shall be provided over all vehicular traffic lanes and shoulders. In addition to these requirements, a minimum vertical clearance of 14'-0" shall be provided to the edge of the clear zone for all roads, except see section 2-501.00 for pedestrian bridges.

2-303.00 Clear Zones

Contact the roadway designer to determine the clear zone to be used for each bridge location.

Section 4 Railroad Crossings

2-401.00 General

All bridges over railroads shall have slope paving provided on the end slopes under each end of the bridge. Vertical and horizontal clearance requirements shall apply to current and future tracks. Verify if any future tracks are to be considered for the project. Protective fencing in accordance with STD-8-5 shall be provided for all railroad crossings. Alternate fence details may be considered in urban areas at the request of local governments. This requires the approval of the Director.

2-402.00 Vertical Clearance

The minimum vertical clearance for all current and future tracks shall be as required for the specific railroad crossed, but in no case shall be less than 23'-0" measured for a minimum of 6'-0" on both sides of the track centerline. The actual minimum vertical clearance shall be shown on the preliminary layout.

2-403.00 Horizontal Clearance

The minimum horizontal clearance for all current and future tracks shall be as required for the specific railroad crossed but shall not be less than 25'-0" measured along a line projected horizontally from the top of the highest rail to the side slope without approval of the Design Manager. In instances where 25'-0" of horizontal clearance cannot be reasonably provided, crash walls or piers of "heavy construction" shall be required and shall meet all the requirements of the railroad. The actual minimum horizontal clearances on each side of the tracks shall be shown on the preliminary layout.

2-404.00 Railroad Specific Criteria

Current policies for any railroad can be found on the railroad website or on the Structures SharePoint site.

2-404.01 Railroads Frequently Crossed

- CSX Railroad
- Union Pacific Railroad
- Canadian National Railroad

Even though Sheet A3 of Appendix A in the CN Railroad design criteria permits a vertical clearance less than 23'-0", the minimum vertical clearance over CN Railroad shall be 23'-0".

- Norfolk Southern Railroad

Norfolk Southern Railroad requires a taller protective bridge fencing than some other railroad companies. See Appendix H.1 of the Norfolk Southern Railroad design criteria for more information.

2-404.02 Other Railroads

- Burlington Northern Santa Fe Railway (BNSF)
- R.J. Corman Railroad/Tennessee Terminal (RJCK)
- Sequatchie Valley Switching Company (SQSC)

- South Central Tennessee Railroad (SCTR)
- Tennessee Southern Railroad (TSRR)
- Tennken Railroad (TKEN)
- Tyner Terminal Railroad (TYNT)
- Union City Terminal Railroad (UCTY)
- Walking Horse Railroad (WHRR)
- West Tennessee Railroad (WTNN)

The designer is responsible for researching the specific requirements of the railroad being crossed and designing to comply with those requirements. Contact HQRailroadCoordinator@tn.gov for additional information.

Section 5 Pedestrian Bridges

2-501.00 Clearances

Contact the roadway designer to determine the clear zone to be used at the location of the pedestrian bridge. The minimum vertical clearance shall be 17'-6" over the travel lanes and shoulders and 16'-6" to the edge of the clear zone.

2-502.00 Structure Type

Allowable structure types include those specified in Section 2-108.00, as well as prefabricated steel trusses. The minimum height of pedestrian railing shall be 42 inches, measured from the top of the walkway (AASHTO 13.8.1). Additional pedestrian railing height may be required for some bridges and shall be evaluated on a case-by-case basis. Discuss this with the Design Manager.

2-503.00 Loading

See the AASHTO LRFD Bridge Design Specifications and the AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges for information regarding loading.

Appendix A. Preliminary Layout Checklist

This checklist is a general guide and may not address every topic applicable to a specific bridge. Not all items will apply to every bridge. Draw the elevation view, plan view, and typical cross-section to scale. This is helpful for identifying conflicts so they can be resolved before the bridge is designed.

ELEVATION VIEW

_____PLACE ELEVATION VIEW AT TOP LEFT HAND SIDE OF THE SHEET.
_____LABEL ACTUAL MIN. VERT. CLEARANCE AND GIVE REQUIRED MIN. VERT. CLEARANCE.
_____LABEL APPROXIMATE EXISTING GROUNDLINE.
_____LABEL BEGINNING AND END OF BRIDGE AND C.L. OF BENTS/PIERS WITH C.L. STA. & F.G. ELEVATIONS
_____LABEL SPAN LENGTHS.
_____LABEL TOTAL LENGTH OF BRIDGE.
_____LABEL SLOPES (e.g., 2:1) AND IDENTIFY AS ORIENTED AT RIGHT ANGLE TO ABUTMENT.
_____LABEL BENTS/PIERS WITH "F" TO DENOTE FIXED.
_____LABEL ABUTMENTS WITH "I" TO DENOTE INTEGRAL OR "E" TO DENOTE EXPANSION JOINT.
_____LABEL TOTAL JOINT OPENING AND TYPE. (EXAMPLE 1: 12" MODULAR EXPANSION JOINT, EXAMPLE 2: 4" STRIP-SEAL EXPANSION JOINT)
_____SHOW F.G. LINE.
_____SHOW BENTS/PIERS WITHOUT FOOTINGS.
_____LABEL AT LEAST 100 FT. STATION MARKS (STRAIGHT BRIDGES ONLY). FOR CURVED BRIDGES, ADD THE FOLLOWING NOTE:
NOTE: ELEVATION VIEW IS PROJECTED FROM PLAN VIEW BELOW.
_____LABEL 5-10 FT. ELEVATION MARKS ALONG THE LEFT-HAND MARGIN.
_____LABEL SLOPE PROTECTION.
_____LABEL LOW GIRDER ELEVATION FOR HYDRAULIC CROSSINGS.
_____SHOW ABUTMENTS ON EITHER PILES OR ROCK.
_____LABEL DATUM, NORMAL POOL, 100 YR. FLOOD, ETC. ELEVATIONS.
_____LABEL AND HATCH ALL EXCAVATION TO BE PAID FOR AS A ROADWAY ITEM.

PLAN VIEW

_____ASK THE ROADWAY DESIGNER IF THEY CAN MOVE ANY CURVES AND SUPERELEVATION TRANSITIONS OFF THE BRIDGE.
_____PLACE PLAN VIEW UNDER ELEVATION VIEW.
_____LABEL LOCATION OF MINIMUM VERTICAL CLEARANCE.
_____LABEL REQUIRED AND ACTUAL MIN. HORIZONTAL CLEARANCE FOR RAILROAD CROSSINGS ONLY.
_____LABEL RAILROAD R.O.W. LINES FOR RAILROAD CROSSINGS.
_____LABEL BEGINNING OF BRIDGE, C. L. BENT/PIER, AND END OF BRIDGE STATIONS.
_____LABEL SKEW.
_____LABEL EQUATIONS IDENTIFYING STATIONS OF INTERSECTING CENTERLINES.
_____LABEL BEARINGS.
_____SHOW BERM AND LABEL WIDTH (usually 4'-0".)

_____SHOW ABUTMENTS (INCLUDING WINGS.)
_____SHOW PIERS/BENTS BUT NOT FOOTINGS.
_____LABEL C. L. SURVEY (WITH TICK MARKS) AND FINISHED GRADE LINE OF ROADWAY(S).
_____LABEL LANE, SHOULDER, SIDEWALK, AND ROADWAY WIDTHS.
_____LABEL 24'-0" PAVEMENT AT BRIDGE ENDS FOR ROADWAY WIDTHS ≥ 30 FT. AND ALL RAMP BRIDGES.
_____SHOW NORTH ARROW.
_____LABEL END OF BRIDGE FLUMES AND DECK DRAINS AS DESIGNED BY HYDRAULICS. AND CHECK FOR ANY DUMPING CONFLICTS.
_____LABEL PC, PT, TS, SC, CS, AND ST (AS APPLICABLE) WHEN HORIZONTAL CURVES ARE PRESENT.
_____SHOW EXISTING BRIDGE TO BE REPLACED (DASHED LINES) INCLUDING CENTERLINES OF EXISTING BENTS.
_____ADD THE FOLLOWING NOTE FOR BRIDGE REPLACEMENTS:
EXISTING BRIDGE NO. (BR. FED. ID NO.) AND APPROACHES TO BE REMOVED TO NATURAL GROUND BETWEEN STATIONS _____ ± AND _____ ±.
_____LABEL EXISTING AND PROPOSED UTILITIES ON OR NEAR BRIDGE, SUCH AS GAS, WATER, SEWER, TELEPHONE, AND FIBER OPTIC LINES.
_____LABEL 2'-0" SOD STRIP OR EROSION CONTROL FABRIC. (Normally this only used for non-hydraulic crossings.)
_____LABEL SLOPE PROTECTION AND THICKNESS. (For all grade crossings with rip-rap slope protection, add “SEE STD. DWG. NO. RD11-SA-1” to label. For hydraulic crossings, the Hydraulic Design Section will dictate when this note should be added.)
_____CHECK FOR ANY CONFLICTS WITH EXISTING SUBSTRUCTURES AND ANY UTILITIES THAT WILL NOT BE RELOCATED.

TYPICAL CROSS-SECTION

_____LABEL OUT-TO-OUT WIDTH OF DECK.
_____SHOW SUPERSTRUCTURE AND BENT/PIER WITHOUT FOOTING.
_____SHOW POSITION OF EXISTING BRIDGE (OUT-TO-OUT) AND REFERENCE TO C.L. SURVEY.
_____SHOW PARAPETS/BRIDGE RAILS AND LABEL WIDTH.
_____LABEL C.L. BEAMS; LABEL BEAM TYPE AND SIZE
_____LABEL C.L. SURVEY AND F.G. LINE.
_____LABEL CANTILEVER DIMENSION (MEASURED FROM EDGE OF SLAB TO C.L. OF EXTERIOR GIRDERS.)
_____LABEL C.L. SPACING OF GIRDERS.
_____LABEL C.L. OF COLUMN(S)
_____LABEL DEPTH(S) OF CAP BEAM.
_____LABEL CANTILEVER OF CAP BEAM.
_____LABEL COLUMN DIAMETER OR WIDTH.
_____LABEL COLUMN SPACING FOR MULTIPOST BENTS. FOR SKEWED BRIDGES, ADD NOTE THAT DIMENSIONS ARE MEASURED ALONG C.L. BENT/PIER.
_____LABEL CROSS-SLOPE OF ROADWAY AND SIDEWALKS.
_____LABEL SIDEWALK DEPTH AT EDGE.
_____LABEL SLAB DEPTH.
_____LABEL DEPTH OF SLAB + FILLER AT SUPPORTS FOR PRESTRESSED CONCRETE BEAMS AND STEEL ROLLED GIRDERS.

_____LABEL DEPTH OF SLAB + FILLER + TOP FLANGE FOR STEEL WELDED PLATE GIRDERS.

-PHASE CONSTRUCTION
_____LABEL PHASES OF STAGE CONSTRUCTION AND OUT-TO-OUT WIDTHS.
_____LABEL PHASE CONSTRUCTION JOINTS.
_____LABEL PORTABLE BARRIER RAIL (T-WZ-PCB2) AND CLEAR DISTANCE TO PHASE CONSTRUCTION JOINT. SEE STRUCTURAL DESIGN MEMORANDUM SDM-22-01 FOR MORE INFORMATION.
_____LABEL NUMBER OF LANES AND WIDTH AVAILABLE TO TRAFFIC BOUNDED BY PORTABLE BARRIER RAIL.

TRANSITION SKETCH
_____LABEL CROSS-SLOPES WITH STATIONS.

GRADE SKETCH
_____LABEL PVC, PVI, AND PVT STATIONS AND F.G. ELEVATIONS.
_____LABEL GRADES (%).
_____LABEL LENGTH OF VERTICAL CURVE.
_____DRAW BOTH GRADE SKETCHES FOR A GRADE SEPARATION.
_____LABEL GRADE SKETCHES WITH CORRESPONDING ROAD NAMES.
_____LABEL APPROXIMATE LOCATION OF PROPOSED BRIDGE.

CURVE DATA
_____PI STATION
_____N COORDINATE
_____E COORDINATE
_____Δ OR Δ_s
_____θ_s
_____Δ_c
_____D OR D_c
_____R OR R_c
_____L OR L_c
_____T OR T_s
_____L_s
_____SE (FT./FT.)
_____DESIGN SPEED
_____TRANS. LENGTH

HYDRAULIC DATA
_____DRAINAGE AREA
_____DESIGN DISCHARGE
_____WATER AREA PROVIDED BELOW ELEV.
_____VELOCITY
_____BACKWATER
_____RDY. OVERTOPPING ELEV.
_____DISCHARGE

GENERAL NOTES

_____CONSTRUCTION SPECIFICATIONS: TENNESSEE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (JANUARY 1, 2021 EDITION.)

_____ DESIGN SPECIFICATIONS: 10TH EDITION (2024) AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND THE 2ND EDITION (2011) AASHTO GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN WITH INTERIMS.

_____ LOADING: HL-93 LIVE LOAD INCREASED BY 10% (MULTIPLIED BY 1.1) IN ADDITION TO ALL LOAD FACTORS SPECIFIED BY AASHTO FOR ALL APPLICABLE LOAD COMBINATIONS; SEISMIC CATEGORY "__" WITH A_S = ___, S_{DS} = ___, S_{D1} = ___ (1000 YEAR RETURN PERIOD); DEAD LOADS SHALL INCLUDE 35 LB/SQ. FT. FOR FUTURE WEARING SURFACE.

_____SUPERSTRUCTURE: TO CONSIST OF ___ SPANS OF CONTINUOUS _____ (Specify beam type and size) WITH COMPOSITE CONCRETE SLAB.

_____CONCRETE: CLASS A f'c=3000 PSI, CLASS D f'c=4000 PSI FOR BRIDGE DECK. (Specify class DS instead of class D for bridges on an interstate or any bridge carrying part or all of a 4 lane (or greater) system (including one or both directions of traffic))

_____REINFORCING STEEL: TO BE ASTM A615 GRADE 60 UNLESS NOTED OTHERWISE. EPOXY COAT ALL SLAB STEEL.

_____BRIDGE DECK SURFACE FINISH: TO BE IN ACCORDANCE WITH METHOD___ IN ARTICLE 604.22 OF THE STANDARD SPECIFICATIONS. (See Bridge Plans Note 8. Use method 1 for roadway design speeds less than 40 mph and 3 for all others.)

_____USE _____ (PARAPETS OR BRIDGE RAILS). (Specify STD-1-1SS, STD-7-1, STD-11-1, STD-11-2, STD-11-3, OR STD-11-4.)

_____TEXTURE COATING: TO BE GRAY (36440) EXCEPT TRAFFIC FACE AND TOP OF PARAPET TO BE WHITE (37886). (Use for STD-1-1SS parapets.)

_____ TEXTURE COATING: TO BE GRAY (36440) EXCEPT ENTIRE (PARAPET OR BRIDGE RAIL) TO BE WHITE (37886). (Use for STD-11-1 parapets and STD-7-1, STD-11-2, STD-11-3, and STD-11-4 bridge rails.)

_____EXCAVATION: TO BE BASED ON (FINAL PROFILE OR EXISTING GROUND) AT ABUTMENTS AND (FINAL PROFILE OR EXISTING GROUND) AT (BENTS OR PIERS).

_____See Bridge Plans Notes 52-54 for the appropriate rip-rap note. Consult with the Hydraulic Design Section if the appropriate note is not already on the hydraulic layout.

_____REINFORCED CONCRETE SLOPE PAVING SHALL BE IN ACCORDANCE WITH SECTION 709 OF THE STANDARD SPECIFICATIONS AND SHALL BE MEASURED AND PAID FOR UNDER ITEM NO. 709-04, C.Y.

_____FLUMES AT BRIDGE ENDS ARE (REQUIRED/NOT REQUIRED.) (Give the Hydraulic Design Section a copy of the preliminary layout to determine this.)

_____BRIDGE DECK DRAINS ARE (REQUIRED/NOT REQUIRED.) (Give the Hydraulic Design Section a copy of the preliminary layout to determine this.)

_____REMOVE EXISTING BRIDGE (BR. FED. ID NO.) AND APPROACHES AFTER THE CONSTRUCTION OF PHASE I. INSTALL ___-TON WEIGHT LIMIT SIGNS AT EACH END OF THE EXISTING BRIDGE AND MAINTAIN TRAFFIC DURING CONSTRUCTION OF PHASE I. (Talk to the Design Manager about this.)

_____EXISTING BRIDGE DESCRIPTION: (length, out-to-out width, type of construction (e.g., 2 SPANS AT 28'-6" CONTINUOUS CONCRETE DECK GIRDER BRIDGE WITH CONCRETE SUBSTRUCTURES.), federal bridge ID no., existing layout dwg. no.)

_____Add Bridge Plans Notes 60-62 as applicable for lead and/or chromates on the existing bridge.
_____Add Bridge Plans Note 74 when existing bridge contains ACM (asbestos containing materials).
_____STREAM CHANNEL: ANY WORK WITHIN THE STREAM CHANNEL AREA (E.G. PIER/BENT FOOTING, RIP-RAP PLACEMENT, ETC.) SHALL BE SEPARATED FROM FLOWING WATER OR EXPECTED FLOW PATH AND PERFORMED DURING LOW FLOW CONDITIONS. ALL ITEMS USED WITHIN THE STREAM CHANNEL AREA FOR DIVERSION OF FLOW (OR EXPECTED FLOW), UNLESS SPECIFIED IN THE PLANS, SHALL NOT BE PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE COST OF OTHER ITEMS. THIS NOTE EXCLUDES ANY ITEMS SPECIFIED IN THE PLANS FOR TEMPORARY DIVERSION CHANNELS (EC-STR-31). *(*Use for all hydraulic crossings.*)*

RAMP TAPER DETAILS

_____BEGIN TAPER STA.
_____END TAPER STA.
_____BEGINNING OF BRIDGE STA.
_____END OF BRIDGE STA.
_____CENTERLINE OR F.G. LINE
_____WIDTH AT BEGINNING OF TAPER
_____ADJACENT LANE WIDTH

INFORMATION IN AND AROUND TITLE BLOCK

-TITLE BLOCK
_____BRIDGE NO.___
_____LABEL “PRELIMINARY LAYOUT”.
_____CROSSING, ___OVER___
_____BR. ID NO. (Request from Becky Hayworth or Steven Paulson.)
_____STA. OF MIDPOINT FOR HYDRAULIC CROSSINGS OR STA. OF INTERSECTION OF ROADS
_____LOG MILE (Use only if the log mile is given in the project termini in PPRM. This is usually only for bridge and approach projects.)
_____COUNTY
-BELOW TITLE BLOCK
_____QUANTITY OF CLASS “__“ MACHINED RIP-RAP (Locate this in the bottom-right border margin.)

INFORMATION IN AND AROUND REVISION BLOCK

-ABOVE REVISION BLOCK
_____P.E. NO.
-IN REVISION BLOCK
_____PROJECT NO.
_____YEAR (Use the year the preliminary layout will be distributed for review.)
_____SHEET NO. (e.g., 1 of 2)

Works Cited

AASHTO, *LRFD Bridge Design Specifications.* 10th. Washington, D. C.: American Association of State Highway and Transportation Officials, 2024.

AASHTO, *LRFD Guide Specifications for the Design of Pedestrian Bridges.* 2nd. Washington, D. C.: American Association of State Highway and Transportation Officials, 2015.

PCI, *Bridge Design Manual*. 3rd. Chicago, IL: Precast/Prestressed Concrete Institute, 2014

TDOT, Design Procedures for Hydraulic Structures, 2012.
https://www.tn.gov/content/dam/tn/tdot/structures/hydraulic-design/thmall.pdf