INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 14-09
Technical Advisory

May 13, 2014

TO: **All Design, Operations, and District Personnel, and Consultants**

FROM: ***/s/ Elizabeth W. Phillips***
Elizabeth W. Phillips
Office of Standards and Policy
Bridges Division

SUBJECT: **Bridge Railing Offset**

REVISES: ***Indiana Design Manual*** **Section 402-6.02(01) and Figure 402-6H**

EFFECTIVE: **Immediately**

The referenced figure has been revised to reflect the preferred and acceptable bridge approach guardrail configurations regardless of 3R or 4R project designation.

As discussed in the AASHTO *Roadside Design Guide*, it is desirable to provide a uniform clearance between traffic and roadside features, including bridge railings. A uniform distance provides a level of expectation for the driver, reducing the likelihood that the driver will react to the feature by changing speed or lane position. Because of the geometry of the concrete bridge railing transition and the connection details of the approach guardrail transition, there will always be a slight gain or loss in the bridge clear roadway width. The nominal gain or loss based on the bridge railing transition type is now illustrated on the figure.

Where a uniform offset is not provided the transition between offset distances should be gradual. At a minimum the transition should be in accordance with the barrier flare rates shown in *Indiana Design Manual* Figure 49-4F.

The revised figure and text are an attachment to this memo.

402-6.02(01) Cross Sections [Rev. May 2014]

Figures 402-6D, 402-6E, 402-6F, and 402-6G each provide schematics of the bridge cross section for a specific highway type. The following will apply to the bridge cross section.

1. Bridge Clear-Roadway Width. The geometric design criteria figure in Chapter 53 for the appropriate functional classification provides this information for a new or reconstructed bridge within the limits of a 4R project. The geometric design criteria figure in Chapter 55 for the appropriate functional classification provides this information for a bridge within the limits of a 3R project. Figure 402-6H shows the relationship between the bridge-railing and approach-guardrail offsets.

   Where a bridge clear-roadway width is permitted to be narrower than the travel lanes plus the usable shoulder width on each side, a guardrail transition, collinear with the bridge railing, shall be provided. Thereafter, the guardrail shall be flared at an appropriate barrier flare rate until the guardrail length satisfies the length-of-need requirement or it intersects the approach guardrail. However, a continuous straight, without flare, run of guardrail is preferred for driving comfort and aesthetics. For this situation, the bridge clear-roadway width will nearly match the face-to-face guardrail width of the approach road section.

   Chapter 53 discusses the design of a median for a long bridge with a sufficiently narrow median. Increased safety benefits can be realized in construction of a single structure. Depending on site conditions, a single structure shall be used rather than twin structures where the median width is approximately 30 ft or less on a freeway, or 20 ft or less elsewhere. The median width at an overpass shall match the median width on the approach.

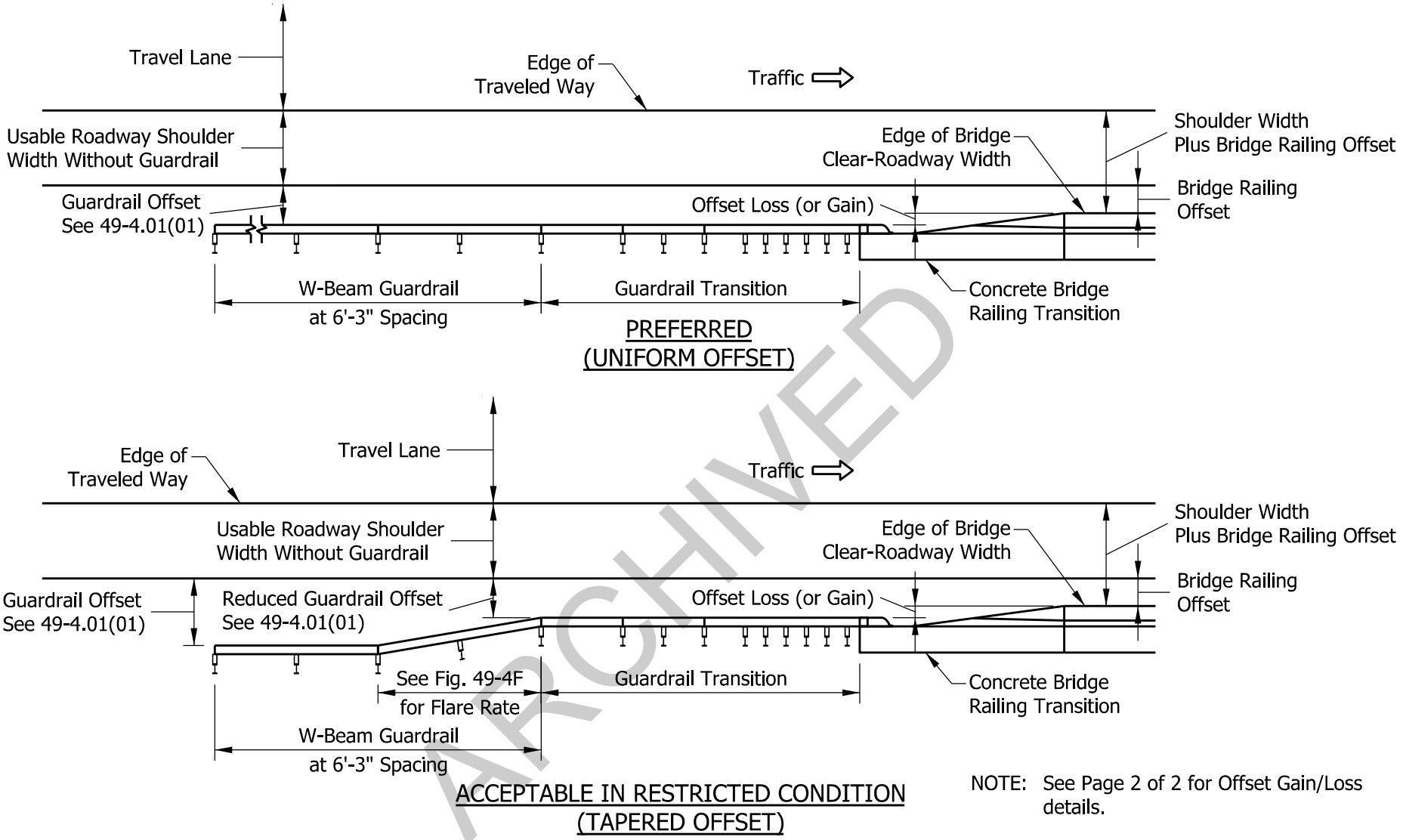
   For the median shoulders of a divided facility with two or more lanes in each direction, each bridge shall have a 5’-8” median-shoulder width where a type FC, FT, or TF-2 railing is used, or a 6’-0” median-shoulder width where another bridge-railing type is used. An auxiliary lane may be required across a structure where warranted. See Chapter 53 for the requirements.

2. Cross Slope. Each new or reconstructed bridge on a tangent section will be constructed with a cross slope of 2% sloping away from the crown. The 2% applies to the entire width from the crown to the face of railing or curb. The crown across the bridge will be in the same location as the approaching roadway crown. A tangent-section cross slope may be increased to 3 to 4%, with only one slope break in the deck, if roadway geometrics require it.

3. Sidewalk. Chapter 53 provides guidelines for sidewalk warrants and sidewalk requirements. Sidewalks are required on an overpass structure or on the road being overpassed if they are currently present, or if either roadway is a candidate for a future sidewalk according to Chapter 53. A pedestrian fence may be required (see Chapter 404).

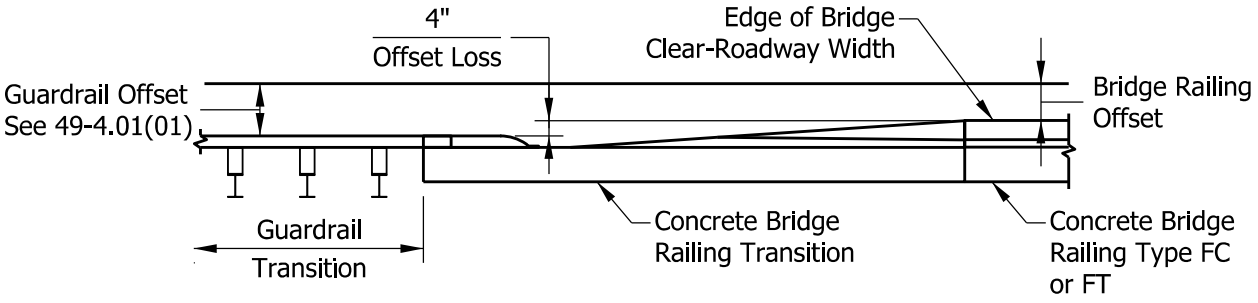
4. Bridge Width for Traffic Maintenance. The figures in Chapter 53 provide criteria for the bridge width. Additional permanent bridge width may be provided solely for the purpose of placing one lane of traffic across the bridge during construction. This can eliminate the need for a detour or runaround, or the use of a local road to re-route traffic during construction. See Chapter 83 for more information on maintenance and protection of traffic during construction.

5. Bridge Width on Flat or Short Horizontal Curve. Railings and copings on a bridge within a horizontal curve are built concentric with the roadway centerline. However, where the bridge is on a flat curve, or if the bridge is short, it may be more practical to build the railing and coping parallel to the long chord if the curved roadway plus shoulders and barrier offsets is within the inner faces of the railings, and it is economically feasible to construct a wider tangent bridge deck. It is considered economical if the bridge-deck width is increased by not more than 1 ft. However, it can be increased if it is determined to be more economical. Figure 402-6 I illustrates these criteria.

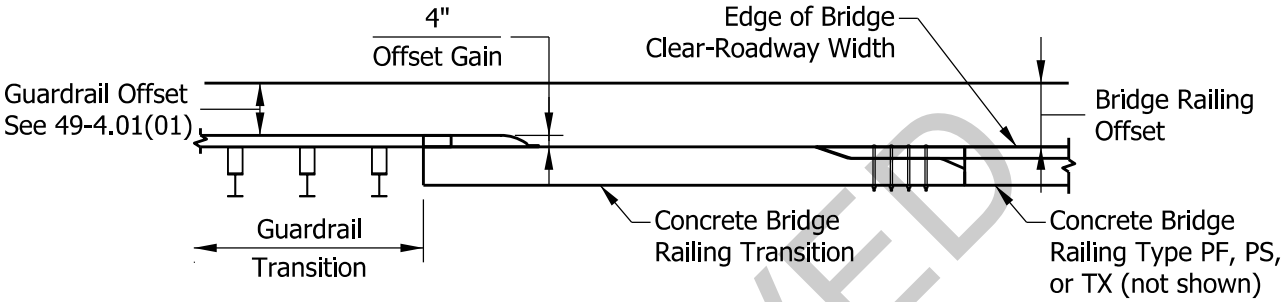


BRIDGE-RAILING OFFSET
GUARDRAIL TRANSITION TO BRIDGE RAILING

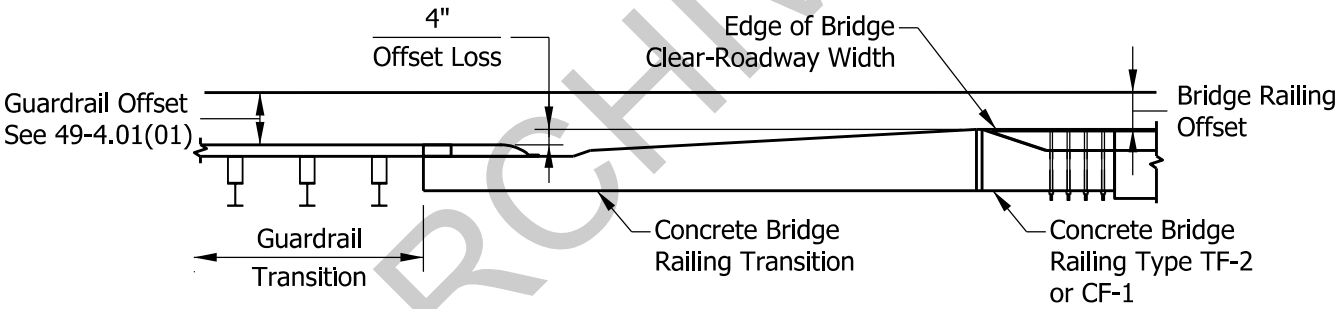
Figure 402-6H
(Page 1 of 2)



BRIDGE RAILING TRANSITION TYPE TFC OR TFT



BRIDGE RAILING TRANSITION TYPE TPF, TPS, OR TTX



BRIDGE RAILING TRANSITION TYPE TTF-2

Bridge Railing Offset = Guardrail Offset or Reduced Guardrail Offset in Restricted Condition + Offset Gain (+) or Offset Loss (-)

Example: Guardrail Offset of 2'-0" on the bridge approach, and Bridge Railing Type FC. 4" of Railing Offset is lost through the Bridge Railing Transition Type TFC.

Bridge Railing Offset = (2'-0") + (- 4") = 1'-8"

BRIDGE-RAILING OFFSET GUARDRAIL TRANSITION TO BRIDGE RAILING

Figure 402-6H
(Page 2 of 2)