LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

INTRADEPARTMENTAL CORRESPONDENCE

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MEMORANDUM

TO: CHRISTOPHER KNOTTS, P. E.
CHIEF ENGINEER

FROM: PAUL FOSSIER, P.E.
BRIDGE DESIGN ENGINEER ADMINISTRATOR

DATE: MAY 9, 2018

SUBJECT: REVISION REQUESTED FOR EDSM II.3.1.3 AND EDSM II.3.1.4

I am requesting approval for a revision to EDSM II.3.1.3, Guardrail and II.3.1.4, Guardrail, Other Bridge Rail End Treatment, Curbs and Sidewalks on Urban Bridges.

Both EDSM's for guardrail were revised based on the new Bridge Guardrail Standard Plans that were recently updated to meet the mew AASHTO MASH criteria.

Requested changes have also been verified by the sections affected by this EDSM. These Section Heads have signed below.

If you have any questions or concerns; please feel free to contact me accordingly.

PF/pf
cc: Chris Guidry
Kurt Brauner
Zheng Zheng Fu
David Smith, Road Design
Attachments: EDSM current version
EDSM with track-changes proposed
EDSM with proposed changes incorporated

RECOMMENDED FOR APPROVAL — DATE 5/16/18
RECOMMENDED FOR APPROVAL — DATE 5/16/18
RECOMMENDED FOR APPROVAL — DATE 5/29/18
APPROVED — DATE 5/30/18

ENGINEERING DIRECTIVES AND STANDARDS

Volume	Chapter	Section	Directive Number	Effective Date
II	3	1	3	5/30/2018

SUBJECT: GUARDRAIL

1. **PURPOSE:** The purpose of this directive is to establish a policy for implementation of the DOTD Guardrail Standard Plans and Special Details on existing highways and bridges. This directive also establishes guidelines that may be used when conditions do not allow application of the most desirable practice.

2. **SCOPE:** This directive affects guardrail on existing highways and structures. All guidelines set herein are exclusively for placement of guardrail on existing roads and bridges and are not intended to modify the contents of the Guardrail Standard Plans.

3. **POLICY:** It will be the policy of the Department of Transportation and Development to apply the same Guard Rail Standard Plans to both new and existing highways and structures. Because the application of these Standards to existing conditions is often impractical, guidelines set herein will aid the designers to arrive at the most effective solution to the problems.

   Any deviation from these guidelines will require a DOTD design waiver approved by the Bridge Design Engineer Administrator unless noted otherwise in these guidelines.

   The Guidelines are as follows:

   A. When roadway and right-of-way conditions permit, guardrails shall be designed in accordance with the Guardrail Standard Plans and Special Details

   B. When roadway and right-of-way restrictions do not allow installation of guardrail as described above, the following equation shall determine the guardrail length in lieu of the equation given in the Highway Safety Hardware Volume of the latest edition of the DOTD Bridge Design and Evaluation Manual.

$$X = \frac{\mathrm{La} + \frac{\mathrm{b}}{\mathrm{a}}(\mathrm{L1}) - \mathrm{L2}}{\frac{\mathrm{b}}{\mathrm{a}} + 0.1763}$$

X= Length of need
La = Lateral extent of object. When designing guardrail for bridge ends, use La = Lc. Lc is the clear zone distance as shown on the Guardrail Standard Plans.
b/a = Flare rate of guardrail
L1 = Tangent section of guardrail in advance of object.
L2 = Distance from edge of travel lane to tangent section of guardrail. 0.1763 = Tangent of departure angle, the departure angle is 10 degrees.

Total offset "Y" from the edge of travel lane shall be computed from the following equation:

$$Y = La - X(0.1763)$$

When computing "X", the maximum allowable flare rate in accordance with the Guardrail Standard Plans shall be used in the computation. When the field conditions do not allow the use of the maximum flare rate, a reduction in the flare rate is allowed; however, the guardrail length shall be recomputed, based on the reduced flare rate.

C. When guardrails are designed with a flare rate of zero, the preceding equation for computation of “X” can be simplified to:

$$X = \frac{\mathrm{La} - \mathrm{L2}}{0.1763}$$

D. When offset "Y" has to be set due to insufficient right-of-way, use the following equation to find the required length of need "X":

$$X = \frac{\mathrm{La} - \mathrm{Y}}{0.1763}$$

E. Under no circumstances shall the required offset for the flared guardrail end treatment be reduced or modified in any form. In situations where the guardrail must be placed with no flare in its entire length, other approved crash worthy tangent end treatments may be considered for use.

F. The minimum guardrail length shall be 75 ft. (length of need, X - 62’- 6"). This requirement will apply, even if the equation yields a smaller value.

G. When intersections with other roadways, driveways, property entrances, etc. prohibit installation of guardrail in accordance the DOTD Standard Plan or with the preceding instructions, consider one of the following alternatives in order of preference.

1) Guardrail layout that is less than what is required by the length of need equation but using a minimum total length of 75’-0” with a standard TL-3 guardrail end treatment system.
2) Guardrail layout as per Standard plan using an approved TL-2 guardrail end treatment system. (Requires an approved design waiver)
3) DOTD Bridge Design special detail for T-Intersections if applicable to the site. (Requires an approved design waiver)
4) Impact Attenuator. (Requires an approved design waiver)

Other alternatives besides those listed above may be considered for use after a review from the Bridge Design Administrator. These alternatives may also require a design waiver.

H. When placing guardrail at the ends of existing rigid bridge railing (concrete, steel tube, etc.), a transition section and other appropriate guardrail sections (w-beam, end treatments, etc.) shall be used as per the DOTD Standard Plans or Special Details. On existing bridges, it may be necessary to construct a new end block at the end of the bridge rail to properly connect the transition section to the bridge. Refer to the Guardrail Standard Plan or Special Details for further information.

When the bridge rail is flexible, such as a guardrail connected to steel or wood posts, a thrie-beam to w-beam transition may be used. For details, refer to the Guardrail Standard Plans or Special Details.

I. Design guidelines for bridge rails with curbs that are located in urban sections or have a design speed of 45 mph or less shall follow EDSM II.3.1.4.

For design speeds of more than 45 mph, when sidewalks are involved, guardrails shall be designed on a case-by-case basis. Under such conditions, prime consideration shall be given to separating pedestrians from vehicular traffic, via an approved traffic barrier. Such traffic barriers shall have a crash worthy end treatment.

J. If in some cases, standard plans or special details that are available herein do not align with a certain type of bridge railing on a structure, a detail of that type of railing and the transition connection may be requested from the DOTD Bridge Design Section or may have to be developed.

K. When bridges are relatively short or where there is little space between them, it is preferred practice to carry the guardrail beam element along the length of the bridge rail, and between the bridges, rather than terminating it near the end of the bridge, or between the bridges.

L. Overlays on roadways or bridge decks that reduce the effective height of the existing guardrail, bridge railing or other barriers are not recommended.

When roadways are overlaid with asphalt or other bituminous material, the height of the existing guardrail will be reduced. If the overall height of the guardrail is less than 28 inches, it should be considered for removal and replacement.

M. When curbs are located in front of existing bridge railings or on roadways, refer to the Guardrail Standard Plans and Special Details for the placement of the guardrail. If the standard plan or special details cannot be followed, contact the Bridge Design Section for further guidance.

N. For protecting roadside objects such as bridge columns, overhead signposts, etc., refer to the Guardrail Standard Plans.

O. For guardrails on culverts, refer to the Guardrail Standard Plans.

P. A minimum of 2 ft. clearance is required from the back of the guardrail post to the break point of the ground slope behind the post. If the post needs to be placed closer to or at the break point, the standard timber guardrail post shall be lengthened by 1.5 ft. and the steel post shall be lengthened by 3 ft. The additional post length over 6 ft. is to be placed in the ground.

Q. The guardrail design shall be based on the design speed set for the particular roadway in consideration. However, if the operating speed proves to be well above the design speed, it is recommended that guardrail design based on operating speed be given consideration.

R. Guardrail for temporary detour bridges shall use the layout shown in the DOTD Bridge Design detour bridge special details.

S. The Bridge Design Section maintains guardrail special details for use on existing bridges and highways. These details are used in conjunction with the Guardrail Standard Plans. These special details may be obtained from the Bridge Design Section for use on Department projects.

4. **OTHER ISSUANCES AFFECTED:** All directives, memoranda, or instructions issued in conflict with this directive are hereby rescinded.

5. **EFFECTIVE DATE:** This directive will be effective immediately upon receipt.

CHRISTOPHER P. KNOTTS, P.E.
CHIEF ENGINEER