



Office of Engineering
PO Box 94245 | Baton Rouge, LA 70804-9245
ph: 225-379-1234 | fx: 225-379-1851

John Bel Edwards, Governor
Shawn D. Wilson, Ph.D., Secretary
Christopher P. Knotts, P.E., Chief Engineer

EMORANDUM

TO: ALL CONSULTANTS
ALL BRIDGE DESIGNERS/RATERS

FROM: ZHENGZHENG “JENNY” FU, P.E.
BRIDGE DESIGN ENGINEER ADMINISTRATOR

SUBJECT: BRIDGE DESIGN TECHNICAL MEMORANDUM NO. 90 (BDTM.90)
UPDATES IN BDEM PART II VOLUME 1 AND VOLUME 5

DATE: June 4, 2020

Effective immediately, the following updates in the LADOTD Bridge Design and Evaluation Manual (BDEM) shall be implemented.

Item 1 - Adoption of the FHWA Memorandum and NCHRP 20-07 Task 410 on Load Rating of Emergency Vehicles EV2 and EV3

On November 3, 2016, FHWA issued a memorandum on “Load Rating for the FAST Act’s Emergency Vehicles” that required states to load rate two emergency vehicles EV2 and EV3 using live load factor of 1.3. Subsequently, AASHTO and FHWA initiated NCHRP 20-07 Task 410 “Load Rating for the FAST Act’s Emergency Vehicles EV2 and EV3” to further calibrate the live load factors for EV2 and EV3, and a new set of live load factors were developed. The final NCHRP 20-07 Task 410 report was published in March 2019. LADOTD adopts the live load factors included in the final NCHRP 20-07 Task 410 report to load rate EV2 and EV3.

Both documents, The FHWA Memorandum dated November 3, 2016 and NCHRP 20-07 Task 410 final report, have been posted on the Bridge Design website under downloads.

As a result of this adoption, the following provisions in BDEM Part II, Volume 5 – Bridge Evaluation/Rating need to be supplemented to include the new requirements to load rate EV2 and EV3 using live load factors developed in NCHRP 20-07 Task 410.

Section 6A.4.1 – Introduction

- a. Add the following paragraph at the end of the Section 6A.4.1:

2c) Load rate emergency vehicles EV2 and EV3 in accordance with FHWA memorandum “Load Rating for the FAST Act’s Emergency Vehicles” dated November 3, 2016, except the live load

factors in Table 6A.4.4.2.2.3c-1 on page 76 of the NCHRP 20-07 Task 410 final report dated March 2019 shall be used.

The following assumptions shall be made when using the Table 6A.4.4.2.2.3c-1:

EV frequency – 1 EV crossing per day shall be used. Use of 10 EV crossing per day requires justifications and approval of the Bridge Design Engineer Administrator.

Traffic Volume (One Direction) – Free flowing traffic shall be used unless evidence justifies the use of congested condition. Linear interpolation between 1000 and 6000 is allowed. For off-system bridges without ADTT information, ADTT < 1000 shall be used.

- b. Add EV2 and EV3 to the list of legal trucks in the “Louisiana LRFR Limit States Table”.

Item 2 - Elimination of the Service II Limit State for Steel Bridges When Evaluating Posting Requirements

The AASHTO Manual for Bridge Evaluation (MBE) requires use of live load factor of 1.3 when load rating the steel bridges for legal loads in Service II Limit State, which is higher than the live load of 1.0 when load rating the steel bridges for design loads in the same limit state for operating condition. To be consistent, the legal loads should be treated the same as the design load in operating condition, thus the live load factor should not be more than 1.0. This is the inconsistency existing in the current MBE, which has caused our state to post steel bridges unnecessarily due to this high live load factor. After discussing with FHWA and AASHTO T-18 Technical Committee, it was advised that as a state, we can modify this requirement so that our load rating methodology is consistent for legal loads. It is also important to note that the live load factors for the Service II Limit State in MBE were not established through reliability-based calibration, but rather selected based on engineering judgement and expert opinions. The true level of reliability represented by this serviceability check is unknown. Considering all these factors and long-term performance records of steel bridges in our inventory, LADOTD has decided to eliminate the Service II Limit State check when evaluating posting requirements for steel bridges.

As a result of this decision, the following provisions in BDEM Part II Volume 5 – Bridge Evaluation/Rating need to be supplemented to include these updates.

Section 6A.4.1 – Introduction

- a. Remove the Service II Limit State check for legal loads in the “Louisiana LRFR Limit State Table” at the end of this section.

Section 6A.4.2.2 – Limit States

- a. Remove the Service II Limit State check for legal loads in the “Louisiana LRFR Service and Fatigue Limit States and Load Factor Table” at the end of this section.

Item 3 – Clarification on As-Designed Load Rating and Bridge Evaluation

To clarify the requirements when performing as-designed load rating and bridge evaluation, the following provisions in BDEM Part II Volume 1 – Bridge Design need to be supplemented.

Section 6A.1.1- General

- a. Add the following sentences to the end of the first paragraph:

As-designed bridge rating and bridge evaluation shall include every bridge component, including, but not limited to, superstructure, substructure and foundations, regardless of structure types.

- b. Replace the second sentence as follows:

If the inventory rating for the HL-93 is less than 1 (as may be the case for rehabilitated bridges), additional ratings for all legal trucks shall be provided in accordance with Section 6A.4.1.

- c. Emergency vehicles EV2 and EV3 shall be added to the “As-Designed Bridge Rating Factor Table” for bridges with HL-93 inventory rating less than 1.

Item 4 – Clarification on Live Load Application for Box Culverts

It is LADOTD’s current policy that all box culverts shall be ASTM C1577 precast concrete box culverts in accordance with the 2016 Louisiana Standard Specifications for Roads and Bridges (Section 1016.04). The ASTM C1577 box culverts are designed for HL-93 live load in accordance with the AASHTO LRFD Bridge Design Specifications.

The LADOTD Bridge Design and Evaluation Manual (BDEM) requires the top slab of the box culvert be designed for HL-93, but the other components of the box culverts be designed for LADV-11. These requirements are intended for the cast-in-place (CIP) concrete box culverts, however, this creates an inconsistency in the design for the precast and CIP box culverts.

To ensure consistency between Precast and CIP box culverts, the following provisions in BDEM Part II Volume 1 – Bridge Design needs to be supplemented.

Section 3.6.1.2.1 – General

- a. Replace the first bullet in paragraph 3 with the following:
 - *MF = 1.0, when applying the design vehicular live load to decks, deck systems, and box culverts per A3.6.1.3.3.*

This technical memorandum is posted on the LA DOTD Website under *Inside La DOTD > Divisions - Engineering > Bridge Design > Technical Memoranda – BDTMs.*

Please contact Dana Feng (225-379-1060, dana.feng@la.gov) if you have questions or comments.

ZZF/df

Cc: Chris Knotts (Chief Engineer)
Chad Winchester (Chief, Project Development Division)
Edward Wedge (Deputy Engineer Administrator)
Vince Latino (Assistant Secretary of Operations)
David Miller (Chief Maintenance Administrator)
Nick Fagerburg (Bridge Maintenance Administrator)
Michael Vosburg (Director of Construction and Materials)
Brian Owens (Construction Engineer Administrator)
Brian Kendrick (Project Management Director)
Chris Nickel (Pavement and Geotechnical Engineer Administrator)
Jacques Deville (Contracts and Specifications)
Art Aguirre (FHWA)
District Administrators, ADA Engineering, ADA Operations, and District Bridge Engineers and Area Engineers