LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Office of Engineering
Project Development Division
Bridge Design Section
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John Bel Edwards, Governor
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MEMORANDUM

TO: ALL BRIDGE DESIGNERS - IN-HOUSE AND CONSULTANTS

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

SUBJECT: BRIDGE DESIGN TECHNICAL MEMORANDUM NO. 96 (BDTM.96) - PUBLICATION OF LOAD RATING, POSTING AND STRENGTHENING STANDARD OPERATING PROCEDURE (SOP)

DATE: October 7, 2020

Effective immediately, the attached SOP is to be used by design engineers when performing load ratings for on-system bridges, with the exception of on-system timber bridges.

This SOP supplements the Bridge Design and Evaluation Manual and all other DOTD bridge load rating policies and procedures. This SOP was developed in an effort to minimize the number of posted bridges.

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

Please contact Kelly Kemp (225-379-1809, kelly.kemp@la.gov) if you have questions or comments.

ZZF/kmk
Attachments
Cc: Christopher P. Knotts (Chief Engineer)
Edward Wedge (Deputy Engineer Administrator)
Chad Winchester (Chief, Project Development Division)
Vince Latino (Assistant Secretary of Operations)
David Miller (Chief Maintenance Administrator)
Nick Fagerburg (Bridge Maintenance Administrator)
Chris Nickel (Pavement and Geotechnical Engineer Administrator)
David Smith (Road Design Engineer Administrator)
Art Aguirre (FHWA Division Bridge Engineer)
District Administrators
ADAs of Engineering and Operations
District Bridge Engineers and Area Engineers

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Bridge Load Rating, Posting, and Strengthening

Standard Operating Procedure

Bridge & Structural Design
Section 25

10/06/2020

Table of Contents

1.0 Introduction

This SOP establishes policies and procedures for the load rating, posting, and/or strengthening of on-system bridges (with the exception of on-system timber bridges) that require load rating and/or possible load posting.

When a bridge structure requires load rating, the State Load Rating Engineer will assign the task to in-house load rating staff or outsource to a consultant. When load rating work is outsourced to a consultant, the contract management will be assigned to an In-House Load Rating Task Manager. The scope of work and man-hour estimate shall include all work in the Section 3 flowchart. Reasonable assumptions shall be made when preparing the man-hour estimate for work beyond Step 1 of the flowchart.

2.0 Definitions

On-System Timber Bridge – An on-system bridge structure with both superstructure and substructure made of timber. It includes structure types TTTRES (Treated Timber Trestles), TTTCOF (Treated Timber Trestles with Concrete Deck), TTMUDS (Treated Timber Mud Sill), and TTTLAM (Treated Timber Trestles with Laminated Deck and/or Stringers).

State Load Rating Engineer – Assistant Bridge Design Administrator in charge of the bridge load rating unit.

In-house Load Rating Engineer – In-house engineer assigned to perform load rating tasks.

Consultant – Consultant contracted to perform load rating tasks.

In-house Load Rating Task Manager – In-house engineer assigned to manage consultant contract(s).

Load Posting Coordinator – In-house load rating engineer responsible for tracking posted bridges, and development and maintenance of this SOP.

CEO – Chief Engineer's Order.

Load Posting and CEO Notification Coordinator – In-house designated staff responsible for handling and distributing load posting and CEO letter.

3.0 Load Rating, Load Posting, and Strengthening Flowchart

Follow the Figure 3.1 flowchart when performing required bridge load rating, load posting, and/or strengthening. Flowchart step descriptions and responsible parties are shown in Table 3.1.

For load ratings that indicate the need for load posting, perform the evaluations provided in Section 3.1, and prepare and submit the Options Form in Appendix A. See sample Option Form in Appendix A.

The District Response Form in Appendix B shall be prepared by the District. See sample District Response Form in Appendix B.

Appendix C shows the standard load posting notification content, which is sent by e-mail.

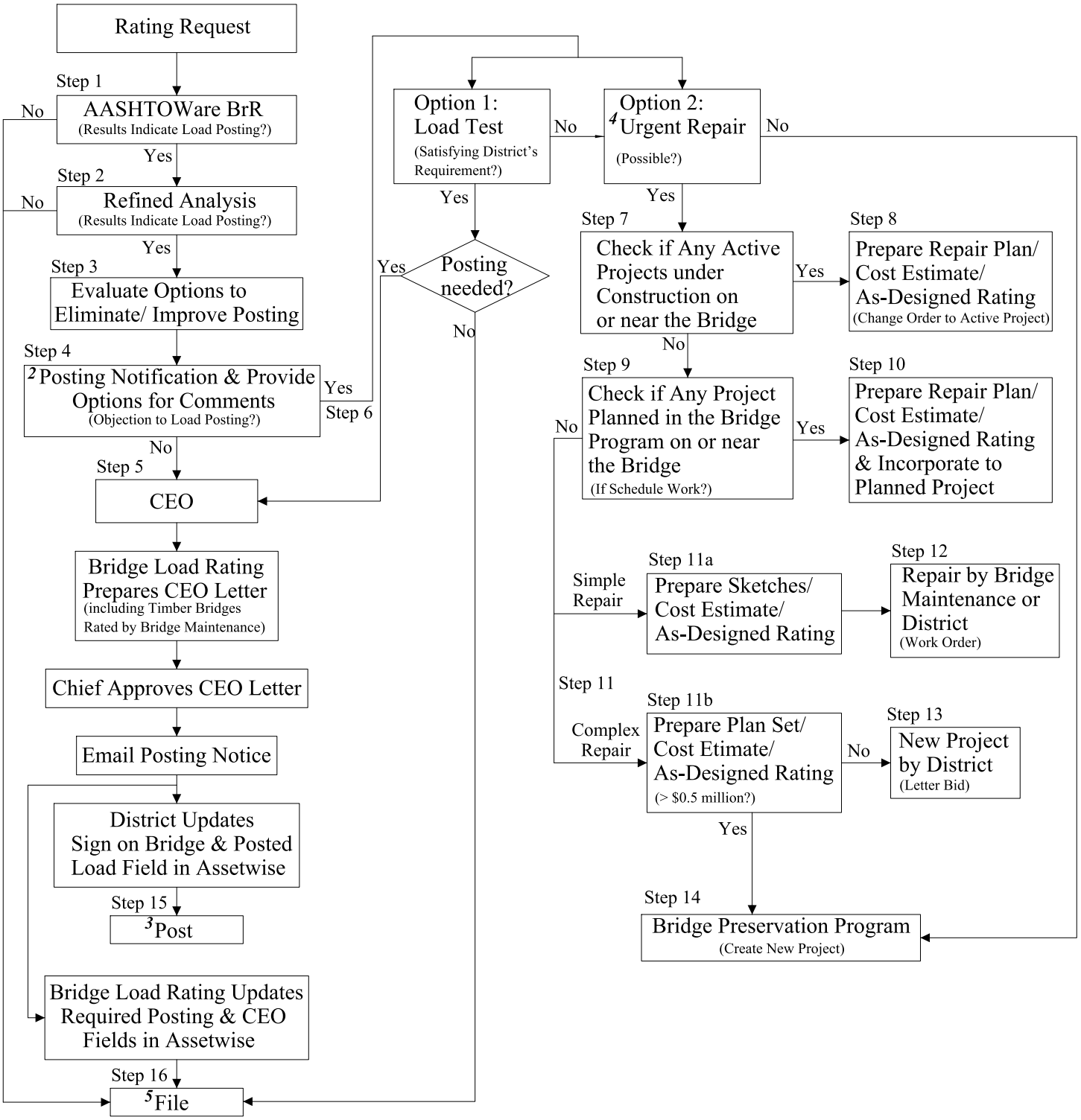


Figure 3.1 - Bridge Load Rating/Posting/Strengthening Flowchart ([1]On-System)

Notes:

1. *The flowchart and the following procedure do not apply to on-system timber bridges.*
2. *Include the Assistant Administrator for Mechanical & Electrical Design Units in the posting notification emails for movable bridges*
3. *The District shall post the bridge within 30 days after notifying DOTD of accepting the posting.*
4. *If urgent repair cannot be completed within 30 days after notification, proceed with Step 5.*
5. *It shall be completed within 90 days from the rating requested to rating filed.*

Table 3.1 Flowchart Steps Description and Responsibility Matrix

Flow Chart Steps	Description	Responsible Person	
		In-house task	Consultant contract
Step 1 (Y-S2/ N-S16)	Perform typical load rating analysis using AASHTOWare BrR. If the structure cannot be rated in BrR, use other LADOTD approved software.	In-house Load Rating Engineer	Consultant
Step 2 (Y-S3/ N-S16)	Perform refined analysis.	In-house Load Rating Engineer	Consultant
Step 3 (S4)	[1]Evaluate options to eliminate or improve posting (if eliminating posting is not feasible). Prepare Options Form (Appendix "A") and provide a copy to Load Posting and CEO Notification Coordinator.	In-house Load Rating Engineer	[1]Consultant & In-house Load Rating Task Manager
Step 4 (Y-S6/ N-5)	[2]Notify the District of the intended posting. Provide Options Form (Appendix "A") and District Response Form (Appendix "B") The District shall fill out District Response Form and return the form within 7 days of the notification.	Load Posting and CEO Notification Coordinator	Load Posting and CEO Notification Coordinator
Step 5 (S15 & S16)	Proceed with processing CEO.	Load Posting and CEO Notification Coordinator	Load Posting and CEO Notification Coordinator
Step 6 - Option 1 (YY-S5 OR YN-S16/ N-Opt2)	Conduct load testing if feasible; if not feasible, choose Step 6 - Option 2 (If load testing achieves the District's requirement with no posting required, go to Step 16; if load testing achieves the District's requirement with posting required, go to Step 5; if load testing does not achieve the District's requirement, proceed to Step 6 - Option 2).	In-house Load Rating Engineer	Consultant & In-house Load Rating Task Manager
Step 6 - Option 2 (Y-S7/ N-S14)	Determination for an urgent repair (If urgent repair cannot be done, proceed with Step 14, and notify Load Posting Coordinator to send online request to create a new rehabilitation/ replacement project).	In-house Load Rating Engineer	Consultant & In-house Load Rating Task Manager

Step 7 (Y-S8/ N-S9)	Check bridge projects let database and with the District to see if there is any active project under construction on or near the bridge site. If it is possible, add the proposed repair as a change order to the active project.	In-house Load Rating Engineer	In-house Load Rating Task Manager
Step 8	Prepare repair plan, perform construction cost estimate and as-designed rating. Coordinate with the project manager and project engineer for a change order to the active project.	In-house Load Rating Engineer	Consultant & In-house Load Rating Task Manager
Step 9 (Y-S10/ N-S11)	Check with the Bridge Program Manager to see if there is an upcoming project planned on or near the bridge site that could perform the needed repair or rehabilitation work without adversely affecting the Bridge Program, and within an acceptable time frame regarding posting concerns. If these conditions are met, proceed with Step 10. Otherwise, proceed with Step 11.	In-house Load Rating Engineer & Load Posting Coordinator	In-house Load Rating Task Manager & Load Posting Coordinator
Step 10	[3]Prepare repair plan, perform related construction cost estimate, perform as-designed rating. Incorporate the repair into the proposed project.	In-house Load Rating Engineer & Load Posting Coordinator	[3]Consultant, In-house Load Rating Task Manager & Load Posting Coordinator
Step 11	Evaluate the required repairs. If it is simple repair that can be performed by DOTD HQ Maintenance and District staff, proceed with Step 11a, otherwise proceed with Step 11b.	In-house Load Rating Engineer	Consultant & In-house Load Rating Task Manager
Step 11a (S12)	Prepare repair sketches, perform cost estimate and as-designed rating.	In-house Load Rating Engineer	Consultant & In-house Load Rating Task Manager
Step 11b (Y-S14/ N-S13)	Prepare repair plan set (traffic control should also be included), perform cost estimate, as-designed rating. If the construction cost estimate does not exceed $0.5 million, proceed with Step 13; otherwise, proceed with Step 14.	In-house Load Rating Engineer	Consultant & In-house Load Rating Task Manager

Step 12	Repair perform by Bridge Maintenance Section or the District as work order.	District/ Bridge Maintenance Section	District/ Bridge Maintenance Section
Step 13	Develop a repair project by District (i.e., letter bid ≤ $0.5 million).	District	District
Step 14	Create a project in bridge preservation program.	Gang 4	Gang 4
Step 15	Post the bridge as required from Step 5. The District shall post the bridge within 30 days after notifying Bridge Design Section of the posting acceptance.	District	District
Step 16	File the bridge load rating documents. It shall be completed within 90 days from the date load rating requested.	In-house Load Rating Engineer	In-house Load Rating Task Manager

Notes:

1. When evaluating the options, the In-house Load Rating Task Manager shall communicate with the District to understand their expectations, and convey them to the consultant to assist consultant with Options Form preparation. After Options Form preparation, the In-house Load Rating Task Manager shall send the form to the Load Posting Coordinator for approval. Upon approval, the In-house Load Rating Task Manager shall provide the form to the Load Posting and CEO Notification Coordinator.

2. For movable bridges, include the Mechanical & Electrical Design Assistant Administrator in the posting notification emails.

3. The In-House Load Rating Engineer or Consultant (as applicable) shall prepare the repair plan, develop the cost estimate, and perform the as-designed rating. For consultant contracts, the In-House Load Rating Task Manager shall manage the contract. The Load Posting Coordinator shall coordinate with the Bridge Program Manager regarding incorporating the repair plan work into the planned project as described in Step 9.

3.1 Evaluations for Load Ratings that Require Load Posting

As indicated by Step 3 in the flowchart, when the results of the bridge load rating indicate the need for load posting, the rating engineer shall evaluate simple and/or typical repairs and how they would affect the rating/posting if those repairs were made. The rating engineer shall also determine if the repair would result in other component(s) of the structure becoming critical.

Perform the following evaluation(s) in all cases as applicable for the situation and include the evaluation analysis results as a rating report Appendix titled “Appendix: Evaluations to Eliminate/ Improve Posting.”

3.1.1 Superstructure Rating Controls and the Bridge has an Overlay:

Determine what the rating would be if the overlay was removed. This is most relevant for panel and slab span bridges (COPCSS, LWPCSS, and COSLAB) where slab thickness is 10”, and a 2” overlay is a significant increase in dead load. The effect is less significant on girder bridge superstructures and on substructures in general.

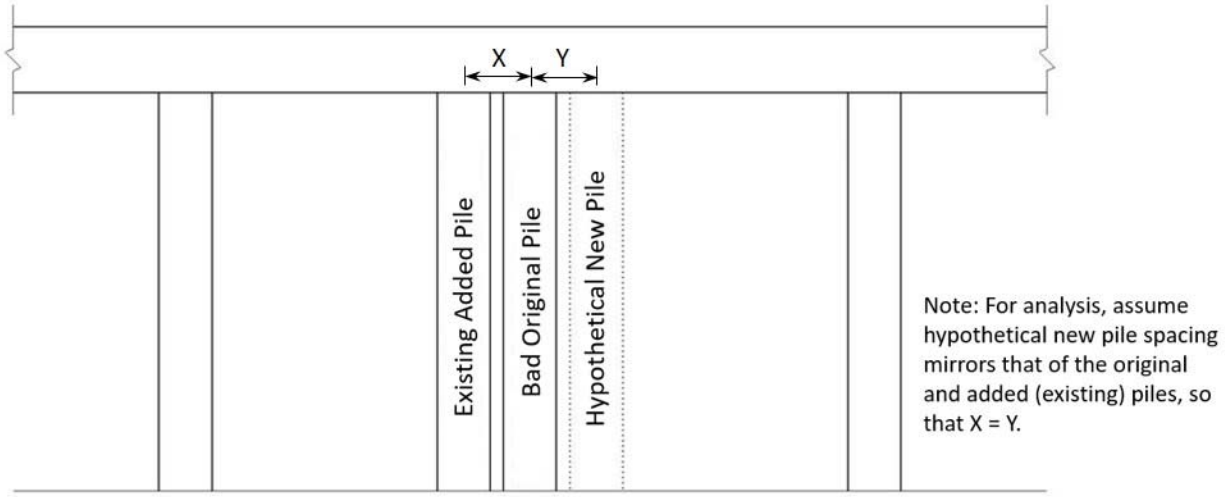
This evaluation **MUST** be performed for all COPCSS, LWPCSS, and COSLAB bridges. For other superstructure types and substructures, the evaluation should be considered depending on the rating engineer’s judgement.

3.1.2 Substructure has a Bad Timber Pile:

If a bridge rating requires load posting based on a failed or badly decayed or deteriorated timber pile, an evaluation **MUST** be performed that assumes the bad pile is stubbed (repaired to the “as-built” condition) or replaced. It is important to remember that other piles might still be a problem if only one of them is stubbed. Therefore, the rating engineer shall list all piles that need to be stubbed, which can be estimated from review of the inspection report.

3.1.3 Substructure has Existing Pile Repaired by Adding Pile(s):

In the past, bad piles were sometimes repaired by adding a new pile next to the bad pile. This increases the cap span length and may have resulted in reduced cap capacity. This is more common in panel bridges where caps tend to have shallow depths. The rating engineer **MUST** evaluate a scenario that includes a hypothetical new pile installed on the other side of the existing bad pile. See sketch below.


X
Y
Existing Added Pile
Bad Original Pile
Hypothetical New Pile
Note: For analysis, assume hypothetical new pile spacing mirrors that of the original and added (existing) piles, so that X = Y.

Appendix A: Options Form

Recall No. XXXXXX

Options for Eliminating the Need for Load Posting:

- Option 1: Load Testing (if feasible).
- Option 2: Repair or rehabilitation. Provide specific details on structure members that need to be repaired, rehabilitated, strengthened, or replaced. For strengthening, include details, such as adding cover plates to # of girders, floor-beams, locations of added cover plates, etc.
- Option 3: Replacement (partial or entire bridge structure).

Options for Improving Posting Options:

- Option 4: Load Testing (if feasible).
- Option 5: Repair or rehabilitation. Provide specific details on structure members that need to be repaired, rehabilitated, strengthened, or replaced. For strengthening, include details, such as adding cover plates to # of girders, floor-beams, locations of added cover plates, etc. The members receiving work should be fewer when compared to Option 2.

Prepared by:

Date:

(*Note: The form can be obtained from DOTD website or upon request.*)

Options Form Sample

Recall No. 006520

Options for Eliminating the Need for Load Posting:

- Option 1: Load Testing (if feasible)
  N/A
- Option 2: Repair or rehabilitation.
  The following members of the main lift span will need to be strengthened with cover plates on top and bottom flanges in order to eliminate posting. Member quantity is shown in parentheses.

  Main Through Girders (2)
  Lifting Girders (2)
  Interior Floorbeams (3)

  Additionally, on initial inspection the following work related to this strengthening is likely needed. These items could potentially require some adjustment once detailing is finalized:

  - Full replacement of grid deck with fill plates on top of all stringers.
  - Rebalancing of the lift span.
  - Potential need for upgrade of list span machinery depending on weight of added steel.
  - Either remove and reinstall or replace railing on top of main girders.
  - Reworking of bridge joints at both ends of the lift span including vertical realignment.
  - Potential need for adjustment of lift span bearings to accommodate new seating elevation.
  - Coatings work, including re-painting of strengthened members and of any members with corrosion.

- Option 3: Replacement
  N/A

Options for Improving Posting Options:

- Option 4: Load Testing (if feasible)
  N/A

- Option 5: Repair or rehabilitation.
  N/A

Prepared by: Load Rating Engineer

Date: mm/dd/yyyy

Appendix B: District Response Form

Recall No. XXXXXX

Please choose from the following options:

☐ Accept Posting

☐ Eliminate Posting

Reasons: (Please describe the reasons)

☐ Improve Posting to XX-XX (Please specify the posting that District can accept)

Reasons: (Please describe the reasons)

Please provide your responses to the following questions:

1. Is there an active construction project on or near the bridge? ☐ Yes ☐ No
2. If the answer to Question 1 is "Yes," can the repair/rehabilitation work be added as a Change Order? ☐ Yes ☐ No
3. If the answer to Question 1 and Question 2 is "No," can the District perform the repair/rehab work described in the Options Form? ☐ Yes ☐ No
4. If the answer to Question 3 is "No," can the Bridge Maintenance Section perform the repair/rehab work? ☐ Yes ☐ No
5. If the answer to Question 4 is "No," can the District develop a letter bid project if the repair/rehab cost estimate is less than $0.5 million? ☐ Yes ☐ No

Prepared by:

Date:

(*Note: The form can be obtained from DOTD website or upon request.*)

District Response Form Sample

Recall No. 0006520

Please choose from the following options:

☒ Accept Posting

New posting of 15-25 accepted for now; but, we'd like to Eliminate Posting.

☒ Eliminate Posting

Reasons: LA 92 is a main truck route with a lengthy detour. This area of Lafayette has grown up around this bridge and removing the posting would have an economic impact on the area.

☐ Improve Posting to XX-XX (Please specify the posting that District can accept)

Reasons: (Please describe the reasons)

Please provide your responses to the following questions:

1. Is there any active construction project on or near the bridge? ☐ Yes ☒ No
2. If the answer to Question 1 is "Yes," can the repair/rehabilitation work be added as a Change Order? ☐ Yes ☒ No
3. If the answer to Question 1 and Question 2 is "No," can the District perform the repair/rehab work described in the Options Form? ☐ Yes ☒ No
4. If the answer to Question 3 is "No," can the Bridge Maintenance Section perform the repair/rehab work? ☐ Yes ☒ No
5. If the answer to Question 4 is "No," can the District develop a letter bid project if the repair/rehab cost estimate is less than $0.5 million? ☐ Yes ☒ No

Prepared by: ADA-Operations

Date: mm/dd/yyyy

Appendix C: Standard Posting Notification

[1]To All,

The Bridge Design Section has evaluated the following bridge structures for load carrying capacity and recommends the required posting shown. The first Attachment (Options Form) provides options for eliminating and/ or improving the posting.

The District is hereby requested to review and fill out the second Attachment (District Response Form) to specify posting requirement within one week from date of this notification.

All rating reports have been uploaded to "Content Manager" indexed under "Bridge Rating Files". Please contact XX (In-House Load Rating Engineer or In-House Load Rating Task Manager) for any comments or concerns.

Bridge List Table:

Structure #	Recall #	Type	Existing Posting	Route	Name	Required Posting

Thank you,

[1]Send the notification email to:

Chief Engineer
Bridge Maintenance Administrator
Bridge Inspection Engineer
Bridge Design Engineer Administrator
Assistant Bridge Design Administrator (Load Rating)
Assistant Bridge Design Administrator (Bridge Program)
Assistant Bridge Design Administrator (Mechanical and Electrical for movable bridges)
Transport Permits Manager
District DA
District ADA-Operations
District Bridge Engineer