

REQUEST FOR PROPOSALS

LTRC No. 18-4ST, SIO No. DOLT1000222

LOAD RATING OF EXISTING CONTINUOUS STRINGERS ON LOUISIANA'S BRIDGES

PROBLEM STATEMENT

Several of Louisiana's bridges were built using floor beams between main members and continuous (spliced) stringers that are supported by the floor beams. These stringers are steel rolled I-beam sections. On some of these bridges when the stringers are load-rated by the LRFD code using the AASHTOWare Bridge RatingTM analytical software, the rating comes out very low requiring extremely restrictive load posting of these members and sometimes even requiring them to be closed. This software assumes a moment gradient factor, C_b , of unity. LADOTD feels that these rating values do not represent reality since most of these structures have been built in the 50s and 60s and have been subject to much heavier traffic loads than what they were designed for at that time and yet no signs of distress or failure have been noticed. The LRFD code is written for design of bridges and is influenced by the typical conservative design philosophies. These conservative philosophies are not appropriate for bridge load rating where simply upsizing members is not an efficient solution. The accuracy of these results obtained by this software using the LRFD bridge code must be checked, what alternative assumptions and analytical methods can be used to calculate a more accurate less conservative rating results, and an analytical approach needs to be developed so the stringers can be rated without extremely restrictive load postings. The bridges affected by this issue are major bridges that are parts of Louisiana's highway system. The current load rating would render these bridges closed or mostly load posted with diminished imposed vehicular loads. Replacing these bridges would cost hundreds of millions of dollars, and is likely unnecessary. Bridges that contain stringers typically have hundreds of stringers so strengthening would also be very expensive. Results of this research would immediately be applied to the load rating of these stringers saving the state the huge expense of retro fitting or replacing these bridges.

OBJECTIVE

The objective of this project is to evaluate the true capacity of those bridge structures built with continuous stringers and develop a new approach for rating those stringers.

RESEARCH APPROACH

The Louisiana Transportation Research Center (LTRC) is seeking the insight of proposers on how best to achieve the research objectives. Proposers shall describe research plans that can be realistically accomplished within the constraints of available funds and contract time as allowed in this RFP.

Proposals must present the candidate's current thinking in sufficient detail to demonstrate their understanding of the problem and the soundness of their approach. Task descriptions are intended to provide a framework for conducting the research. The proposal shall address at a minimum, the following tasks:

Task 1 – Literature Review

Review existing literature and research on steel stringers, including information on considering contraflexure points as braced points. A search of the TRIS database is a minimum.

Task 1 – Review Current Analysis

Review current analysis and use other means to determine that the code is being applied correctly and the low resulting ratings for the members are accurate. Note up to four (4) bridges to be investigated will be provided by the LADOTD bridge rating section.

Task 3 – Interim Report

Submit an interim report documenting work completed in Tasks 1 and 2. Prepare a presentation to the PRC documenting the research effort completed in Tasks 1 and 2.

Task 4 – Develop Methodology for Appropriate Moment Gradient Factor

- If the low rating results are confirmed, a methodology based on using appropriate moment gradient factor, C_b , should be developed. Compute several C_b values based on location and load applied on such stringers. The PI will decide said locations to compute C_b values and submit the locations, with justification, to DOTD for approval prior to proceeding with the re-rating work. DOTD will evaluate and respond to the PI within two (2) weeks. The PI will re-rate those stringers using proper C_b values.
- If the rating of the stringers shows acceptable rating factors, the PI will develop an Excel spreadsheet application that will generate the C_b values.
- If the rating of the stringers does not show acceptable rating factors, the PI will summarize work completed in this task and submit it to PRC.

Task 5 – Provide a Final Report, Technical Summary, and PRC Presentation

The researcher shall provide a final report that documents the entire research effort for internal future reference and the benefit of others. A Final Draft Report, Technical Summary document (two pages), and summary presentation to the Project Review Committee (PRC) are due three (3) months prior to the project completion date for review and approval. The final report shall direct and recommend future steps toward the incorporation/implementation of the research into department policy, including a spreadsheet for generating C_b values and examples showing computation of C_b values and ratings of stringers using those values.

DELIVERABLES

The proposal shall include project deliverables for appropriate tasks. Deliverables shall be due as defined in the proposal. The proposal shall include at a minimum the following deliverables:

- Task 1: Literature Review
- Task 3: Interim report and presentation to PRC
- Task 4: Methodology for Appropriate Moment Gradient Factor
- Task 5: Final Report, Technical Summary, and summary presentation

SPECIAL NOTES

- A. LTRC research projects will be conducted in accordance with the LTRC Manual of Research Procedures, 2016 edition.

(http://www.ltrc.lsu.edu/pdf/2016/LTRC_RESEARCH_MANUAL_FINAL.pdf)

- B.** Task descriptions are intended to provide a framework for conducting the research. Louisiana Transportation Research Center (LTRC) is seeking the insight of proposers on how best to achieve the research objectives. Proposers are expected to describe research plans that can be realistically accomplished within the constraints of available funds and contract time as highlighted on page 4. Proposals must present the candidate's current thinking in sufficient detail to demonstrate their understanding of the problem and the soundness of their approach. **Any work that is anticipated to be required from LTRC or DOTD forces shall be specifically detailed in the proposal.**
- C.** LTRC projects are intended to produce results that will be applied in practice. It is expected that the implementation of the results of this research into practice will evolve as a concerted effort during this project. The final report must contain an implementation plan to include, as a minimum, the following:
 - a. The "product" expected from the research;
 - b. A realistic assessment of impediments to successful implementation;
 - c. The activities necessary for successful implementation; and
 - d. The criteria for judging the progress and consequences of implementation.
- D.** To assist in the implementation process, the investigators of this research shall present the final results to LA DOTD officials in an oral presentation to be held in Baton Rouge, Louisiana at LA DOTD Headquarters after acceptance of the final report.
- E.** The proposal should include travel to meet with the Project Review Committee for a "kick off" meeting, presentation of interim report, and presentation of the final report at a minimum. Funds budgeted for travel shall be limited to what is necessary for the conduct of the research. Funds shall not be budgeted for conference travel. Funding for technology transfer of research results are available upon request subject to LTRC approval and available funds.
- F.** LTRC's mission includes the support of higher education in Louisiana. Consultant and out-of-state institutions submitting proposals are encouraged to cooperate and collaborate with Louisiana universities for the purpose of sharing of knowledge and increasing transportation expertise in the academic community.
- G.** Graduate assistance stipends are allowed. Tuition reimbursement or tuition remission rates applied to stipends are not allowed.
- H.** To equitably answer any questions regarding this Request for Proposals, the Louisiana Department of Transportation and Development (LA DOTD) website will be updated with questions and answers and related documents regarding the project.

<http://webmail.dotd.louisiana.gov/agrestat.nsf/WebAdvertisements?OpenPage>

LA DOTD makes these documents available for informational purposes only to aid in the efficient dissemination of information to interested parties. LA DOTD does not warrant the documents against deficiencies of any kind. The data contained within this web site will be periodically updated. Interested parties are responsible to be aware of any updates.

Questions regarding this RFP should be submitted in writing to the LTRC contact person. Questions must be received by close of business seven calendar days prior to deadline date.

- I. Consultants and business entities shall be registered with the Secretary of State in order to be able to work in Louisiana prior to award of contract.
<http://www.sos.la.gov/tabid/1011/Default.aspx>
- J. If Sub-Consultants/Entities are used, the Prime Consultant/Entity must perform a minimum of 51% of the work for the overall project.
- K. LTRC reserves the right to withhold invoice payments for delinquent deliverables as defined in the proposal.

ESTIMATED COST OF RESEARCH

\$125,000

ESTIMATED COMPLETION TIME

15 months (*include three months for review and approval of final report - i.e. final report due 12 months*).

LTRC PRIMARY CONTACT

Walid Alaywan, Ph.D., P.E.
Sr. Structures Research Engineer
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AUTHORIZATION TO BEGIN WORK:

January 2, 2018 (Estimated)

PROPOSAL FORMAT

All proposals are required to be formatted according to LTRC Manual of Research Procedures. Chapter 3 provides guidance on proposal development.

PROPOSAL SELECTION

The Project Review Committee selected for this project will review, evaluate and rank all proposals received using the criteria established on the proposal review form.

SUBMISSION OF PROPOSAL

Ten copies of the proposal must be received by LTRC by close of business November 20, 2017. Proposals are to be submitted to:

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Louisiana Transportation Research Center
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