NCHRP 12-106 [RFP]

Proposed Guidelines for Performance-Based Seismic Bridge Design

Posted Date: 9/8/2015

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<th>Project Data</th>
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<td><strong>Funds:</strong></td>
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<td><strong>Contract Time:</strong></td>
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<td>(includes 1 month for NCHRP review and approval of each interim report and 3 months for NCHRP review and for contractor revision of the final report)</td>
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<td><strong>Authorization to Begin Work:</strong></td>
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<td><strong>Staff Responsibility:</strong></td>
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**BACKGROUND**

The current *AASHTO Guide Specifications for LRFD Seismic Bridge Design* do not address performance-based seismic bridge design or provide design criteria for bridges that are critical or essential. Furthermore, the guide specifications do not provide direction to assist owners and designers who wish to consider seismic risk mitigation beyond the life safety objective. A bridge may have different operational requirements depending on the post-earthquake functions (for example,
serving the community by providing emergency vehicle access), which would suggest a higher performance objective than the basic levels included in the design codes. Research is needed to provide guidance to help bridge owners and designers define enhanced seismic performance objectives and design bridges to meet those objectives.

OBJECTIVES

The objectives of this research are to develop: (1) proposed AASHTO guidelines for performance-based seismic bridge design and (2) proposed revisions to the AASHTO Guide Specifications for LRFD Seismic Bridge Design to link with the proposed AASHTO guidelines for performance-based seismic bridge design.

Accomplishment of the project objectives will require at least the following tasks.

TASKS

Task descriptions are intended to provide a framework for conducting the research. The NCHRP is seeking the insights of proposers on how best to achieve the research objectives. Proposers are expected to describe research plans that can realistically be accomplished within the constraints of available funds and contract time. Proposals must present the proposers' current thinking in sufficient detail to demonstrate their understanding of the issues and the soundness of their approach to meeting the research objectives.
PHASE I—Planning

Task 1. Conduct a literature review of relevant domestic and international performance-based seismic research and guidelines. The domestic review should include research conducted through the NCHRP; Strategic Highway Research Program 2 (SHRP2); FHWA; and other national, state, and pooled-fund sponsored research. The review should cover research findings, existing design guidelines, and owner and industry experience.

Task 2. Synthesize the literature review to identify the knowledge gaps for performance-based seismic bridge design. These gaps should be addressed in the final product and in the recommended future research.

Task 3. Propose a methodology, to be developed and executed in Phase II, to achieve the project objectives. At a minimum, the methodology should consider: (a) different bridge types, bridge configuration and geometry, and materials; (b) deformation limits; (c) damage states; (d) performance objectives and levels; (e) seismic hazard levels and the nature of the design ground motion (e.g., geometric mean vs. maximum component, deterministic vs. probabilistic, uniform hazards vs. risk targeted, etc.); and (f) analytical methods.

Task 4. Prepare a detailed outline of the proposed AASHTO guidelines and identify any required revisions to the AASHTO Guide Specifications for LRFD Seismic Bridge Design to link it with the proposed AASHTO guidelines. Propose design examples to demonstrate the proposed methodology and guidelines.
Task 5. Prepare Interim Report No. 1 that documents Tasks 1 through 4 and provides an updated work plan for the remainder of the research no later than 4 months after contract award. The updated plan must describe the process and rationale for the work proposed for Phases II though IV.

Note: Following a 1-month review of Interim Report No. 1 by the NCHRP, the research team will be required to meet with the project panel to discuss the interim report. Work on Phases II through IV of the project will not begin until authorized by the NCHRP. Phase I shall be limited to $40,000.

PHASE II—Methodology Development

Task 6. Fully develop and execute the methodology according to the approved Interim Report No.1.

Task 7. Complete sample section of the guidelines to be selected by NCHRP. This section should be publication ready (i.e., AASHTO-style format) with appropriate level of details.

Task 8. Prepare Interim Report No. 2 that documents Tasks 6 and 7 and provides an updated work plan for Phases III and IV no later than 8 months after approval of Phase I.
Note: Following a 1-month review of Interim Report No. 2 by the NCHRP, the research team will be required to meet with the project panel to discuss the interim report. Work on Phase III of the project will not begin until authorized by the NCHRP. Phase II shall be limited to $100,000.

PHASE III—Guidelines Development

Task 9. Develop the remaining sections of guidelines and prepare illustrations (e.g., flowcharts, graphs) and identify interdependencies with existing AASHTO seismic bridge design standards. Prepare proposed revisions to AASHTO Guide Specifications for LRFD Seismic Bridge Design. The recommended guidelines shall be provided in AASHTO-style format. Submit the design examples.

Task 10. Prepare Interim Report No. 3 that documents Task 9 and provides an updated work plan for the remainder of the project no later than 9 months after Phase II approval. The updated plan must describe the process and rationale for the work proposed for Phase IV.

Note: Following a 1-month review of Interim Report No. 3 by the NCHRP, the research team will be required to meet with the project panel to discuss the interim report. Work on Phase IV of the project will not begin until authorized by the NCHRP.

PHASE IV—Final Products
**Task 11.** Revise the guidelines after consideration of the panel’s review comments.

**Task 12.** Prepare final deliverables including: (1) a final report that documents the entire research effort; (2) the proposed AASHTO guidelines, revisions to the *AASHTO Guide Specifications for LRFD Seismic Bridge Design*, and examples; and (3) a stand-alone technical memorandum titled “Implementation of Research Findings and Products.” See Special Note D for additional information.

*Note: Phases III and IV shall be limited to $160,000. Following receipt of the draft final report, the remaining 3 months shall be for NCHRP review and comment and for research agency preparation of the revised final report.*

**SPECIAL NOTES**

A. The research team should anticipate making presentations to appropriate technical committees at annual meetings of the AASHTO Highway Subcommittee on Bridges and Structures.

B. Proposals should include a task-by-task breakdown of labor hours for each staff member as shown in Figure 4 in the brochure, "Information and Instructions for Preparing Proposals" ([http://onlinepubs.trb.org/onlinepubs/crp/docs/ProposalPrep.pdf](http://onlinepubs.trb.org/onlinepubs/crp/docs/ProposalPrep.pdf)). Proposals also should include a breakdown of all costs (e.g., wages, indirect costs, travel, materials, and total) for each task using Figures 5 and 6 in the brochure.
C. Item 4(c), "Anticipated Research Results," in each proposal must include an Implementation Plan that describes activities to promote application of the product of this research. It is expected that the implementation plan will evolve during the project; however, proposals must describe, as a minimum, the following: (a) the "product" expected from the research, (b) the audience or "market" for this product, (c) a realistic assessment of impediments to successful implementation, (d) the institutions and individuals who might take leadership in applying the research product, (e) the activities necessary for successful implementation, and (f) the criteria for judging the progress and consequences of implementation.

D. The required technical memorandum titled "Implementation of Research Findings and Products" should (a) provide recommendations on how to best put the research findings/products into practice; (b) identify possible institutions that might take leadership in applying the research findings/products; (c) identify issues affecting potential implementation of the findings/products and recommend possible actions to address these issues; and (d) recommend methods of identifying and measuring the impacts associated with implementation of the findings/products. Implementation of these recommendations is not part of the research project and, if warranted, details of these actions will be developed and implemented in future efforts.

E. Item 5 in the proposal, "Qualifications of the Research Team," must include a section labeled "Disclosure." Information relevant to the NCHRP's need to ensure objectivity and to be aware of possible sources of significant financial or organizational conflict of interest in conducting the research must be presented in this section of the proposal. For example, under certain conditions, ownership of the proposing agency, other organizational relationships, or proprietary rights and interests could be perceived as jeopardizing an objective approach to the research effort, and
proposers are asked to disclose any such circumstances and to explain how they will be accounted for in this study. If there are no issues related to objectivity, this should be stated.

F. Proposals are evaluated by the NCHRP staff and project panels consisting of individuals collectively very knowledgeable in the problem area. Selection of an agency is made by the project panel considering the following factors: (1) the proposer's demonstrated understanding of the problem; (2) the merit of the proposed research approach and experiment design; (3) the experience, qualifications, and objectivity of the research team in the same or closely related problem area; (4) the plan for ensuring application of results; (5) the proposer's plan for participation by Disadvantaged Business Enterprises--small firms owned and controlled by minorities or women; and (6) the adequacy of the facilities.

Note: The proposer's plan for participation by Disadvantaged Business Enterprises should be incorporated in Item 12 of the proposal.

Proposals (20 single-bound copies) are due not later than 4:30 p.m. on 11/3/2015.

This is a firm deadline, and extensions are not granted. In order to be considered for award, all 20 copies of the agency's proposal accompanied by the executed, unmodified Liability Statement must be in our offices not later than the deadline shown, or the proposal will be rejected. Proposers may choose any carrier or delivery service for their proposals. However, proposers assume the risk of proposal rejection if the carrier or delivery service does not deliver all the required documents by the deadline.

Delivery Address:

PROPOSAL-NCHRP
Liability Statement

The signature of an authorized representative of the proposing agency is required on the unaltered liability statement in order for the NCHRP to accept the agency's proposal for consideration. Proposals submitted without this executed and unaltered statement by the proposal deadline will be summarily rejected. An executed, unaltered statement indicates the agency's intent and ability to execute a contract that includes the provisions in the statement.


General Notes

1. According to the provisions of Title 49, Code of Federal Regulations, Part 21, which relates to nondiscrimination in federally assisted programs, all parties are hereby notified that the contract entered into pursuant to this announcement will be awarded without discrimination on the grounds of race, color, religion, sex, national origin, or disability.

2. The essential features required in a proposal for research are detailed in the current brochure entitled "Information and Instructions for Preparing Proposals" (updated July 2015). Proposals must be prepared according to this document, and attention is directed specifically to Section V for mandatory requirements. Proposals that do not conform with these requirements will be rejected. This brochure is available here.

3. The total funds available are made known in the project statement, and line items of the budget are examined to determine the reasonableness of the allocation of funds to the various tasks. If the proposed total cost exceeds the funds available, the proposal is
rejected.

4. All proposals become the property of the Transportation Research Board. Final disposition will be made according to the policies thereof, including the right to reject all proposals.

IMPORTANT NOTICE

Potential proposers should understand clearly that the research project described herein is tentative. The final content of the program depends on the level of funding made available through States' agreements for financial support of the NCHRP. Nevertheless, to be prepared to execute research contracts as soon as possible after sponsors' approvals, the NCHRP is assuming that the tentative program will become official in its entirety and is proceeding with requests for proposals and selections of research agencies.