NCHRP 18-18 [RFP]

Design and Construction of Deck Bulb Tee Girder Bridges with UHPC

Posted Date: 11/18/2016

Project Data	
Funds:	$480,000
Contract Time:	39 months *(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)*
Authorization to Begin Work:	7/1/2017 -- estimated
Staff Responsibility:	Waseem Dekelbab Phone: 202/334-1409 Email: wdekelbab@nas.edu
RFP Close Date:	1/31/2017
Fiscal Year:	2017

BACKGROUND

Many state DOTs and the Federal Highway Administration (FHWA) are actively promoting accelerated bridge construction (ABC) onsite construction time, environmental impacts, and life-cycle costs. However, the usage of prefabricated deck bulb tee (DBT) gi relatively short-span and low traffic bridges because of (1) difficulties in accommodating super-elevation transitions on bridge deck camber, and stability; and (2) concerns of long-term performance of connections between DBT girders. For example, skewed D deck profile problems because the cambers in adjacent girders do not "line up," and if diaphragms are used to bring the DBT girc are induced.

For the longitudinal and transvers connections between DBT girders, there are a wide range of potential variables to be consi construction of the connections including connection width, bar size, bar spacing, bar detailing (straight, bent or headed), bla thickness, and closure pour materials. The typical DBT girders connected by longitudinal joints with welded tie and grouted conn well and are not suitable for long-span DBT girder bridges as the load transfer demand on the connection is high. Addressing thes high performance concrete (UHPC) as closure pour materials could result in a dramatic improvement in reliability and economy of

OBJECTIVE

The objective of this research is to propose draft *AASHTO LRFD Bridge Design Specifications* and *AASHTO LRFD Bridge Cons* design and construction of DBT girder bridges using UHPC for connection.

Accomplishment of the project objective 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 p achieve the research objective. Proposers are expected to describe research plans that can realistically be accomplished within th funds and contract time. Proposals must present the proposers' current thinking in sufficient detail to demonstrate their understanc soundness of their approach to meeting the research objective.

PHASE I—Planning

Task 1. Conduct a literature review of relevant domestic and international guidelines and specifications. The review should also existing design guidelines, and owner and industry experience.

Task 2. Synthesize the literature review to identify the knowledge gaps for DBT girders design, fabrication, stability, erection, connection details. These gaps should be addressed in the final product or in the recommended future research as budget permits

Task 3. Propose analytical and parametric studies to be executed in Phase II. At a minimum, the studies should consider the follow

a. fabrication, control of camber, stability, and erection of DBT girders using conventional and light weight concrete;
b. effect of span length, girder spacing and skew, diaphragm effects, differential camber, and provisions for bridge widening;
c. connections details between DBT girders and continuity at intermediate piers using UHPC as an option; and
d. live load continuity at the transverse connections between DBT girders and applicability of the *AASHTO LRFD Bridge Desig* distribution factors.

Task 4. Propose a system test to be executed in Phase III. The plan for the system test should be presented in a matrix form minimum:

a. multiple girder lines to verify negative moment continuity at the intermediate pier and to verify longitudinal joints effectiver

due to differential camber and live load distribution;
b. different connection details with different UHPC mixes; and
c. service loads, cyclical testing of at least two million cycles, and ultimate strength.

Task 5. Propose areas of the AASHTO bridge design and construction specifications that will require modification or addition.

Task 6. Prepare Interim Report No. 1 that documents Tasks 1 through 5 and provides an updated work plan for the remainder of th plan must describe the process and rationale for the work proposed for Phases II through V. This report must be submitted no contract award.

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

PHASE II—Analytical and Parametric Studies

Task 7. Execute the analytical and parametric studies according to the approved Interim Report No.1.

Task 8. Finalize the system test work plan and describe how the test results will be utilized to develop the AASHTO specifications.

Task 9. Prepare Interim Report No. 2 that documents Tasks 7 and 8 and provides an updated work plan for Phases III throug submitted no later than 9 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 pro interim report, if necessary. Work on Phases III through V of the project will not begin until authorized by the NCHRP. Phase II sha

PHASE III—System Test

Task 10. Execute the system test according to the approved Interim Report No. 2. Validate the analytical and parametric stud results.

Task 11. Prepare Interim Report No. 3 that documents Task 10 and provides an updated work plan for the remainder of the pro submitted no later than 12 months after Phase II approval.

Note: Following a 1-month review of Interim Report No. 3 by the NCHRP, the research team will be required to meet with the pro interim report, if necessary. Work on Phases IV and V of the project will not begin until authorized by the NCHRP. Phase III shall b

PHASE IV—Specifications Development

Task 12. Develop draft proposed modifications to the AASHTO design and construction specifications, and design examples a demonstrate the application of the proposed specifications, and AASHTO agenda items for the AASHTO Highway Subcor Structures. Prepare Interim Report No. 4 that documents Task 12. This report must be submitted no later than 4 months after appr

PHASE V—Final Products

Task 13. Revise the proposed draft AASHTO bridge design and construction specifications, design examples, and connection det the panel's review comments.

Task 14. Prepare final deliverables including: (a) a final report that documents the entire research effort and (b) the proposed draf design examples, and connection details.

Note: Phases IV and V shall be limited to $80,000. Following receipt of the draft final report, the remaining 3 months shall be 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 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 br Instructions for Preparing Proposals" (http://onlinepubs.trb.org/onlinepubs/crp/docs/ProposalPrep.pdf). Proposals also should in costs (e.g., wages, indirect costs, travel, materials, and total) for each task using Figures 5 and 6 in the brochure. Please no Research Program subawards (selected proposers are considered subawards to the National Academy of Sciences, the parent o comply with *2 CFR 200 – Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards*. Th a provision that proposers without a "federally" Negotiated Indirect Costs Rate Agreement (NICRA) shall be subject to a maximum 10% of Modified Total Direct Costs. Modified Total Direct Costs include all salaries and wages, applicable fringe benefits, materia travel, and up to the first $25,000 of each lower-tier subaward and subcontract. Modified Total Direct Costs exclude equipme charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of and subcontract in excess of $25,000.

C. The NCHRP is a practical, applied research program that produces implementable products addressing problems faced by tr

and managers. The benefits of NCHRP research are realized only when the results are implemented in state DOTs and other age the research product must be considered throughout the process, from problem statement development to research contract and research. Item 4(c), "Anticipated Research Results," must include the following: (a) the "product" expected from the research, (b) for this product, (c) a realistic assessment of impediments to successful implementation, and (d) the institutions and individuals w in deploying the research product. The project panel will develop and maintain an implementation plan throughout the life of the pr will be expected to provide input to an implementation team consisting of panel members, AASHTO committee members, the Coordinator, and others in order to meet the goals of *NCHRP Active Implementation: Moving Research into* http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP_ActiveImplementation.pdf.

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

E. Proposals are evaluated by the NCHRP staff and project panels consisting of individuals collectively very knowledgeable in the of an agency is made by the project panel considering the following factors: (1) the proposer's demonstrated understanding of the the proposed research approach and experiment design; (3) the experience, qualifications, and objectivity of the research tear related problem area; (4) the plan for ensuring application of results; (5) the proposer's plan for participation by Disadvantaged Bu 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 t

F. Copyrights - All data, written materials, computer software, graphic and photographic images, and other information prepared u copyrights therein shall be owned by the National Academies of Sciences, Engineering, and Medicine. The contractor and subc publish this material for non-commercial purposes, for internal use, or to further academic research or studies with permissio Research Programs. The contractor and subcontractors will not be allowed to sell the project material without prior approval by th Sciences, Engineering, and Medicine. By signing a contract with the National Academy of Sciences, contractors accept legal respo infringement that may exist in work done for TRB. Contractors are therefore responsible for obtaining all necessary permissior material in TRB's Cooperative Research Programs publications. For guidance on TRB's policies on using copyrighted material pl "Use of Copyrighted Material," in the Procedural Manual for Contractors.

Proposals (12 single-bound copies) are due not later than 4:30 p.m. on 1/31/2017.

This is a firm deadline, and extensions are not granted. In order to be considered for award, all copies of the agency's proposal accompanied by the executed, unmodified Liability S 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 delivery service does not deliver all the required documents by the deadline.

Delivery Address:

PROPOSAL-NCHRP
ATTN: Christopher J. Hedges
Director, Cooperative Research Programs
Transportation Research Board
500 Fifth Street, NW
Washington, DC 20001

Liability Statement

The signature of an authorized representative of the proposing agency is required on the unaltered liability statement in order for the NCHRP t agency's proposal for consideration. **Proposals submitted without this executed and unaltered statement by the proposal deadline *will* *rejected.*** An executed, unaltered statement indicates the agency's intent and ability to execute a contract that includes the provisions in the sta

Here is a printable version of the Liability Statement (pdf). A free copy of the Adobe Acrobat PDF reader is available at http://www.adobe.com.

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 pa the contract entered into pursuant to this announcement will be awarded without discrimination on the grounds of race, color, religion, sex, national origi

2. The essential features required in a proposal for research are detailed in the current brochure entitled **"Information and Instructions for Preparin** *2016).* **Proposals must be prepared according to this document, and attention is directed specifically to Section V for mandatory requireme 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 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 th

IMPORTANT NOTICE

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