



New Jersey Department of Transportation
Bureau of Research
RESEARCH PROJECT
Request for Proposal
2021 – 2022 SPR Program

Project Title: Fatigue Resistance of Connection Details for Highway Support Structure
Posting No.: 2021-01
Date of RFP Announcement: 8/23/2021
Closing Date: 10/5/2021

Proposals must be prepared in accordance with NJDOT's *Supplemental and Proposals guidelines*. Please visit <https://www.state.nj.us/transportation/business/research/guidelines.shtm> for the most current version.

All proposals must also have a corresponding online PreAward Risk Assessment form completed and submitted by the PIs prior to the RFP closing date and time. This online form can be found at: https://www.state.nj.us/transportation/business/research/risk_assessment_forms.shtm

1 - RESEARCH PROBLEM STATEMENT AND OBJECTIVES

1.1 Problem Statement

The 1st Edition of AASHTO LRFD Specifications for Support Structures for Highway Signs, Luminaires, and Traffic Signals was published in 2015, and is currently implemented by DOT for all types of highway support structures to update DOT design standards and meet 2015 FHWA final rules for Design Standards for Highways. For fatigue design, however, a few types of connection details which have demonstrated successful and economical applications in the past decades in New Jersey are not included in the new AASHTO LRFD Specifications. This forced DOT to use only those details included in the spec and may result in a more complex design/fabrication process and/or uneconomic design compared to previous design.

One such typical connection detail is the socket weld detail for tube-to-base-plate connection and chord-to-splice-plate connection. Another connection type is used for traffic signal support structures. DOT uniquely requires clamp-type mast arm-to-post connection detail, which is not included in the AASHTO LRFD spec. In addition, fatigue resistance of strut-to-chord gusset plate connection for sign/DMS structures depends on diameter versus plate thickness (r/t) ratio in the new Code and the strut side welded detail fatigue strength is not well known. Therefore, fatigue resistance of these and other details need to be verified for better fatigue design. In order to efficiently achieve cost-effective design and fabrication, study on fatigue strength of these connection details used in New Jersey is demanded and thus this research statement is proposed.

1.2 Research Objectives

The objectives of this research are to develop fatigue resistance of cost-effective details and simplified fatigue design method for transportation support structures

At minimum, the proposed research shall include:

Phase 1: Conduct a comprehensive literature review of research related to the following required NJDOT needs/tasks:



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- 1) Review the 1st Edition (including current Interim) AASHTO LRFD spec, especially Fatigue Design with Methodology, Fabrication, and Construction related sections. Identify issues that may be encountered in design and fabrication.
- 2) Identify and investigate economic details that have worked successfully in the past decades in New Jersey and will potentially continue to be successful in the future.
- 3) Explore and evaluate any potential alternative details and design methodology to achieve cost-effective solutions.
- 4) Make recommendations based on Phase 1 literature study for Phase 2 study.
- 5) Present findings and recommendations to RPM, research project customer, and Technical Advisory Committee of NJDOT Subject Matter Experts (SMEs) via PowerPoint presentation and Literature Review Report deliverable.

Phase 2: Based on the research and literature review findings in Phase 1, develop Phase 2 work plan with specified tasks for review and approval. With the permission of the RPM and customer, the research team shall proceed to Phase 2 following the work plan.

The research team shall possess sufficient facility and equipment for analytical and experimental study in Phase 2 study. In experimental study, full scale fatigue tests will be necessary

In Phase 2, the research team shall execute analytical and experimental study on recommended most successful connection details to develop a fatigue resistant design that is not included in AASHTO LRFD with benefit of cost-effectiveness.

The research team shall submit progress reports, make presentation at progress meetings as per RPM request, and make possible adjustment of work plan if necessary.

A final report shall include the research details, findings, summary/conclusions, recommendations from both phases along with the recommended simplified fatigue design methodology. The research team shall recommend, with NJDOT staff/SME input, a-prospective New Jersey applications for a possible implementation phase to be separately posted as an independent RFP.

1.3 Type of Contract

It is proposed that if the Issuing Office enters into a contract because of this Request for Proposal (RFP), it will be a **Cost Reimbursement, Deliverable-Based** contract containing the Standard Contract Terms and Conditions.

2 - BUDGET and CONTRACT TIME

The **TOTAL** project budget shall not exceed **\$400,000 US Dollars**. Budgets will be evaluated separately, and only after a selection has been made as to which proposal is the most qualified based on technical merit. Please place three (3) copies of the budget for this project in a separate sealed envelope.



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The PI must provide the anticipated research study duration based on the proposed tasks. Consideration should be given to potential impediments so that adjustments are incorporated into the schedule minimizing the need for time extensions.

Contract time shall include sufficient time for the procurement of potential subcontractors, as well as no less than three months for Final Report review and acceptance. Please be advised that going forward, new task orders having permissible justification will be allowed no more than a one-time extension (with no additional cost) with the advent of 2 CFR 200.

A 48-month total project duration is preferred.

Please provide a Gantt Chart schedule, by month number (e.g. 1-24), showing tasks start/end, and deliverables. List corresponding deliverables below the chart.

3 - Oral Presentations

Oral online presentations may be requested as part of this RFP. If required, you will be notified by the Bureau of Research to schedule your oral presentation. They will be held at NJDOT headquarters in Trenton, NJ, attended by the Technical Advisory Panel (TAP), and be limited to no more than an hour, including time for questions and answers.

4 – Deadline

Proposals (10 single-bound copies) are due at the NJDOT Bureau of Research no later than **4:00 p.m. on October 5, 2021.**

Approximate Start Date: 4/4/2022. The official start date is the date that the Bureau of Research obtains a signature from the Assistant Commissioner.

5 – CONTACTS

Interested parties shall send all questions related to this RFP to the Research Bureau Manager by sending an e-mail to Amanda.Gendek@dot.nj.gov or by phone (609-963-2242). Questions on this topic **shall not** be directed to any Research Project Manager, Research Customer, or any other NJDOT person. All questions must be received **on or before 9/7/2021 in order to be answered.**

PROPOSAL DELIVERY INSTRUCTIONS:

During the COVID-19 pandemic, hand-carried deliveries will not be accepted.

For private, paid messenger services such as Federal Express, DHL, UPS, etc. deliveries:

RFP No. **2021-01** PROPOSAL-NJDOT
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