## NCHRP 08-145 [RFP]

### Utilizing Cooperative Automated Transportation (CAT) Data to Enhance Freeway Operational Strategies

**Posted Date: 12/15/2020**

| Project Data | |
|---|---|
| **Funds:** | **$500,000** |
| **Contract Time:** | **24 months** |
| ***(includes 1 month for NCHRP review and approval of the interim report and 3 months for NCHRP review and for contractor revision of the final report)*** | |
| **Authorization to Begin Work:** | **4/1/2021 -- estimated** |
| **Staff Responsibility:** | **B. Ray Derr**<br>**Phone: 202-334-3231**<br>**Email: rderr@nas.edu** |
| **RFP Close Date:** | **2/18/2021** |
| **Fiscal Year:** | **2021** |

**BACKGROUND**

The application of new technologies in transportation operations and management began more than 50 years ago, with the introduction of digital computers. Continuous developments in computer technology, emerging sources of data, and communications have created new opportunities for operational strategies and performance measures to improve freeway network safety and mobility. Traffic management systems (TMS) continue to evolve and are incorporating the collection and use of real-time information from fixed sources (e.g., loop detectors, radar, cameras), mobile sources (e.g., probes, smart phones), other systems (e.g., weather, pavement monitoring), and other sources (e.g., third party providers).

AASHTO's *Infrastructure Owner Operators Guiding Principles for Connected Infrastructure Supporting Cooperative Transportation: Supporting Technical Concepts* states "Cooperative Automated Transportation (CAT) envisions all stakeholders and elements of the transportation system working together to improve safety, mobility, equity, and operations efficiency through interdependent vehicle, infrastructure, and systems automation enabled by connectivity and information exchange. The concept is intentionally expansive. It looks beyond existing, developing, and planned transportation concepts to a fully integrated system serving travelers, goods, and services." The emergence of CAT, particularly Connected and Automated Vehicles (CAVs), will provide public agencies with the opportunity to collect, use, and share data among vehicles, infrastructure, and other devices and could transform how agencies actively manage and operate traffic, improving safety and mobility. Agencies will be able to issue advisory, warning, and regulatory messages based on current and projected conditions unique to a specific location (e.g., section of roadway, corridor, geo-fenced area), direction of travel, and possibly specific vehicles. In addition to allowing new operational approaches, these data may reduce the need for fixed sensors that are costly to deploy and maintain.

**OBJECTIVE**

The objective of this research is to assess operational scenarios and use cases where freeway operations strategies could be improved through the transmission of data between a TMS and the larger CAT system (either directly or through a third party). This assessment should (1) spur development of enhanced and new operational strategies and (2) help agencies justify gaining access to additional CAT data.

**RESEARCH PLAN**

*Proposers are asked to develop and include a detailed research plan for accomplishing the project objective. The work proposed must be divided into tasks and proposers must describe the work proposed in each task. Proposers are expected to present a research plan 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 objective. NCHRP may choose to publish interim work products. The research approach should address this potential.*

The research plan shall describe appropriate deliverables that include, but are not limited to the following:

- Literature review on CAT derived data and its use in freeway performance measures and operational strategies, including NCHRP Project 03-137, "Algorithms to Convert Basic Safety Messages into Traffic Measures."
- Evaluation of potential uses of CAT derived data for operational strategies that would be implemented by a transportation agency. This evaluation will include: (1) catalog of freeway operational strategies with typical approaches for their control logic (including performance monitoring), (2) description of data in the Basic Safety Message (BSM) that could support freeway operational strategies, (3) description of other CAT data beyond the BSM (including SAE J2945 messages) that may be beneficially applied to freeway operational strategies (including characteristics such as availability from third-party providers, latency, aggregation level, and reliability), (4) description of information that could be passed from the TMS to CAVs (e.g., lane control), and (6) draft operational concepts for enhanced freeway operational strategies that draw upon this CAT data (including potential architectures for data processing).
- Interim report and panel meeting. The interim report should include important preliminary research results, an update of the remaining tasks, and a detailed outline of the final research product(s). The report should recommend a limited number of enhanced freeway operational strategies to be developed further in subsequent tasks commensurate with the project budget. The panel meeting will take place after the panel review of the interim report.
- Development of enhanced freeway operational strategies. This will include (1) collecting sample data from ongoing demonstration projects, field tests or other sources (e.g., ITS Public Data Hub), and assessing their suitability, (2) selecting a freeway testbed already coded and calibrated in a microsimulation tool, (3) mapping the data flows for the strategies, (4) developing a test plan for the strategies, (5) developing scenarios that include parameters such as the penetration rate of CAV, (6) identifying data elements and message formats for data beyond the BSM and the Basic Infrastructure Message, (7) incorporating CAT data from third-party providers as appropriate, (8) developing the core logic of the operational strategy, (9) suggesting improvements to current operational algorithms commonly in use, (10) testing the core logic using field data and, as necessary, simulated data, and (11) evaluating the potential benefits of the operational strategy.
- A final report that documents the entire research effort and presents a clear plan for further development and deployment of the selected operational strategies (including potential pilot deployment sites and issues to consider when developing requirements for data acquisition and management). If any algorithms or other logic are developed, they should be made available as open source and documentation provided. The report should be accompanied by appropriate briefing and presentation materials and an implementation plan that identifies opportunities for dissemination and moving research into practice (see Special Note C).

The research plan shall include a schedule for completion of the research that includes 1 month for panel review of the interim report and 3 months for panel review and for contractor revision of the final research product(s).

**SPECIAL NOTES**

A. 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). 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. Please note that TRB Cooperative Research Program subawards (selected proposers are considered subawards to the National Academy of Sciences, the parent organization of TRB) must comply with 2 CFR 200 – Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. These requirements include a provision that proposers without a "federally" Negotiated Indirect Costs Rate Agreement (NICRA) shall be subject to a maximum allowable indirect rate of 10% of Modified Total Direct Costs. Modified Total Direct Costs include all salaries and wages, applicable fringe benefits, materials and supplies, services, travel, and up to the first $25,000 of each lower-tier subaward and subcontract. Modified Total Direct Costs exclude equipment, capital expenditures, charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of each lower-tier subaward and subcontract in excess of $25,000.

B. The *Instructions for Preparing and Submitting Proposals* were modified in November 2020 to include maximum file size and page limits for all CRP proposals. Proposals must be submitted as a single PDF file with a maximum file size of 10 MB. If printed on standard 8 ½" X 11" paper, the entire proposal must not exceed 60 pages. Proposals that do not meet these requirements will be rejected. For other requirements, refer to Chapter V of the *Proposal Information and Instructions for Preparing Proposals for the Transportation Research Board's Cooperative Research Programs.*

C. The NCHRP is a practical, applied research program that produces implementable products addressing problems faced by transportation practitioners and managers. The benefits of NCHRP research are realized only when the results are implemented in state DOTs and other agencies. Implementation of the research product must be considered throughout the process, from problem statement development to research contract and beyond completion of the research. Item 4(c), "Anticipated Research Results," must include 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, and (d) the institutions and individuals who might take leadership in deploying the research product. The project panel will develop and maintain an implementation plan throughout the life of the project. The research team will be expected to provide input to an implementation team consisting of panel members, AASHTO committee members, the NCHRP Implementation Coordinator, and others in order to meet the goals of NCHRP Active Implementation: Moving Research into Practice, available at http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP_ActiveImplementation.pdf.

D. 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) how the proposer approaches inclusion and diversity in the composition of their team and research approach, including participation by certified Disadvantaged Business Enterprises; and, if relevant, (6) the adequacy of the facilities.

**Note: The proposer's approach to inclusion and diversity as well as participation by Disadvantaged Business Enterprises should be incorporated in Item 11 of the proposal.**

E. Copyrights - All data, written materials, computer software, graphic and photographic images, and other information prepared under the contract and the copyrights therein shall be owned by the National Academies of Sciences, Engineering, and Medicine. The contractor and subcontractors will be able to publish this material for non-commercial purposes, for internal use, or to further academic research or studies with permission from TRB Cooperative Research Programs. The contractor and subcontractors will not be allowed to sell the project material without prior approval by the National Academies of Sciences, Engineering, and Medicine. By signing a contract with the National Academy of Sciences, contractors accept legal responsibility for any copyright infringement that may exist in work done for TRB. Contractors are therefore responsible for obtaining all necessary permissions for use of copyrighted material in TRB's Cooperative Research Programs publications. For guidance on TRB's policies on using copyrighted material please consult Section 5.4, "Use of Copyrighted Material," in the Procedural Manual for Contractors.

F. If the research approach includes human subjects testing, proposers should be aware that contracts will be subject to approval by an Institutional Review Board (IRB). This review may be conducted by the National Academies of Sciences, Engineering, and Medicine's IRB, but NASEM will delegate the review to the contracting agency's IRB if that agency's process meets all federal requirements for the protection of human subjects.

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**Proposals should be uploaded via this link: https://www.dropbox.com/request/Fz8DO156uDbeaqvK9EBT**
**Proposals are due not later than 5:00 p.m. Eastern Time on 2/18/2021.**

This is a firm deadline, and extensions are not granted. In order to be considered for award, 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.

**Liability Statement**

The signature of an authorized representative of the proposing agency is required on the unaltered statement in order for TRB 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.

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 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"**. **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.**

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.

5. Potential proposers should understand that follow-on activities for this project may be carried out through either a contract amendment modifying the scope of work with additional time and funds, or through a new contract (via sole source, full, or restrictive competition).

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