

# NETC

NEW ENGLAND TRANSPORTATION CONSORTIUM

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June 7, 2016

## INVITATION TO SUBMIT A RESEARCH PROPOSAL

The New England Transportation Consortium (NETC) invites proposals for the following research projects:

### **NETC 15-2: “Using the New SHRP2 Naturalistic Driving Study Safety Databases to Examine Safety Concerns for Older Drivers”**

Please distribute this RFP to faculty/researchers who may be interested.

The New England Transportation Consortium is a cooperative effort of the Departments of Transportation and the Land Grant Universities of the six New England States. Through the Consortium, the states pool their professional, academic, and financial resources for transportation research leading to the development of improved methods for dealing with high priority problems associated with the administration, planning, design, construction, rehabilitation, reconstruction, operation and maintenance of the region's transportation system. For more information on NETC, visit our web site:

<http://netc.w3.uvm.edu/>

This Request for Proposals is being sent to each of the six New England State Land Grant Universities. Collaboration among the universities is encouraged. Proposals should be based on the project's Scope of Work (see Attached) and be prepared in the format shown in the Proposal Preparation Guidelines (see Attached).

**TRANSPORTATION INNOVATIONS AND IMPROVEMENTS FOR THE FUTURE**

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**One (1) original hard copy and a CD containing the proposal in ADOBE™ PDF should be returned to the NETC Coordinator, at the following address, so as to be received no later than July 22, 2016:**

**Glenn McRae  
New England Transportation Consortium Coordinator  
University of Vermont - Transportation Research Center  
210 Colchester Avenue  
Burlington, VT 05405**

Proposals will be reviewed and evaluated by the Project Technical Committee that developed the Scope of Work (see Attached). The committee will recommend a proposal, to the NETC Advisory Committee, for funding. The schedule for completing the selection process is also attached.

Questions concerning technical aspects of the Scope of Work should be directed to the Chairperson of the appropriate Project Technical Committee (see Attached).

Questions concerning administrative matters relating to this RFP should be directed to Glenn McRae, NETC Coordinator (Tel: 802-656-1317 / Email: netc@uvm.edu).

Sincerely,

Glenn McRae  
New England Transportation Consortium Coordinator

Attachments:

- Project Scope of Work
- Proposal Preparation Guidelines
- Proposal Evaluation Guidelines
- Schedule for Processing the Proposal
- Technical Committee Chairpersons

NETC: 15-2

## **NEW ENGLAND TRANSPORTATION CONSORTIUM SCOPE OF WORK**

**NETC PROJECT:** NETC 15-2 “Using the New SHRP2 Naturalistic Driving Study Safety Databases to Examine Safety Concerns for Older Drivers”

**Problem title:** Using the New SHRP2 Naturalistic Driving Study Safety Databases to Examine Safety Concerns for Teens and Older Drivers

### **Introduction**

The most comprehensive database ever gathered on driver behavior was developed through SHRP2. The Naturalistic Driving Study (NDS) conducted through the SHRP2 program includes data from over 3,400 volunteer participants, from six sites across the U.S. Each participant’s vehicle was heavily instrumented with cameras and sensors. These data were collected continuously from all trips taken by each participant over 1-2 years resulting in a dataset that includes 2 petabytes of data covering 5.4 million trips.

The SHRP2 NDS data is complemented by the Roadway Information Database (RID), containing detailed roadway data collected on approximately 12,500 centerline miles of highways in and around the study sites plus additional information on approximately 200,000 centerline miles acquired from state inventories, including crash histories, traffic and weather conditions, work zones, and active safety campaigns in the study areas.

The NDS and RID data sets are geo-spatially linked and, as a result, provide state departments of transportation, researchers, and others with a uniquely powerful data resource to study driver behavior, roadway design, and the interactions between them. Accessibility to these data provides an unprecedented opportunity to construct an in-depth understanding of how drivers interact with their vehicles, the roadway and, ultimately, support the identification and development of safety improvements. It is now possible to employ new analytical methods and tools given the level of detail, accessibility, complexity, and integration that is possible with the SHRP2 Safety data. However, in some cases it requires a change in thinking to completely understand the possibilities with these new data sources. In order to realize the full potential of the data, researchers may need to revisit the way that they currently conduct highway safety research. This includes problem identification, testing of new analytical methods, and the exploration of proof-of-concept approaches that will eventually lead to real-world safety improvements. In addition, the size of the dataset provides unique challenges associated with access, computing power, and sample size selection. Furthermore, due to the nature of the data collected through this effort, personally identifiable information (PII) of the participants (video showing their faces, GPS data that indicates their travel patterns, etc.) must be protected. As a result, researchers are required to access PII data at approved secure data enclaves.

The focus of this study is the mature driver (65+ years old) segment. Specifically, older drivers are over-represented in most New England states’ crash data results for signalized intersection crashes, particularly for left turn maneuvers - therefore this

scenario is the research focus of this effort (see state crash data attached). We look to use the NDS data to better understand the decision process of an older driver at non-protected left turns so that we can enhance the safety and reduce crashes. The Technical Committee has already reviewed with the Federal Highway Administration the intersections identified in the RID and selected the locations that meet the criteria of having permissive left turns and represent relatively standardized intersections to narrow down the study's focus.

Phase I will include development of an analysis plan and implementation of this plan on the NDS and RID data already identified. The research team will be required to review the trip data and narrow down the pre-selected intersections based on locations in which older drivers made left turns. At this point the intersections were pre-selected based on older drivers traveling through the signalized intersections, but left turns by older drivers were not specifically identified. The researchers will need to help the Technical Committee make the final determination of this study's scope and what relevant data would be necessary to complete this portion of research. The ultimate outcome goal is to develop recommendations to enhance design features of these types of intersections and identify educational opportunities for the older driver segment. At the end of Phase I, the researcher shall provide some data analysis as a proof of concept as well as a draft NETC research problem statement for Phase II. The project shall ultimately lead to a final deliverable(s) that has direct value to highway safety practitioners at the State and local level. Appropriate documentation shall be included to support findings and implementation procedures, as necessary.

### **Project Scope**

**OVERVIEW:** To evaluate, through Naturalistic Driving Study data and driver video observations, the behaviors of drivers 65 years old and older when making left turns at signalized intersections.

This NETC REQUEST FOR PROPOSALS aims to address highway safety challenges by funding research using the SHRP2 NDS and RID data to examine intersection safety for drivers 65 and older. This study will utilize a phased approach with Phase I constituting a preliminary examination of the data, some safety analysis for proof of concept and insights into its application for improving intersection safety for this age group and some data analysis. Phase II will be based on the success of Phase I. Research in the second phase shall define and undertake innovative approaches that ultimately provide advancements in the study of road crashes and/or implementable solutions to real-world problems. The program shall ultimately lead to final deliverables that have direct value to highway safety practitioners at the State and local level.

This project is a proof of concept type study with two major objectives: 1) utilize the new SHRP2 Naturalistic Driving Study/Roadway Information safety databases (NDS/RID) to examine patterns of behavior associated with older drivers and how they affect safety, and 2) utilize the new SHRP2 NDS/RID Databases to suggest to the extent possible, countermeasures to improve driver safety (either infrastructure-based or behaviorally-based).

Distinct intersections were identified in which older drivers traversed and there were at least 2 near crashes (but many instances of no near crashes). This list has been refined so that it does not include locations where there are protected only left turns or intersections with some other unusual feature. Based on that screening, there are just under 300 distinct intersections identified. The PI will be provided the routeIDs and the intersectionIDs and the researcher will need to further pare down the selection of intersections to those in which older drivers have made left turns. In cases where a signal phasing is protected-permissive, the researcher will have to weed out the left turning trips made during the protected phase.

**Principle Tasks:** Evaluate practices of Mature Drivers (aged 65 and older) that potentially lead to crash outcomes and are identified through findings in the SHRP2 Naturalistic Driving Study Safety Databases related to crash, near-crash/'Safety Critical Events' and NON-"near-crash/Safety Critical Events" to best understand driver behavior tendencies. (How are older drivers safely navigating through the permissive left turn phase at intersections in some cases and not others?) As part of the available data, do include the pre-survey driver testing data that will reflect any driver issues related to vision, risk-taking propensity, and other health/physical issues that may be a factor in observed behaviors.

The NON-"near-crash/Safety Critical Events" will help to evaluate the questions in the bulleted list below. The types of intersections to focus on are: Urban/suburban settings; local or state roads; 2 or 4 lanes; and primarily in permissive traffic signal control settings.

The principal investigator, as part of their proposal, will need to include what situational aspects they will be analyzing from the bulleted list below and to what extent they anticipate identifying related mitigations for each.

Report out the following considerations/driver behavior observations (this list can be further defined as the Principle Investigator (PI) and the Technical Committee discuss methodologies and complexities of data analysis.):

- Identifying common behavioral issues in this driver age group that typically lead to crashes. Findings would help identify training/education opportunities for this driver segment.
- Looking at repeated practices from the same driver in similar intersection situations.
- Are drivers checking for approaching and cross traffic?
- Do distractions play a role? What type?
- What is the driver's ability to physically turn when checking traffic at a skew angle
- While our data do not reflect any specific night-related issues, are additional issues identified that are peculiar to night driving situations? (especially related to signs, signal, pavement markings and other visibility issues?)
- (when applicable)When does the driver move into the appropriate lane? Does the driver move into the appropriate lane as soon as a sign/pavement marking alerts him/her to this? What about other lane changes at the intersection (driver behind a left turning vehicle shifts lanes).
- Are turn signals used?

- Identify/describe situations indicating driver disorientation due to darkness, sun glare or other environmental factors. - Driving situations such as time of day, etc.
- Identify situations where diminished driving skills are demonstrated (cognitive, visual, physical flexibility to turn/observe). Are any of these skills impacted by lack of road guidance information?
- Signal placement and infrastructure type that may be a factor in the observed behaviors.

The study will need to include the same situation performance of a control group of non-older drivers (e.g. ranging in age from 30 to 64) so that relative comparisons of older driver performance can be assessed. Do these findings point to Engineering, Education or age-specific issues – including any countermeasures and screening or administrative / legislative opportunities. The principal investigator and research team need to describe if and how they will conduct these comparisons.

**Subtasks for the bulleted items above:**

1. Principal investigator (PI) will conduct analysis of the InSight online database, prepare a summary and present to the Technical Committee.
  - a. Use the InSight Naturalistic Driving Study (NDS) website <https://insight.shrp2nds.us/home/index> in order to review/access health data for those drivers that were in the NDS.
  - b. Evaluate mature driver activity at selected intersection locations (as noted above, there will be some pre-screening of these locations provided by the Technical Committee.)
  - c. Based on this initial effort, refine the NDS database queries and questions to be answered during the research.
2. PI will work with VTTI (Virginia Tech Transportation Institute) to obtain the required NDS data and with Iowa State / CTRE to obtain the Roadway Information Database (RID). Prior to the request for data, the PI will summarize the methodology and report to the Technical Committee. The PI should expect to work with two sets of data. The first data set includes the NDS/RID data specified by the PI except for face video and other personal identifying information (PII). The second data set is the NDS/RID data specified including PII, with the understanding that any PII must be accessed in an approved SHRP 2 NDS secure data enclave. These likely require different levels of IRB approval. It is expected that contact with VTTI will be fairly frequent and iterative as the PI develops the study's specifications.
3. PI will conduct analysis of the findings for each bulleted item above. This list can be refined based on PI's early findings related to the availability of the requested data. Methodology will need to be reviewed with the Technical Committee and Proof of Concept will be part of this project.
4. PI will meet either in-person or via teleconference with the Technical Committee on at least a quarterly basis to discuss progress, interim findings, data research issues and refinements to how data deliverables are to be presented.
5. Prepare summary of findings, report to Technical Committee.

### **Summary of Deliverables for this Project:**

- Development of methodologies to derive data and ‘*proof of concept*’ findings.
- Report on leading data observations and provide observational commentary for the aspects of the elements listed above. The RFP bidders may select some, all, or add to these listed elements.
- Categorize each of the leading data findings relative to general areas that need to be further assessed as a result of this study: Driver Behaviors, Infrastructure, Driver Training/Outreach opportunities, Administrative, Screening of driver skills, etc. These findings may point to multiple mitigation categories for each data element. The proposal should state to what degree countermeasure and improvement opportunities will be addressed in this project phase.
- The PI will share not just the data findings, but the data mining process with the Technical Committee to familiarize them with methodologies used. The data set produced/procured shall be included as part of the deliverables.
- Recommendations for any future related scopes of work. This could include what elements of the available NDS data will best result in concrete recommendations to the following but it is noted that the specific countermeasures and improvement opportunities will come in Phase II :
  - Enhance engineering design - including intersection geometrics, signalization, and signs
  - Identify general educational opportunities that would improve safety training for older drivers and all drivers.
  - Identify any driver screening or legislative aspects that should be considered.

Deliverables above should be provided within 18 months after contract execution.

### **Reference/Resource Links:**

Insight NDS website <https://insight.shrp2nds.us/home/index>

AASHTO SHRP2 Safety website <http://shrp2.transportation.org/Pages/Safety.aspx>

Roadway Information Database (RID) website: <http://www.ctre.iastate.edu/shrp2-rid/>

Individual state intersection crash data

### **RFP Considerations:**

- Contactor needs to be a qualified researcher –see on line resource
- Include information references for RFP applicants
- Provide web data and user registration info here (a couple of starter links shown below)
- Roadway Information Database (RID) is \$750 and available from Iowa State University, contact Omar Smadi [smadi@iastate.edu](mailto:smadi@iastate.edu)
- NDS data processing costs may be in the \$10,000 to \$25,000 range
- Make final determination of what info is just available at Virginia Tech Transportation Institute (secure enclave)

- Proof of Concept is defined as *a realization of a certain method or idea to demonstrate its feasibility,[1] or a demonstration in principle, whose purpose is to verify that some concept or theory has the potential of being used.*

**MEETINGS WITH PROJECT TECHNICAL COMMITTEE:** The proposal should provide for a minimum of four (4) meetings with the Technical Committee that has been established to monitor the progress of the project. The Technical Committee meetings will include a Kick-Off meeting at the start of the project, as well as meetings at the conclusion of every major task. Annually, the Principal Investigator will make presentations to the Technical Committee and the NETC Advisory Committee. These presentations can be conducted remotely using a webinar application.

**REPORTS:** The Principal Investigator will be required to prepare and distribute the following reports:

**Post-Task Reports:** One (1) copy prepared and e-mailed to the NETC Coordinator, after each Task is completed. Report should include documentation of the Research Project to date (completed Task) and the proposed next steps (proposed Task). The report should arrive no later than ten (10) working days after the scheduled end date for the proposed Task. The Coordinator will forward copies to the Project Technical Committee. The Post-Task Report deliverables must also be included in the Schedule of Major Activities which is required for all proposal submissions. Please see the Proposal Preparation Guidelines for more information.

**Quarterly Progress Reports:** One (1) copy prepared and e-mailed to the NETC Coordinator, on a calendar quarter basis, so as to arrive no later than three (3) working days after the end of the calendar quarter. The Coordinator will forward copies to the Project Technical Committee.

**Draft Final Report:** Seven (7) copies of the Draft Final Report will be prepared and distributed to the members of the Project Technical Committee for review prior to printing of the Final Report. Principal Investigators should allow ninety (90) days, in the Project Schedule, for completion of the review of the Draft Final Report including resolution of the Project Technical Committee's comments and receipt of approval from the Project Technical Committee Chairperson to submit the Final Report to the NETC Coordinator.

**Final Report:** Upon receipt of approval from the Chairperson of the Project Technical Committee to submit the Final Report to the NETC Coordinator, the PI will submit the following: a paper copy and a CD containing the report in ADOBE™ PDF. Upon submittal of the Final Report to the NETC Coordinator, Principal Investigators should allow thirty days in the project schedule for completion of the Coordinator's review. Following this review, the Coordinator will provide the PI with NETC report covers and backs and instruct the PI to print seventy-five (75) copies of the Final Report.

**TECHNOLOGY TRANSFER STRATEGY:** NETC recognizes that research results are not automatically put into practice upon completion of the research and publication of the final report. Effective implementation is more likely when researchers and user agencies collaborate to plan for implementation. Therefore, NETC requires that all research proposals

for NETC funded research include an implementation plan and technology transfer strategy for incorporating the research results/products into practice. The implementation plan should be drafted by the PI in the final report, and should indicate the type of activities (workshops, demonstrations, etc.) that would be considered the most effective means for disseminating the results of the study to potential users. The PI will then need to work closely with the Technical Committee members to tailor the implementation plan to each DOT with a one page summary of the tasks and schedule of activities that should be carried out by the Technical Committee after the research project is complete. Additionally, the NETC requires that each project include a Tech Transfer Toolbox as a deliverable. The toolbox will include a one page fact sheet, a project poster, and a recording of a project presentation. Implementation of the research results should be viewed as a priority in the scope of work.

**FUNDS AVAILABLE: \$ 150,000**

**TIME TO COMPLETE: 18-24 months** (including preparation and review of final report).

The time to complete should be limited when feasible. If the scope of work dictates a lengthy project duration, consider proposing a multi-phased project.

**DEVIATION FROM THE SCOPE OF WORK:** In the event that the proposer deems it necessary to deviate from the Scope of Work (Cost, Principal Tasks, Time to Complete, etc.) in order to accomplish the objectives of the research project, such deviation should be noted and the reasons clearly stated in the proposal.

## NEW ENGLAND TRANSPORTATION CONSORTIUM PROPOSAL PREPARATION GUIDELINES

The proposal should be a well thought-out document that establishes in clear, concise terms the necessity of the research undertaking, definite project objectives, and a systematic work plan designed to attain the project objectives. The proposal should contain, but is not limited to, the following:

1. **Project Identification:** The project number, title and name or names of the principal investigator(s) [P.I.(s)]. Resumes of the principal investigator(s), including a description of the P.I.'s related research and publications, should be included as an appendix to the proposal.
2. **Significance of the Problem:** A clear definitive statement of the problem and its significance.
3. **Objectives of the Research:** In clear, concise terms, state the objectives of the proposed work.
4. **Methodology:** A description of the major tasks that will be undertaken to complete the proposed work. A number and title should be assigned to each task followed by a description of the methodology to be used in carrying out the task.

*NOTE: Since the NETC recognizes that research results are not automatically put into practice upon completion of the research and that implementation is more likely when researchers and user agencies collaborate to plan for implementation) NETC requires that all research proposals include a technology transfer and implementation plan for incorporating the research results/products into practice.*

5. **Schedule of Major Activities:** To allow for flexibility in the project start date, the schedule should be generic and not refer to particular months or a particular year. The schedule should show, in terms of elapsed time (number of months or weeks) from the start of the project, the planned start and completion of each of the major tasks described in the methodology and the following tasks:
  - **Submission of Quarterly Progress Report to Coordinator:** Quarterly Progress reports are to be submitted electronically to the NETC Coordinator for distribution to the Project Technical Committee no later than three (3) working days after the end of each calendar quarter.
  - **Submission of Draft Final Report to Project Technical Committee for Review:** Sixty (60) days are to be allowed for completion of the review of the Draft Final Report and resolution of review comments.
  - **Preparation of Final Report:** Ninety (90) days following completion of the review of the Draft Final Report are to be allowed for preparation of the final report and submittal to the NETC Coordinator.
6. **Budget and Total Cost:** If the cost of the proposal exceeds the "Funds Available", as given in the Scope of Work, an explanation should be provided. In the event that this proposal is selected for funding, the proposal budget will be incorporated into the funding agreement. Invoices for project costs will be reviewed against the proposal budget for consistency. Therefore, it is the responsibility of the Principal Investigator to insure that the proposal's budget categories are consistent with the categories that will be used for invoicing project costs. Principal Investigators are encouraged to break their costs down into lump sum invoices that correspond to major task deliverables, with the final report delivery constituting 20% of the total project budget.

## NEW ENGLAND TRANSPORTATION CONSORTIUM PROPOSAL EVALUATION GUIDELINES

- 1. Understanding of the Problem:** A clear and succinct statement and understanding of the problem and the research objectives is desired. A review of the present state-of-the-art and a description of how the proposed work will create new knowledge and benefit the New England Transportation Consortium should be presented
- 2. Research Approach:** The evaluation of the research approach will consider consistency with the objectives and the scientific and practical aspects of the research methodology. This evaluation will include such items as the approach to data collection, cooperative features, innovative concepts, and reliability of equipment proposed for use. Consideration will also be given to whether or not the approach is sufficiently detailed, both in terms of work and budget allocations by tasks.
- 3. Application of Results:** The evaluation will include a realistic appraisal of the prospects for successful accomplishment of project objectives. The evaluation will consider the statements in the proposal indicating the manner in which the anticipated results would be reported and how they could be used to improve transportation engineering or transportation evaluation practices; e.g., mathematical models, design techniques, field or laboratory test procedures, changes in highway specifications, impact methodologies, etc. Consideration will also be given to whether or not there might be any financial or institutional barriers to implementation of products from the research.
- 4. Qualifications of Principal Investigator(s):** Proposals are desired from individuals having demonstrated capability and expertise in the subject problem area. The evaluation will be based on the evidence contained in the proposal pertaining to both the experience and the indicated amount of effort by the principal investigator(s).
- 5. Facilities and Equipment:** The evaluation will be based on the evidence contained in the proposal. It is important to consider whether facilities and equipment are actually available or are proposed to be purchased or built. The proposal budget often provides some insight into this situation.

**NEW ENGLAND TRANSPORTATION CONSORTIUM  
PROPOSAL SCHEDULE  
Project 15-2**

<b>ITEM</b>	<b>COMPLETION DATE</b>
Deadline for Questions about the Scope of Work.....	June 29, 2016
Deadline for Coordinator's receipt of proposals.....	July 22, 2016
Coordinator forwards proposals to Project Technical Committees for evaluation.....	July 27, 2016
Deadline for Coordinator's receipt of Project Technical Committees' evaluation of proposals and recommendation of award .....	August 24, 2016
NETC Coordinator forwards Project Technical Committees' recommendations of award to NETC Advisory Committee for action .....	August 2016
NETC Coordinator notifies Principal Investigators and Project Technical Committees of NETC Advisory Committee's action on award of funding and initiates preparation of the project agreement. ....	September 2016
Target date for start of project .....	November 2016

## **NETC TECHNICAL COMMITTEE CHAIRPERSON**

### **NETC 15-2:**

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