



**REGION 2
UNIVERSITY TRANSPORTATION RESEARCH CENTER
RFP COVER SHEET**

Title: Using Lighting to Alter Driver Behavior

RFP Number: C-06-36

Sponsor: NYSDOT

Date Issued: March 2, 2009

Draft Budget Due at UTRC: **April 10, 2009** (send to ckamga@utrc2.org)

Final Proposal Due at UTRC: **April 14, 2009** (submit through the UTRC Online Submission System at www.utrc2.org)

RFP Closing Date: April 14, 2009 at 5:00 PM

If you plan to apply:

Please contact Penny Eickemeyer at peickemeyer@utrc2.org (cc: ckamga@utrc2.org) to let us know you are assembling a proposal. We will make sure you receive any additional information that becomes available about this RFP.

Proposal submission guidelines:

Please submit your proposal electronically to UTRC at www.utrc2.org. All proposals must include the UTRC cover page (<http://www.utrc2.org/research/assets/Technical-CoverSheet.doc>)

We will confirm that the proposals make comparable budget assumptions and will deliver the electronic proposals to the sponsoring agency by the closing date.

Funding available:

Up to \$210,000 is available from NYSDOT. Facilities and Administrative Costs (or Indirect Costs) charged by academic institutions are included in the above amount.

Budget forms can be downloaded at <http://www.utrc2.org/research/assets/budget-Template.xls>

For questions about this RFP, please contact:

Paul Hoole, Director
Research and Policy Studies Section, 6th Floor
New York State Department of Transportation
50 Wolf Road, Albany, NY 12232

For questions about budget preparation, please contact: Camille Kamga, ckamga@utrc2.org



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We will confirm that the proposals make comparable budget assumptions and will deliver the electronic proposals to the sponsoring agency by the closing date.

Funding available:

Up to \$210,000 is available from NYSDOT. Facilities and Administrative Costs (or Indirect Costs) charged by academic institutions are included in the above amount.

Budget forms can be downloaded at

<http://www.utrc2.org/research/assets/nysdotbudgetproposal.xls>

For questions about this RFP, please contact:

Paul Hoole, Director
Research and Policy Studies Section, 6th Floor
New York State Department of Transportation
50 Wolf Road, Albany, NY 12232

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Request for Proposals
SPR # C-06-36: Using Lighting to Alter Driver Behavior
March 2, 2009

RESEARCH PROBLEM STATEMENT

In locations where an appropriate lighting system is used to impart information to drivers, the impressions of lane width and speed change can be conveyed. In response to these impressions, drivers may either maintain their speed or slow down, depending on the impression imparted (i.e., apparent lane narrowing or speed increase may cause drivers to slow down and apparent lane widening or speed decrease may cause drivers to maintain speed). These positive changes in the driver's behavior can increase the safety of traffic operations and improve traffic flow. Causing drivers to reduce speed when appropriate (such as on ramps) may increase safety by reducing the number of incidents and the residual delays they cause. Encouraging drivers to maintain speed, at appropriate times of the day, may reduce chronic congestion in areas prone to traffic back-ups.

Rollover type accidents commonly occur when truck drivers enter a curve at too fast a speed. This is usually seen on ramps where sharp curves are often needed to connect roadways. A lighting configuration illuminated at the approach to an interchange ramp, with a history of rollover incidents, could give the driver the illusion that the lane is narrowing and/or that their speed is increasing. It is this illusion that should encourage drivers to reduce their speed sooner and thus will ultimately avoid a rollover type incident.

Traffic congestion is a nationwide problem that occurs daily during peak times of high traffic volumes. This congestion is a major contributor to rear end type accidents along these roadways. If a lighting configuration was located at a congestion point and illuminated during times of congestion it could give the driver the illusion that the lane is widening and/or that their speed is slowing thus encouraging drivers to better maintain their speeds and ultimately eliminating or reducing the congestion and its adverse effects. During times of normal traffic flow the lighting can be turned off.

OBJECTIVES

This project will plan and research the idea of using a lighting system to alter the way a driver reacts and responds to their surrounding environment. Two locations within the Albany, N.Y., area will be chosen. At one location the research will concentrate on the design of a lighting system that is effective in getting drivers to slow down. At the other location, the research will concentrate on the potential effectiveness of an additional lighting system design that would eliminate congestion by getting drivers to maintain their speeds. The project will include researching appropriate lighting techniques at each site; identifying and selecting the most appropriate lighting techniques; planning the installation of each lighting system, which would include conducting traffic engineering analyses; design, develop, and install the lighting system for testing; monitoring the performance of both the vehicles and the lighting systems; and finally evaluating, reporting, and presenting on the lighting system's effectiveness at the two test locations.

PROPOSED RESEARCH TASKS

Task descriptions are intended to provide a framework for conducting the research. NYSDOT 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 research period. Proposals must present the proposer's current thinking in sufficient detail to demonstrate their understanding of the issues and the soundness of their approach to meeting the research objectives.

The proposed project will be ideally accomplished under two phases which will run simultaneously following the Pilot Study. Phase 1 will address reducing speeds in order to prevent rollover type crashes. Phase 2 will address speeds in relation to the issue of chronic traffic congestion.

Preliminary Phase – Pilot Study

- **Task 1**

Preliminary work will be needed to identify the appropriate lighting configurations and technologies for use in this project. The results of this preliminary effort will be useful for both Phases of this project and should include the following:

- A laboratory study to examine the impressions observers feel with respect to apparent lane width and speed for different lighting configurations. Several hypotheses will be tested regarding the impression of speed and lane width from visual clues. Variables, such as the distance between light fixtures, and the angle between the light fixtures and the lane lines, should be examined. The laboratory study should be performed to scale using roadway models, computer simulation, or a combination of both.
- Working with the lighting industry and other lighting vendors to identify, acquire, and test the lighting components and controls necessary to implement the developed lighting designs. In particular, solid state (i.e., LED) lighting technology shall be examined due to its low energy requirements, long life, and durability.
- Running a pilot study by installing a small scale lighting system at a controlled test site. The goal of this pilot study shall be to: examine component installation, identify potential construction or commissioning issues, and examine system maintenance and reliability. If needed, the NYSDOT may be available to assist with the installation of this small scale lighting system.

Phase I - Rollover Incident Reduction at an Interchange Ramp

- **Task 2: Lighting Design and Development**

Coordinate with the Region 1 NYSDOT Office to identify an interchange ramp located within the Capital District that is specifically prone to truck rollovers, such as Westbound I-90 to Northbound I-87, Southbound Rt. 9 to Southbound I-87, or Westbound Alt. Rt. 7 to Northbound I-87. Once a site is identified, a lighting system will be developed that lends itself to altering a driver's behavior by encouraging speed reduction. Two approaches should be considered in the development of a lighting system: the conveyed illusion of lane narrowing and the conveyed illusion of increased speed. Several configurations of the appropriate lighting approach may be generated in order to test different hypotheses regarding lighting information and driver behavior. Site visits and video observation will be used to determine which approach is most appropriate for the test site. It is envisioned that the lighting system will be designed not to be in the pavement, but rather, raised above the roadway on new or existing marking posts or rails.

- **Task 3: Installation of Lighting System**
The lighting system is to be installed at an agreed upon location with NYSDOT. NYSDOT will in turn aid with the installation of the lighting system at the test site location. This will include reviewing construction drawings and documentation, meeting with the installers, and on site inspection. A plan for commissioning the system once installed will be needed prior to installation.
- **Task 4: Observe Lighting System Performance**
Observations and measurements of the lighting system's performance shall be documented. This includes taking measurements of traffic speeds, traffic volumes, and subjective impressions of drivers in order to study the lighting system's effects on reducing rollover type accidents. Truck rollover accident history will also be compared for a period before and after lighting system installation. Photometric measurements and site observations shall be performed periodically to examine the installation, maintenance and reliability of the lighting system for this large scale application.
- **Task 5: Develop Recommendations**
Results of this study should be generalized in order to develop recommendations for the use of a lighting system that encourages drivers to *reduce* speed in specific areas thus reducing rollover type crash incidents along New York State roadways.

Phase II - Congestion Mitigation

- **Task 2: Lighting Design and Development**
Coordinate with the Region 1 NYSDOT Office to identify an appropriate location, within the Capital District, that is specifically prone to chronic congestion, such as the Southbound I87 approach to the Twin Bridges. Develop the lighting system in order to facilitate traffic flow at the congestion point. Two approaches should be considered: the illusion of lane widening and the illusion of decreased speed. Several configurations of the appropriate lighting design may be generated in order to test different hypotheses regarding lighting information and driver behavior. Site visits and video observation will be used to determine which approach is best for the test site. It is envisioned that the lighting system will be designed not to be in the pavement, but rather, raised above the roadway on new or existing marking posts or rails.
- **Task 3: Installation of Lighting System**
The lighting system is to be installed at an agreed upon location with NYSDOT. NYSDOT will in turn aid with the installation of the lighting system at the test site location. This shall include reviewing construction drawings and documentation, meeting with the installers, and on site inspection. A plan for commissioning the system once installed will be needed prior to installation.
- **Task 4: Observe Lighting System Performance**
Observations and measurements of the lighting system's performance shall be documented. This includes measurements of traffic speeds, traffic volumes, and subjective impressions of drivers to study the lighting system's effects on congestion mitigation. One aspect that should be examined closely is whether the lighting mitigates congestion in the entire area or simply moves the congestion point to another location along the roadway. Photometric measurements and site observations shall also be periodically performed to examine the installation, maintenance and reliability of the lighting system for this large scale application.

- **Task 5: Develop Recommendations**

Results of this study should be generalized in order to develop recommendations for the use of a lighting system that will encourage drivers to *maintain* speeds in specific areas helping to reduce chronic congestion on New York State roadways.

Final Report

- **Task 6: Final Report / PowerPoint Presentation / Training**

Prepare a final report detailing all of the work performed in the Pilot Study and Phases I and II. This report will be suitable for publication in whole or in part by the Transportation Research Board and that can be used by the NYSDOT, FHWA, and AASHTO. Conclusions and recommendations for future work shall be provided within the report.

Develop a PowerPoint presentation that exemplifies the research project, promotes the most effective use of the lighting system on various traffic flows, and instructs on the installation and operations of the lighting system. It is anticipated this presentation will be given by the consultant as a training tool for NYSDOT staff. CD/DVD's of the PowerPoint should be provided for distribution.

RESEARCH PRODUCTS

- Final Report – See Attachment “A” for requirements of the final report
- PowerPoint presentation
 - CD/DVD's for distribution
 - Training for various NYSDOT staff
- Lighting System
 - Standard Specifications required for the Lighting System(s)
 - Standard Design and Installation Details for Lighting System(s)

URGENCY / EXPECTED BENEFITS

It is expected that the results of this project will allow for several benefits including safety and environmental improvements. It is anticipated that various innovative lighting configurations will provide a reduction in rollover type accidents along interchange ramps and will also be used to eliminate areas of chronic traffic congestion.

FUNDING

\$210,000 has been budgeted for this project, exclusive of administrative fees. New York State believes this is a reasonable estimate for the total cost of the work being requested.

The net cost to New York State is one of the selection criteria. When compared to competing proposals, a proposal that requires fewer New York State dollars will receive a higher score on the cost component of the selection criteria. The value of New York State funds required could be reduced through efficiencies (fewer hours per task and/or lower cost per hour) or through cost-sharing where other funds substitute for New York State funds.

Proposals with a New York State cost over the budgeted amount will also be considered, provided the New York State cost, exclusive of administrative fees, does not exceed the

budget estimate by more than 10%. (Note: Cost-sharing funds may increase the total project cost further.)

If a sufficient number of potential Principal Investigators indicate in writing that they believe the research cannot be reasonably conducted within these funding constraints and there are only a limited number of proposals submitted within the funding constraints, New York State reserves the option of not proceeding with the work or revising the budget estimate and issuing a new Request for Proposals. Potential Principal Investigators who believe the budget estimate is unreasonable should write to:

Paul Hoole, Director
Research and Policy Studies Section, 6th Floor
New York State Department of Transportation
50 Wolf Road
Albany, NY 12232

RESEARCH PERIOD

It is expected that this research will require 16 months to complete. Phase I and Phase II of the project are anticipated to be completed simultaneously.

SPECIAL NOTES

- **Proposals are due by close of business, April 14, 2009.** This Request for Proposals (RFP) is being offered to the University Transportation Research Center (UTRC) members only. Members should submit proposals through the Administrator of this consortium. The receipt of an electronic PDF copy of the proposal by NYSDOT on or before the above due date is satisfactory, providing hard copies follow within a week.
- **Ten (10) hard copies** of the proposal should be provided.
- Proposals should indicate direct and indirect costs, hourly rates and hours by task, travel costs, and material costs to assist NYSDOT in understanding how the total cost for the work was estimated. The winning proposal will result in a fixed cost contract based on details provided.
- Please provide a Budget Chart which shows for each task the deliverable and cost. Task headings in the Budget Chart are to match the scope task headings.
- Please include a Gantt Chart, showing the duration (start to finish) for each task in terms of months (i.e. Month 1, Month 2, etc) since the actual start date is an estimate.
- If the proposal involves a joint venture or sub-consultants, it must be clear as to how tasks will be distributed or shared in the scope of work.
- **The designated contacts for this solicitation are Paul Hoole and Deborah Mooney.** Questions seeking clarification on the RFP will be accepted up to three (3) weeks prior to the due date for proposals and should be e-mailed to: phoole@dot.state.ny.us and dmooney@dot.state.ny.us

- Principal Investigators should be familiar with and follow the requirements of New York State with regard to the *Compliance Procurement Lobbying Law* and consultant contract procurement. Information can be found on the NYSDOT website under Business Center / Doing Business with NYSDOT / Consultants / Non-Architectural Engineering Information / Active Solicitations:
<https://www.nysdot.gov/main/business-center/consultants>
- The final report on the research will be expected to contain, at a minimum, the information described in Attachment “A,” *Requirements for the Final Report*.

CRITERIA FOR SELECTION

- **Expertise / Understanding / Approach (Weight: 70%)**
Expertise: What is the extent of the relevant experience of the Principal Investigator? What is the extent of the relevant experience of others who will be involved in the research?

Understanding of the Problem: Does the proposal reflect an understanding of the problem and its relevance to New York State? Does the proposal reflect an understanding of existing data and the current state of knowledge in New York State?

Approach: Is the proposed approach clear, especially in how it will build upon and enhance the state of knowledge in New York State? Will it yield the deliverables called for in the RFP? Does the approach show insight that will lead to results that will sufficiently assist New York State in addressing the problem? Is the proposed approach practical given the schedule and total budget? Will the proposed research draw upon all critical sources of pertinent information?
- **Investigators Previous Experience with Similar Projects (Weight 10%)**
 Successful completion of previous projects by the Investigator(s) will be considered. A percentage of the selection criteria will be given to those Principal Investigator(s) who can show that they have successfully conducted previous research specifically regarding the effects of lighting on driver’s behavior.
- **Cost to New York State (Weight 20%)**
 The lower the New York State cost, the greater consideration a proposal will receive.

Requirements for the Final Report

Copies of Final Report – **Twenty-five (25)** hard copies of a bound, final report shall be provided at the conclusion of the research study. An electronic PDF copy of the report is required as well.

Required Organization for the Final Report

Title Page - that contains:

- The research number (C#) assigned by the Research & Policy Studies Section of the Policy and Planning Division;
- The name of the research study as stated in the Task Assignment (contract);
- The words “Final Report;”
- The date (month & year) the Final Report is completed;
- The name(s) of the Consultant(s) / Principal Investigator(s), along with the name(s) of the organization(s) they represent and their address(es); and,
- If the Final Report has a security classification, it shall be noted on the title page.

Disclaimer - as follows:

DISCLAIMER

The contents of this report reflect the views of the author who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the New York State Department of Transportation, the United States Department of Transportation, or the Federal Highway Administration. This report does not constitute a standard, specification, regulation, product endorsement, or an endorsement of manufacturers.

Form DOT F 1700.7 – A copy of USDOT form DOT F 1700.7

Executive Summary

Introduction – a discussion of the problem, its background, a concise history of research previously completed on the topic, and a discussion of what NYSDOT policies, procedures, and practices are currently in place related to the research topic.

Research Method – a description of the methods used in conducting the research.

Findings and Conclusions – a discussion on the analysis of the data (findings) and the conclusions reached based on the findings. Suggestions for additional research, if appropriate, would appear in this section.

Statement on Implementation – a statement on the potential for implementation, along with what resources and actions will be required to have the benefits of the research fully achieved.

Appendices – as appropriate