



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

Title: Nighttime Highway Construction Illumination

RFP Number: C-08-14

Sponsor: NYSDOT

Date Issued: November 18, 2009

Final Proposal Due at UTRC: **January 13, 2010** (submit through the UTRC Online Submission System at www.utrc2.org)

RFP Closing Date: January 13, 2010 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 \$300,000 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:

Deborah Mooney
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

New York State Department of Transportation
Request for Proposals
SPR # C-08-14: Nighttime Highway Construction Illumination
November 18, 2009

RESEARCH PROBLEM STATEMENT

Department nighttime highway construction can introduce unexpected bright light sources, causing issues with reduced visibility for both drivers and workers due to glare and non-uniform illumination. These problems combine with other work zone safety issues including higher speeds due to lower volumes, interrupted traffic flow, impaired drivers (alcohol, drugs or fatigue), and fatigued workers. Improved lighting, signals, demarcation, and signage can reduce traffic disruption and provide a safe and efficient work area.

OBJECTIVES

The overarching goal of this project is to design and implement a new “lighting system continuum” to efficiently and effectively illuminate nighttime highway construction, control disabling glare and assist the motorists’ and workers’ eyes to quickly adjust to changing light conditions. The objectives of the project are to address and resolve the multiple issues of illumination use, maintenance, cost effectiveness, and environmental issues for illuminating nighttime highway construction, while ensuring compatibility of supporting signs, channelizing devices, warning lights and vehicle/equipment delineation, so workers and drivers can adequately see, perceive, and react to potential and impending hazards for safe nighttime highway construction work.

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.

Research tasks include determining needed illumination; evaluation of illumination sources; and designing a continuum illumination with transition from darkness to illuminated areas, continuous illuminated areas and from illuminated areas to darkness. Research will also determine the most effective materials ensuring visible and legible signs, channelizing devices, and construction vehicles/equipment to effectively illuminate nighttime construction work areas without disabling workers or drivers with high luminance light.

- Determine needed illumination for nighttime work
Determine the necessary nighttime highway construction illumination levels for workers to efficiently perform night work activities and for workers and the traveling public to adequately see, perceive, and react to potential and impending hazards. This should be accomplished through laboratory or field studies, using subjects that are representative of highway workers and the driving population in terms of visual ability and age.

- Determine practical illumination sources to reduce glare for nighttime work
Determine the most practical and environmentally benign light sources, fixtures, materials, and techniques for nighttime highway construction work areas that effectively illuminate the work zone without causing disabling glare and allow workers and traveling public to adequately see, perceive, and react to potential and impending hazards. This will be accomplished through

photometric analysis, calculation of light levels using photometric accurate lighting software, and validation using mock-up lighting installations of different light sources and configurations.

- Design continuum illumination system

Design a continuum illumination system for nighttime highway construction work, consisting of a gradual transition from dark conditions, to sporadic bright illumination conditions, to consistent bright illumination, and gradually transitioning back from bright illumination conditions to dark conditions. This illumination design should be based on the most practical use of existing or new illuminating technologies to enable motorists, including passenger vehicles and large trucks, to adequately see, perceive, and react to potential and impending hazards entering into, traveling through and exiting safe nighttime highway construction work areas. The system should also provide sufficient illumination for adequate visibility of nighttime construction workers as identified in previous tasks.

- Determining most visible and legible signs for highway construction

Determine the most practical, visible and legible regulatory, warning and information signs for passenger vehicles and large trucks in construction work areas utilizing new technologies including prismatic retro-reflective sheetings and phosphorescent coatings. This will be accomplished through laboratory or field studies using human subjects that are representative of the driving population.

- Determining retro-reflective sheeting for channelizing devices used at night

Identify the most effective commercially available retro-reflective sheeting(s) that provide the best visibility for passenger vehicles and large trucks without creating obstructing glare to workers, equipment and objects behind the channelizing devices in nighttime highway construction areas. Determine the practicality and usefulness of using phosphorescent materials. This will be accomplished through laboratory or field studies using human subjects that are representative of the driving population.

- Design of vehicle/equipment warning lights and delineation materials

Through laboratory or field studies using human subjects representative of highway construction workers, determine which, where, and when warning lights and delineation markers are most effective at warning workers of slow moving construction vehicles and equipment in a construction work area. Determine how to minimize their distracting effects, including guidance as to when they should not be used. Determine the most effective warning lights that provide the highest visibility and identify their best location on slow moving or stationary construction vehicles and equipment. Energy usage and maintenance costs and requirements should be taken into account. Determine the practicality of utilizing phosphorescent and retro-reflective materials to delineate and accentuate construction vehicles/trucks/equipment.

- Design an integrated work zone lighting and marking system

Design an integrated work zone lighting and marking system that incorporates research from the previous tasks on human factors, lighting technology, and product development to develop guidelines for NYSDOT. The system should integrate visual design techniques, signals, markers, and signage to protect drivers and staff at work zones and to promote safe navigation by drivers through the nighttime work zone.

RESEARCH PRODUCTS

- A report detailing increased functionality of nighttime highway construction illumination for workers to efficiently perform night work activities, as well as for workers and the traveling public to adequately see, perceive, and react to potential and/or impending hazards for safe nighttime highway construction work areas.
 - Milestone 1 – 12 months
- A report determining the viability of the different illuminating sources for nighttime highway construction work areas and continuum illumination design for workers to efficiently perform night work activities, as well as for workers and the traveling public to adequately see, perceive, and react to potential and/or impending hazards for safe nighttime highway construction work areas.
 - Milestone 2 – 24 months
- A report determining the most practical, visible and legible regulatory, warning and information signs in work zones; channelizing devices that provide the best visibility for passenger vehicles and large trucks without obscuring equipment and objects behind the channelizing devices in nighttime highway construction areas; warning lights that are most effective to accentuate slower moving construction vehicles and equipment in a construction work area; and retro-reflective delineation needed to effectively accentuate slower moving or stationary construction vehicles or equipment in nighttime construction work areas. Also, provide guidelines on integrating visual design techniques, illumination, signals, markers, and signage to produce safe work zones.
 - Milestone 3 – 36 months

URGENCY / EXPECTED BENEFITS

The research products will result in guidelines for increasing the functionality and performance of nighttime highway construction lighting, by providing details for the effective design of nighttime highway construction illumination systems. The guidelines will address illumination intensity and glare concerns, the most practical illuminating sources for nighttime highway construction work areas and continuum illumination design for workers to efficiently perform night work activities. They will also address how to determine the most practical, visible and legible signs, channelizing devices and vehicle/equipment accentuation for workers to efficiently perform night work activities, as well as for workers and the traveling public to adequately see, perceive, and react to potential and impending hazards for safe nighttime highway construction work areas.

RESEARCH PERIOD

36 months

FUNDING

\$300,000 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:

Deborah Mooney
Research & Policy Studies Section, 6th Floor
New York State Department of Transportation
50 Wolf Road
Albany, NY 12232

SPECIAL NOTES

- **Proposals are due by close of business, Wednesday, January 13, 2010.**
This Request for Proposals 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.
- **Seven (7) 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 final report on the research will be expected to contain, at a minimum, the information described in Attachment A, *Requirements for the Final Report*.
- **The designated contact for this solicitation is 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: 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>

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. These projects should be in the area of expertise required for successful completion of this project, such as industrial, life science, behavioral, materials, environmental, highway construction lighting and electrical engineering.
- **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 – **Fifteen (15)** hard copies of a bound, final report shall be provided at the conclusion of the research study. An electronic PDF copy of the final report is required as well.

Required Organization for the Final Report

Title Page (front cover) - that contains:

- The research number (C#) assigned by the Research & Policy Studies Section of the Policy & 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 (inside cover) - as follows:

DISCLAIMER

This report was funded in part through grant(s) from the Federal Highway Administration, United States Department of Transportation, under the State Planning and Research Program, Section 505 of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the United States Department of Transportation, the Federal Highway Administration or the New York State Department of Transportation. This report does not constitute a standard, specification, regulation, product endorsement, or an endorsement of manufacturers.

Form DOT F 1700.7 – complete the standard form used throughout the country to summarize federally funded transportation research

Table of Contents

Executive Summary - a non-technical summary of the research and its findings

Introduction – a discussion of the problem, its background, and 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 brief statement on what would need to occur to introduce the results into practice, and a discussion on possible technology transfer activities

Appendices – as appropriate