



# RESEARCH PROJECT CAPSULE [20-3SA]

June 2021

TECHNOLOGY TRANSFER PROGRAM

## Minimum Intersection Illumination

### JUST THE FACTS:

**Start Date:**

May 1, 2021

**Duration:**

18 months

**End Date:**

October 31, 2022

**Funding:**

SPR: TT-Fed/TT-Reg-5

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### POINTS OF INTEREST:

Problem Addressed / Objective of  
Research / Methodology Used /  
Implementation Potential

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### PROBLEM

Roadway lighting has a significant impact on traffic safety. According to the National Highway Traffic Safety Administration (NHTSA), higher rates of traffic crash fatalities are recorded during late night or early morning hours than at other times of the day for all road users in both rural and urban locations. *The Federal Highway Administration (FHWA) Lighting Handbook* reports that nighttime fatality rates are three times the daytime rate, and that roadway lighting has resulted in a reduction of nighttime fatalities by up to 60%.

The handbook provides warranting methods to be used to determine lighting requirements for freeways and interchanges. Full lighting is recommended for signalized intersections on collector, arterial, and local roads. Recommendations for unsignalized intersections are based on geometric, operational, environmental, and crash factors.

There is no current policy mandating lighting at intersections in Louisiana. This study will collect information to be considered during development or implementation of an intersection lighting policy.

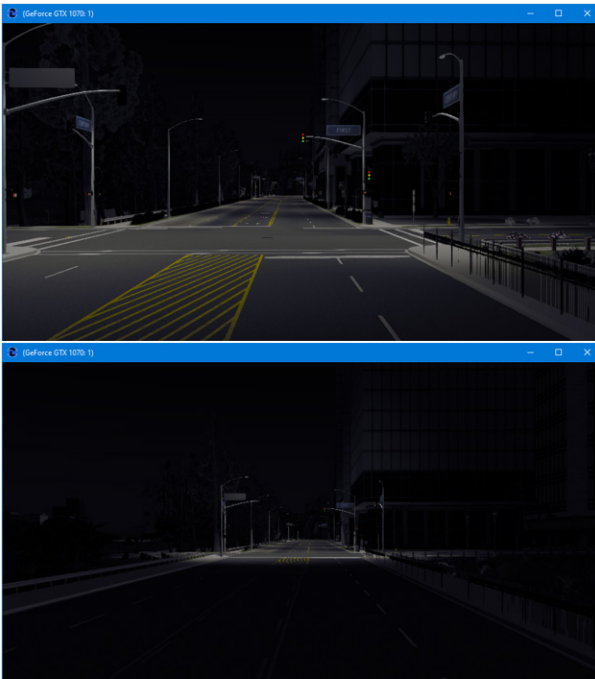
### OBJECTIVE

The primary objective of this project is to examine whether Louisiana has a traffic safety problem due to lack of lighting at its intersections, particularly at roundabouts and stop-controlled intersections in rural and suburban areas. This research will also undertake a nationwide survey of state DOTs to document lessons learned from those who have adopted lighting policies or other low-cost countermeasures at roadway intersections.

Through a driving simulator experiment, this study will investigate if lighting has significant impact on drivers' ability to safely perform the driving task at intersections. An analysis will be conducted to assess the costs and benefits that result from providing partial or full lighting at intersections considering implementation and maintenance costs along with expected benefits from reducing the quantity and severity of traffic crashes.

### METHODOLOGY

An in-depth literature review will be conducted to identify recent and most relevant studies pertinent to the scope of this research. The research team will design a questionnaire survey for distribution to state DOTs. The survey will seek information



**Figure 1. Examples of driving simulator scenarios**

regarding lessons learned, such as the effectiveness of countermeasures for reducing the likelihood of traffic crashes due to lack of lighting.

A driving simulator experiment will be developed using the LSU driving simulator, assessing the impact of an intersection's lighting upon driver behavior and ability to drive safely while accounting for lighting in the surrounding area. Multiple scenarios will be designed, including different combinations of lighting condition, traffic volume, and roadway geometry. Subsequently, a sample of Louisiana drivers from different age groups will be invited to participate in the experiment.

The research team will also perform in-depth crash analysis for the most recent five years of crash data to examine whether Louisiana has a traffic safety problem due to lack of lighting at its intersections. Factors affecting the occurrence and severity of nighttime crashes at intersections will be identified.

The cost of engineering to develop an adequate lighting plan as well as the costs of equipment, installation, and maintenance of lights at all intersections may prove to be very expensive. Further analysis will evaluate these costs and the expected benefits from providing lighting at intersections.

## IMPLEMENTATION POTENTIAL

The results obtained from this study will help when assessing if lack of lighting at intersections is a traffic safety problem in Louisiana. Policy makers will be provided with a summary of the issue, including which intersections present the most risk. Ultimately, DOTD will be guided by this research as decisions are made regarding implementation of any countermeasures.