

Project Title:           **C-08-14: Nighttime Highway Construction Illumination**  
PIN:                       R021.46.881  
Responsible Unit:     Engineering - Office of Construction  
Project Manager:     Méthé, Janice

### **Project Goal:**

The overarching goal of this project is to design and implement a new “lighting system continuum” to eliminate the blinding glare and assist the eyes to quickly adjust. In doing so, the project builds on itself by addressing and solving the aforementioned multi-layers of nighttime work zone glare issues. But, will translate and have major impacts with farther reaching implications addressing all forms of glaring illumination, i.e., street/traffic signal lights, street/traffic signs, including variable message boards, automobile/truck headlights, outdoor/indoor lighting etc. The goal of this project should also include ease of use and maintenance, as well as cost effectiveness, and the impact on all green issues, such as energy savings and cost savings.

1. Determining the necessary design of illumination, delineation, and/or hazard identification to provide workers and traveling public with the safe nighttime highway work zone.
2. Design all illuminating source for nighttime highway construction work areas with minimal glare.
3. Design a gradual transition from dark to bright illumination and back to darkness. Such a continuum illuminating design and use of illuminating technology is needed to enable motorists to clearly perceive and safely react to hazards.
4. Determine the most effective retroreflective sheeting(s) used for temporary road side signs to provide the best visibility and legibility for operators of passenger vehicles and large trucks traveling through the nighttime work zone.
5. Determine the most effective retroreflective sheeting(s) used for channelizing devices to provide optimum identification of traffic boundaries through a nighttime highway construction work zone for operators of passenger vehicles and large trucks. Yet enable high visibility of other vehicles, equipment, and/or workers near channelizing devices.
6. Determine the ideal color light(s) needed to identify nighttime construction vehicles/trucks/equipment that provide the highest visibility and identify the location of vehicle/truck/equipment with low energy usage and minimal maintenance.

### **Actions Proposed:**

#### *Determine needed illumination for nighttime operations:*

Determine the need and process to illuminate nighttime highway work areas. Determine the necessary illumination requirements for construction workers and traveling public to adequately see, perceive, and react to potential and/or impending hazards. The first step of this program is determining the necessary design of illumination, delineation, and/or hazard identification to provide workers and traveling public with a safe nighttime highway work zone.

#### *Evaluate illumination sources to reduce/eliminate glare:*

Illuminating nighttime highway construction work areas often has an effect on motorists entering a nighttime work zone where they experience blinding light and residual glare, while traveling from a very dark area into a very brightly illuminated area. Illuminating technology has progressed with new illumination sources, such as electrodeless lights and light emitting diodes. Current and new illuminating technologies need to be evaluated to identify the technology(s) that

will provide the needed illumination and minimal glare for safe nighttime highway construction. Glare obscures pavement markings and traffic drums, as well as conceals anything that may be in the dark including workers and equipment.

*Design continuum illumination:*

The design for a gradual transition from dark to bright illumination and back to darkness is needed. A continuum illuminating design, from research of new or use of the latest illuminating technology, to enable motorists to clearly perceive and safely react to potential hazards is needed. The design of nighttime highway construction illumination needs to address a new approach to gradually vary the illumination intensity to allow for motorists' eyes to become adjusted to the varying light conditions.

*Determining most effective retroreflective sheeting for signs used at night:*

The most effective retroreflective sheeting(s) used for temporary road side signs for nighttime construction work zones must be determined to provide the best visibility and legibility for operators of passenger vehicles and large trucks traveling through the work zones.

*Determining most effective retroreflective sheeting for channelizing devices used at night:*

In nighttime construction work zones, the most effective retroreflective sheeting(s) used for channelizing devices must be determined to provide the best visibility for operators of passenger vehicles and large trucks, and enable high visibility of other vehicles, equipment, and/or workers near channelizing devices.

*Design of vehicle/equipment warning lights:*

Determine when, where, and type of color light(s) needed to identify construction vehicles/trucks/equipment, whether within or adjacent to vehicles in traffic lanes conducting the road work operations. What color lights will provide the highest visibility and identify the location of vehicle/truck/equipment with low energy usage and minimal maintenance.

*Design of vehicle/equipment retroreflective delineation:*

Determine when, where and type of retroreflective delineation is needed to identify construction vehicles/trucks/equipment when within or adjacent to vehicles in traffic lanes conducting road work operations. Vehicles/trucks/equipment may be longitudinal or transverse to traffic lanes during nighttime construction operations and retroreflective delineation will accentuate the outline of the equipment for instant recognition.

**Anticipated Work Products and Accomplishments:**

The desired outcome of this project is to design a continuum type lighting system that:

1. Provides non-glare illumination for nighttime construction
2. Develops an ideal illumination source providing visibility and legibility with no glare
3. Defines or specifies a process to achieve transition illumination for approaching and exiting nighttime construction
4. Determines the most effective retroreflective sheeting(s) used for channelizing devices
5. Determines the most effective retroreflective sheeting(s) used for temporary road side signs
6. Develops effect and efficient light(s) needed to identify nighttime construction vehicles/trucks/equipment
7. Determine the most effective retroreflective delineation needed to accentuate the outline of the nighttime construction vehicles/trucks/equipment

**Proposed Budget:**    \$323,250