

# Smart Luminaire for Roadway Lighting

Many roadways are lit inefficiently and ineffectively with outdated equipment. The result is wasted energy, glare, light pollution, and light trespass. Several states now have or are considering legislation that specifies certain types of luminaires for new outdoor installations. Requiring specific equipment, however, limits options and may not provide the best solution to outdoor lighting problems. Better information about energy-efficient and effective roadway lighting is needed, as well as better luminaire designs. In response to this need, LRC researchers have designed a new roadway luminaire that combines energy efficiency with improved light control.

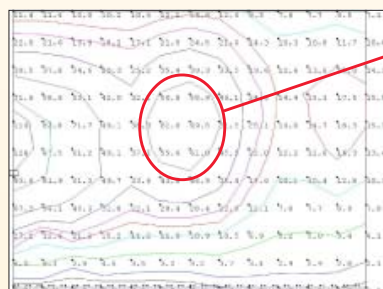


Prototype luminaire

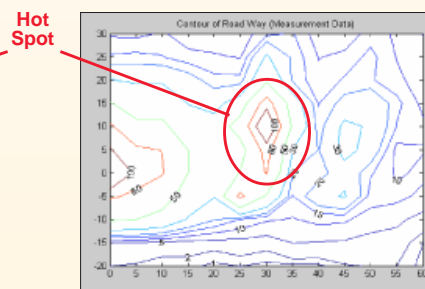
## Designing the luminaire

The LRC specified and designed two prototype luminaires to maximize performance and energy use and minimize light trespass, glare, and sky glow. Specifications were based on the performance of other luminaires and the desire to limit the light intensity emitted at different angles that result in negative lighting impacts.

Iso-illuminance plots were used to compare the design and the actual luminaire performance.



Simulated performance



Measured performance

## Field test

Prototype luminaires were fabricated from the designs and tested in the field. Researchers measured the illuminance on the ground for the two prototypes and compared the results with a simulated illuminance distribution developed with optical design software. The measurements for each luminaire showed good agreement with the predicted distribution: The location of the hot spot relative to the luminaire and the illuminance values on the ground closely matched the simulation.

The LRC presented the project findings and prototypes to a roundtable of government decision-makers and manufacturers. The designs are available from the LRC for any manufacturer interested in commercializing the fixtures.

## Specifications

### Performance

- 200-foot spacing, 30-foot height
- Type II distribution
- Meets most photometric requirements

### Glare

- Candela target is less than 10% (ideally 5%) of the lamp's lumens

### Light trespass

- Type II distribution
- Candela target along the road < 30%
- Candela target decreasing behind luminaire

### Uplight

- No light above 90°

### Source

- High-pressure sodium

## Sponsor

New York State Energy Research and Development Authority