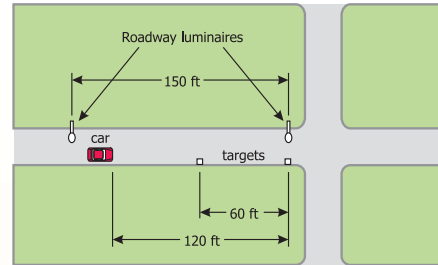


# Visibility from Vehicle Headlamps and Roadway Lighting

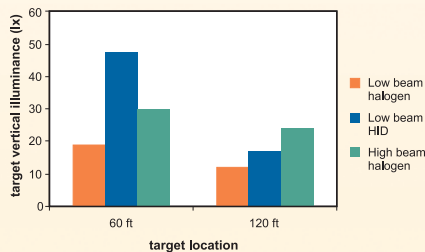
Illumination for vehicle drivers comes from two sources: headlamps and fixed roadway lighting. A recent study from the LRC shows that these sources contribute differently to visibility when driving at night. The study also shows the differential advantages of different headlamp beam patterns for different target locations where pedestrians might be encountered.



Scenario for visibility analyses

## Methodology

To compare the visibility conditions provided by three different headlamp systems and fixed streetlight conditions, researchers created three scenarios. Each scenario simulated a driver approaching an intersection where pedestrians might be near the roadway. The three scenarios included no roadway lighting, a single roadway luminaire at the intersection, and continuous roadway lighting provided by luminaires spaced 150 ft apart to meet Illuminating Engineering Society (IES) recommendations. In each of the three scenarios one of three vehicle lighting systems were modeled: low-beam halogen, low-beam high-intensity discharge (HID), and high-beam halogen headlamp beam patterns. Researchers used the relative visual performance (RVP) model to evaluate each test case.



Vertical illuminances on the pedestrian targets from each headlamp beam pattern

## Sponsors

National Cooperative Highway Research Program  
Transportation Lighting Alliance

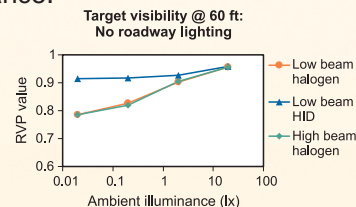


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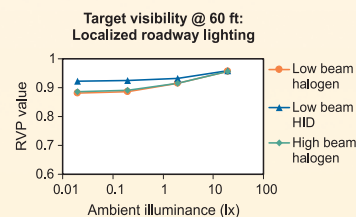
## Results

For targets close to the vehicle (60 ft), located at more peripheral angles, the HID headlamp beam pattern provided greater target luminance and visual performance (with little or no fixed roadway illumination). For targets furthest from the vehicle (120 ft), the high-beam headlamp pattern provided the highest level of visual performance. Differences among headlamp beam patterns were smaller when roadway lighting was present.

In urban locations that have high levels of ambient lighting, both roadway lighting and vehicle lighting had less influence on visual performance.



Visual performance for pedestrian targets at 60 ft with no roadway lighting present for each headlamp beam pattern evaluated



Visual performance for pedestrian targets at 60 ft with a single roadway luminaire present for each headlamp beam pattern evaluated

Lighting  
Research Center