

JERSEY DOT'S

"Turning Problems into Solutions"



Tech Brief

Design and Evaluation of Effective Crosswalk Illumination

FHWA-NJ-2009-003

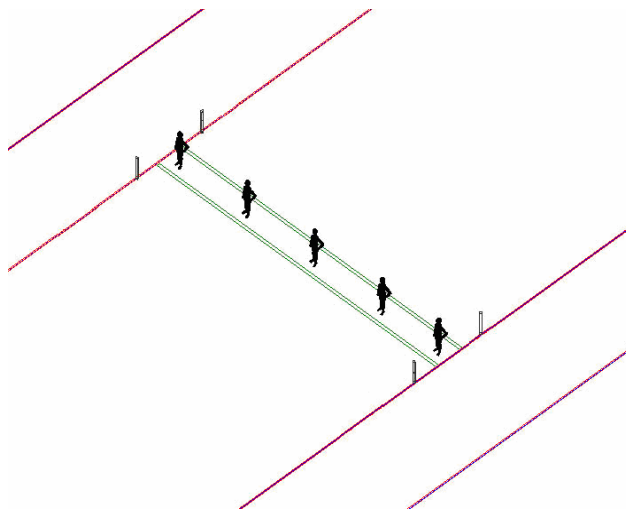
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WHAT'S THE PROBLEM?

- Pedestrian-related crashes result in more than a thousand deaths annually in the United States
- More than half of the pedestrian deaths in New Jersey occurred when pedestrians were crossing the road or when they were at intersections
- Reduced visibility at night is part of the reason nighttime crash rates are about three times higher than daytime crash rates
- Current lighting practices at crosswalks do not always make pedestrians stand out visually from the rest of the roadway environment

WHAT'S OUR SOLUTION?

- After evaluating several different lighting configurations in terms of visibility and cost, we recommended a bollard-based lighting system:

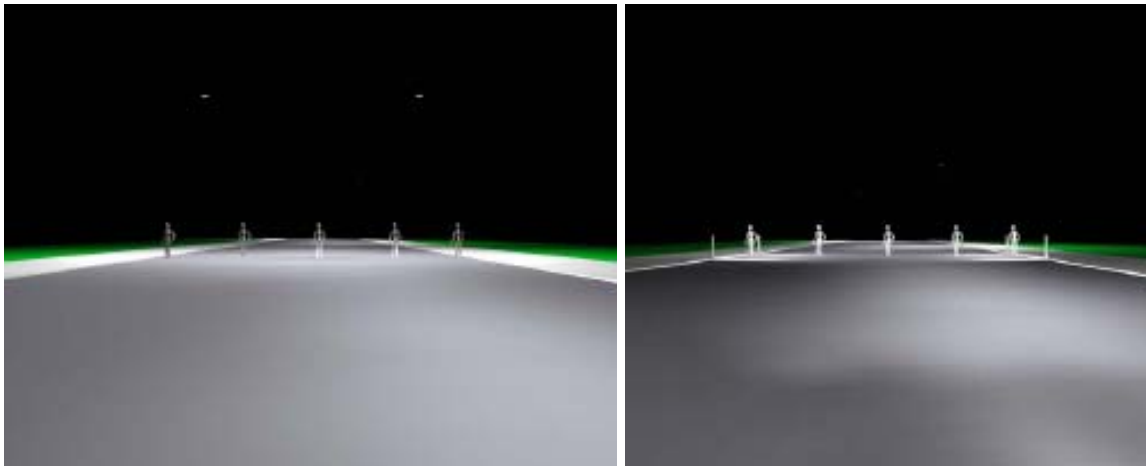


- Unlike fixtures on poles directly overhead, the bollard fixtures produce **vertical illuminance** onto pedestrians so they will appear brighter than their background wherever they are standing in the crosswalk
- The fixtures we studied contain fluorescent lamps with low brightness compared to most roadway lights and therefore do not create excessive levels of glare
- The total wattage of the fixtures is lower than the usual pole-mounted lighting uses, so operating costs are reduced

HOW DID WE EVALUATE IT?

- Initial evaluations used lighting simulation and calculation software that provides accurate data about light levels on the road from roadway lights, crosswalk fixtures and headlights from cars
- From the light level data, visibility of the pedestrians and glare levels were found
- Lighting systems with consistently good visibility and low glare were considered for economic analysis
- Economic analyses included initial and installation costs as well as electricity and maintenance costs

The images below show how the bollard lighting system (on the right) makes pedestrians appear brighter against the roadway background than typical overhead lighting (on the left).



- Once this crosswalk lighting system was confirmed as a promising candidate, it was set up at the intersection of U.S. Route 9 and Texas Road in Old Bridge, Middlesex County for a short-term field demonstration
- Observers from NJDOT, New Jersey Transit and the Old Bridge Police Department confirmed that the lighting system worked well and improved pedestrian visibility



WHAT'S THE BOTTOM LINE?

- The bollard lighting system is a feasible solution for improving pedestrian visibility in crosswalks while at the same time reducing operating costs
- The field demonstration resulted in improvements for further reducing glare such as using louvers to direct light from the fixtures only toward the crosswalk and not toward oncoming cars
- The system can be set up to operate at reduced light intensity and increase to full output when the pedestrian signal button is pressed - this would alert drivers that someone is about to cross the street, and would save even more electricity
- The project report describes the evaluation method so that other lighting options can be evaluated in terms of visibility for locations where bollard fixtures might be impractical

FOR MORE INFORMATION CONTACT:

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A final report is available online at
<http://www.state.nj.us/transportation/refdata/research/>

If you would like a copy of the full report, please FAX the NJDOT, Bureau of Research, Technology Transfer Group at (609) 530-3722 or send an e-mail to Research.Bureau@dot.state.nj.us and ask for:

Design and Evaluation of Effective Crosswalk Lighting:

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