Feature Presentation

Nighttime Visibility for Safety

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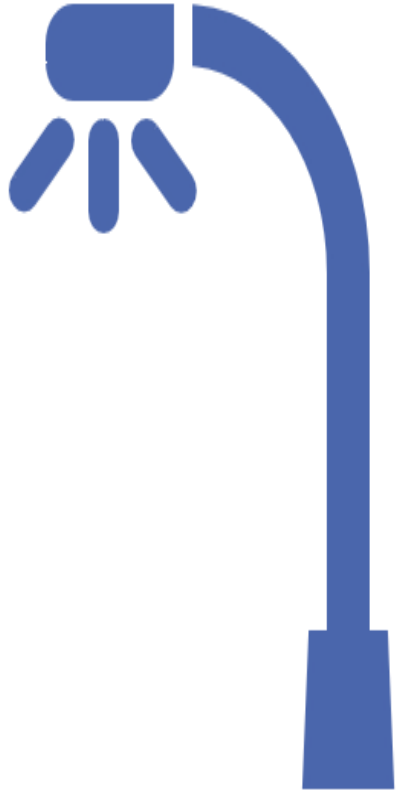
Alan M. Voorhees Transportation Center
Rutgers University

Charu Jegan & Andrey Terentiev
New Jersey Department of Transportation
Bureau of Traffic Engineering

Life-Saving Lighting

Enhancing nighttime visibility for pedestrian and bicyclist safety



NJ BICYCLE AND PEDESTRIAN RESOURCE CENTER AT THE ALAN M. VOORHEES TRANSPORTATION CENTER, RUTGERS UNIVERSITY

ROWAN UNIVERSITY

MARCH 15, 2023

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NJ Bicycle and Pedestrian Resource Center (NJ BPRC)

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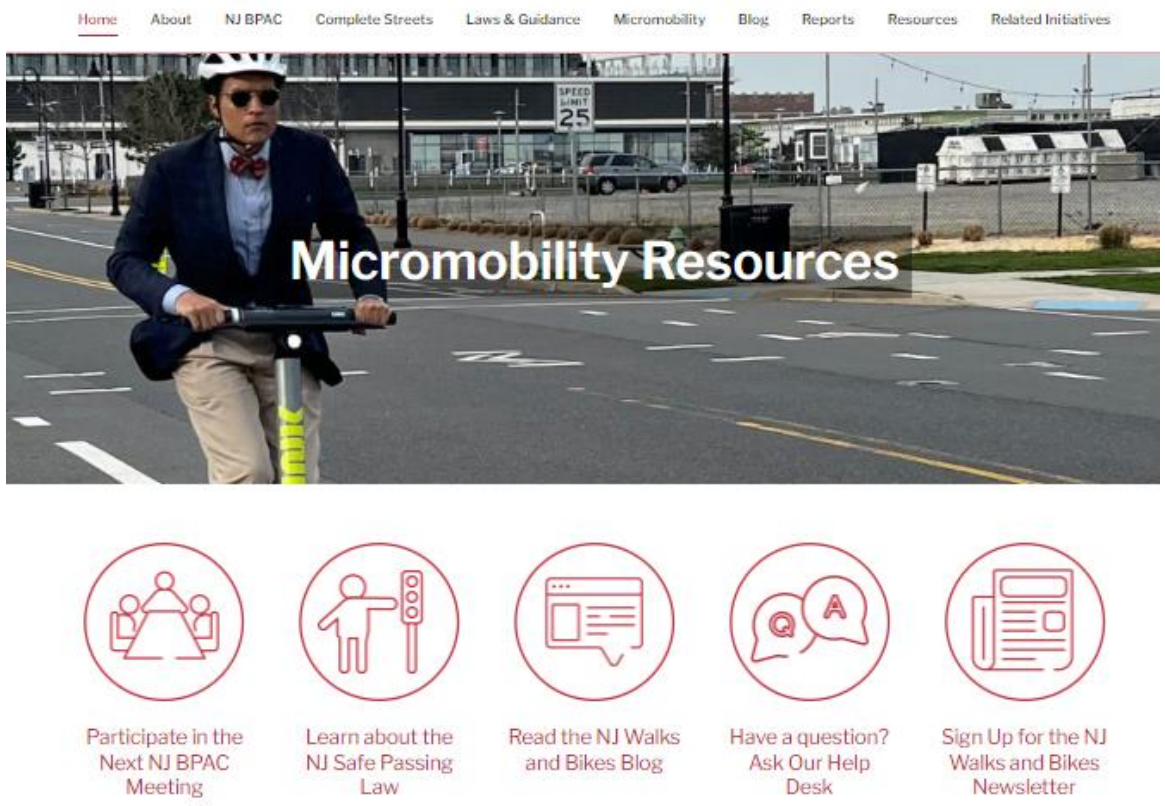

Coordinated on behalf of the New Jersey Department of Transportation through the Bureau of Safety, Bicycle, and Pedestrian Programs (BSBPP), with funding from the Federal Highway Administration (FHWA)

DEPARTMENT OF TRANSPORTATION THE STATE OF NEW JERSEY

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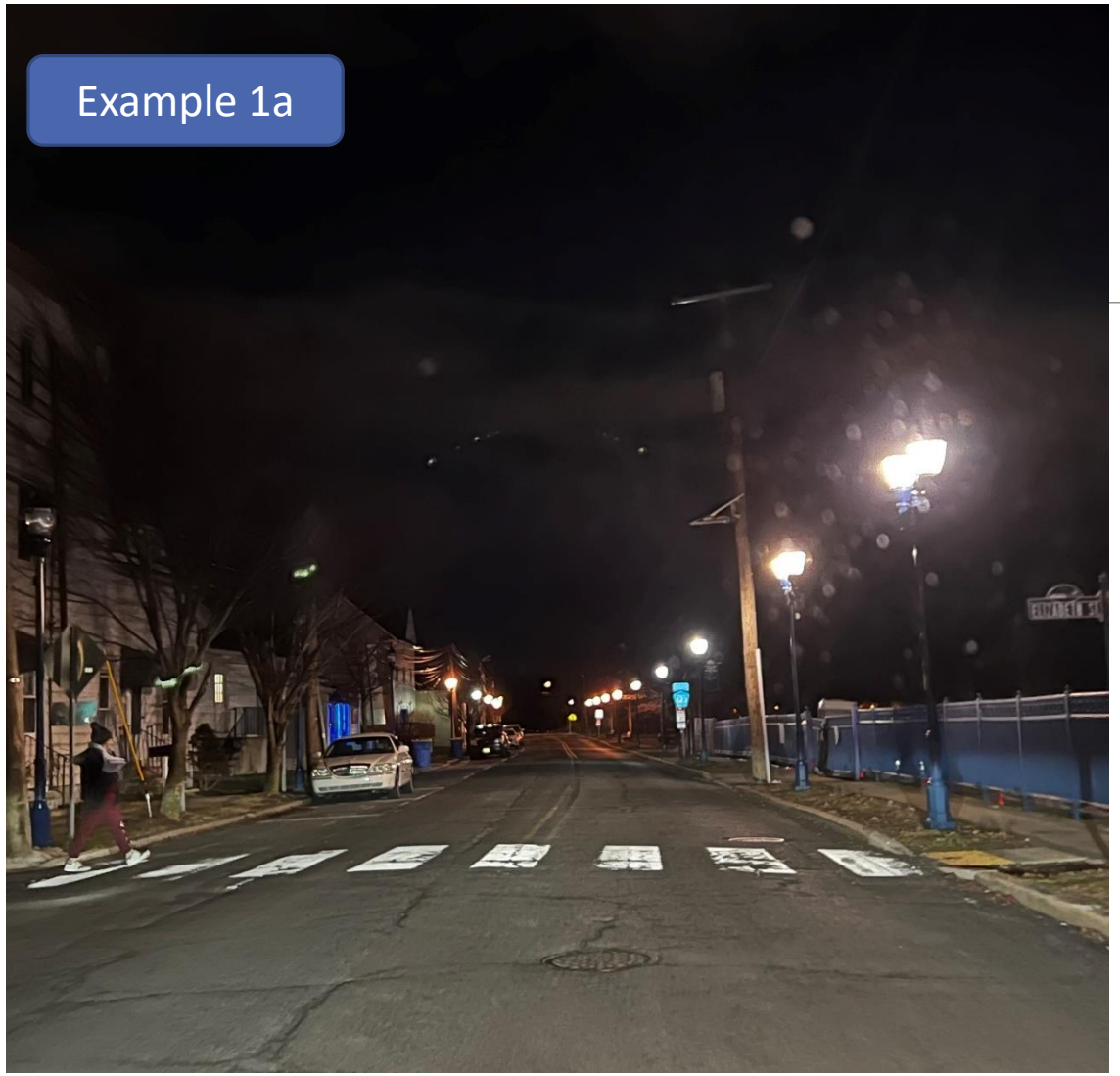
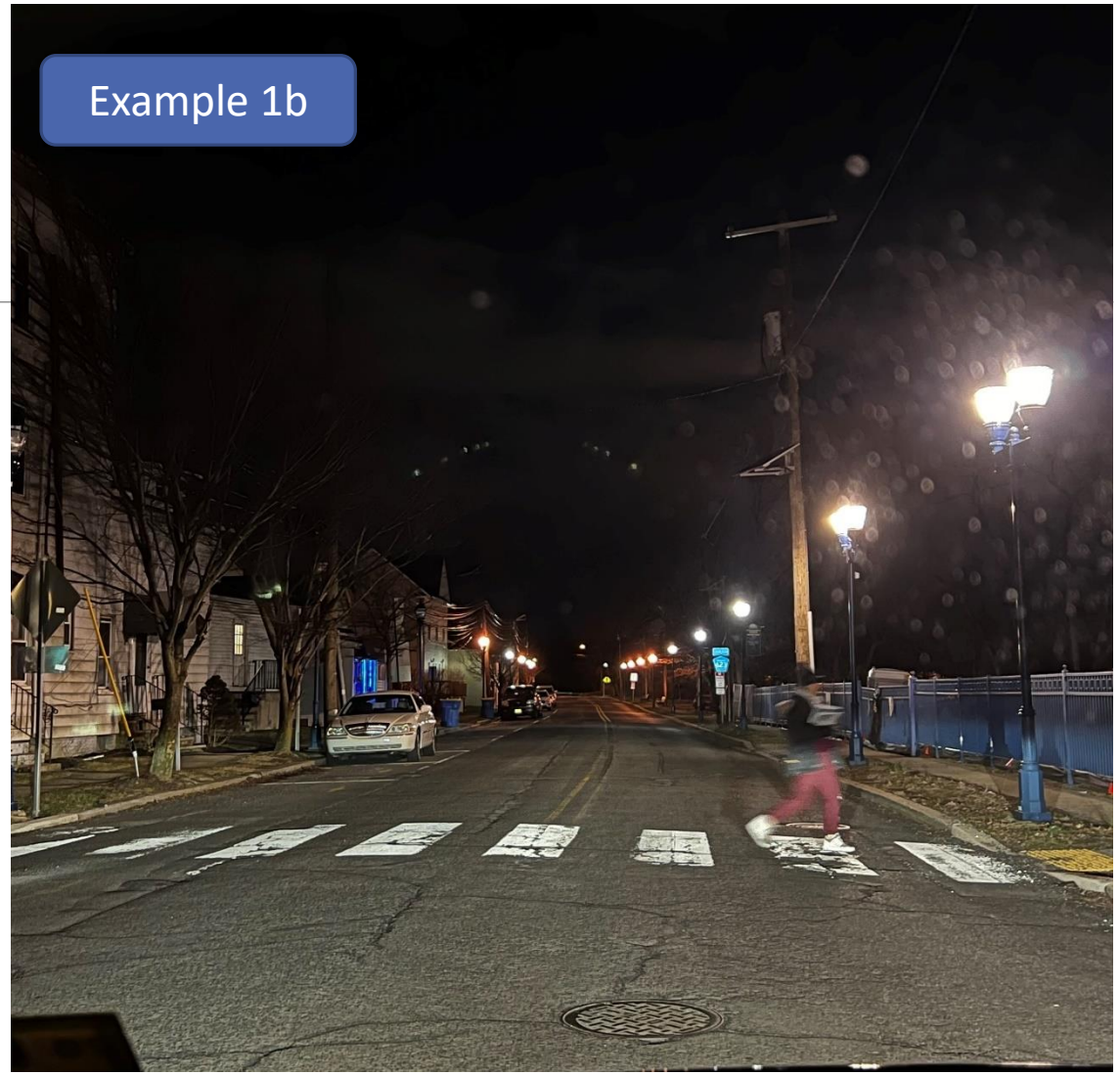
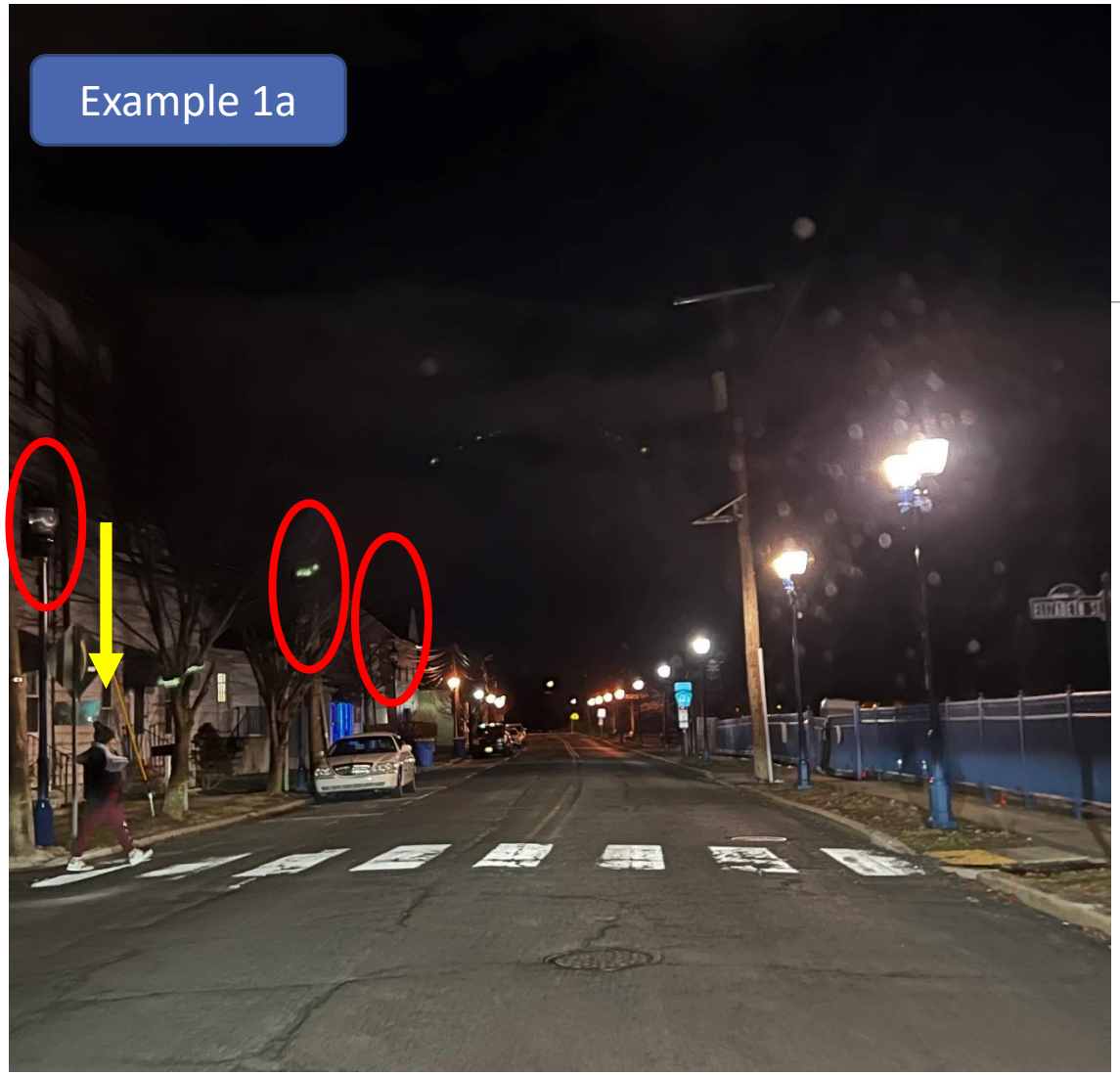
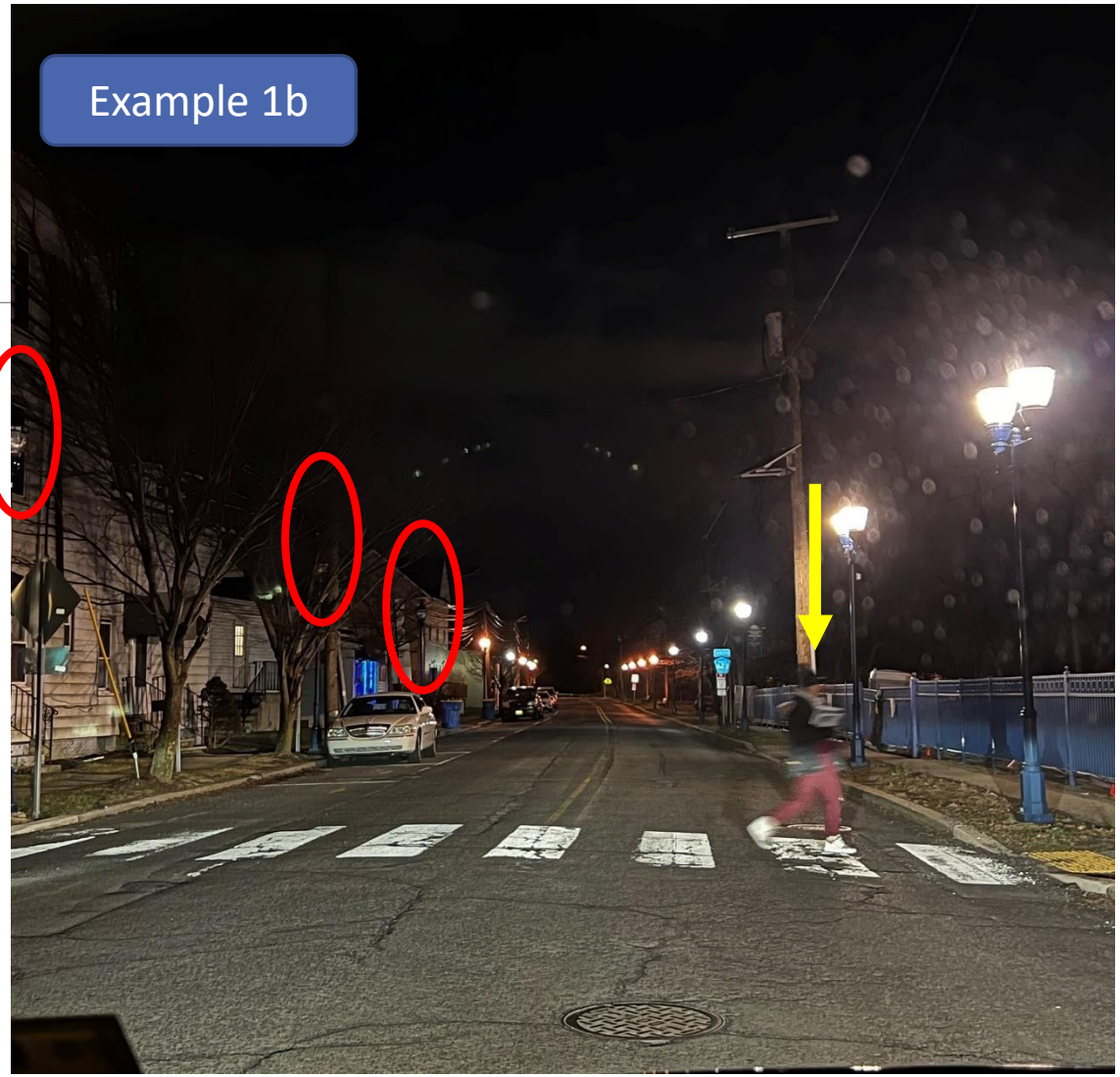




South Bound Brook, NJ





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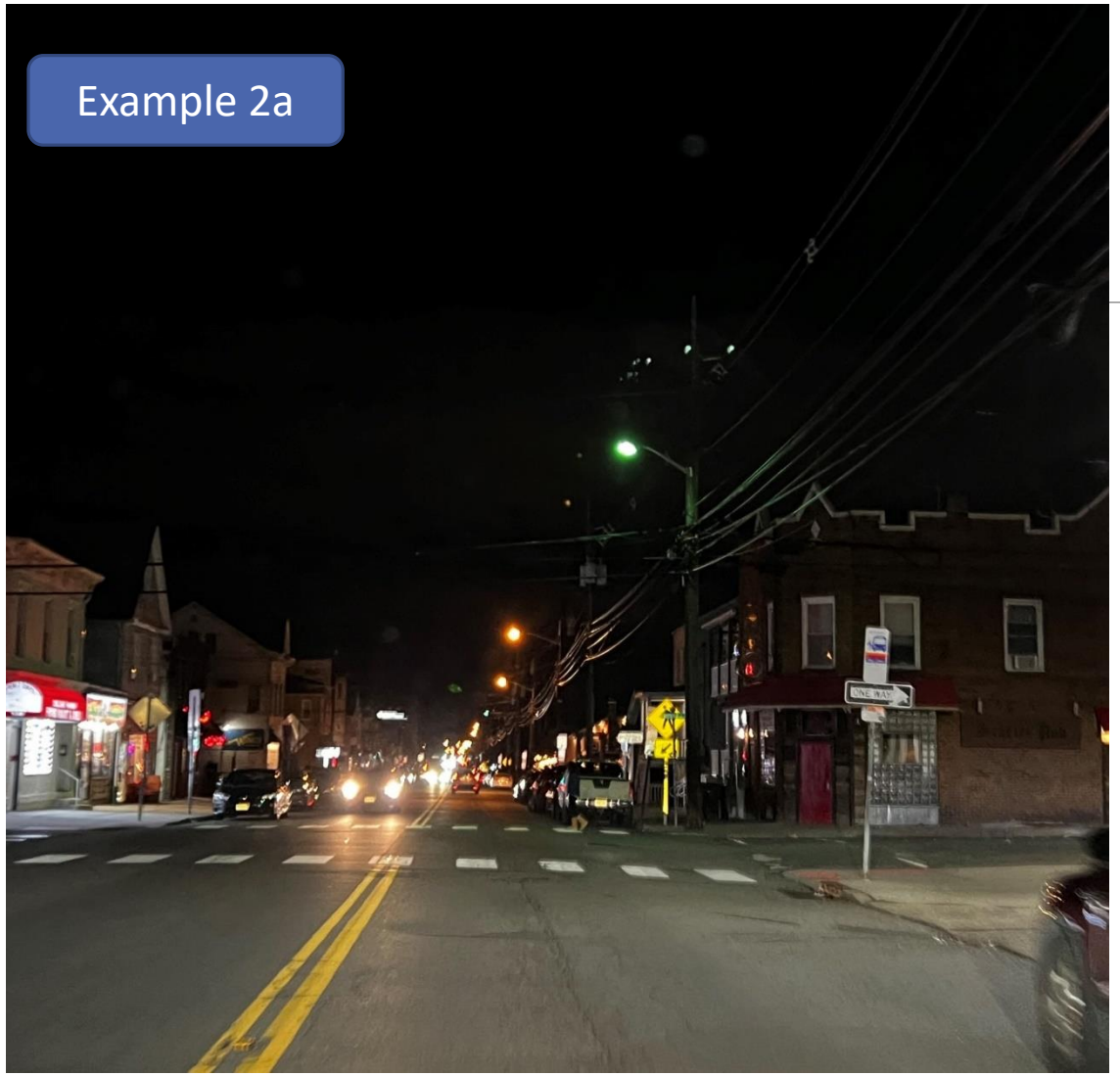
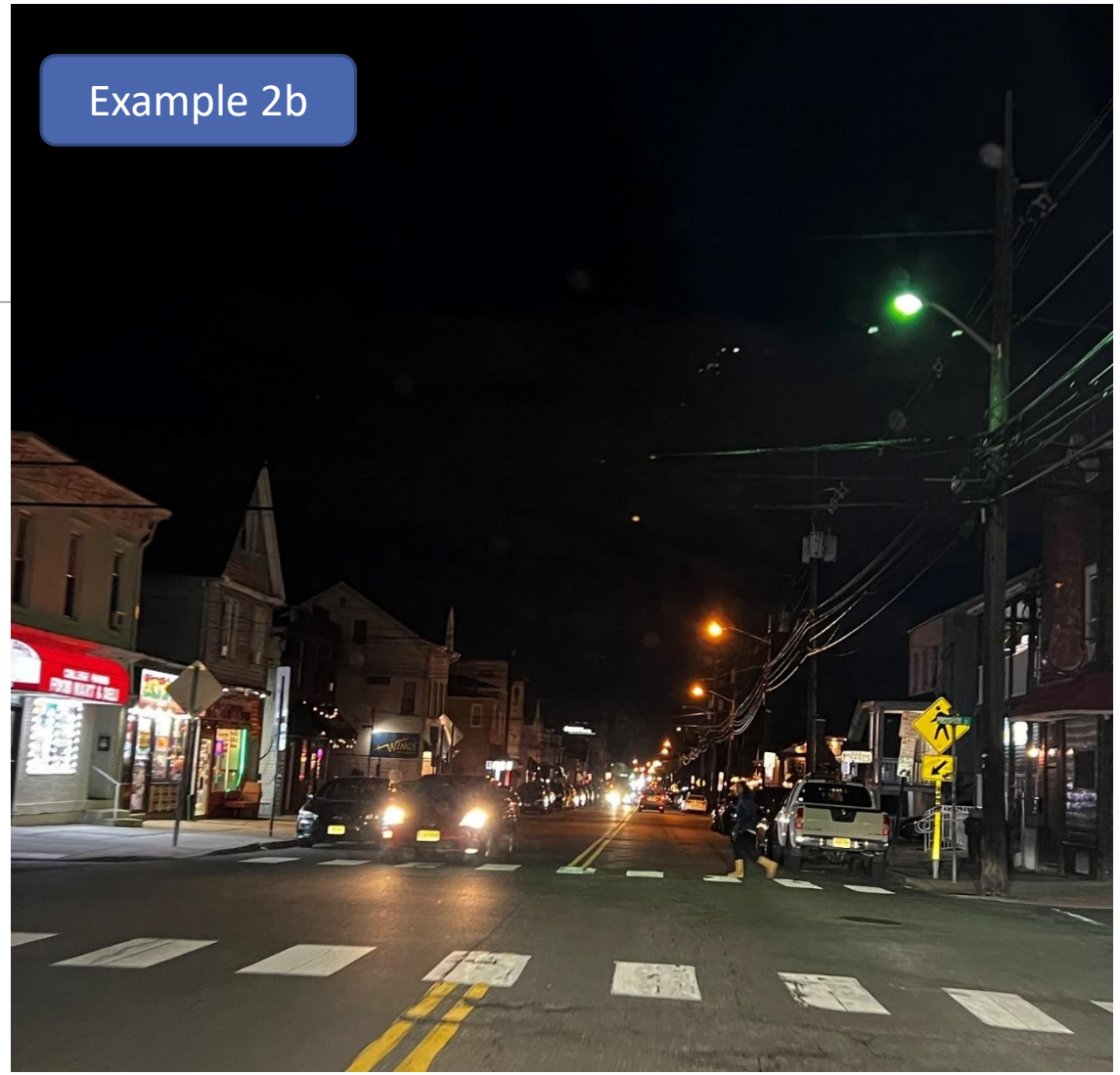
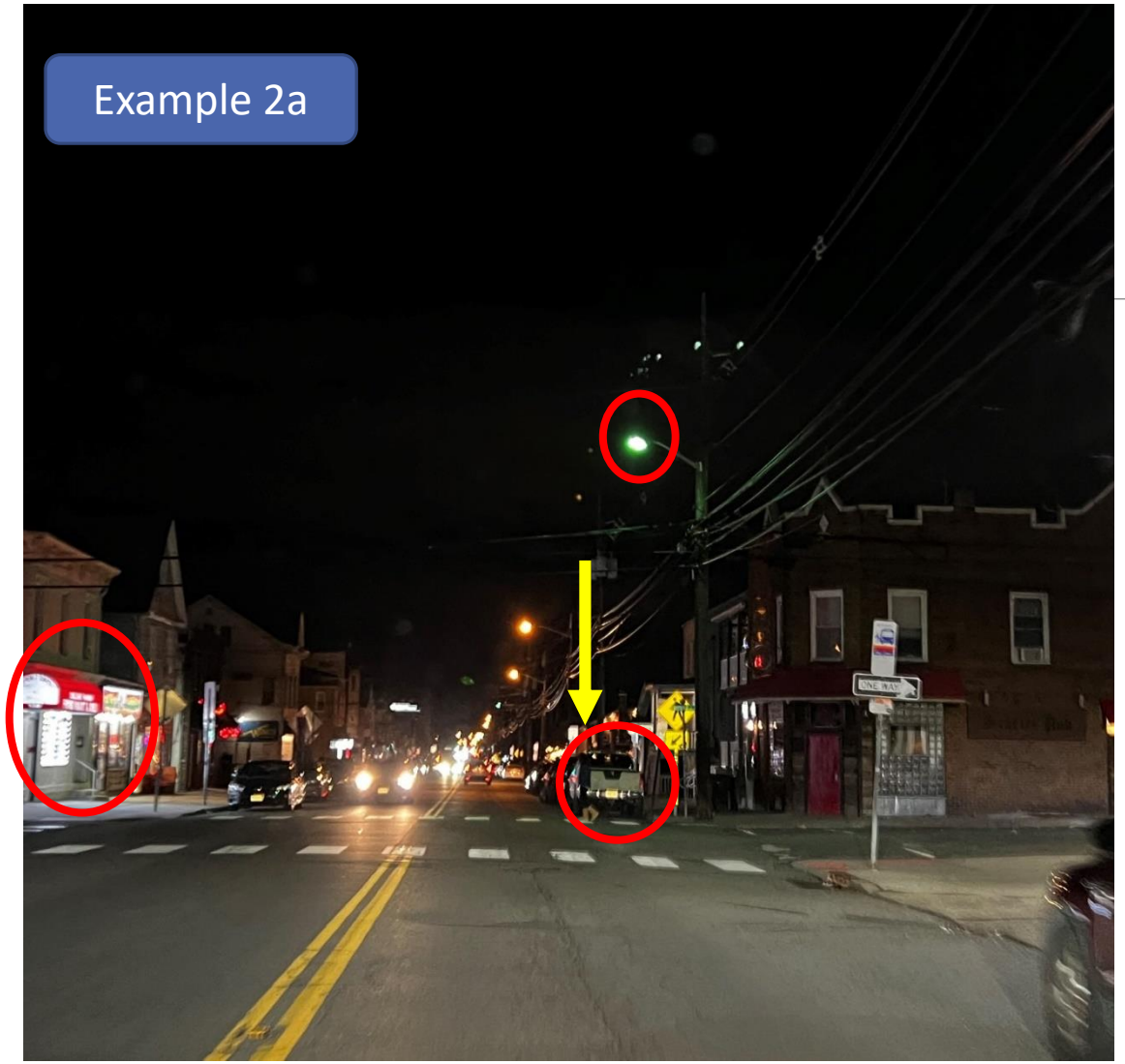
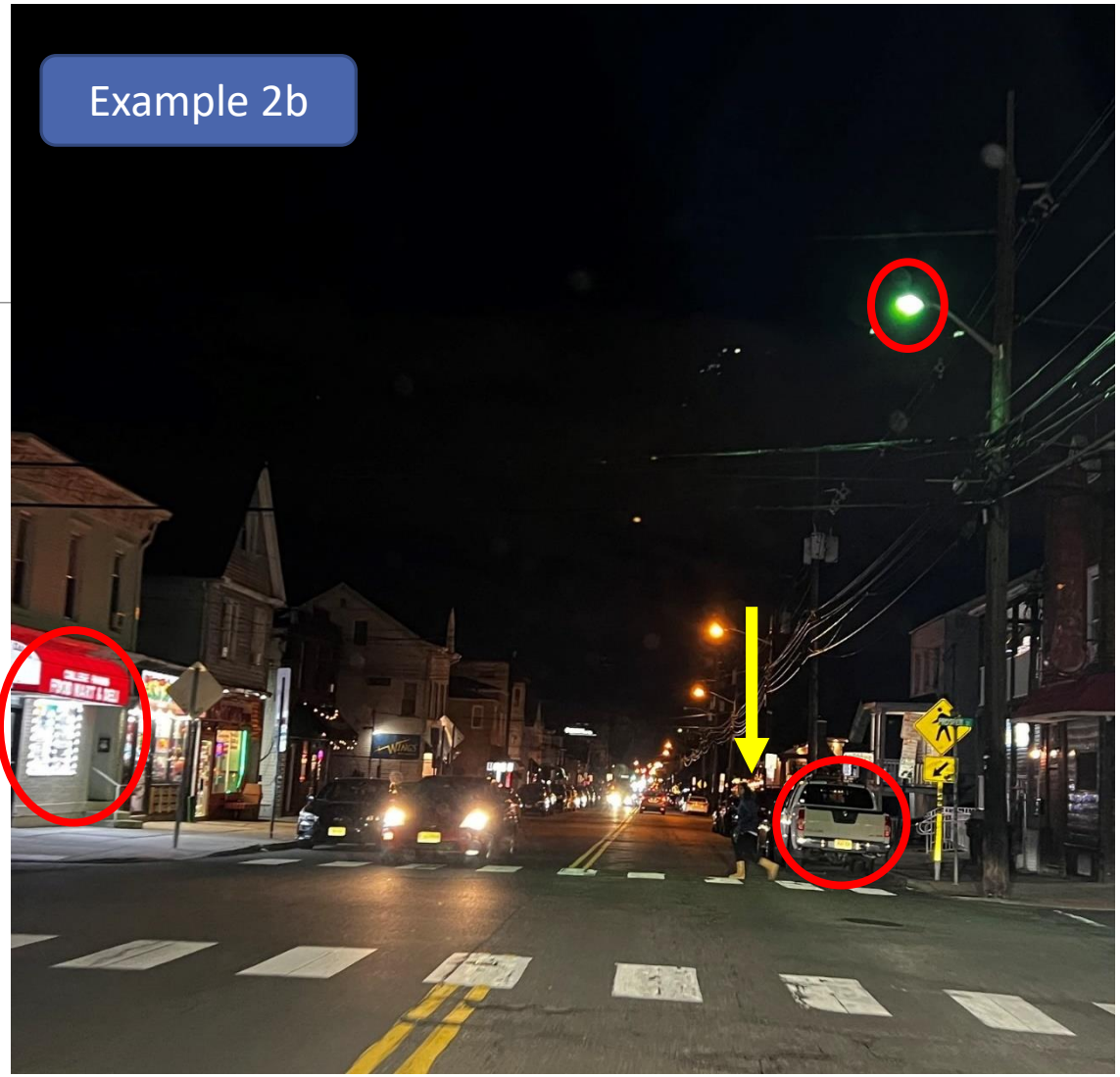




New Brunswick, NJ

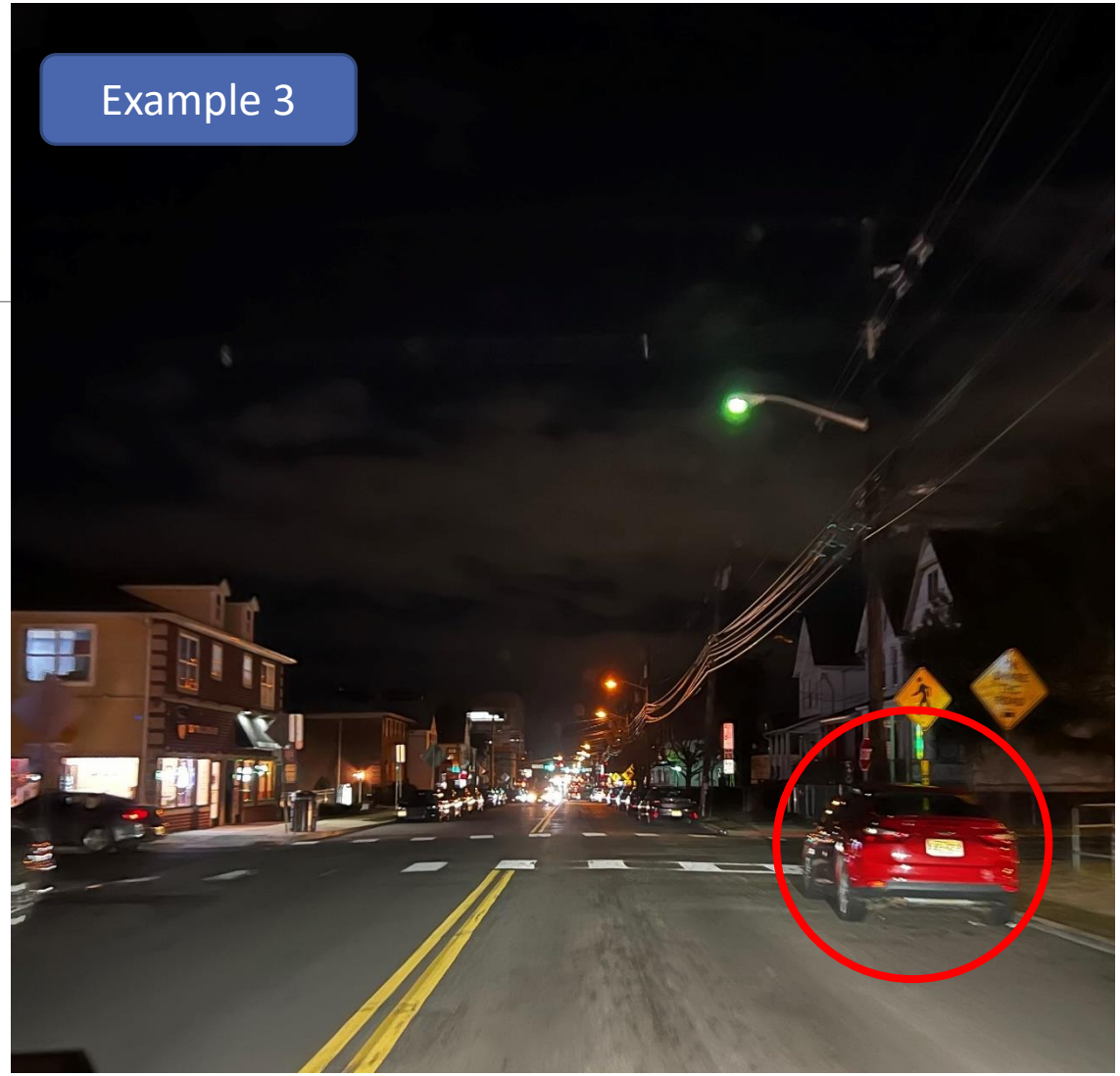




New Brunswick, NJ

Already, we know…

1. Crossing the street as a pedestrian is already difficult in daylight
2. Road lighting does not necessarily serve pedestrians
3. Illegal parking is a compounding factor to poor pedestrian visibility
4. Visibility can change by the foot



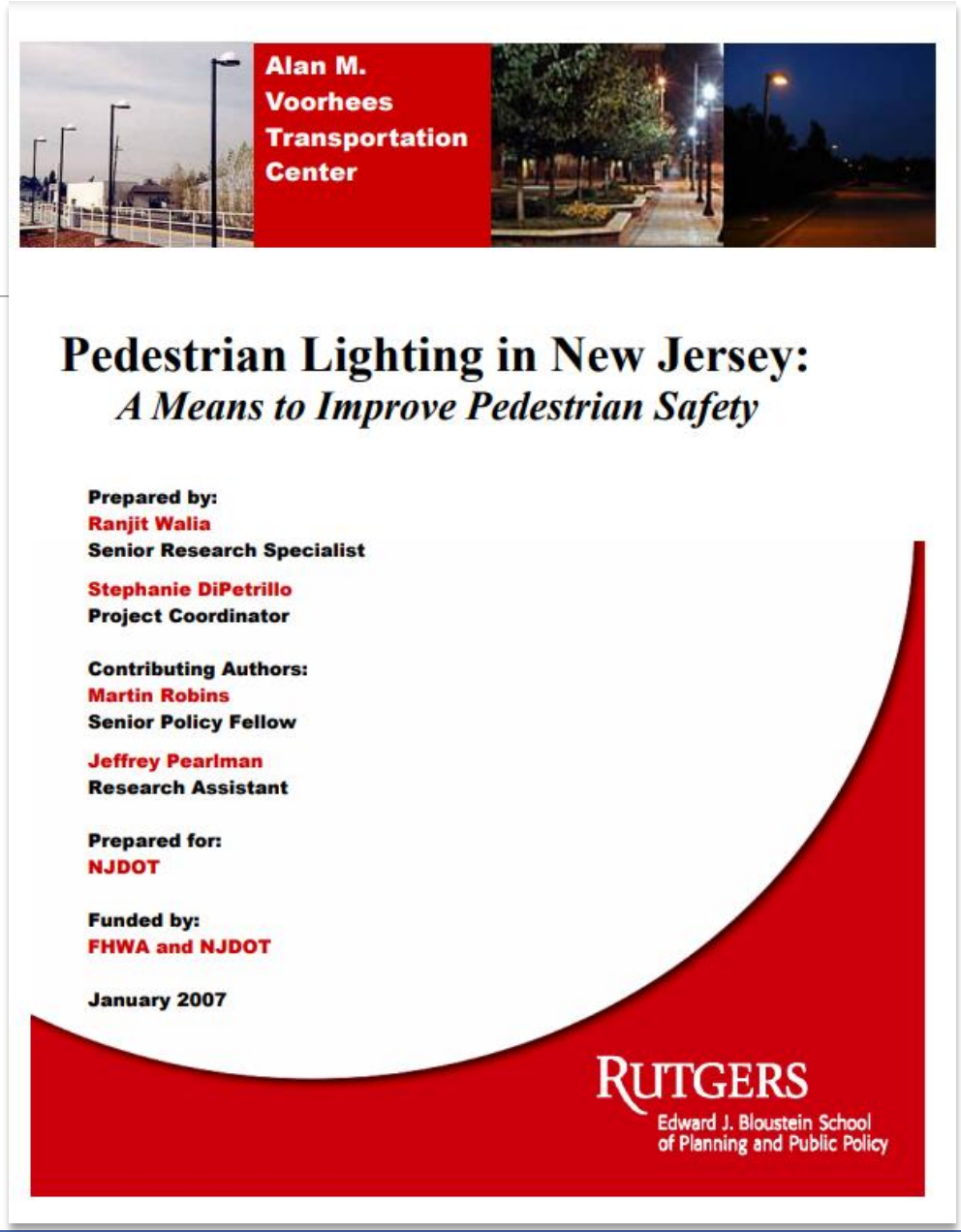
New Brunswick, NJ

Prior VTC Work

Integrating pedestrian lighting into all planning and design

Underscores a gap in expertise in pedestrian lighting in most localities

Identifies a lack of relevant planning and design guidance



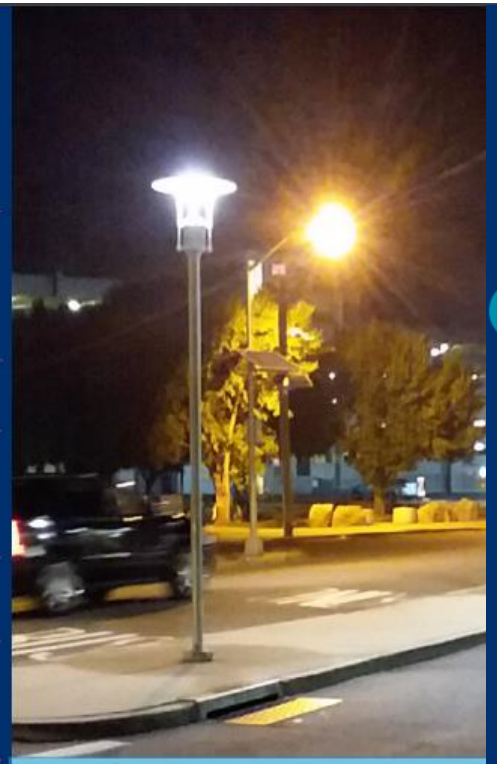
Prior Work: BPAC Ped Lighting Guide

Visit: njbikeped.org/safety/

Key Resources

Numerous agencies and organizations have published research and guidance concerning pedestrian-scale lighting best practices. Some are listed below:

New Jersey Department of Transportation Pedestrian Compatible Planning and Design Guidelines	https://www.state.nj.us/transportation/about/publicat/pdf/PedComp/pedintro.pdf
New Jersey Outdoor Lighting Ordinance Guide	https://www.nj.gov/dep/opsc/docs/Sample_Lighting_Ordinance.PDF
Voorhees Transportation Center Report on Pedestrian Lighting in New Jersey: A Means to Improve Pedestrian Safety	http://vtc.rutgers.edu/wp-content/uploads/2014/07/Pedestrian_Lighting_NJ_Final_Report.pdf
Pedestrian and Bicycle Information Center	http://www.pedbikeinfo.org/webinars/webinar_details.cfm?id=13
FHWA Informational Report on Lighting Design for Midblock Crosswalks	https://www.fhwa.dot.gov/publications/research/safety/08053/
U.S. Department of Energy Report on Pedestrian Friendly Outdoor Lighting	https://www1.eere.energy.gov/buildings/publications/pdfs/ssl/2013_gateway_pedestrian.pdf
Seattle Pedestrian Lighting Citywide Plan	http://www.seattle.gov/Assets/Documents/Departments/SDOT/About/DocumentLibrary/PedMasterPlan/PedLightingFINAL.pdf
Chandler (AZ) Report on Crime Prevention Through Environmental Design	http://www.chandlerpd.com/wp-content/uploads/2010/12/CPTED-Handbook-v4-20170627.pdf



Pedestrian-Scale Lighting Guide for New Jersey

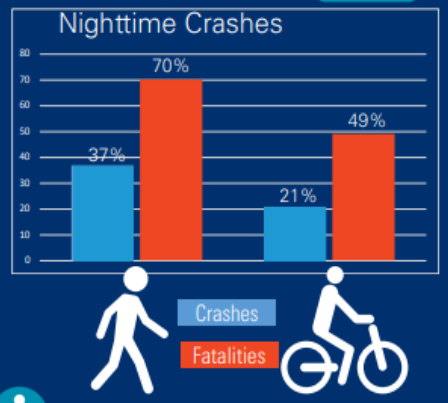
Importance

Pedestrian-scale lighting does more than make a neighborhood look good. Most street lighting in New Jersey was designed with motorists' in mind; assuring there was proper lighting to navigate roads at high speeds. This lighting does not take into account pedestrians. Pedestrian-scale lighting is first and foremost a safety concern, helping to improve pedestrian safety, security and comfort.

The presence of adequate pedestrian lighting helps promote visibility between motorists and pedestrians, reducing the frequency of crashes

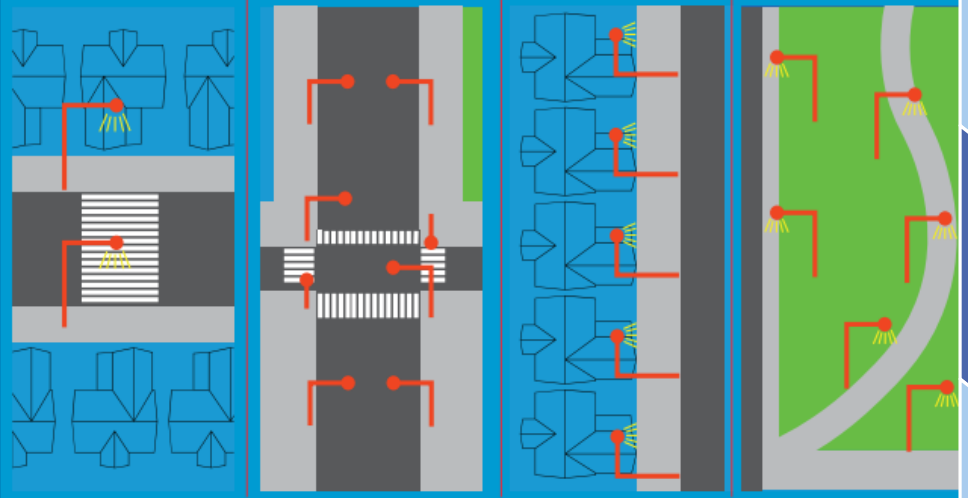
Crashes

- bike/ped fatalities in New Jersey disproportionately occur at night



Pedestrian-scale lighting helps illuminate sidewalks and improve pedestrian safety, security and comfort. Properly designed and installed pedestrian-scale lighting can both help define a streetscape and create a sense of place in a community.

Siting



Factors to Consider

Proximity
should light sidewalks and crosswalks without blocking them

Spacing
evenly distributed approximately 60 feet apart

Brightness
20 lux measured at a height of five feet from the road surface

Direction
fixtures faced downward to direct light onto pedestrians and avoid causing nuisance

Height
Poles should be shorter than street lights; 12-16 feet

Glare
brighter is not always better; glare factors include fixture and background luminance, and size and angle of the fixture

Energy Efficiency
due to light depreciation, initial light levels should be above what is required; adaptive technology can allow to operate at maintained level for longer times

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Seattle Pedestrian Lighting Citywide Plan	http://www.seattle.gov/Assets/Documents/Departments/SDOT/About/DocumentLibrary/PedMasterPlan/PedLightingFINAL.pdf
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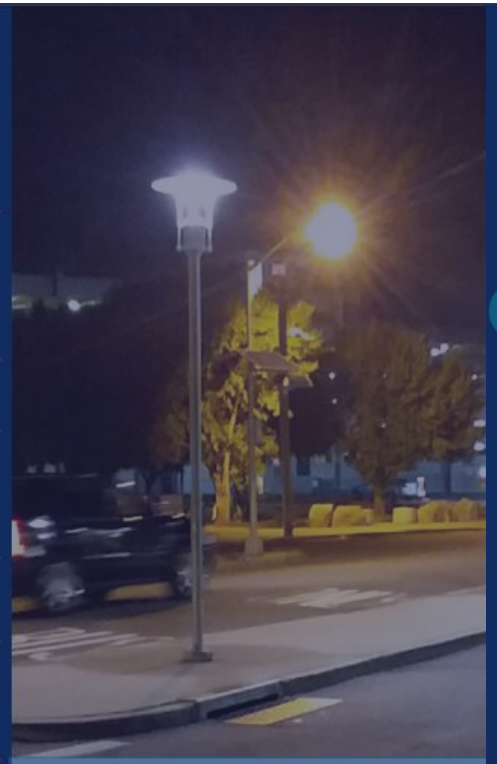

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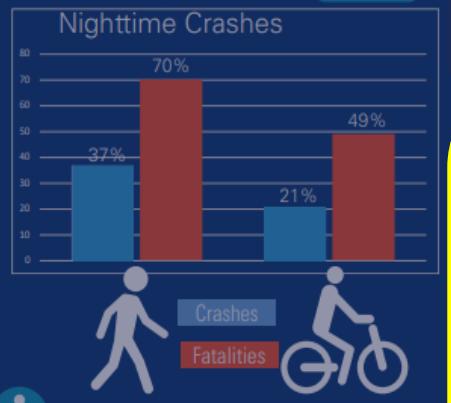

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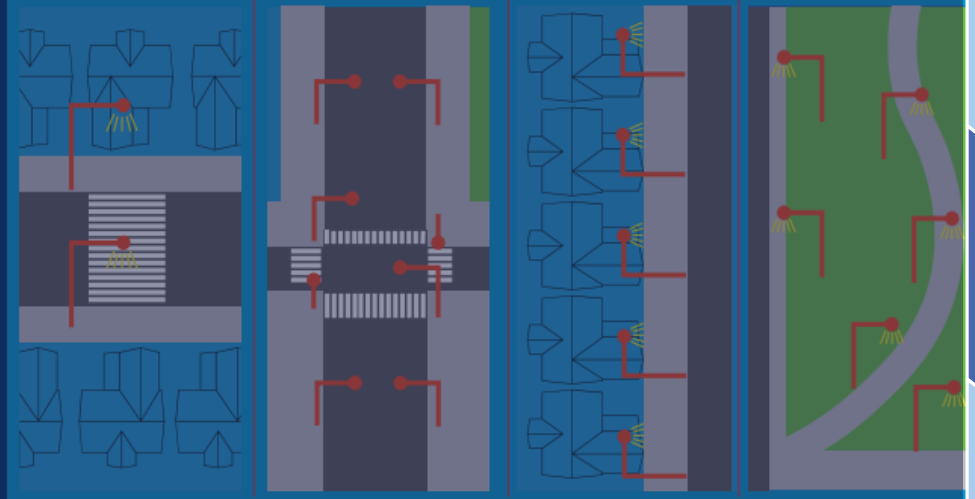

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Factors impacting the fatality of non-motorist involved crashes in New Jersey

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1/24/2023

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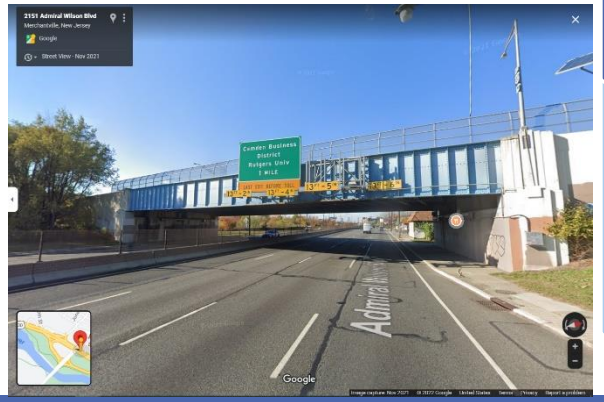
NEW JERSEY Safe Routes

Introduction and research questions

Fatal non-motorist involved crashes account for **1/3rd of all fatal crashes** in New Jersey. Non-motorist involved crashes (either fatal/injury or property damage only) occur disproportionately more in low-income and minority communities.

1. What is the relationship between non-motorist involved crashes, geocoded crashes, and low-income and minority communities?
2. Where are the community hot spots? A hot spot analysis of crashes in New Jersey.
3. What are the risk factors? A regression analysis.



Data: Geocoded Safety Voyager Bicycle and/or Pedestrian Involved Crashes from 2016-2020

Overburdened communities and geocoded crashes

Overburdened communities are minority, low income, and/or limited English communities. They make up 20.6% of the NJ population.

However, 40.3% of all NJ crashes occur in overburdened communities

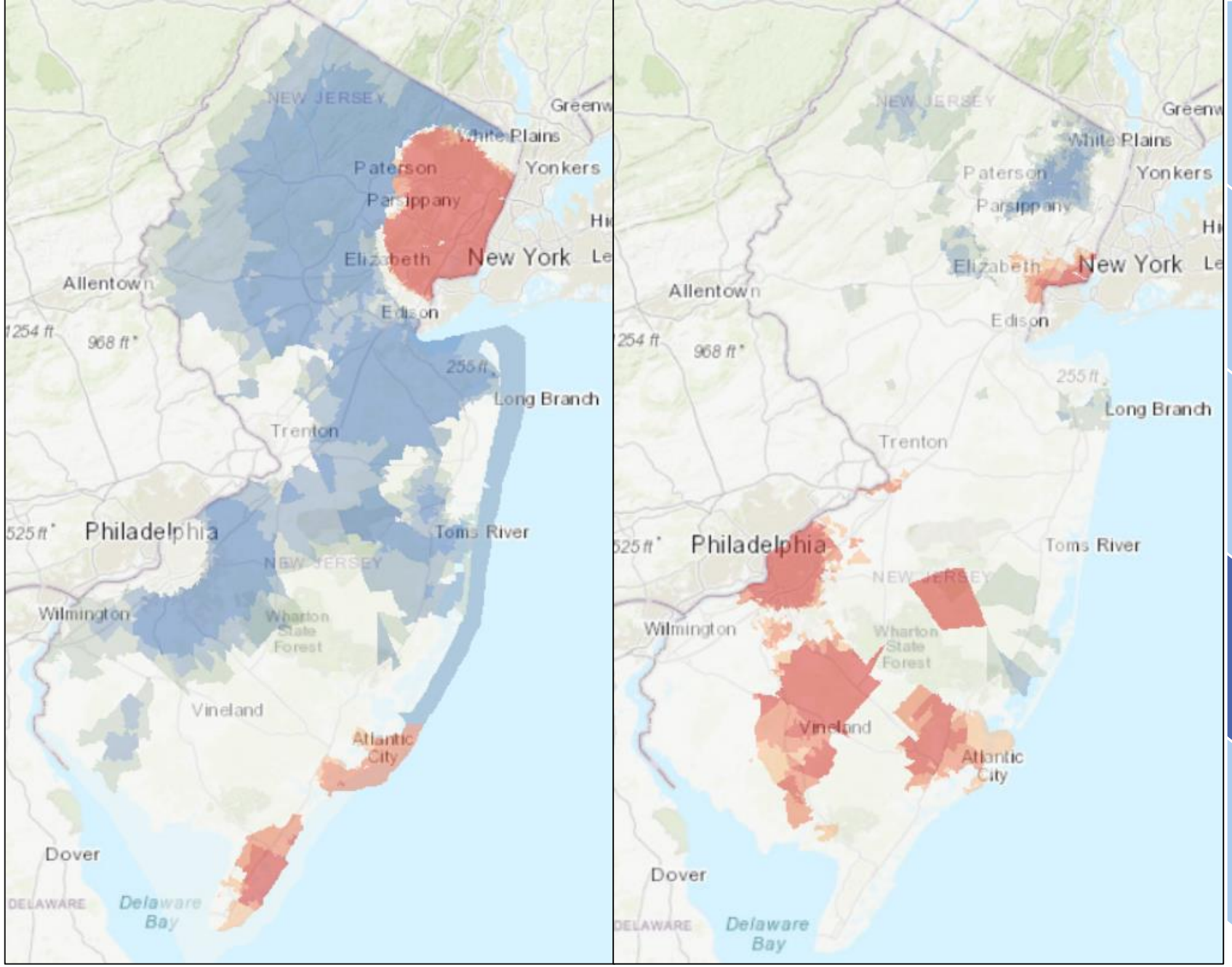
Geocoded Crashes	NJ	Low income/Minorities	Percentage
Dark Conditions (No lights)	1,111	320	28.8%
Dark Conditions (Lights)	8,620	3,819	44.3%
Daylight	17,404	6,753	38.8%
State Highway Crashes	4,000	921	23.0%
Fatal Crashes	956	258	27.0%
Youth Involved Crashes	5,126	2,047	39.9%
All Crashes	28,643	11,544	40.3%

Data: Numetric and Safety Voyager Bicycle and/or Pedestrian Involved Crashes from 2016-2020 and NJDEP Overburdened Communities Data

Hotspots for bike/ped crashes per capita
(2016-2020)

All crashes (left)

Fatal Crashes (right)



Data: Safety Voyager Bicycle and/or Pedestrian Involved Crashes from 2016-2020

Selected results relating to lighting

Compared to daylight, crashes that occurred in dark conditions (no streetlights) were **6-7.5 times** more likely to be fatal.

At night, a crash is **twice as likely** to be deadly if there are no lights available or if they are broken or off.

Pedestrian- and bicyclist-involved crashes: associations with spatial factors, pedestrian infrastructure, and equity impacts

Authors: Hannah Younes, Ph.D., Robert Noland, Ph.D., Leigh Ann Von Hagen, AICP/PP, Sean Meehan

Publication: Journal of Safety Research, JSR-D-22-00872

Date: Volume 86, anticipated release date between April 15-July 1, 2023

New Research Task: Life-Saving Lighting

Joint research task between Rutgers-VTC and Rowan University

Conduct research, including a literature review, on best practices for streetlights to improve roadway safety with a focus on vulnerable roadway users (VRUs).

- Current research connecting lighting design types to reductions in KSI for VRUs
- Existing design guides, memoranda, and presentations with a focus on pedestrian-scale lighting

Produce a non-technical, easy-to-use lighting design guide

- Draw attention to the needs of VRUs during design and implementation of streetscapes
- Recommend a set of luminaire types for street and trail lighting
- Focus on key facts and site conditions to assist designers with choosing appropriate lighting
- Rely on figures, example images, and graphics to help explain benefits of specific design options

Give your feedback on Menti!

What should we focus on to help municipalities incorporate safe lighting for vulnerable roadway users (VRUs)?

VRUs = people walking, bicycling, and using scooters, wheelchairs, and other mobility devices

Go to: www.menti.com

Use the code: **7485 7205**

Thank you!

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Safe Routes to School

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