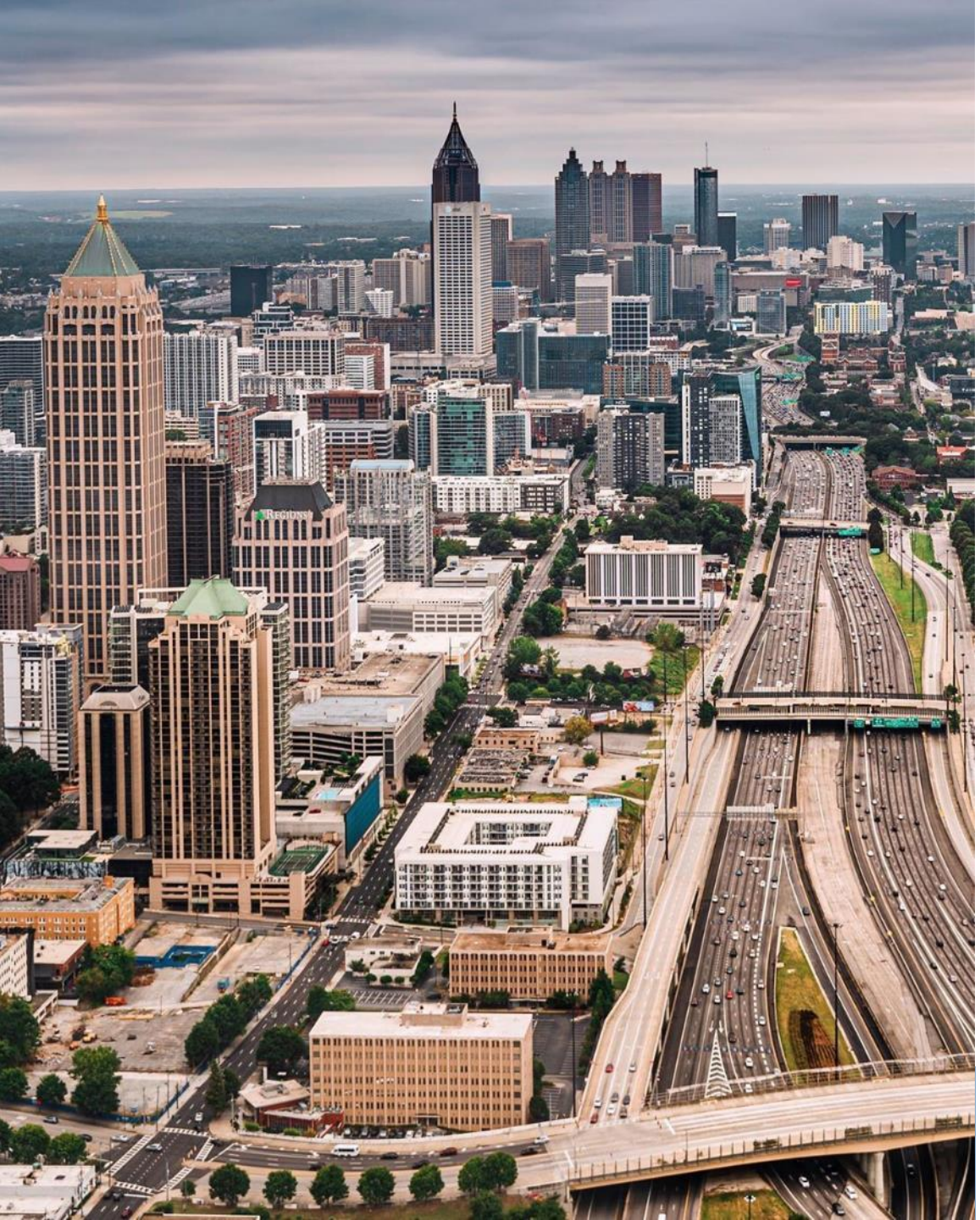

Transportation Committee: Streetlights

Advisor: Dr. Leon F. McGinnis
Client Contact: Douglas Nagy

Alyssa Sullivan, Andres Farach, Esteban Ulloa, Gabriella Marenco, Isaac Hergott, Jordi Sabria, Monica de Armas, Willem Hartog

*This project has been created as a part of a student design project at Georgia Institute of Technology.

Meet the Team

Georgia Tech Industrial Engineers

Jordi Sabria

Major:
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Minor:
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Concentration:
Data Analytics

Andres Farach

Major:
Industrial Engineering
Concentration: Economic and Financial Systems

Isaac Hergott

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Monica de Armas

Major:
Industrial Engineering
Concentration:
Data Analytics

Introduction

The City of Atlanta and ATLDOT aspire to improve streetlighting in the city, especially in areas where additional lighting is most needed.

*"I am proud to announce that Atlanta has adopted a **Vision Zero** Strategic Transportation Plan that boldly commits the city to **improving roadway safety** and ending tragic traffic fatalities."*

- Mayor Keisha Lance Bottoms

ATLDOT
Provide streetlighting

Citizens & Visitors
Consume streetlighting

Today's Agenda

Context of Lighting Study

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Diagnostic Insights

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Proposed Path Forward

- Deploy 7,883 new streetlights in three phases, prioritizing the highest need first
- Phase 1 improves conditions on 1,156 road segments in 84 neighborhoods
- Estimated NPV cost of installation and maintenance of all phases is $70-$90M

Context

Streetlights have been shown to reduce crime and traffic severity in major U.S. cities.

STUDY: NIGHT CRIME DOWN IN NYC AFTER LIGHTING EFFORT

“Increased levels of lighting led to a 36% reduction in "index crimes" — a subset of serious felony crimes that includes murder, robbery and aggravated assault, as well as certain property crimes — that took place outdoors at night in developments that received new lighting”.

UCHICAGO URBANLABS

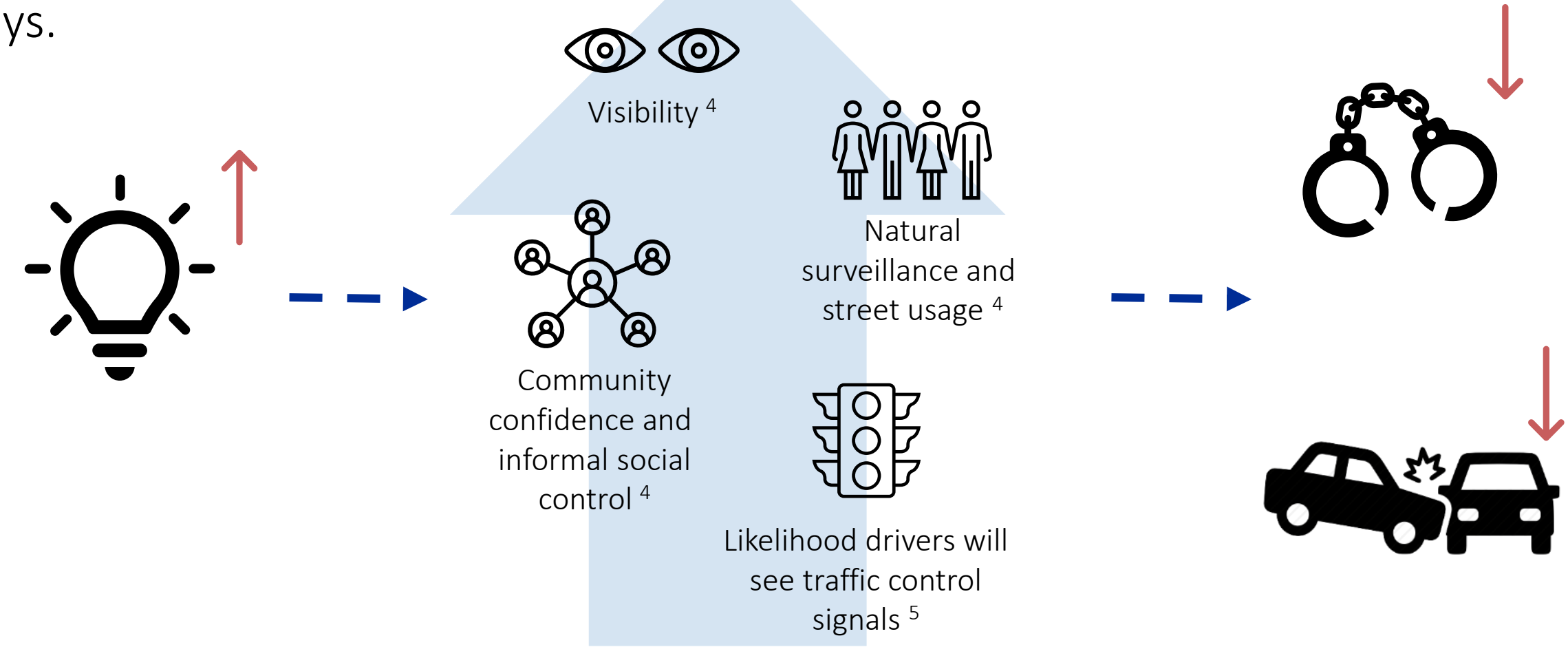
STUDY: PEDESTRIAN DEATHS DOWN IN DETROIT AFTER LIGHTING EFFORT

There's an interesting case study from Detroit where they had a major problem with streetlight repair. 40% of the streetlights in Detroit were broken or missing. They did a major $185M bond to replace and repair 55,000 lights. before the repair, an avg o 24 people were killed walking each year in low light conditions. Afterwards in 2017, only one person was killed walking in low-light conditions

Source: Right of Way by Angie Schmitt, uChicago Urban Labs

Motivation

Streetlights help reduce crime and traffic severity in obvious and less obvious ways.

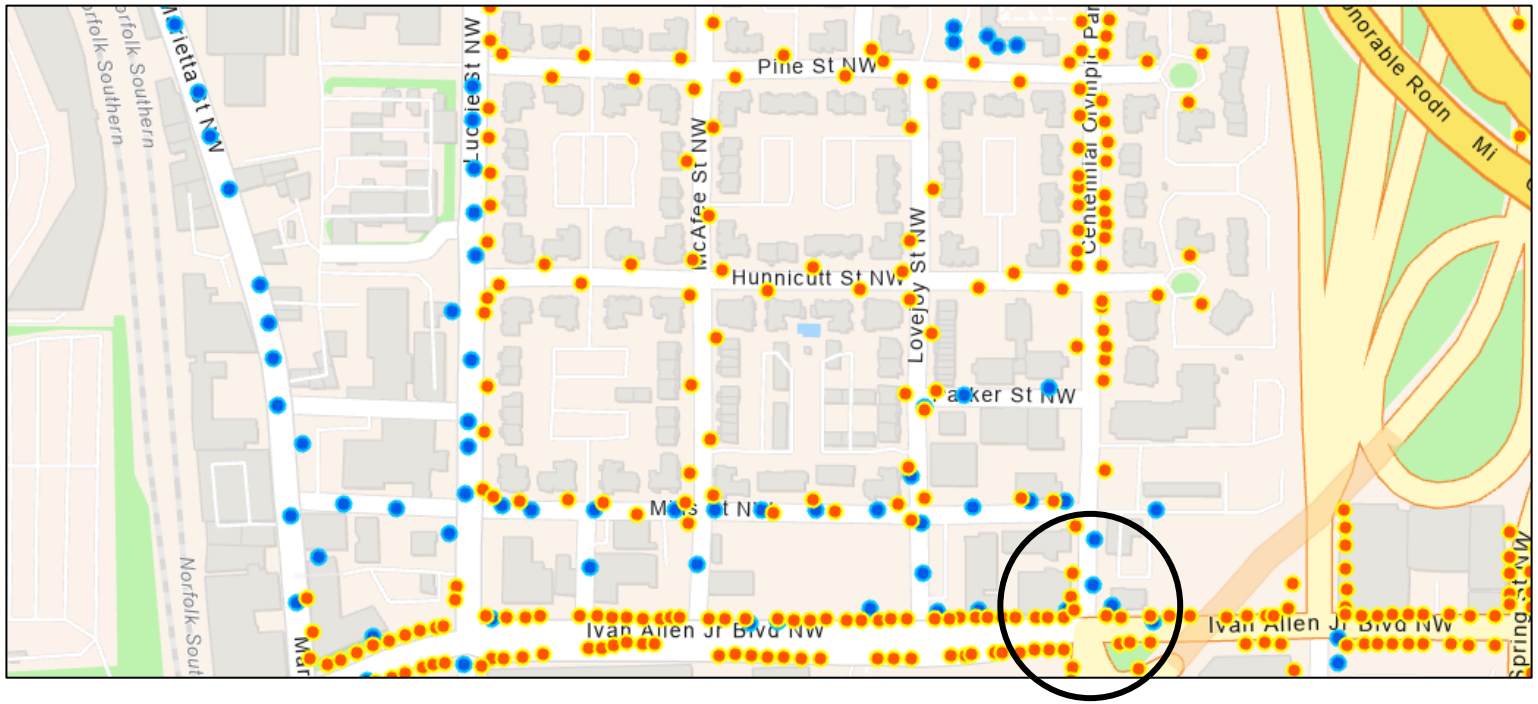


System Overview

Atlanta has ~50K streetlights with ~10K owned and managed by City of Atlanta and ~40K leased from and maintained by Georgia Power.

Orange Lights

Blue Lights



Out-of-Scope Observation: The dual ownership of streetlights creates a confusing situation for citizens requesting repairs.

Project Overview

The project focused on prioritizing areas based on lighting need and developing an implementation recommendation that weighs trade-offs.

	Approach	Outcome
1. Created a **methodology** that identifies and prioritizes areas based on need.	Prioritization Model Ranked road segments and neighborhoods using key metrics.	
2. Evaluated **trade-offs** and determined plan of action for chosen implementation of streetlights.	Neighborhood Clustering Equity Analysis Cost-Benefit Analysis	**Maximize** impact of DOT's investment to improve public safety

Key Metrics

The key metrics used to inform the study are crime rate, severity of nighttime traffic crashes, and current lighting coverage.

Crime Rate

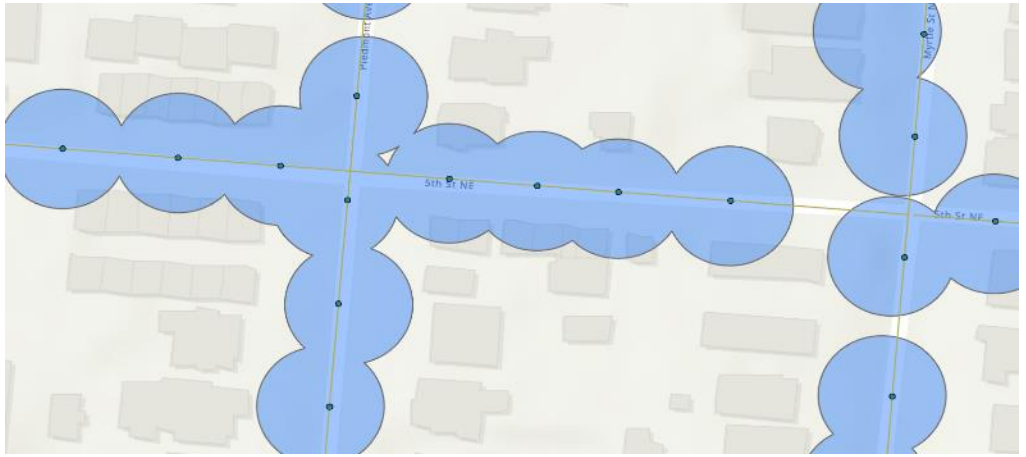
Yearly crime rate per 1000 residents

Crash Severity

Average EPDO per mile

Lighting Coverage

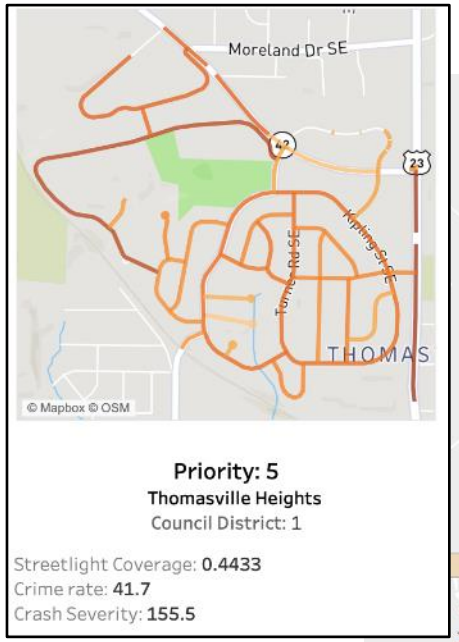
Percent Covered

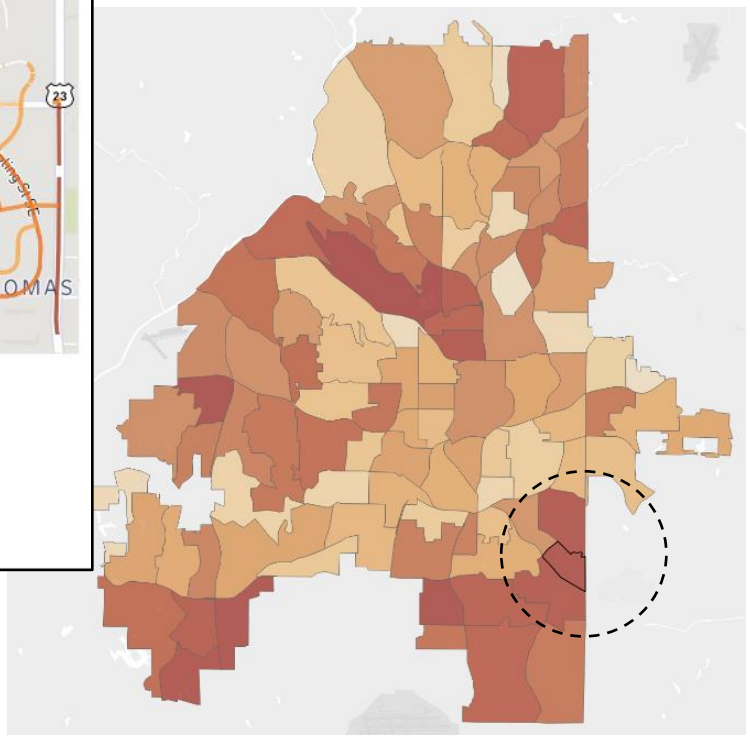


Ranking

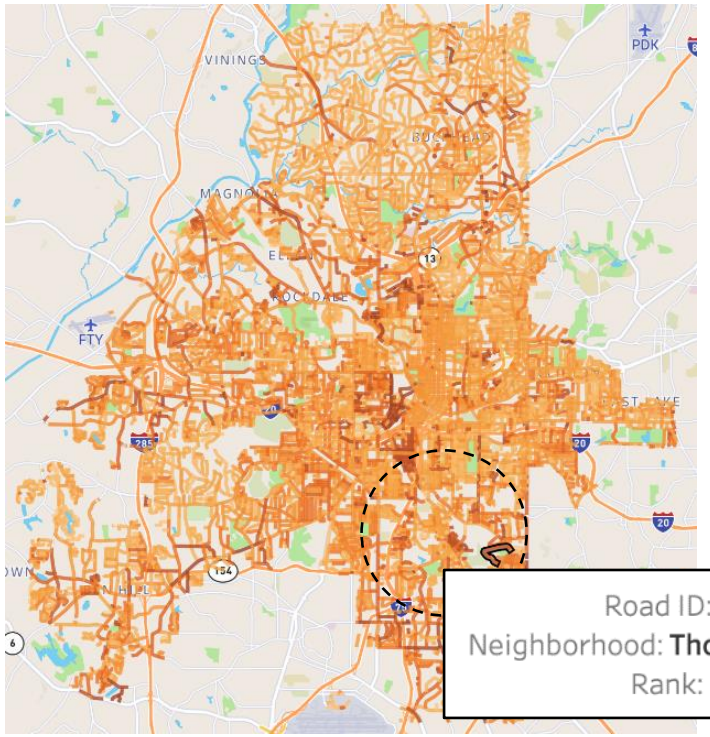
A dual methodology was used to identify highest need areas for more lighting at the neighborhood-level and at the street-level.

1. Neighborhood Ranking





2. City-wide Road Segment Ranking



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- **The highest need is on the South and West side of the City, but there are streets in every corner of the city that need additional streetlighting**
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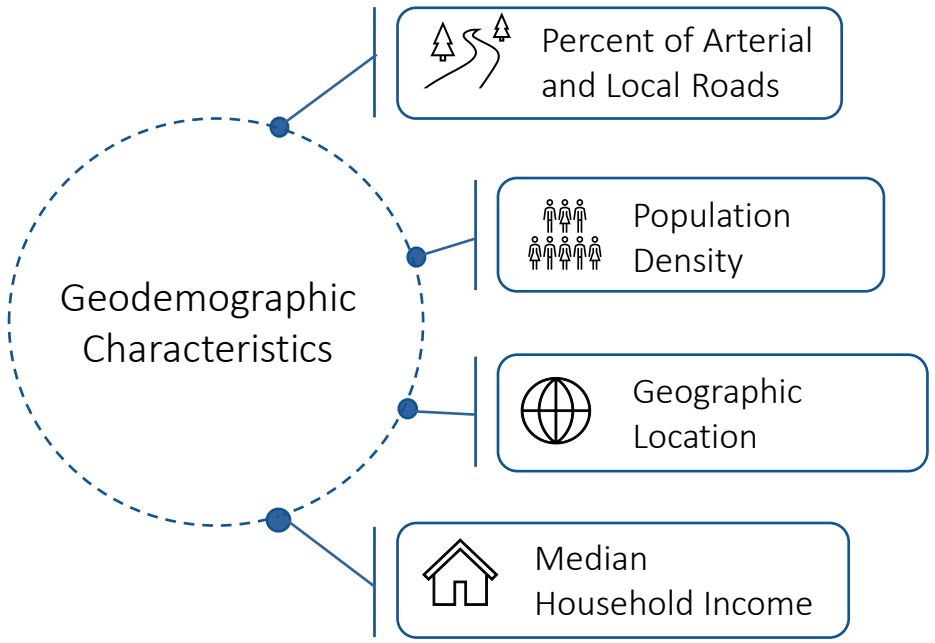
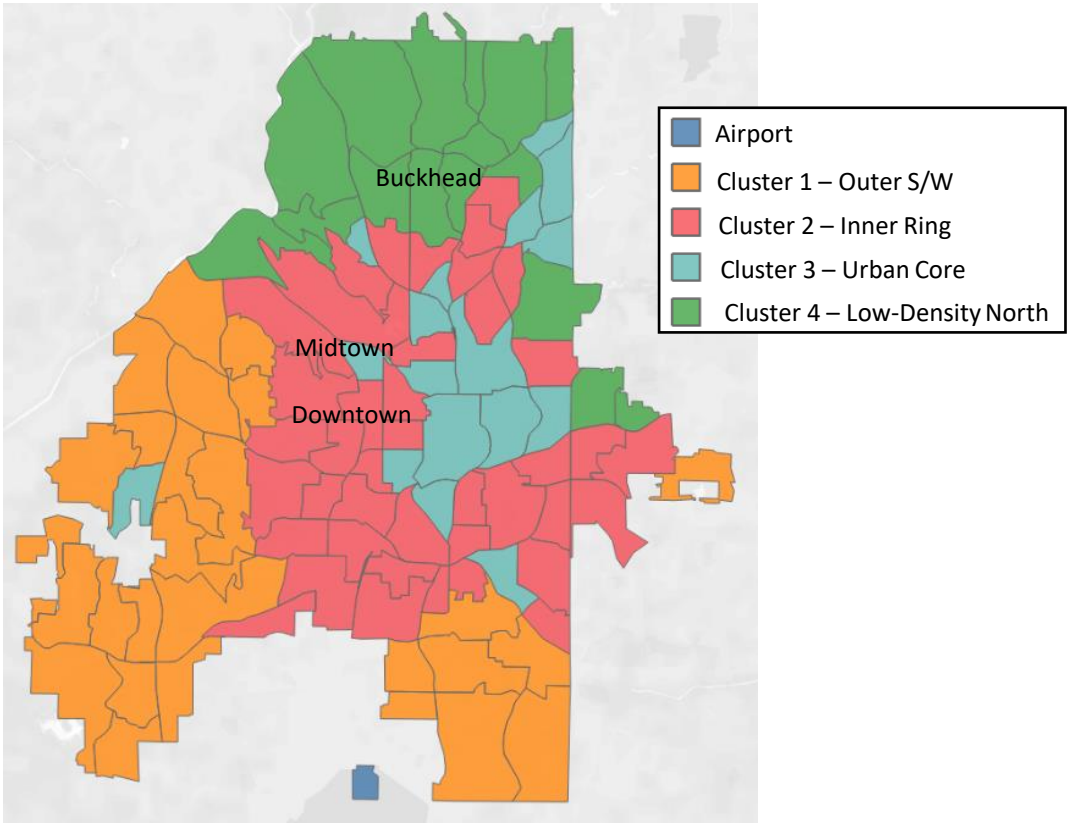
Neighborhood Analysis

We used machine learning to cluster neighborhoods based on their characteristics to measure the societal ROI for investing in additional streetlights.

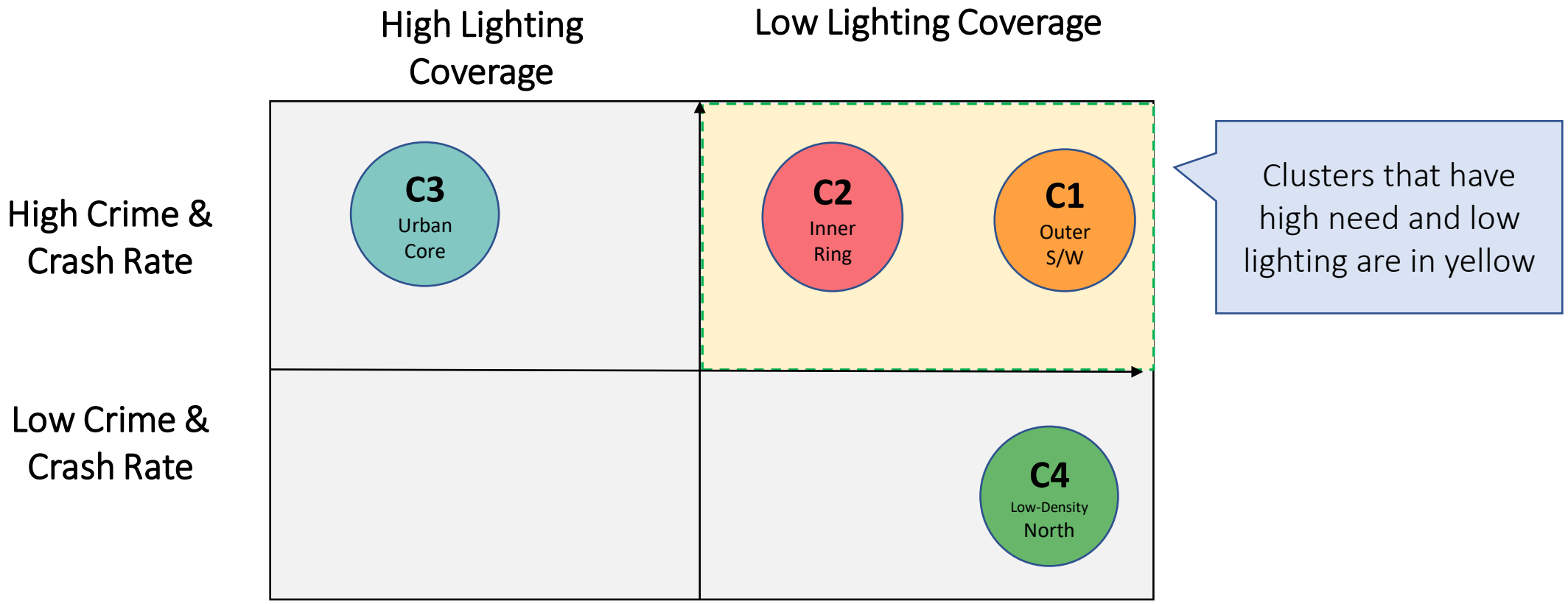


K-Means Clustering of Neighborhoods



Neighborhood Analysis: Results

Clusters 1, 2 and 3 have high apparent need of lighting, but Cluster 3: Urban Core is the only cluster that already has high lighting coverage today.



Societal Cost Savings

Data analytics and forecasting show that investing in additional street lighting in Clusters 1 & 2 has a high net societal benefit from reduced crime and crashes.

Quantified the net societal benefit of added lights in a neighborhood for each cluster over 5 years

	Forecast Decrease in Crime	Forecast Decrease in Crashes	Societal Benefit
Cluster 1: Outer S/W	19.95%	16.61%	$70 M
Cluster 2: Inner Ring	16.63%	2%	$48.8M
Cluster 3: Urban Core	No measurable impact on crime	No measurable impact on crashes	0
Cluster 4: Low-Density North	No measurable impact on crime	No measurable impact on crashes	0

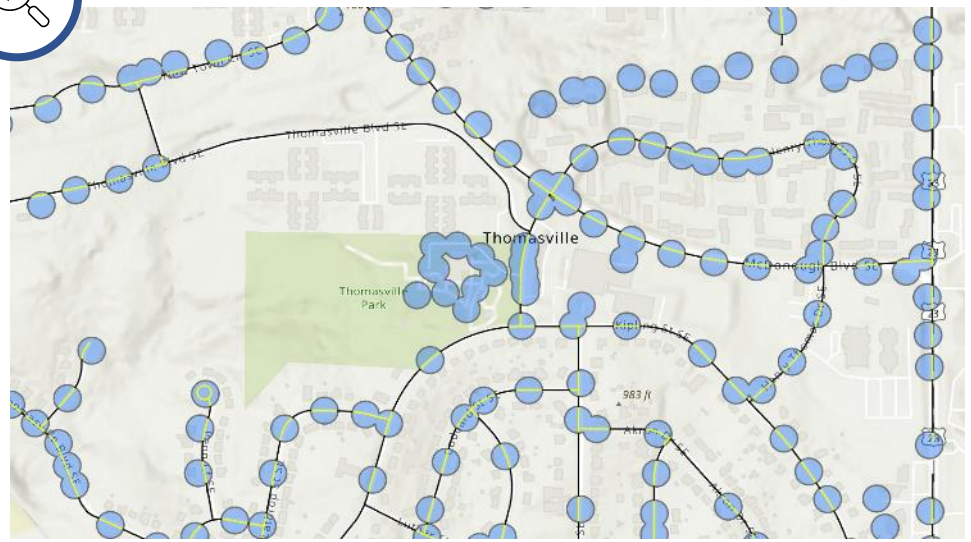
From both an ROI standpoint and an equity standpoint, there is a strong case for investing in additional lighting in South & West Atlanta

Though the overall lighting investment case is weaker for clusters 3 & 4, there are individual high need streets that meet the bar for investment in both clusters

Calculating Needed Lighting

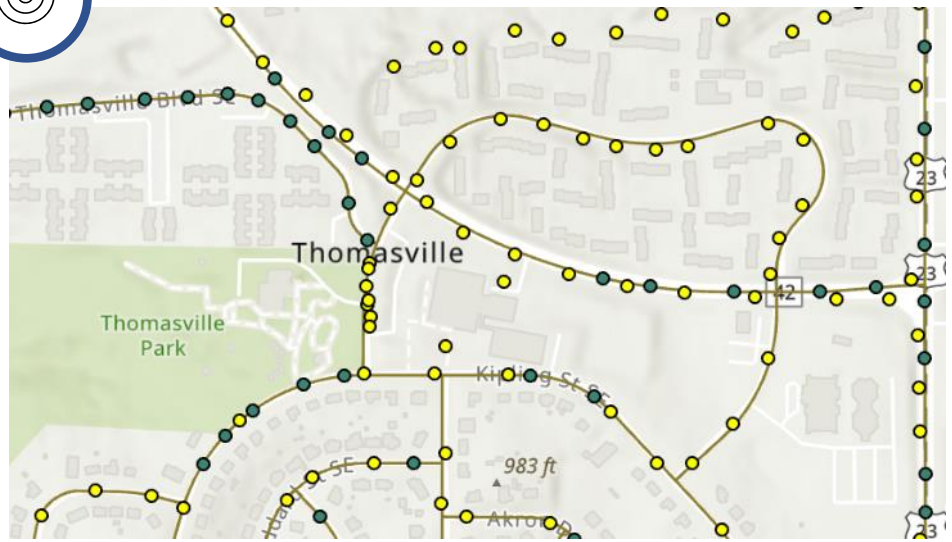
The most common condition in the high need neighborhoods is low-lighting coverage that could be augmented with in-fill streetlights.

Neighborhood: Thomasville Heights



Unlit road

Neighborhood: Thomasville Heights



Current lights

Proposed new lights

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Recommendation

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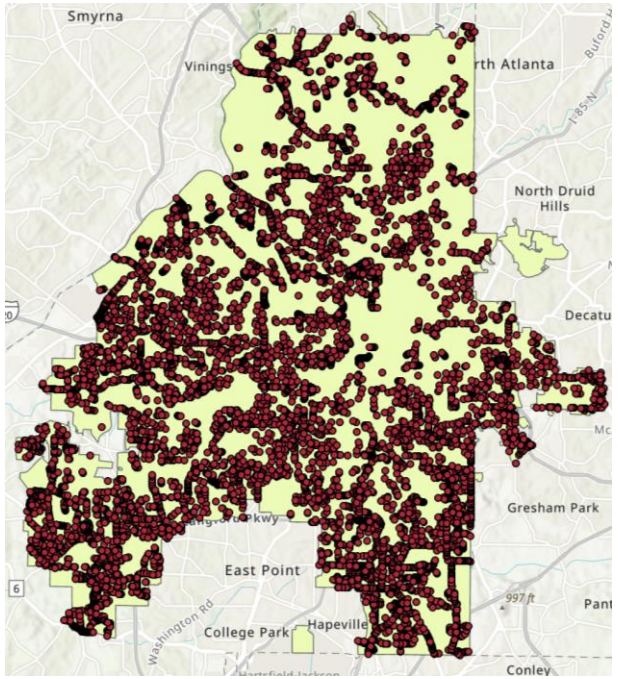
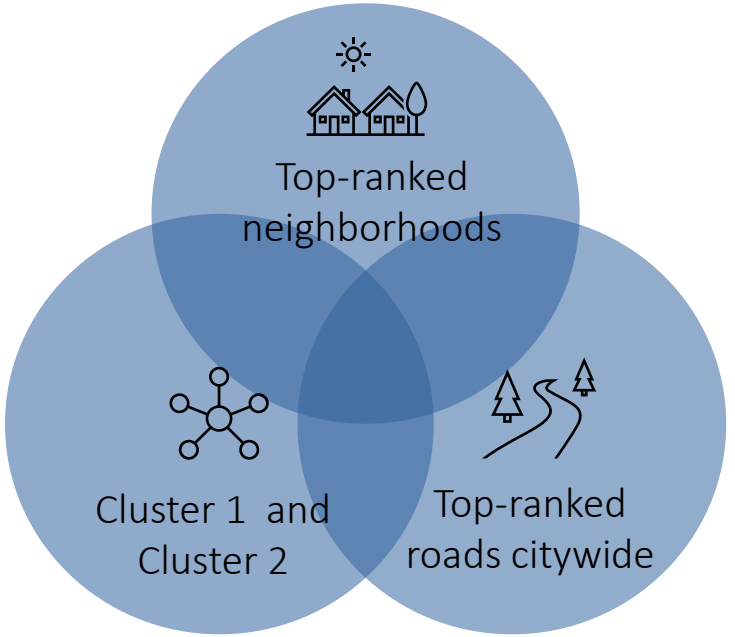


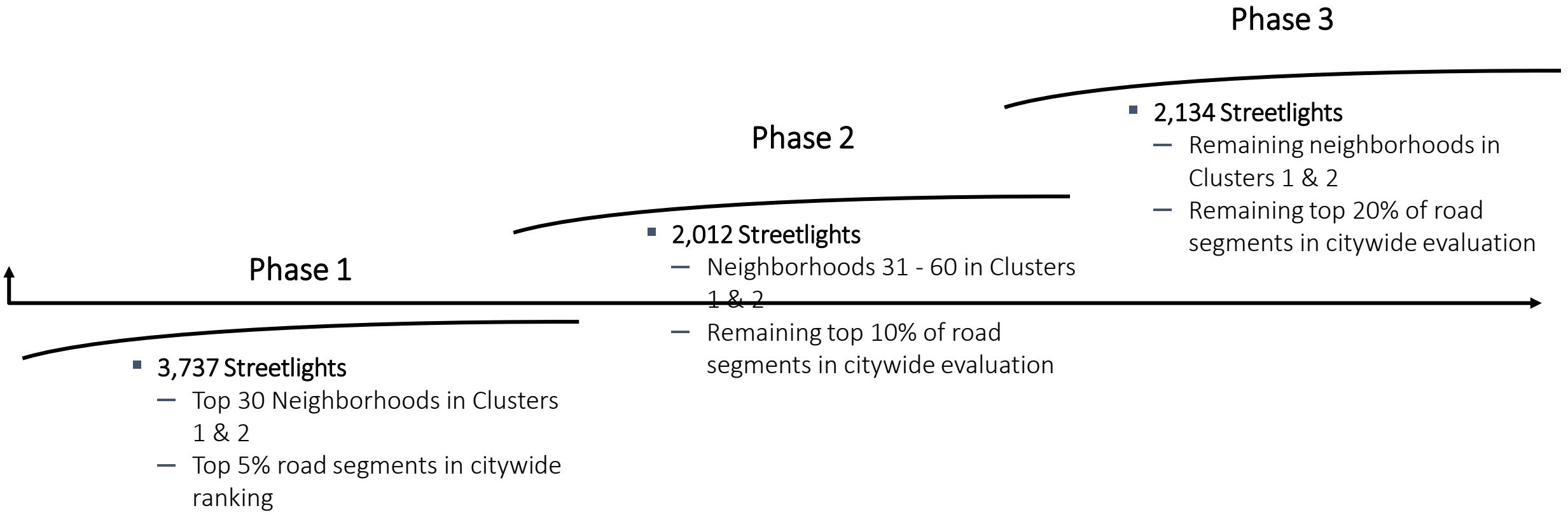
~8K additional streetlights are “highly critical” to address crime and crashes



3,145	101	7,883
Roads	Neighborhoods	Streetlights

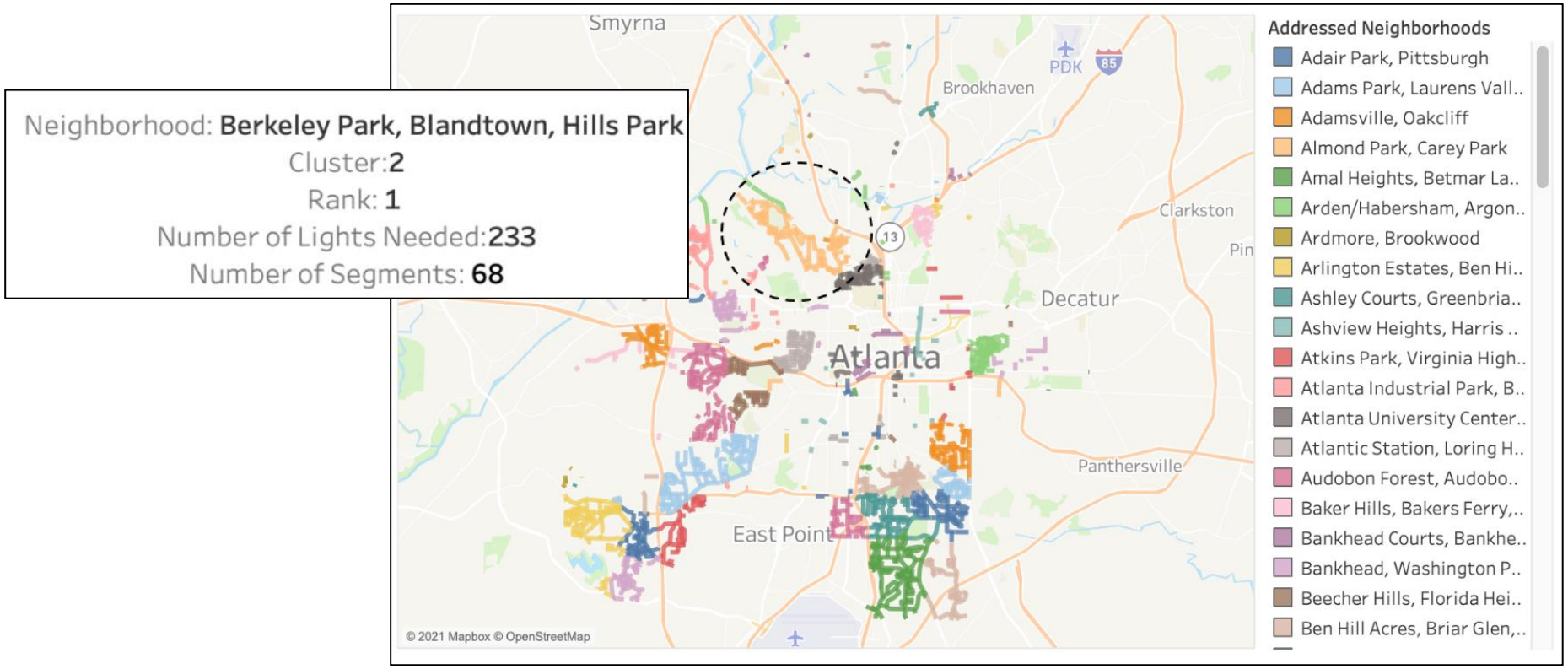
Plan of Action

The GT Team recommends deploying 7,883 net new streetlights in three phases, prioritizing the highest need first.



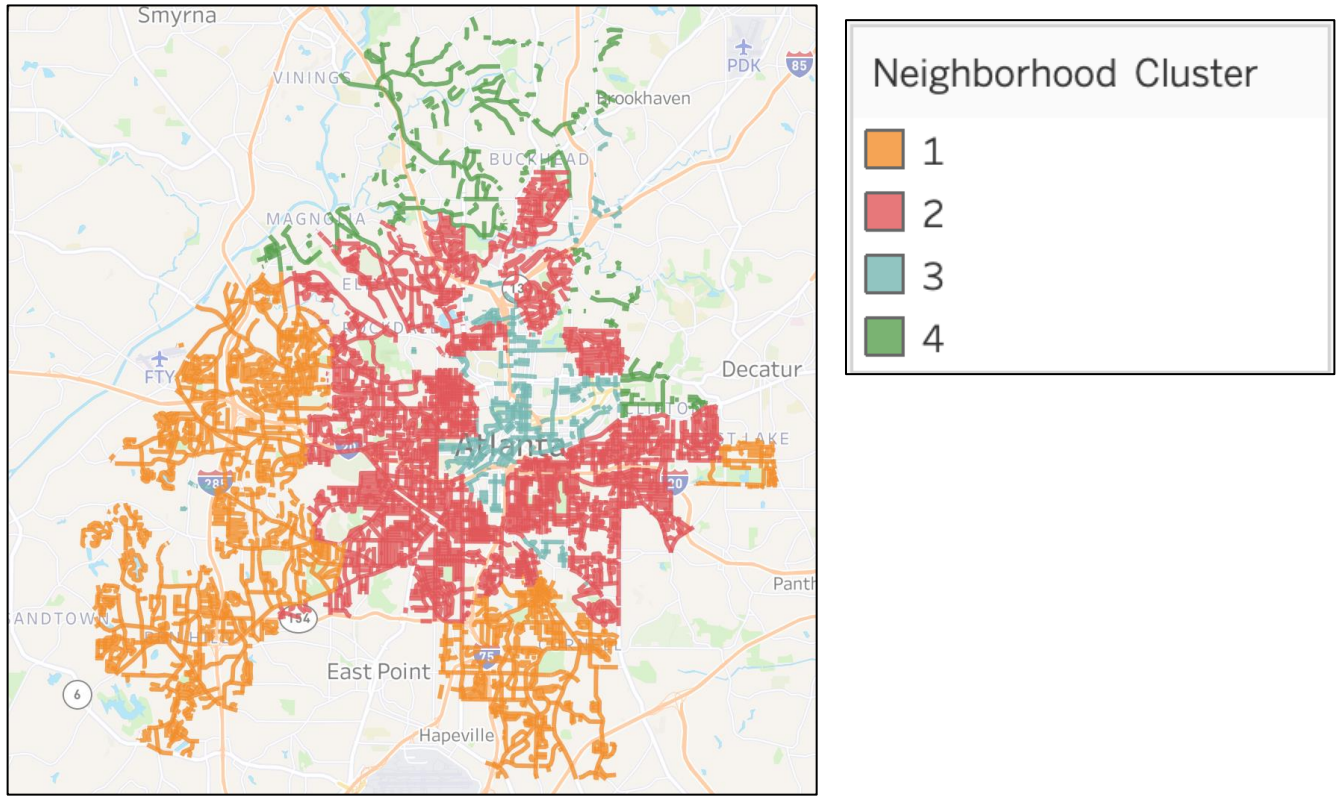
Plan of Action: Phase 1

Implementation of Phase 1 would add 3,737 new streetlights, improving conditions on 1,156 road segments in 84 neighborhoods.



Total Impact

The implementation of the 3 phases would add 7,883 new streetlights, improving conditions on 3,145 road segments in all 101 neighborhoods.



Cost Estimates

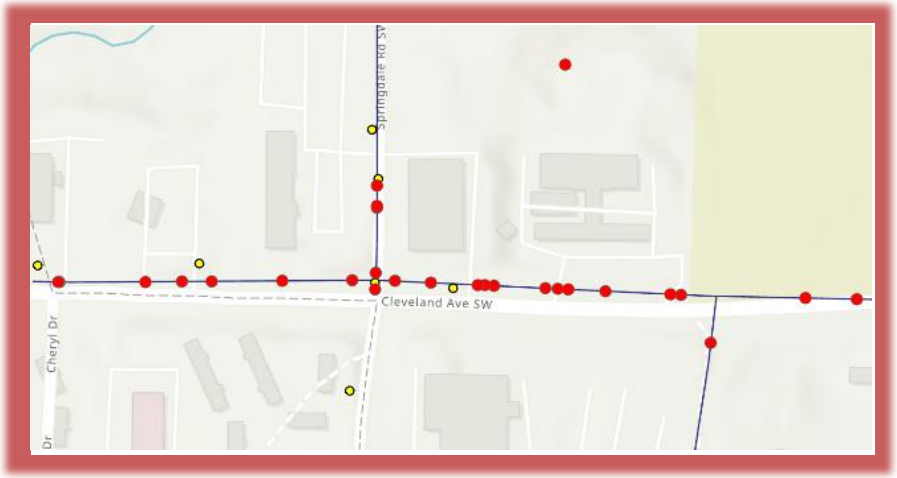
The Team estimates that deploying 7,883 net new streetlights has an NPV cost of $70-$90M in installation, maintenance and operations costs over 15 years.

	Number of Streetlights	Estimated Cost
Phase 1	3,737	$30M - $40M
Phase 2	2,012	$20M - $25M
Phase 3	2,134	$20M - $25M
+ Potential Future Phases		
Total	7,883	$70M-$90M

Community Value: Example 1

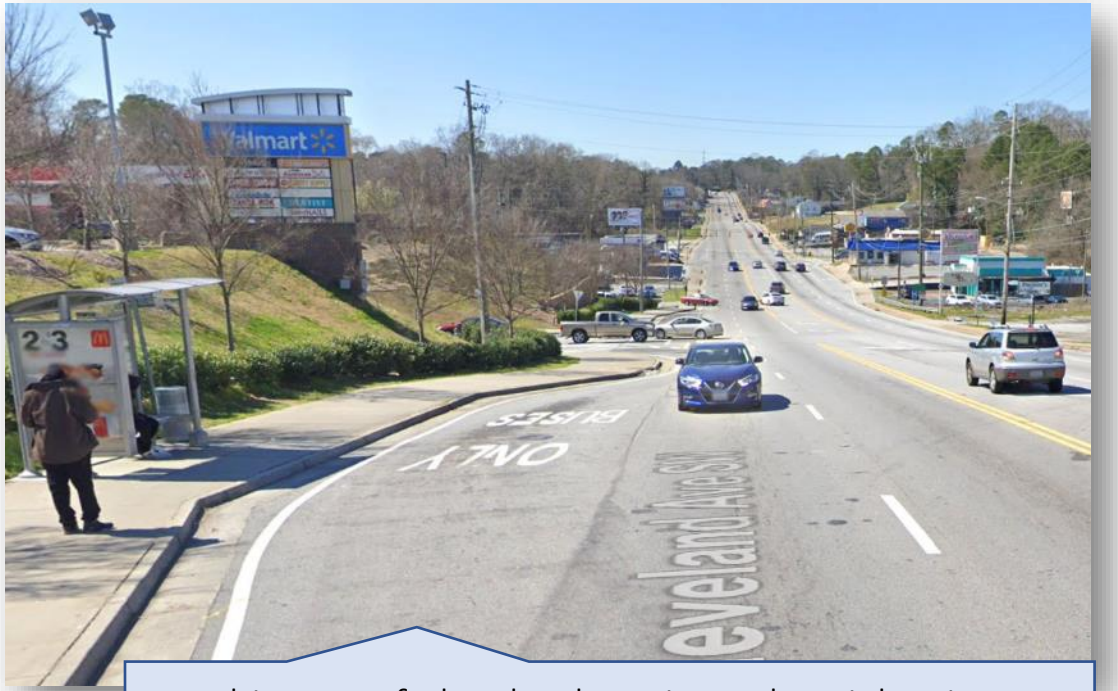
Perkerson was identified as the #3 neighborhood for highest need of lighting in the City of Atlanta.

Neighborhood: Perkerson
Road: Cleveland Ave SW



- Nighttime crashes and crime reports
- Streetlights

Google Street View

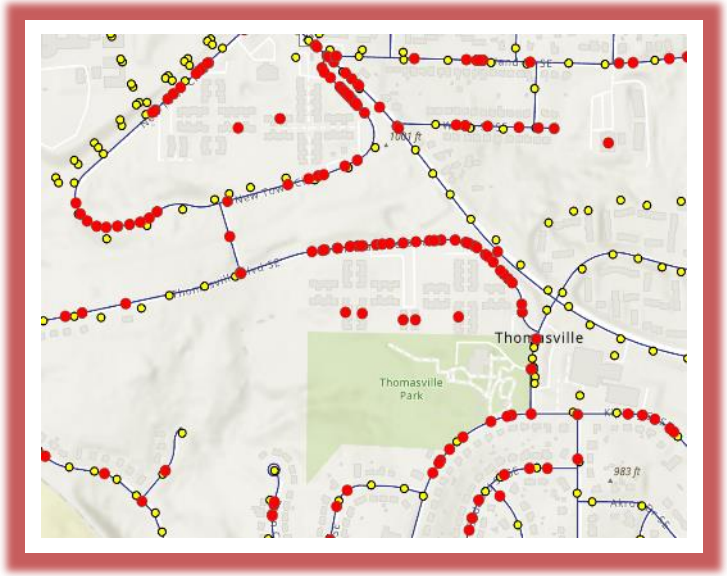


This area of Cleveland Ave is on the High-Injury Network and there is hardly any streetlighting!

Community Value: Example 2

Thomasville Heights was identified as the #5 neighborhood for highest need of lighting in the City of Atlanta.

Neighborhood: Thomasville Heights
Road: Thomasville Blvd SE



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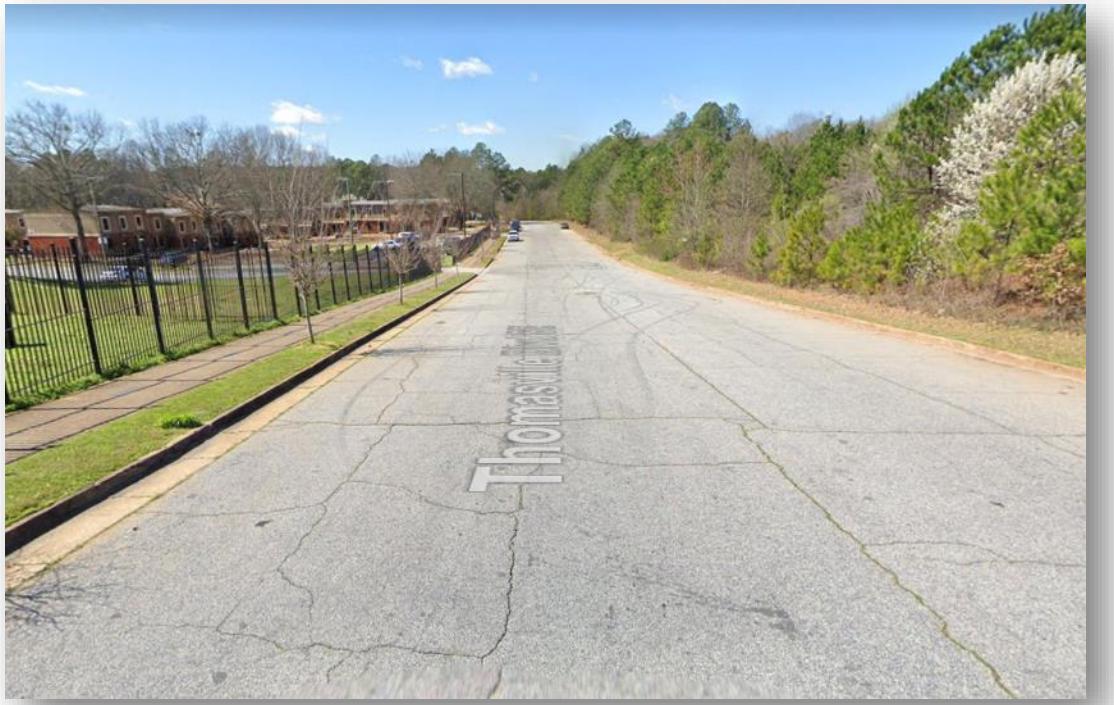
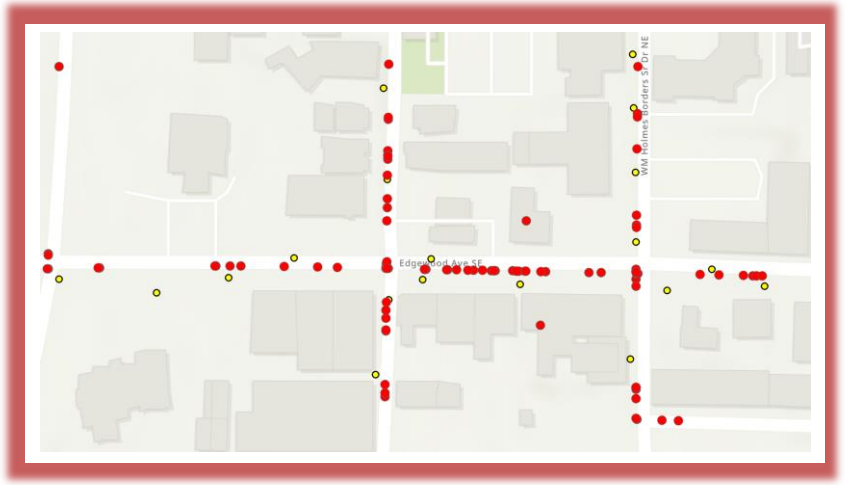


Community Value: Example 3

Edgewood Ave SE is an example of a street in Cluster 3: Urban Core in need of streetlighting.

Neighborhood: Old Fourth Ward
Road: Edgewood Ave SE



- Nighttime crashes and crime reports
- Streetlights

Google Street View

Thank You!

Any questions for the team?

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