

Exploring the Economic Impacts of Complete Streets

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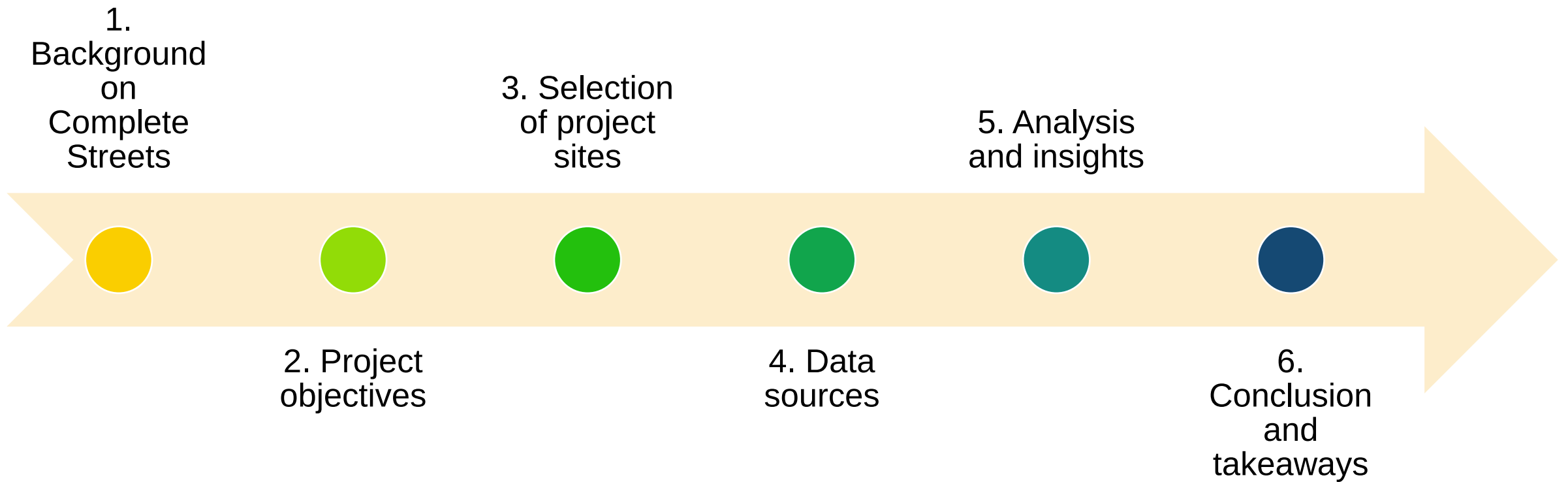
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PRESENTATION OUTLINE



COMPLETE STREETS ARE STREETS DESIGNED FOR EVERYONE

- Transportation planning and (re)design approaches
- Travel **accessible** for **all ages and abilities**
 - Pedestrians
 - Cyclists
 - Drivers
 - Public transit users
 - Those who don't have access to vehicles
 - Vulnerable communities
 - Children and low-income groups
- Prioritizes people over automobiles
- Emphasis on providing 'choice' for participating in community life



Source: NACTO Street Design Guide

COMPLETE STREETS ARE CONTEXTUAL



Dedicated bus lanes, City of Rochester



Bus shelter and bike parking, Suffolk County



ADA ramps, Village of Canisteo



Route 5S Bike lane, Utica



Crosswalks and medians, Canisteo Main St.

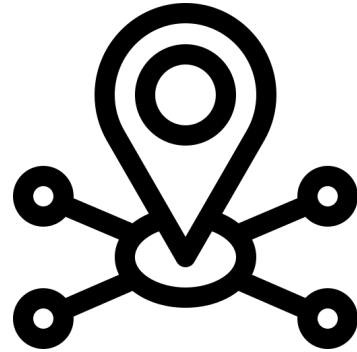


Outdoor seating, New York City

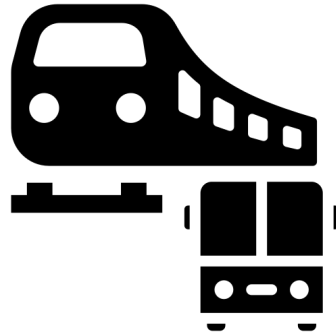
COMPLETE STREETS HAVE SEVERAL POSITIVE BENEFITS



Safer travel
**Reduction in
motor vehicle
crashes**



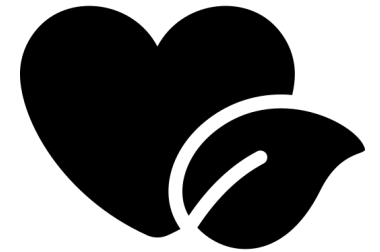
Increase in
access and
mobility
**Multimodal
options**



Transportation
options
Fairness



Stronger
communities and
neighborhoods
**Social
interaction**



Healthy cities
**Public /
Community
health**

Complete Streets improvements positively influence communities

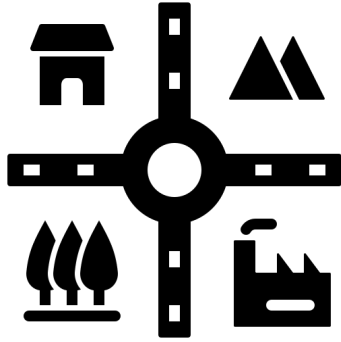
- Facilitates neighborhood improvement
- Attracts investments
- Increases economic activity
- Make neighborhoods more 'vibrant' or 'desirable'
- Properties near improvements likely to have higher sale/rental prices
- 8/10 projects saw increase in property values (Smart Growth America, 2015)

What about businesses?

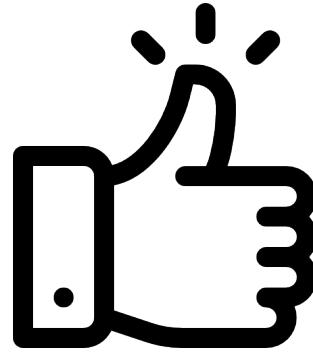


Source: NY State Department of Transportation

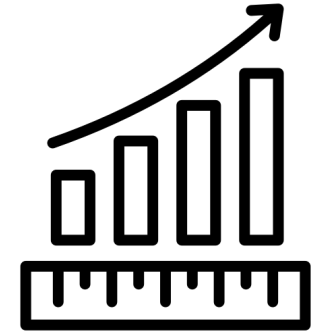
PROJECT OBJECTIVES



1. Identify **design elements** and **land use characteristics** that improve active transportation and multimodal access



2. Identify **best practices** for analyzing economic impact of Complete Streets improvements



3. Propose **methodologies to measure** the economic benefits of Complete Streets

REVIEW ON THE ECONOMIC BENEFITS OF COMPLETE STREETS



LITERATURE REVIEW: LAND USE AND DESIGN ELEMENTS

Mode	Land Use	Design Elements	Positive Benefits	Negative Benefits
Bicycle Infrastructure	• Dense, mixed-use areas with existing transit networks. • Commercial districts with people-oriented businesses. • High jobs-housing balance and income diversity.	• Protected bike lanes outperformed shared lanes • Shared bike systems (e.g., bike-share). • Replacing underutilized parking with bike infrastructure.	• Increased restaurant and grocery sales due to foot traffic. • Savings in time and costs for users. • Property values increase when combined with transit access. • Business support is possible with shared parking incentives.	• Gentrification and neglect of low-income groups. • Decline for auto-oriented businesses. • Safety risks from crashes in shared or poorly designed lanes.
Bus Rapid Transit (BRT)	• Urban and metropolitan areas. • Transit-Oriented Development (TOD) zones with integrated land-use planning.	• Dedicated lanes. • High-frequency and reliable service. • Well-designed station amenities: off-board fare collection, platform-level boarding, security measures.	• Increased business activity and job opportunities near stations. • Increased property values within 0.5 miles of stations. • Effective for regional connectivity. • More effective than other transit modes when properly implemented.	• Arterial BRT lacked economic benefit and led to reduced job growth. • Systems without dedicated infrastructure, high frequency, or reliability underperform.
Passenger & Light Rail	• High-density corridors and downtown cores with economic agglomeration. • Mixed-use zoning with supportive TOD policies.	Integration with street • Accessibility (ADA-compliant ramps) • Wayfinding (signage) • Dedicated lanes • Pedestrian signals Room for businesses (for elevated stations)	• Increased retail, office, and commercial property values near stations (premiums seen up to 1.85 miles). • Surge in building permits and development project values post-announcement.	• Construction disruptions caused temporary/permanent harm to small businesses. • Negative perceptions from single-family homeowners. • Competing land uses / saturation can lead to decline in certain sectors. • Benefits are not automatic and require supportive policy.
Sidewalks & Road Diets	• Existing walkable neighborhoods. • Mixed-use areas where walking is practical. • Areas with complementary multi-modal infrastructure.	• Adding sidewalks where they are missing. • Road diets • Pedestrian-scale improvements (lighting, crosswalks, landscaping).	• Increased property values in walkable neighborhoods. • Enhanced safety and community appeal.	• No economic benefit in car-dependent, low-density suburban areas.

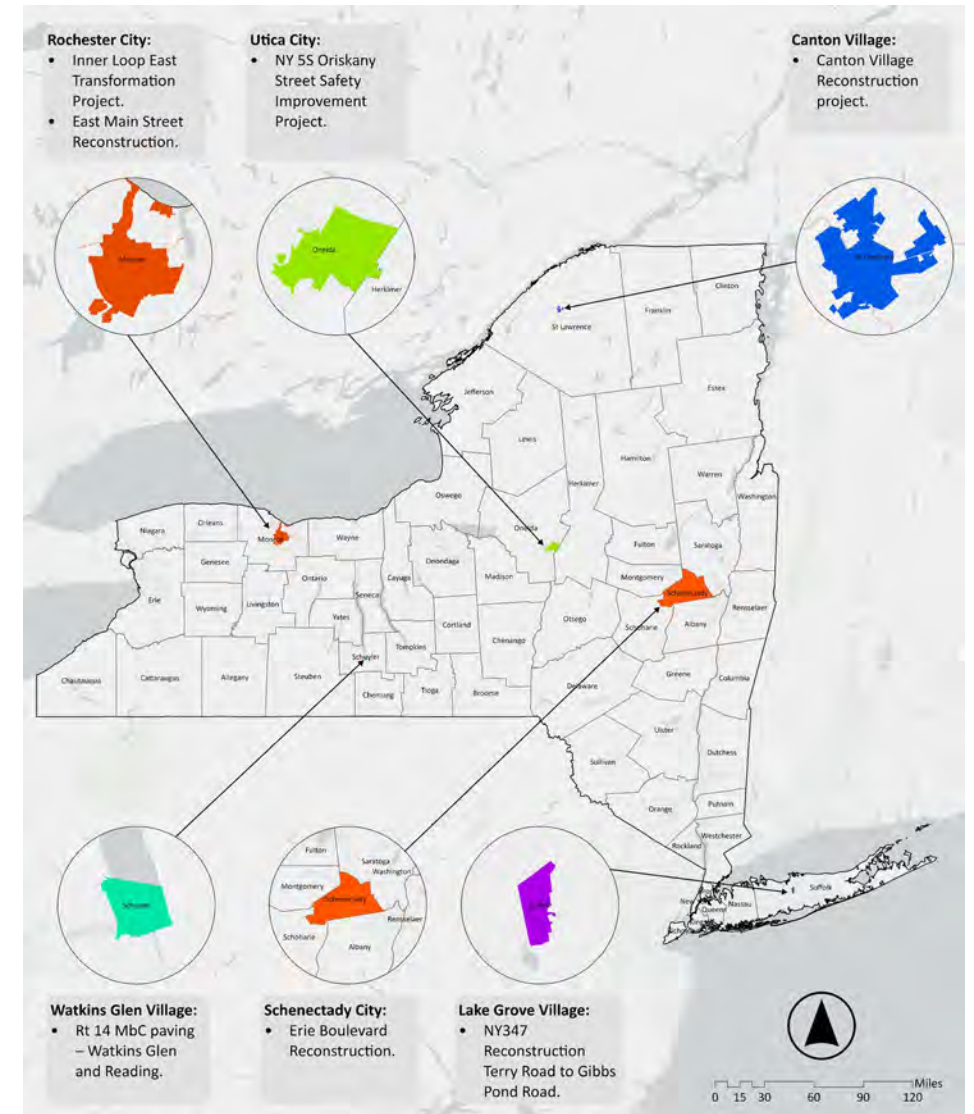
SELECTION OF PROJECT SITES



SELECTION PROCESS

- Diversity of projects:
 - Context: urban, suburban, rural
 - Complete streets elements: ADA ramps, medians, sidewalks, crosswalks, bike lanes, on route parking, pedestrian signals
 - Timeline: 2013 – 2013
- Effort to understand if benefits were realized.

No	Context	Project	County	Year Completed
1	Rural	Canton Village Reconstruction project	St. Lawrence	2013
2	Urban	Erie Boulevard Reconstruction	Schenectady	2016
3	Suburban	NY 347 Reconstruction Terry Road to Gibbs Pond Road	Suffolk	2017
4	Urban	Inner Loop East Transformation Project	Monroe	2018
5	Rural	Route 14 MbC paving – Watkins Glen and Reading	Schuyler	2019
6	Suburban / Urban	NY 5S Oriskany Street Safety Improvement Project	Oneida	2021
7	Urban	East Main Street Reconstruction	Monroe	2023



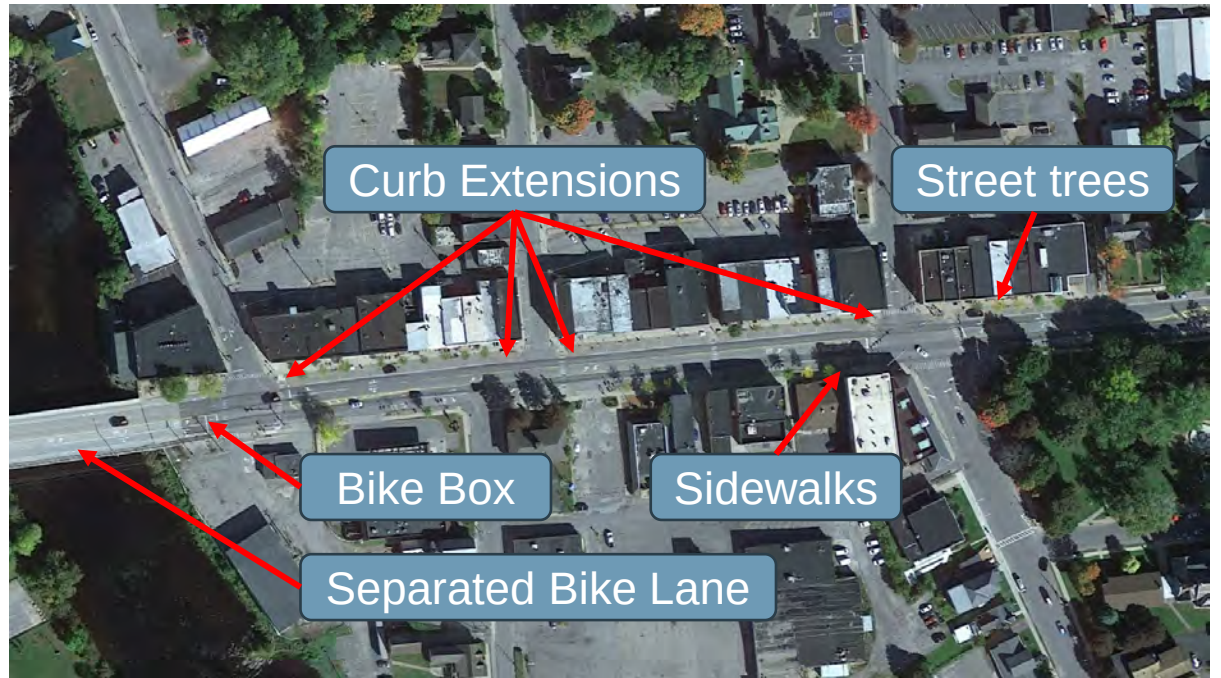
1. CANTON VILLAGE RECONSTRUCTION PROJECT



BEFORE

Context: Canton, St. Lawrence County (**Rural**)

Improvements: Sidewalks, pedestrian bump outs, appurtenances (ornamental lighting, benches) and street trees



AFTER

Completed: 2013

Source: Google Earth Pro

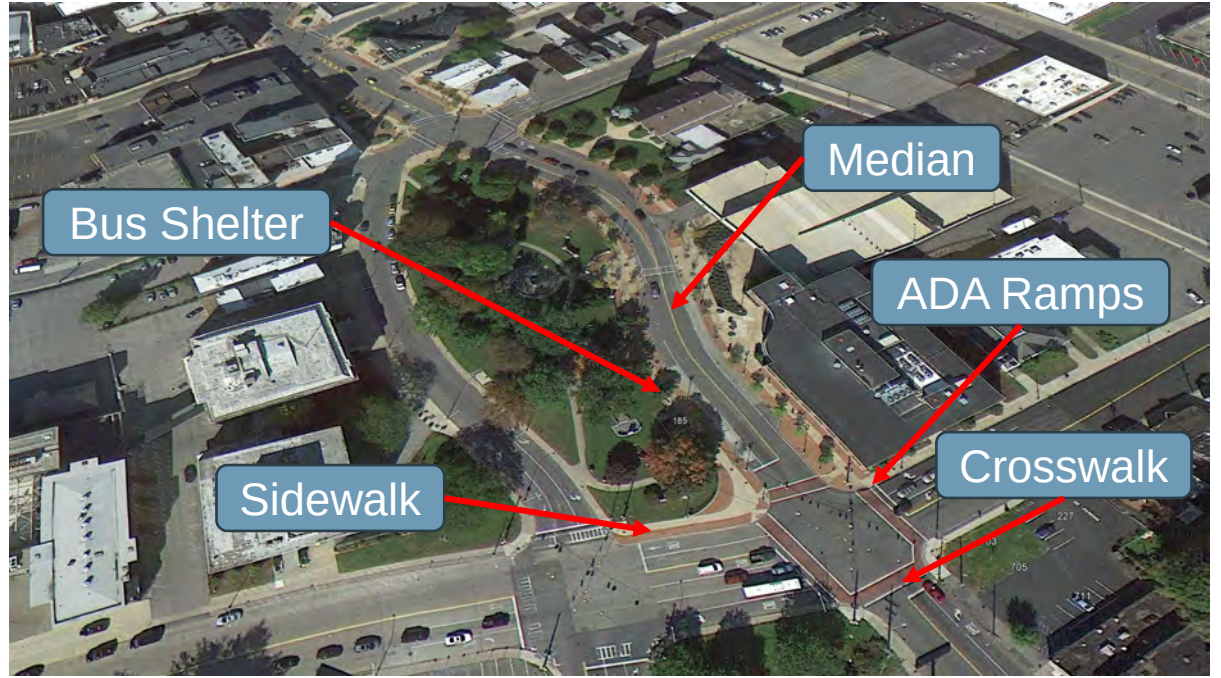
2. ERIE BOULEVARD RECONSTRUCTION



BEFORE

Context: Schenectady, Schenectady County (**Urban**)

Improvements: Streetscape enhancements like lighting, benches, and trees.
Traffic calming measures
New parking and additional depth of frontage between businesses and curb line



AFTER

Completed: 2016

Source: Google Earth Pro

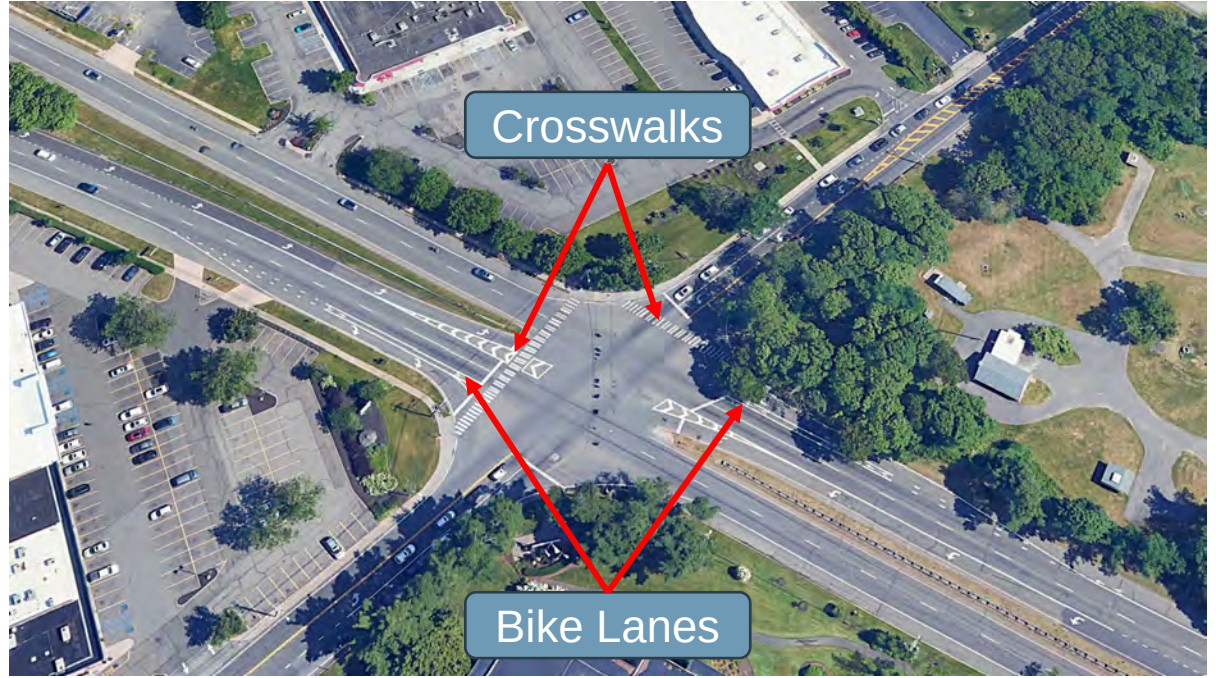
3. NY 347 RECONSTRUCTION (Terry Road to Gibbs Pond Road)



BEFORE

Context: Lake Grove, Suffolk County (**Suburban**)

Improvements: Shared use path, pedestrian sidewalk, ADA ramps, enhanced bus shelter, planted center median, pedestrian crosswalks, pedestrian timers



AFTER

Completed: 2017

Source: Google Earth Pro

4. INNER LOOP EAST TRANSFORMATION PROJECT



BEFORE

Context: Rochester, Monroe County (**Urban**)

Improvements: Improve geometric design, on-street parking, street lighting
Pedestrian accommodations in conformance with ADA standards.
Two-way cycle track from Monroe Ave to University Ave



AFTER

Completed: 2018

Source: Google Earth Pro

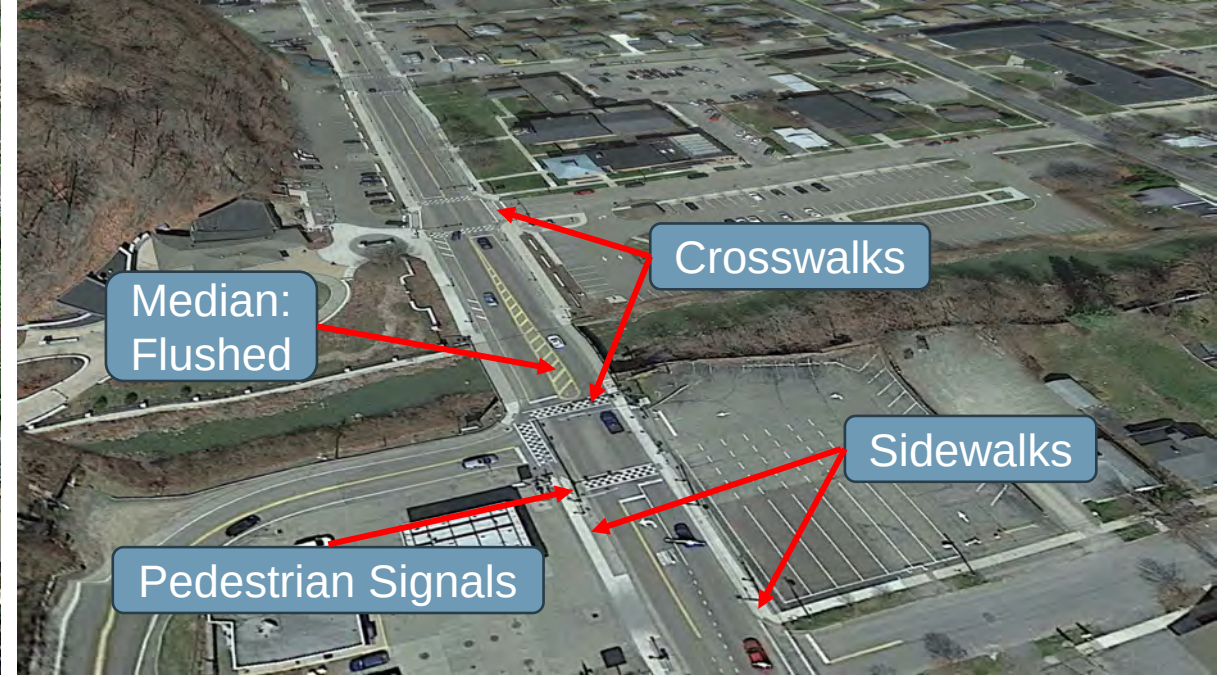
5. ROUTE 14 MBC PAVING – (Watkins Glen Village and Reading Town)



BEFORE

Context: Watkins Glen Village, Schuyler County (**Rural**)

Improvements: Adding “gateway” features, street lighting, ADA ramps, crosswalks, special crosswalk, sidewalk, colored and imprinted concrete, adding a curbed median and raceway historic features



AFTER

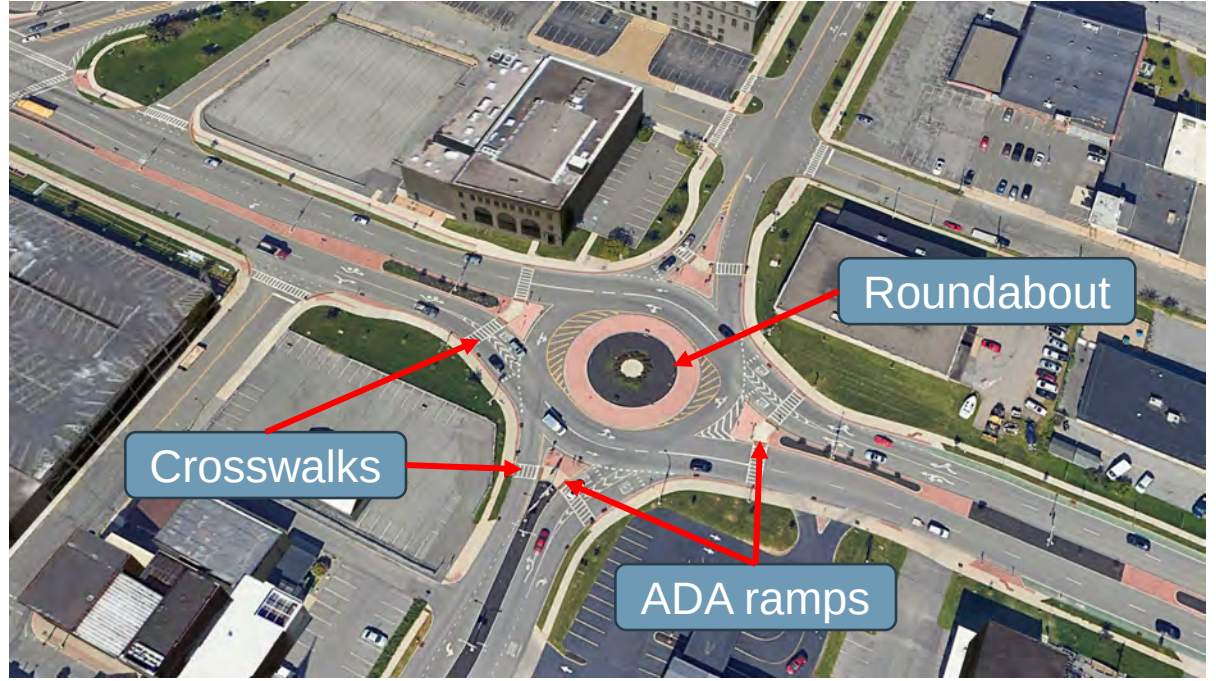
Completed: 2019

Source: Google Earth Pro

6. NY 5S ORISKANY STREET SAFETY IMPROVEMENT PROJECT



BEFORE



AFTER

Context: Utica, Oneida County (**Suburban/Urban**)

Completed: 2021

Improvements: Vehicular travel lanes eliminated, dedicated bicycle facilities, pedestrian crossing distances reduced, mid-block crossings added, roundabout replaced a signalized intersection in the corridor

Source: Google Earth Pro

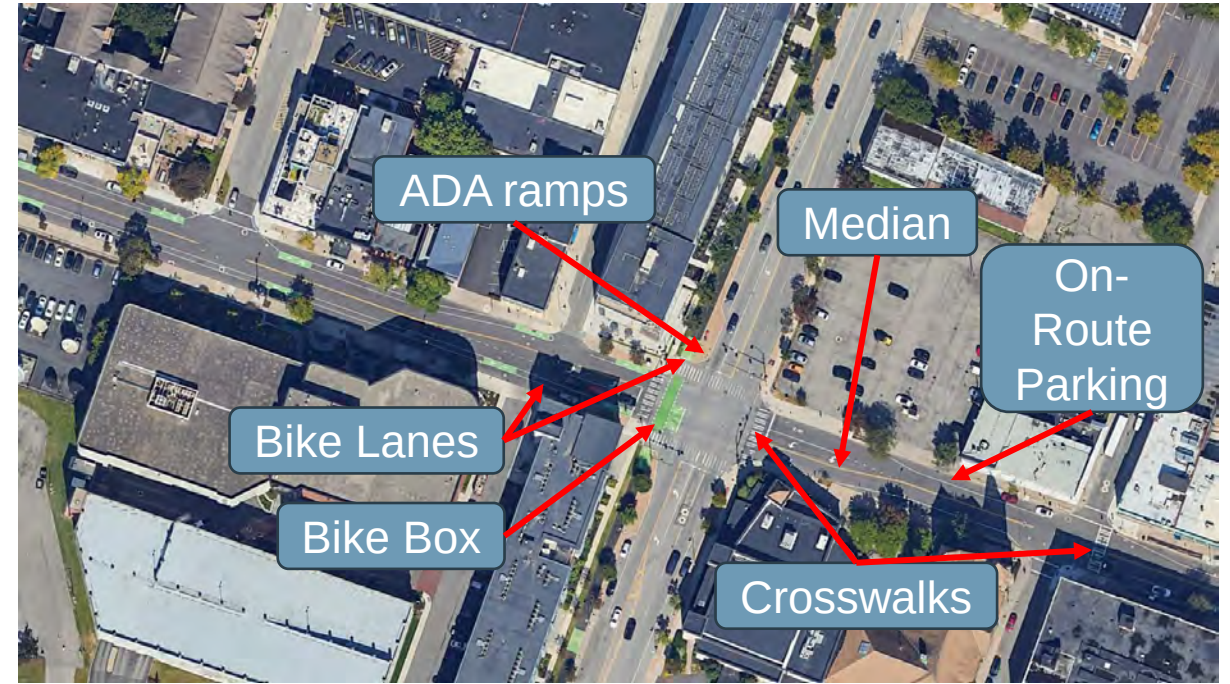
7. EAST MAIN STREET RECONSTRUCTION



BEFORE

Context: Rochester, Monroe County (**Urban**)

Improvements: 8-ft sidewalks including 4-ft space for street light poles, trees, traffic signs, hydrants and pedestrian amenities.
6'-6" width for sidewalks and curb ramps
Two midblock crossings with public space and bike facility.



AFTER

Completed: 2023

Source: Google Earth Pro

DATA SOURCES



DATA SOURCES

Unit of Analysis: Census Tract

- NYSDOT Layers on Complete Streets, Businesses, and Property Prices
- Replica Datasets
- NY State Census Tracts (NYS GIS Clearinghouse)
- Population (American Community Survey, 5-year estimates)
- Analysis of data within 1.25-mile buffer



ANALYSIS AND INSIGHTS



ANALYSIS & INSIGHTS

- Business Count Change
- Business Count % Change
- Employee Sum Change
- Employee Sum % Change
- Property Value Change
- Property Value % Change
- Z Scores of each Complete Street improvements
- Composite Score = Average of CS Z scores in each tract

Simple Correlaton Matrix

+1: A perfect positive relationship (as one increases, the other increases proportionally).

0: No linear relationship.

-1: A perfect negative relationship (as one increases, the other decreases proportionally).

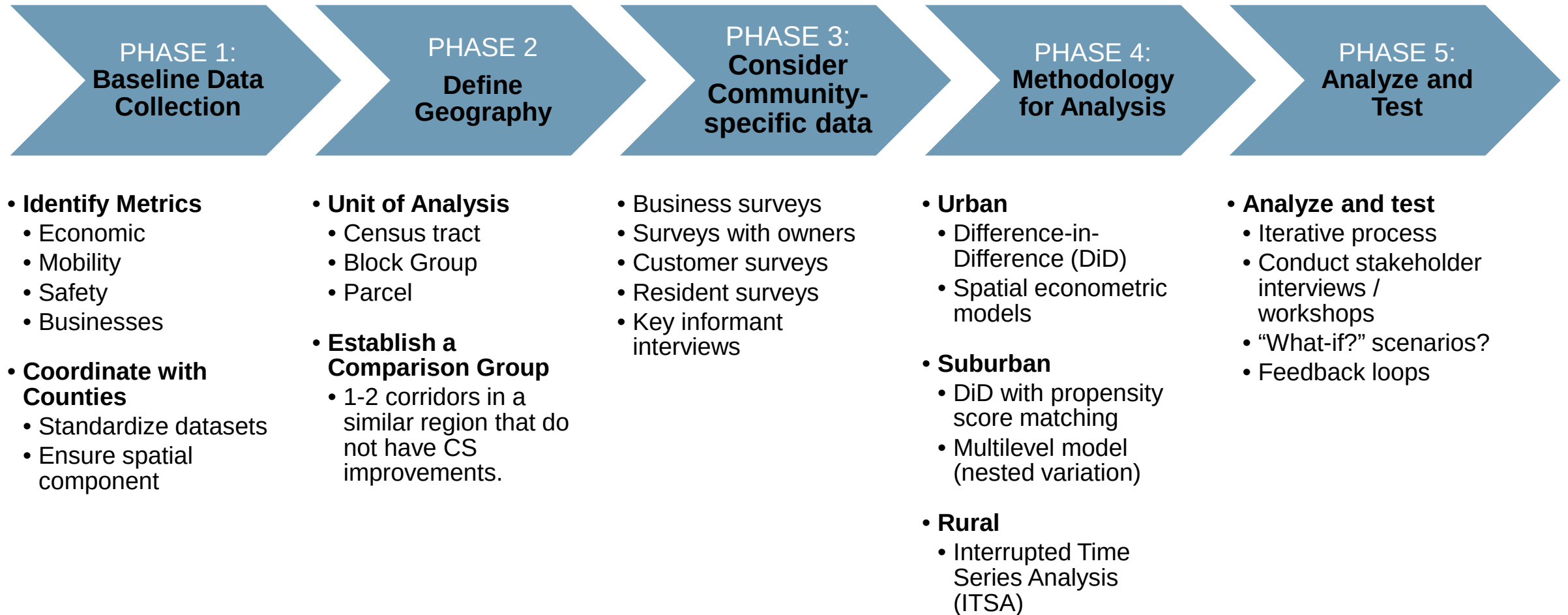
	Composite_Score	Count_Signals	Count_ADA	Sum_Parking_ft	Sum_Median_Area_ft	Sum_Bikelane_Area_ft	Sum_Sidewalk_Area_ft	Sum_Crosswalk_Area_ft
Business_Count_Change	0.45	0.26	0.51	0.49	-0.24	0.22	0.52	0.57
Employee_Sum_Change	0.45	0.25	0.53	0.40	-0.24	0.25	0.51	0.56
PropValue_%_Change	-0.19	-0.21	-0.15	-0.14	-0.20	0.00	-0.15	-0.16

ANALYSIS & INSIGHTS

Project Sites	Businesses
Canton Village Reconstruction project	Strong positive correlation with ADA ramps and crosswalks
Erie Boulevard Reconstruction	Generally weak and negative correlation with most improvements Only positive correlation is between medians and property value (0.30)
NY 347 Reconstruction Terry Road to Gibbs Pond Road	No strong evidence to show correlation
Inner Loop East Transformation Project	Moderate positive correlation with parking, crosswalks, signals, and ADA ramps
Route 14 MbC paving – Watkins Glen and Reading	No strong evidence to show correlation
NY 5S Oriskany Street Safety Improvement Project	No strong evidence to show correlation
East Main Street Reconstruction	Moderate positive correlation with crosswalks, sidewalks, and ADA ramps Only site showing positive relationship with employment

- Three sites (**Canton Village, Inner Loop, East Main St.**) showed moderate to strong positive correlations between CS improvements and increase in the number of businesses.
- Three sites (**Erie Blvd, NY347, NY5S**) showed weak or negligible correlations.
- CS improvements can be associated with business growth, but they are not guaranteed to be
 - Correlation $\neq$ Causation
- CS improvements included in larger neighborhood revitalization projects are likely to improve businesses.

ASSESSMENT FRAMEWORK TO EVALUATE COMPLETE STREETS



THANK YOU!

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Department of
Transportation



IN MEMORY OF
IGNATIUS ADANGA
CHARLES LESPERANCE
SEE WONG SHUM



RUTGERS-NEW BRUNSWICK

Edward J. Bloustein School
of Planning and Public Policy

Determining Latent Demand and Mode Shift Potential for Shared Mobility, Micro-Mobility and Active Transportation Across Rural, Suburban, Urban Settings

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M.Sc Student

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Special Thanks



Karen M. Lorf, NYSDOT



Ali Afshar, PhD, NYMTC



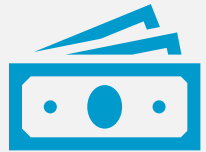
Richard Batchelder, NYSDOT

What is Latent Demand?

Unobserved portion of the
demand curve

“Pent-up” demand that
can be activated by
improvements to
transportation
infrastructure and services

What is Latent Demand?



Marketing Perspective

Latent demand exists when a consumer cannot satisfy a desire due to insufficient funds, lack of product/service availability, or lack of awareness



Psychological Theories

Characterize induced demand as a desire that a consumer cannot satisfy because they are unaware of it or cannot envision the product or service

From A Transportation Perspective



People have unmet needs or desires for travel that can be activated by improvements in transportation options (Lee et al., 1999)



People may not travel to a discount retailer that's farther away if the traffic is too congested, but they might if a new road is built that makes the trip faster and easier (Cervero, 2002)



The concept of latent demand is also linked to "missed trips", which represent unmet needs for travel due to transportation disadvantages (Fields et al., 2021)

What is Active Transportation?



Walking



Bicycling

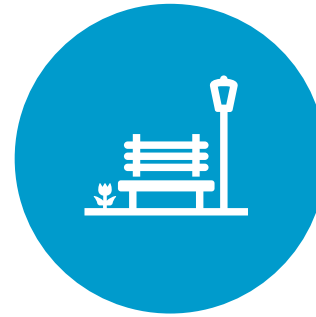


Rolling

My Contribution



Explored the concept of latent demand for active transportation using a GIS-based framework



By integrating demographic, land use, and attractor variables such as schools, colleges, transit stops, parks, etc.



Provided a framework for identifying locations with high potential for walking and biking



Applying the proposed framework to Troy, New York

Methodology



QGIS was used
as the primary
GIS platform to:

LDS: Latent Demand Score



Process the spatial data



Perform calculations



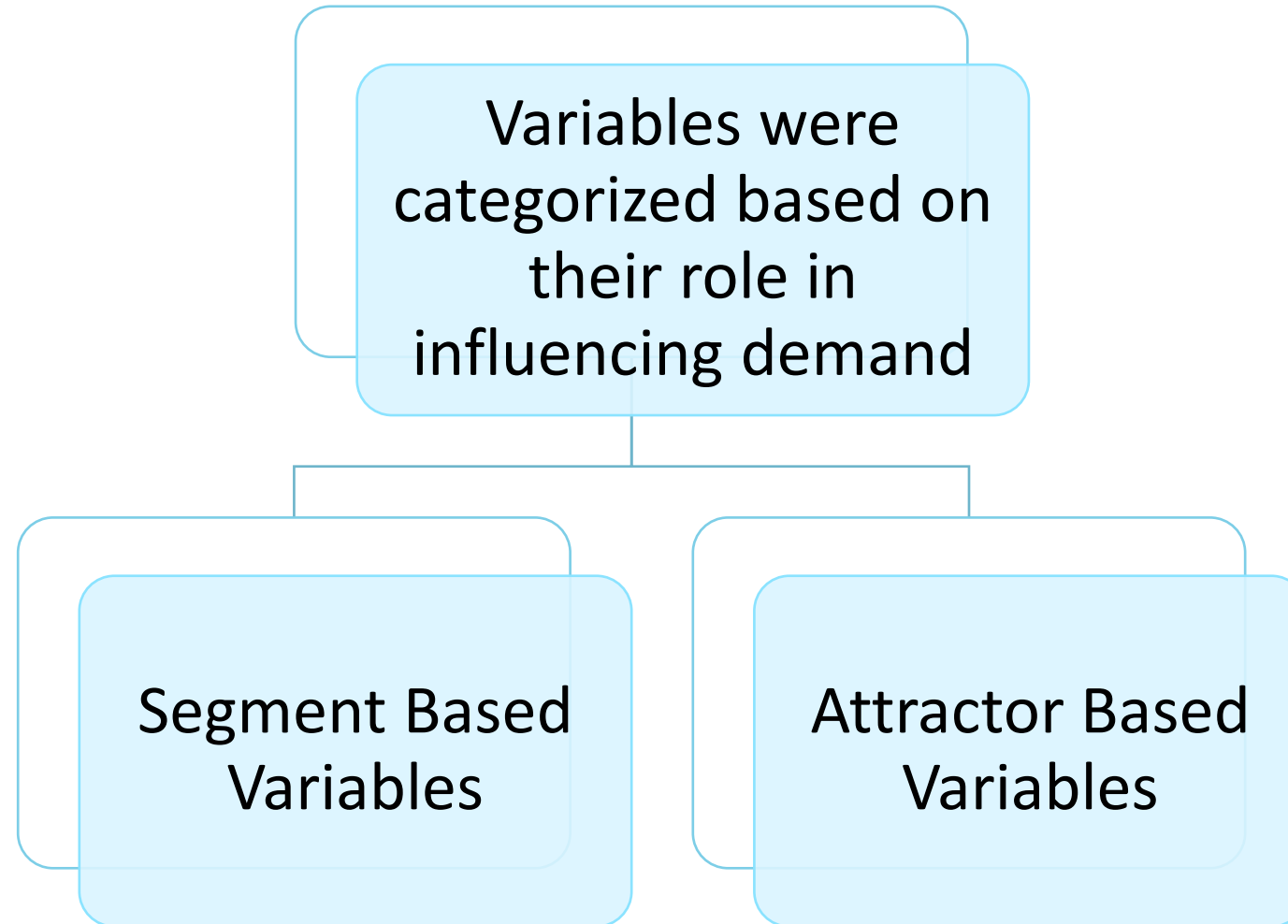
Generate LDS for walking
and bicycling

Selection of Variables

- Population by block group
- Employment by block group
- Locations of schools and enrollment data
- Locations of colleges and enrollment data
- Locations of transit stops
- Locations of recreational facilities (e.g., parks, public golf courses, picnic grounds)



Handling the Variables



Segment Based Analysis: Population and Employment

1

Buffers were created around each road segment using GIS software

GIS: Geographic Information System

2

The portion of surrounding block groups falling within each buffer was then calculated

3

Using this ratio (area within buffer/total block group area), the corresponding share of population and employment for each road segment was estimated



Ensures that latent demand is linked proportionally to the segments' surrounding socio-economic context

Formulation: Population

$$LDS = \sum_{d=1}^n P_d \sum_{z=1}^n Population_z \cdot P_{wb}$$

LDS = Latent Demand Score of a particular street segment

d = Spatial query buffer

n = Total number of buffers

P_d = Effect of travel distance on demand = $e^{-\beta d}$ where, $\beta_{biking} = 1.20$ and, $\beta_{walking} = 1.71$

z = Buffer adjacent to roadway segment

$Population_z$ = Population in the corresponding Buffer

P_{wb} = Percentage of people that either bicycle or walk for shopping and errand trips (67% for bicycle and 100% for walking)

Formulation: Employment

$$LDS = \sum_{d=1}^n P_d \sum_{z=1}^n Employment_z \cdot P_{wb}$$

LDS = Latent Demand Score of a particular street segment

d = Spatial query buffer

n = Total number of buffers

P_d = Effect of travel distance on demand = $e^{-\beta d}$ where, $\theta_{biking} = 1.20$ and, $\theta_{walking} = 1.71$

z = Buffer adjacent to roadway segment

$Employment_z$ = Population in the corresponding Buffer

P_{wb} = Percentage of people that either bicycle or walk for shopping and errand trips (67% for bicycle and 100% for walking)

Segment Based Analysis: Transit Stops



Walking in the United States is strongly associated with access to public transit (Kuzmyak & Dill, 2012a)

1

For transit stops, buffers were created around road segments, and the number of transit stops within each buffer was counted using GIS

GIS: Geographic Information System

2

The Latent Demand indicator was then expressed as the number of transit stops per mile of each road segment

Formulation: Transit Stops

$$LDS = \sum_{d=1}^n P_d \sum_{z=1}^n \left(\frac{NTS}{SL} \right)_z P_{wb} \quad \left(\frac{NTS}{SL} \right) = \text{Transit Stops/miles}$$

LDS = Latent Demand Score of a particular street segment

d = Spatial query buffer

n = Total number of buffers

P_d = Effect of travel distance on demand = $e^{-\beta d}$ where, $\beta_{\text{biking}} = 1.20$ and, $\beta_{\text{walking}} = 1.71$

z = Buffer adjacent to roadway segment

NTS = Number of Transit Stops

SL = Street Segment Length

P_{wb} = Percentage of people that either bicycle or walk for shopping and errand trips (67% for bicycle and 100% for walking)

Attractor Based Analysis: Schools and Colleges



Allows for the estimation of potential demand associated with educational trips

1

Buffers were drawn around each attractor, and the extent to which road segments fell within these buffers was calculated

2

The enrollment figures were then distributed based on the ratio of the segment length inside the buffer to the total segment length

Formulation: Schools and Colleges

$$LDS = \sum_{d=1}^n P_d \sum_{z=1}^n \left(\frac{S_B}{S_L} \right) (Enrollment)_z \cdot P_{wb}$$

LDS = Latent Demand Score of a particular street segment

d = Spatial query buffer

n = Total number of buffers

P_d = Effect of travel distance on demand = $e^{-\beta d}$ where, $\beta_{\text{biking}} = 1.20$ and, $\beta_{\text{walking}} = 1.71$

z = Buffer adjacent to roadway segment

$\frac{S_B}{S_L}$ = Ratio of Street Segment Length in Buffer to Total Street Segment Length

$(Enrollment)_z$ = Enrollment of a particular School or College

P_{wb} = Percentage of people that either bicycle or walk for shopping and errand trips (67% for bicycle and 100% for walking)

Attractor Based Analysis: Parks



Most frequent purpose for both walking and bicycling was recreational or social in nature (Kuzmyak & Dill, 2012a)

1

For recreational facilities, buffers were generated around the facilities themselves

2

The total population residing within these buffers was determined and then distributed across the road segments falling within the buffered areas



Accounts for recreational trip demand linked to proximity to parks and similar amenities

Formulation: Parks

$$LDS = \sum_{d=1}^n P_d \sum_{z=1}^n (Population)_z \cdot P_{wb}$$

LDS = Latent Demand Score of a particular street segment

d = Spatial query buffer

n = Total number of buffers

P_d = Effect of travel distance on demand = $e^{-\beta d}$ where, $\beta_{\text{biking}} = 1.20$ and,

$\beta_{\text{walking}} = 1.71$

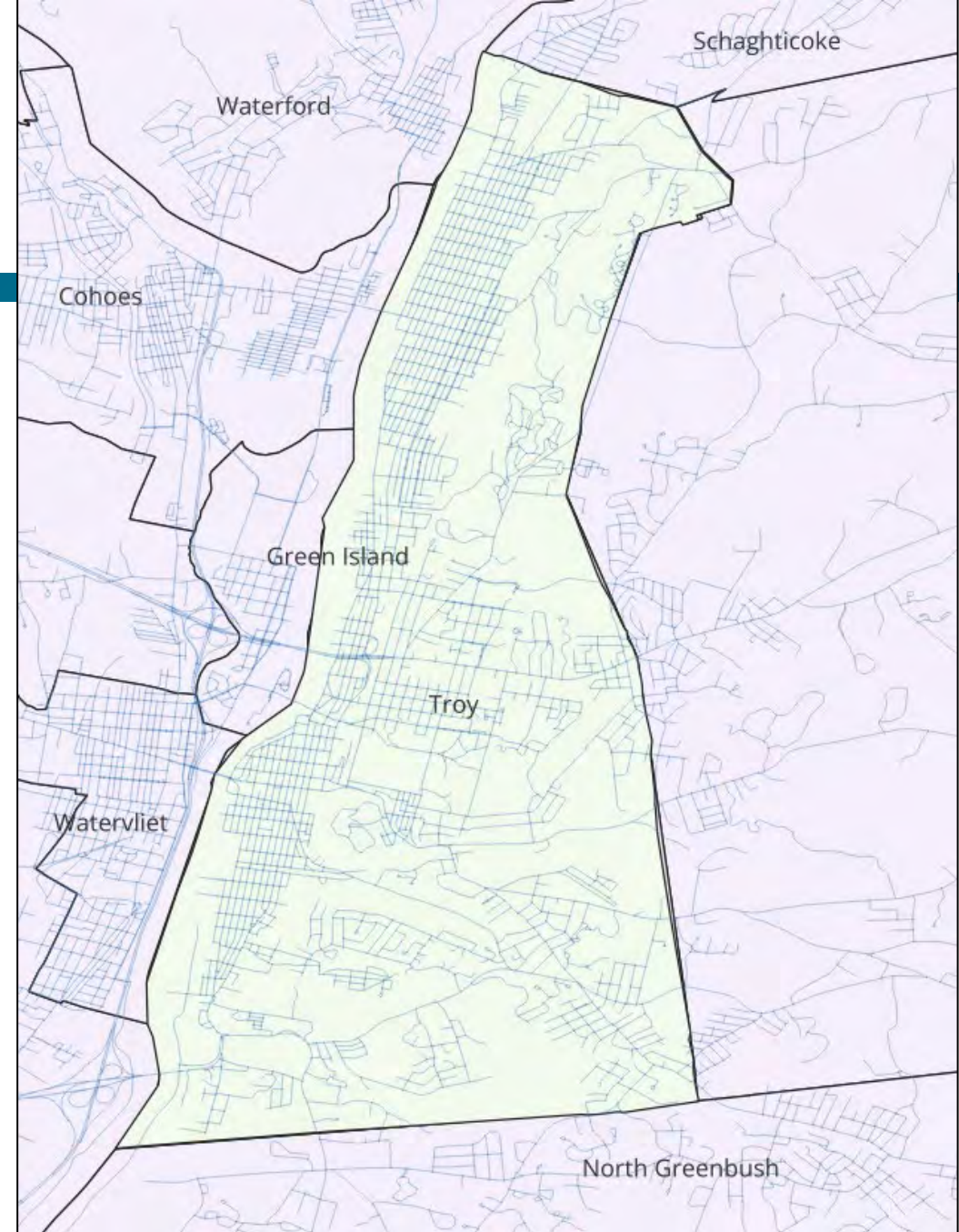
z = Buffer adjacent to roadway segment

$(Population)_z$ = Population within the Buffer of the Park

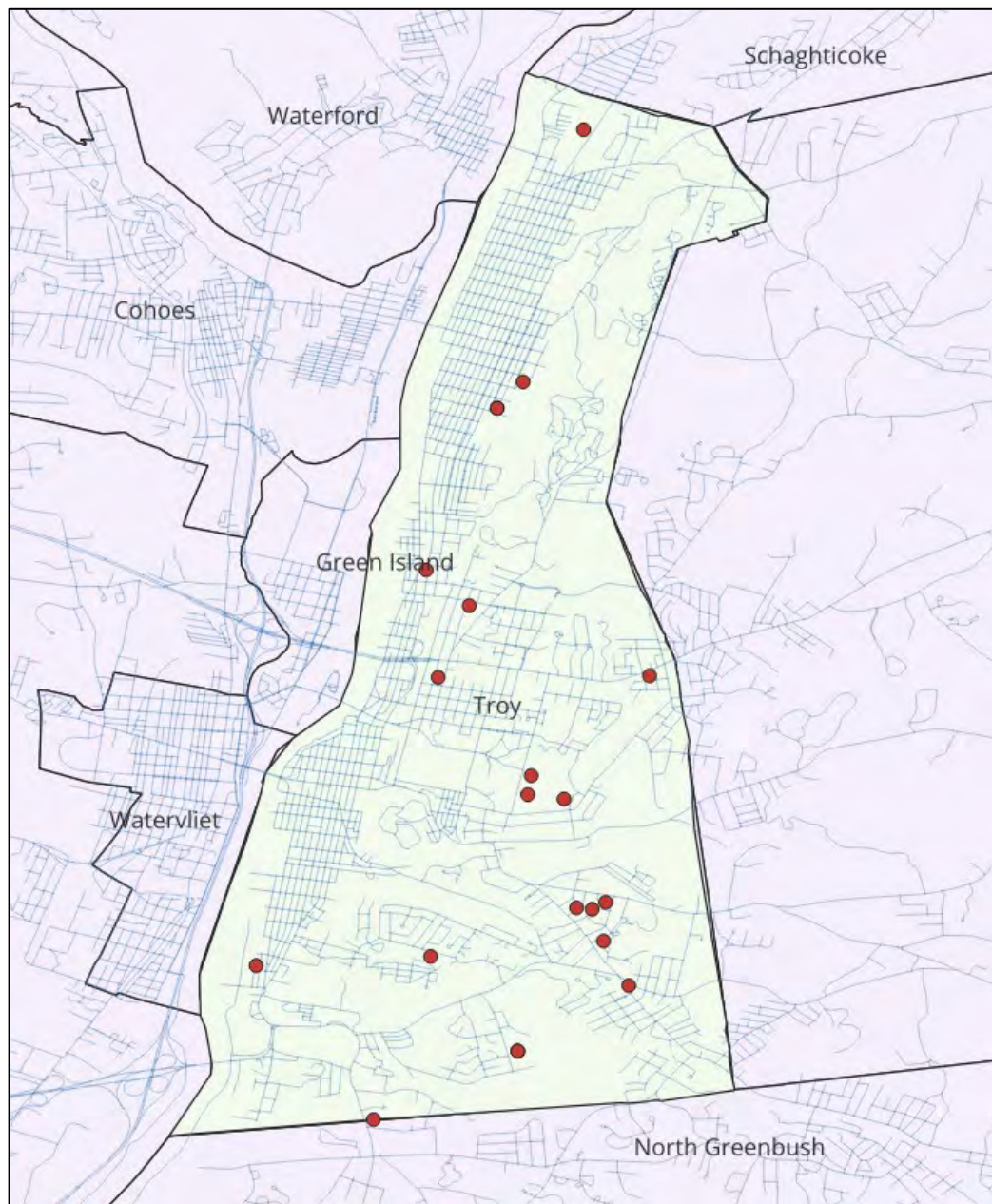
P_{wb} = Percentage of people that either bicycle or walk for shopping and errand trips (67% for bicycle and 100% for walking)

City of Troy: A Case Study

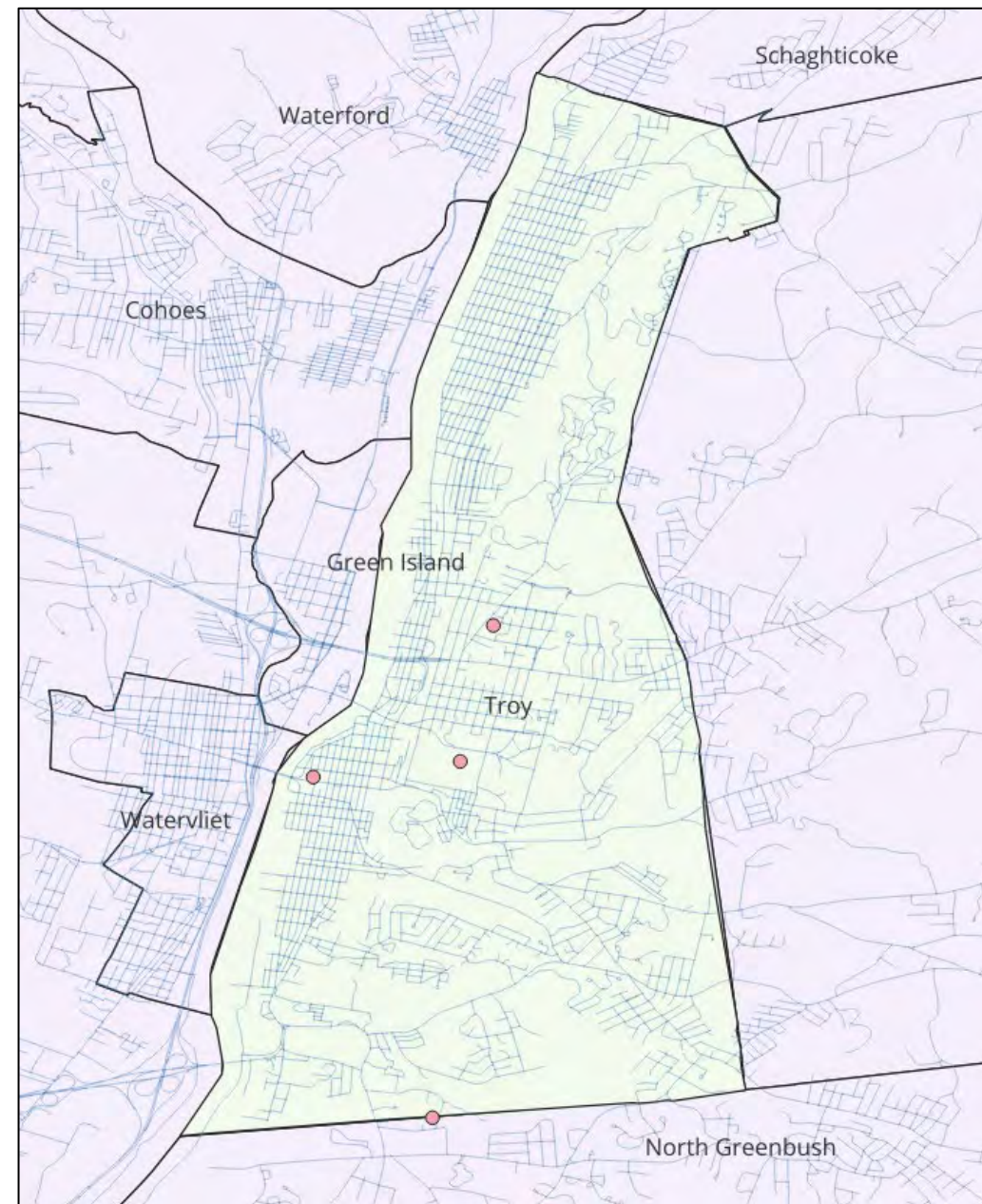
- Mid-sized urban area with a mix of residential, commercial, and institutional land uses.
- The city has a total population of approximately 51,000, a median age of 33 years, and a weighted average age of 37 years (ACS 2023)



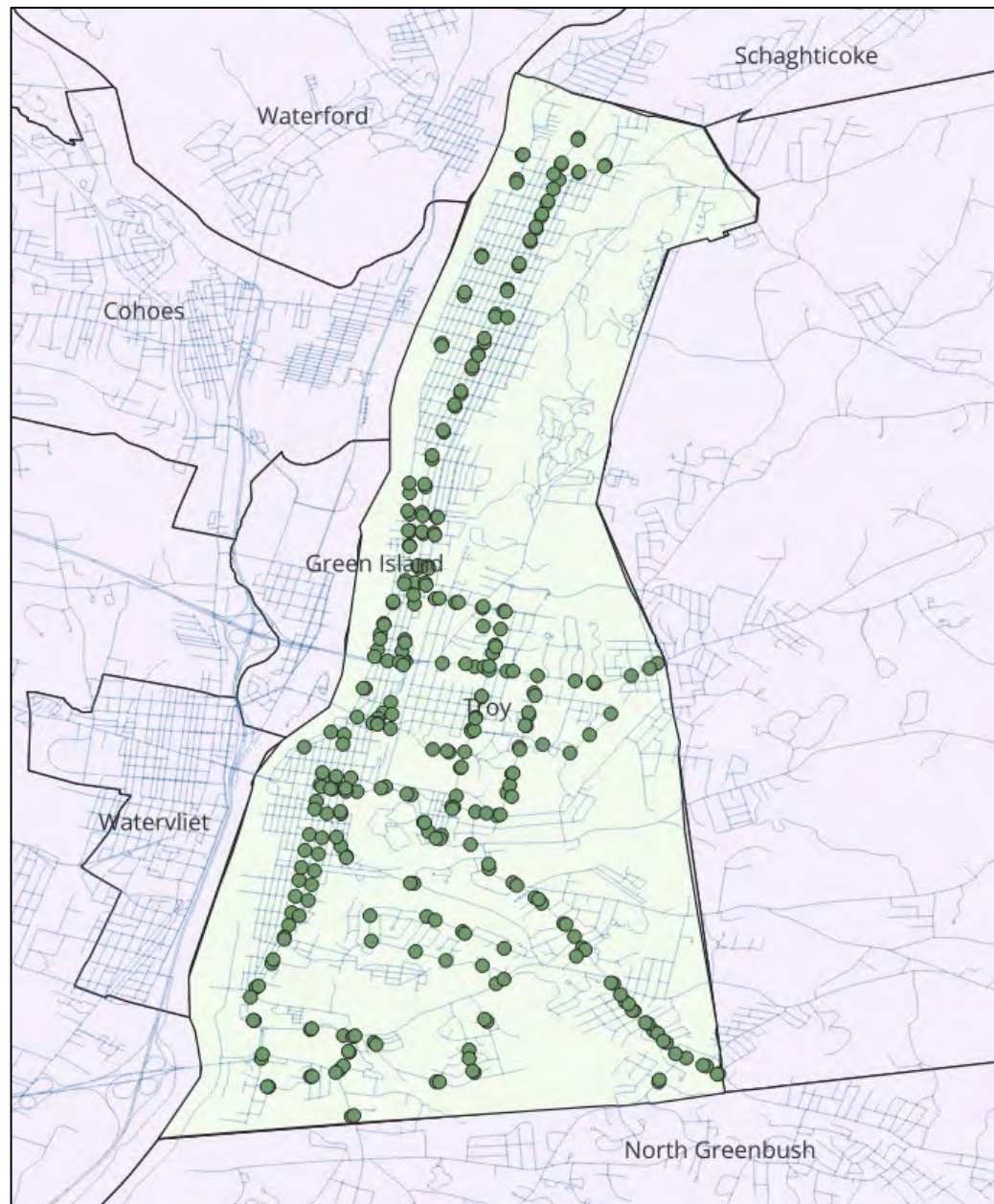
City of Troy and Surrounding Cities with Streets



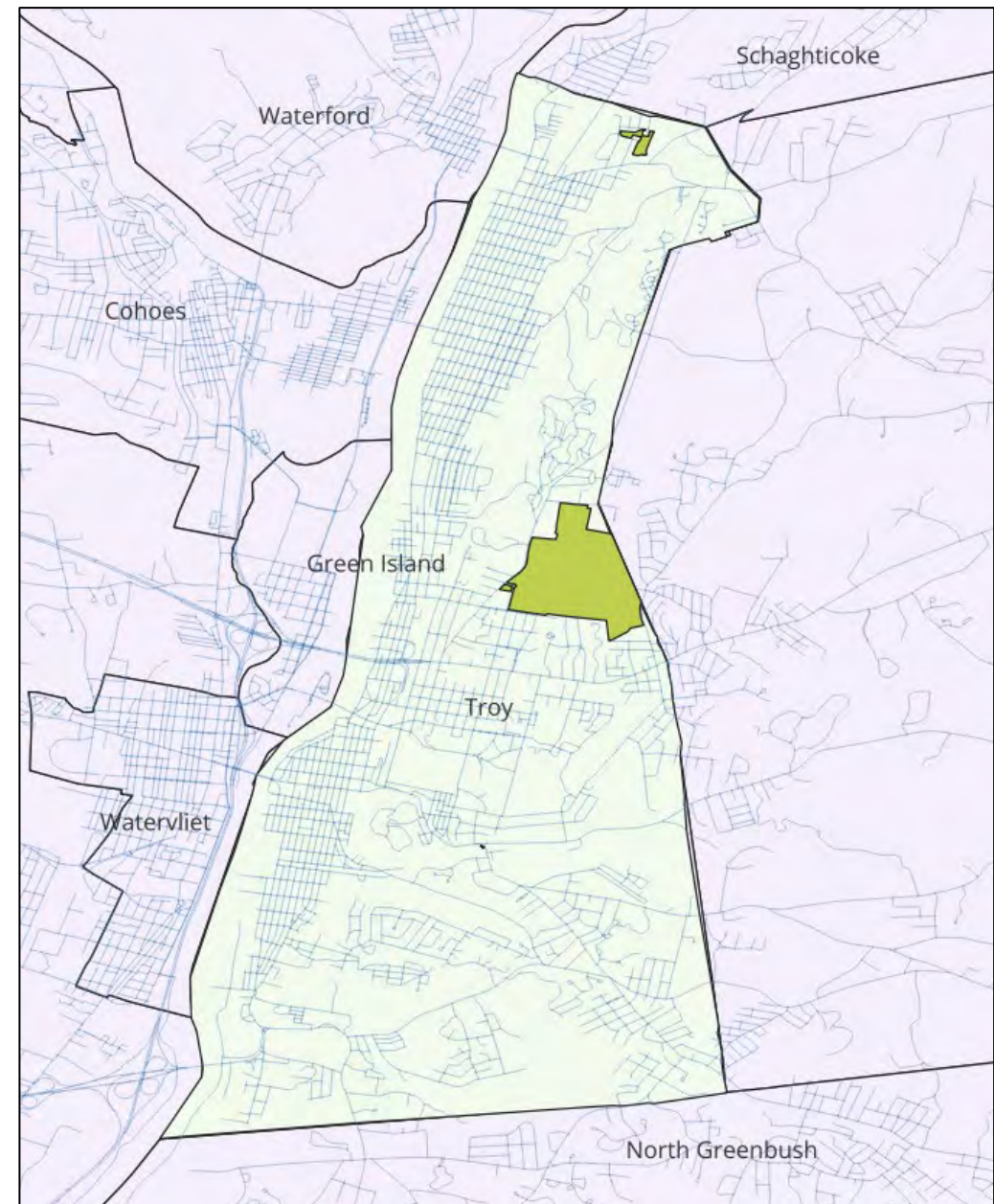
City of Troy and Surrounding Cities with Schools



City of Troy and Surrounding Cities with Colleges



City of Troy and Surrounding Cities with Transit Stops



City of Troy and Surrounding Cities with Parks

QGIS: Software Used



Walking: Top 10 Street Segments

Street Name	Length(miles)	LDS	Normalized LDS
Hoosick St	0.1	65326.83	1
Sage Ave	0.16	54611.64	0.83
5th Ave	0.16	50771.93	0.77
15th St	0.16	50166.77	0.76
12th St	0.08	49625.47	0.75
Hoosick St	0.11	49247.88	0.75
11th St	0.08	49032.61	0.75
Ferry St	0.09	49026.45	0.75
15th St	0.08	48921.88	0.74
14th St	0.08	48865.13	0.74

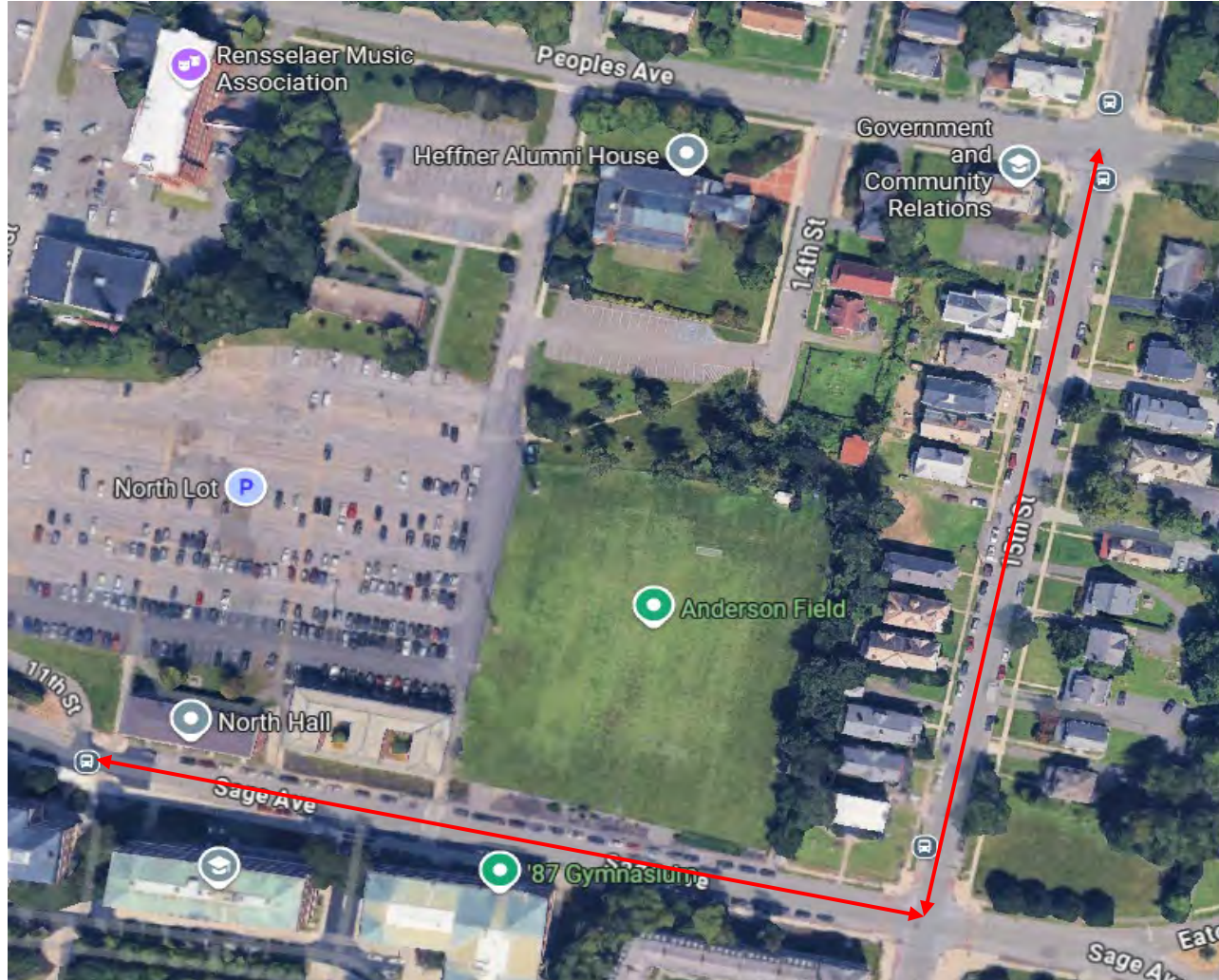
Top Segments with Highest LDS for Walking

Hoosick St

Businesses and Employments



Top Segments with Highest LDS for Walking

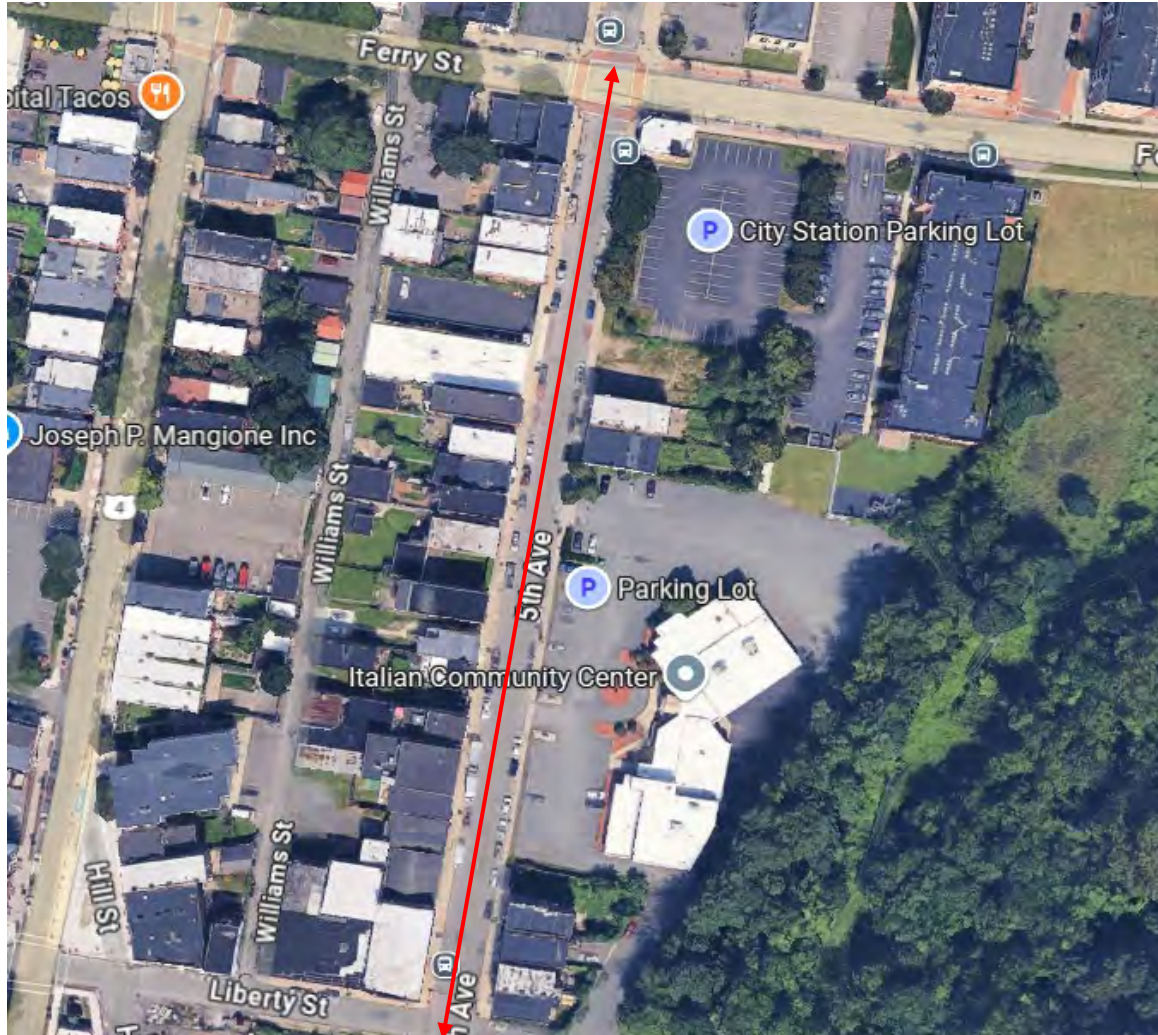


- 15th St and Federal St
- Beside Rensselaer Polytechnic Institute campus

LDS: Latent Demand Score

Image: 15th St and Federal St from Google Maps

Top Segments with Highest LDS for Walking



- 5th Ave is beside City Station
- City Station has apartments designated for students

LDS: Latent Demand Score

Image: 5th Ave from Google Maps

Biking: Top 10 Street Segments

Street Name	Length(miles)	LDS	Normalized LDS
Hoosick St	0.1	63972.33	1
5th Ave	0.16	62171.83	0.97
Linden Ave	0.25	55459.5	0.86
Church St	0.11	52297.91	0.81
2nd St	0.11	49082.83	0.75
Federal St	0.16	49005.38	0.75
Frear Aly	0.11	48625.78	0.74
Ferry St	0.09	48459.04	0.74
1st St	0.11	48446.61	0.74
15th St	0.08	47769.77	0.73

LDS: Latent Demand Score

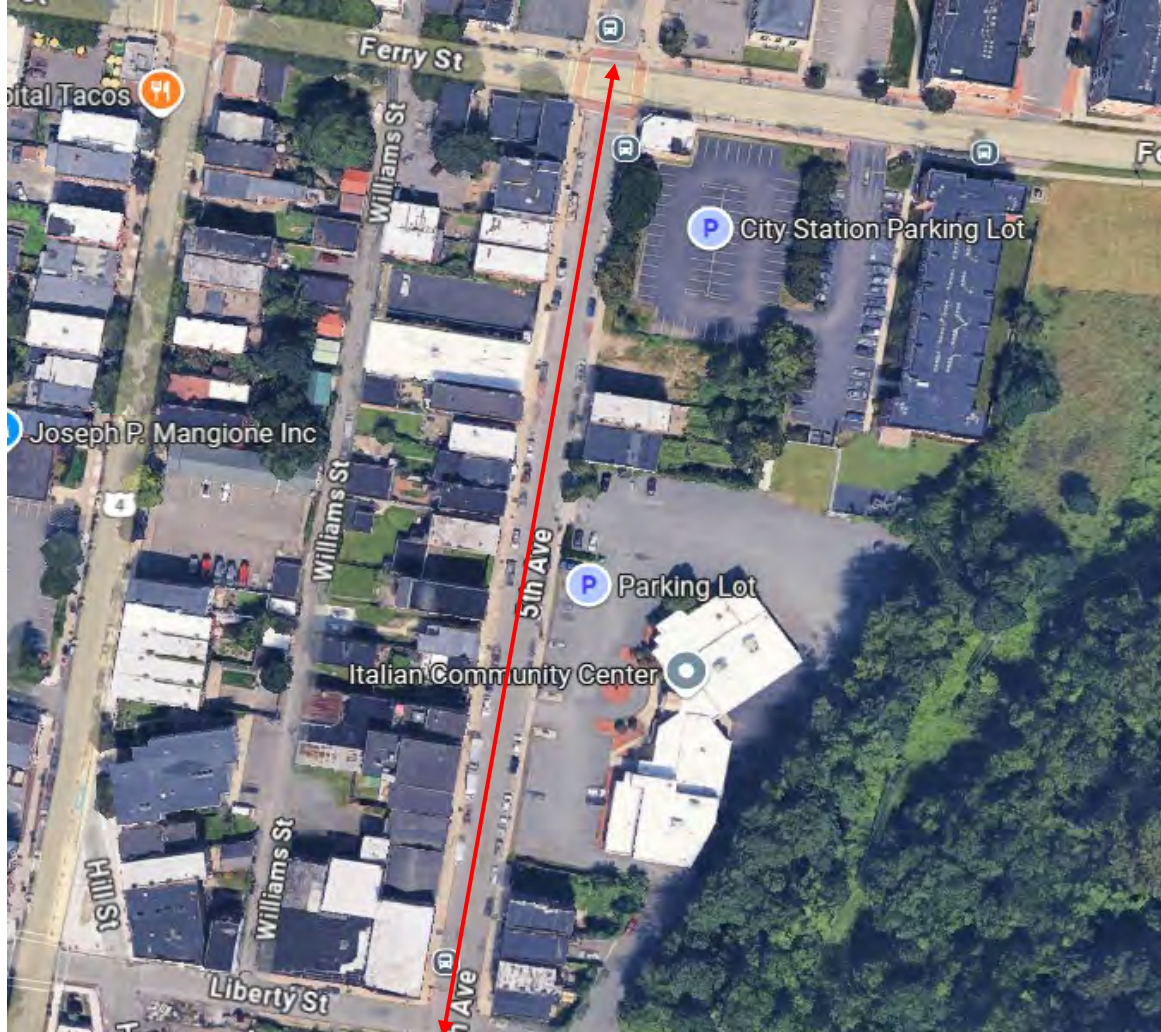
Top Segments with Highest LDS for Biking

Hoosick St

Businesses and Employments



Top Segments with Highest LDS for Biking



- 5th Ave is beside City Station
- City Station has apartments designated for students

LDS: Latent Demand Score

Image: 5th Ave from Google Maps

Top Segments with Highest LDS for Biking



- Linden Ave
- A park and a trail are nearby

LDS: Latent Demand Score

Image: Linden Ave from Google Maps



Scopes for Future Research

- Incorporating factors such as topography, climate, and weather conditions
- Requires more detailed data and field visits for feasibility evaluation as infrastructure should be applied in roadway corridors, not in segments

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Thank You!



Evaluating Curb Cut Safety Near Schools

Bennett Jonathan

September 10, 2025

Acknowledgements

- New York Metropolitan Transportation Council (NYMTC) and Center for Advanced Infrastructure and Transportation (CAIT) Rutgers
- New York City Department of Transportation (NYC DOT)
- Transportation Planning & Management (TPM)
- Research, Implementation and Safety (RIS)
- School Safety (SS)
- Columbia University
- Family and Friends

Background

Program Origin

- High-volume curb cuts (gas stations, parking lots, auto-oriented businesses, etc.) are a pedestrian safety concern
- Sites linked to multiple fatalities and injuries city-wide
 - 82 Wyckoff Ave (2018)
 - 8910 4th Ave (2021)
- Mayor Adams announced commitment to 'parking lot and gas station traffic-calming'



Source: NYC DOT

Background

Child Fatality: 82 Wyckoff Avenue, Brooklyn

- June 24, 2018: Luz Gonzalez (4) struck and killed by vehicle backing out of Clean City Laundry parking lot
- NYC Department of Buildings (DOB) ordered lot closure, barrier installation
- Lot re-opened in 2020 with refined single-point access design

Before (2018)



Interim (2019)



After (2020)



Source: Google Street View

Background

2021 Fatality: 8910 4th Avenue, Brooklyn

- Driver pulled out of car dealership lot, required driving on the sidewalk to exit
- Pedestrian struck, killed on sidewalk
- 4th Ave: multiple driveways, Right of Way (ROW) encroachments, sidewalk driving, near several schools



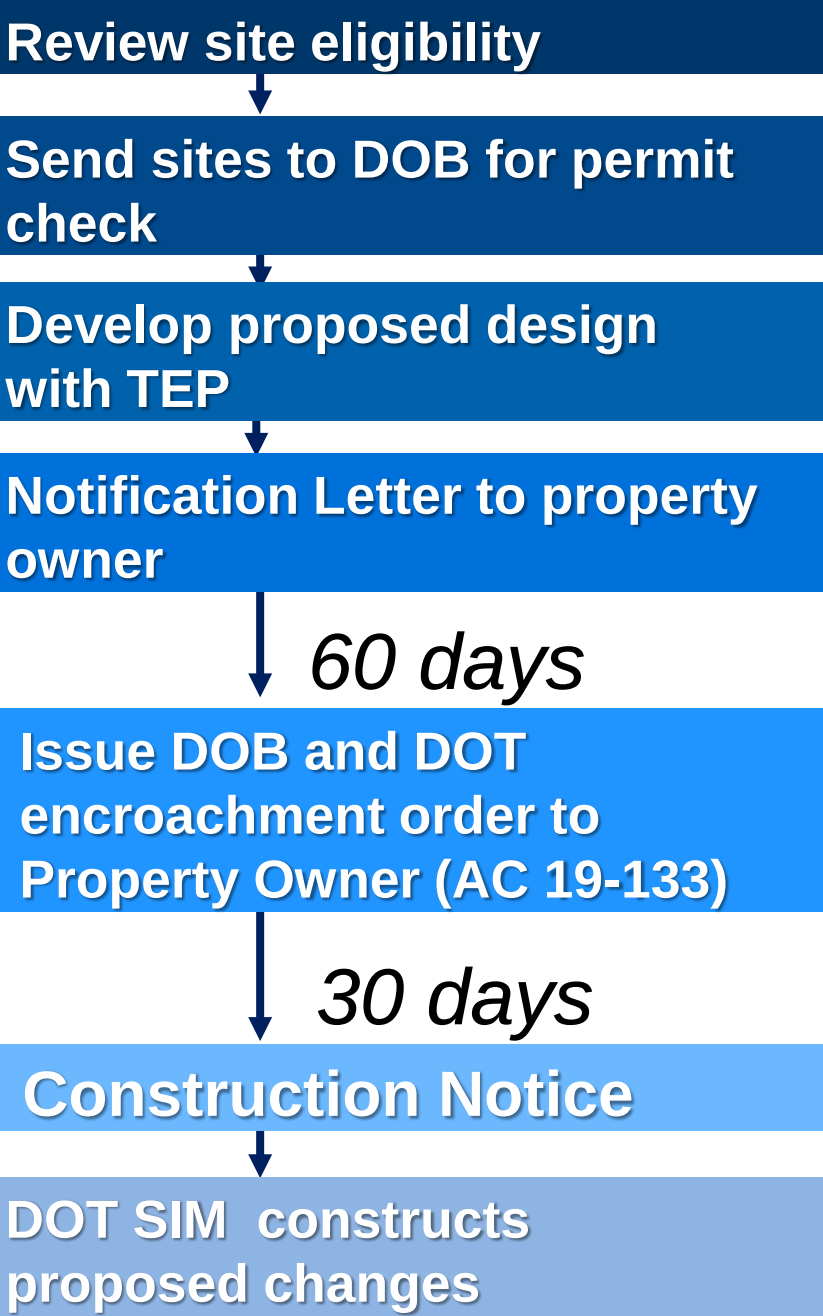
Source: Google Maps

Pilot Program

Current Process and Site Selection

Process developed with DOB, DOT Traffic Engineering and Planning (TEP), and DOT Legal team to identify, notify, and implement safety improvements at five pilot sites:

Address	Boro	Who	Status
418 Coney Island Ave	BK	BP Oil	Complete July 2024
378 Coney Island Ave	BK	DOT	Complete July 2025
4308 Ft Hamilton Pkwy	BK	DOT	Planned Fall 2025
641 E Gun Hill Rd	BX	BP Oil	In Construction
43-21 Junction Blvd	QN	BP Oil	Complete July 2024



Design Solutions

Curb Cut Design Standards

New buildings code requirement

- Curb cuts must be 50 ft from an intersection
- Curb cuts may not be longer than 30 ft
- Parking lots to be accessible via a curb cut
- Parking lots to have fencing/barrier from the sidewalk
- Exceptions to the above require approval from DOT (TEP)

Standards for improving existing sites

- Relocating curb cuts that are close to the intersections
- Closing curb cuts that conflict with bus stops
- Narrowing wide curb cuts
- Closing redundant curb cuts
- Installing back of sidewalk barriers or bollards

Treatments to Close Curb Cuts/Parking Pads

Materials



Restore Full-Height Curb



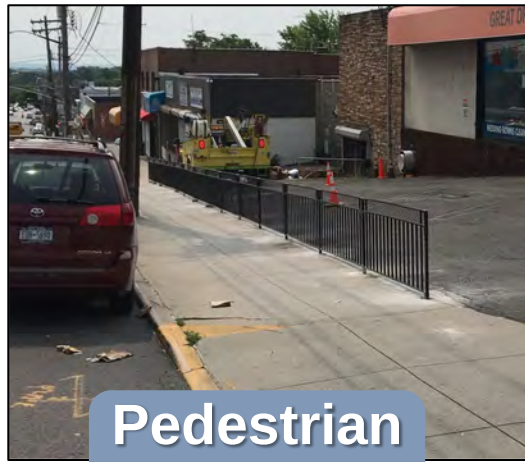
Granite Blocks



Jersey Barrier



Pipe Bollards



Pedestrian Fencing



Wheel Stops

*Source:
NYC DOT*

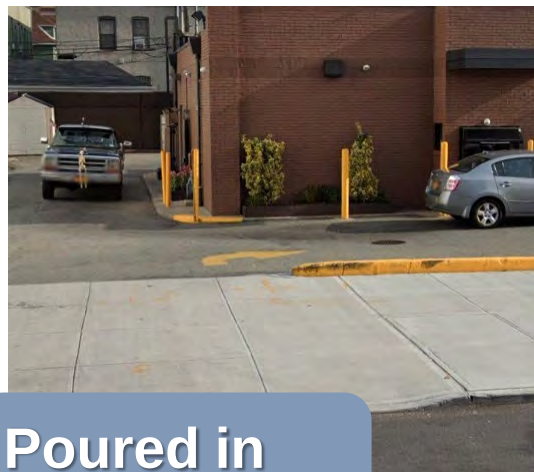
Pilot Program

Design Treatments

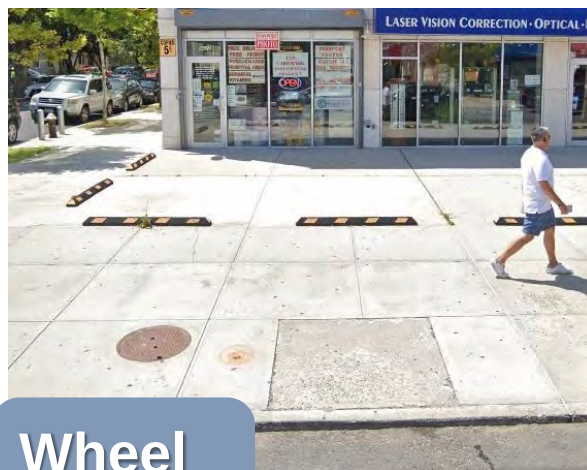
- Relocate curb cuts that are close to intersection (within 50 ft)
- Close curb cuts that conflict with bus stops
- Close redundant curb cuts (More than 1 on a frontage)
- Narrow wide curb cuts (30+ ft)
- Install back of sidewalk barriers or bollards

Source: NYC DOT

Back of Sidewalk Treatments



Poured in
Place Curb



Wheel
Stops

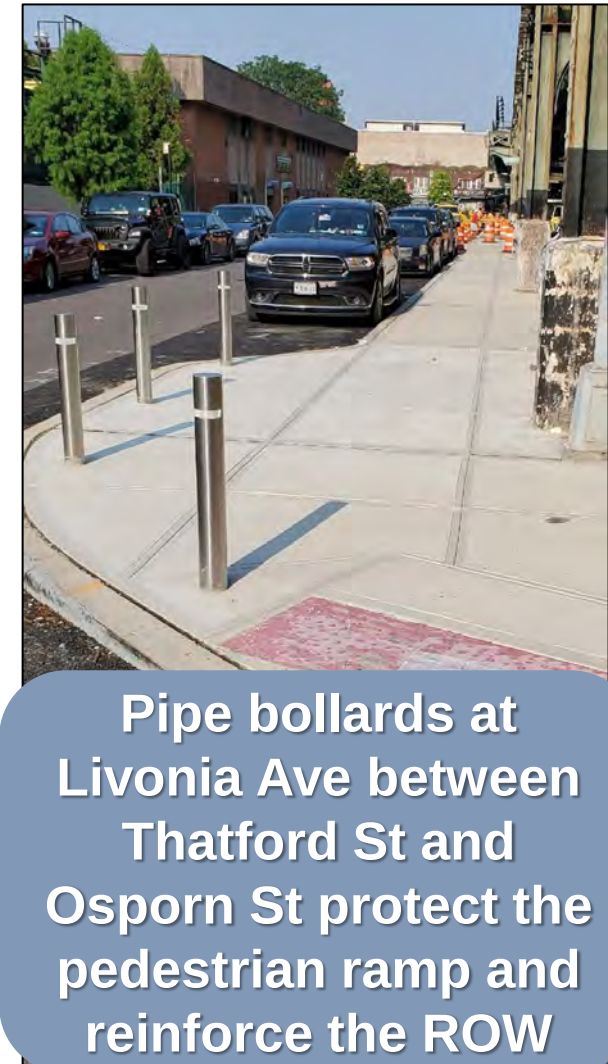
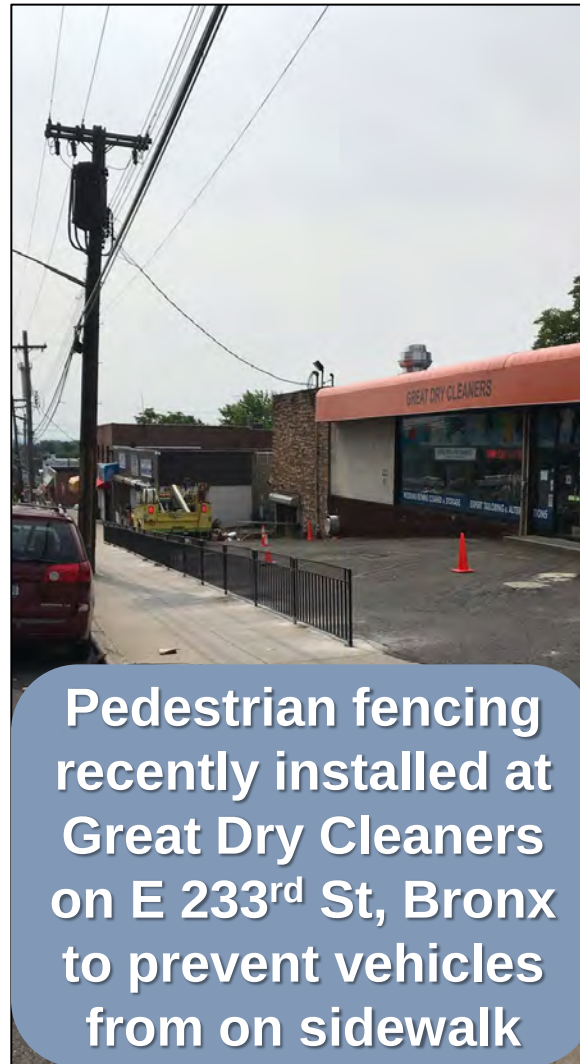


Pipe
Bollards

Pilot Program

Previous Projects to Address ROW Encroachment

Source: NYC DOT



Principles of Access Management

Avoid Continuous Access Along Property Frontage



*Source:
Google
Street View*

Principles of Access Management

Avoid Continuous Access Along Property Frontage



Source: Google Street View



Principles of Access Management

Avoid Continuous Access Along Property Frontage

Separate vehicular and pedestrian access points



Source: NYC DOT

Pilot Sites

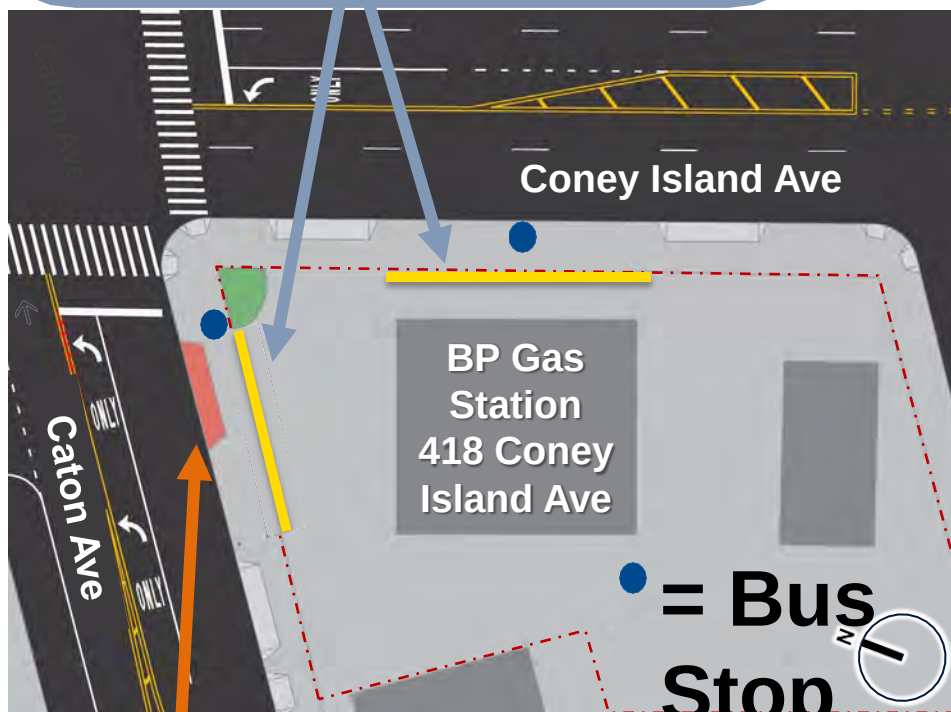
2024-25 Pilot Locations

Address	Boro	Who is Constructing	Status
418 Coney Island Ave	BK	BP Oil	Completed July 2024
378 Coney Island Ave	BK	DOT	Completed July 2025
4308 Ft Hamilton Pkwy	BK	DOT	Drawing signed - Planned Summer 2025
641 E Gun Hill Rd	BX	BP Oil	Completed Oct 2024
43-21 Junction Blvd	QN	BP Oil	Completed July 2024

Pilot Site

418 Coney Island Ave, Brooklyn

Back-of-sidewalk treatment



Close existing driveway by restoring full-height curb and sidewalk

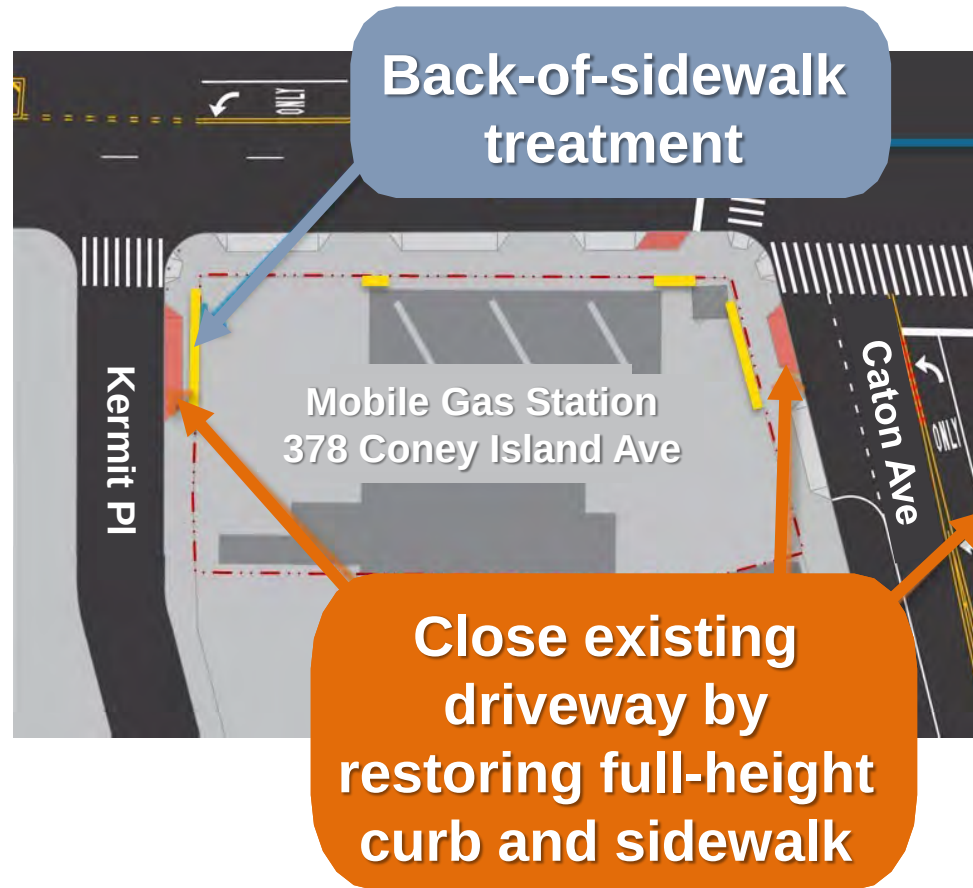
BP Oil: completed July 2024



Source:
NYC DOT

Pilot Site

378 Coney Island Ave, Brooklyn



NYC DOT: completed July 2025

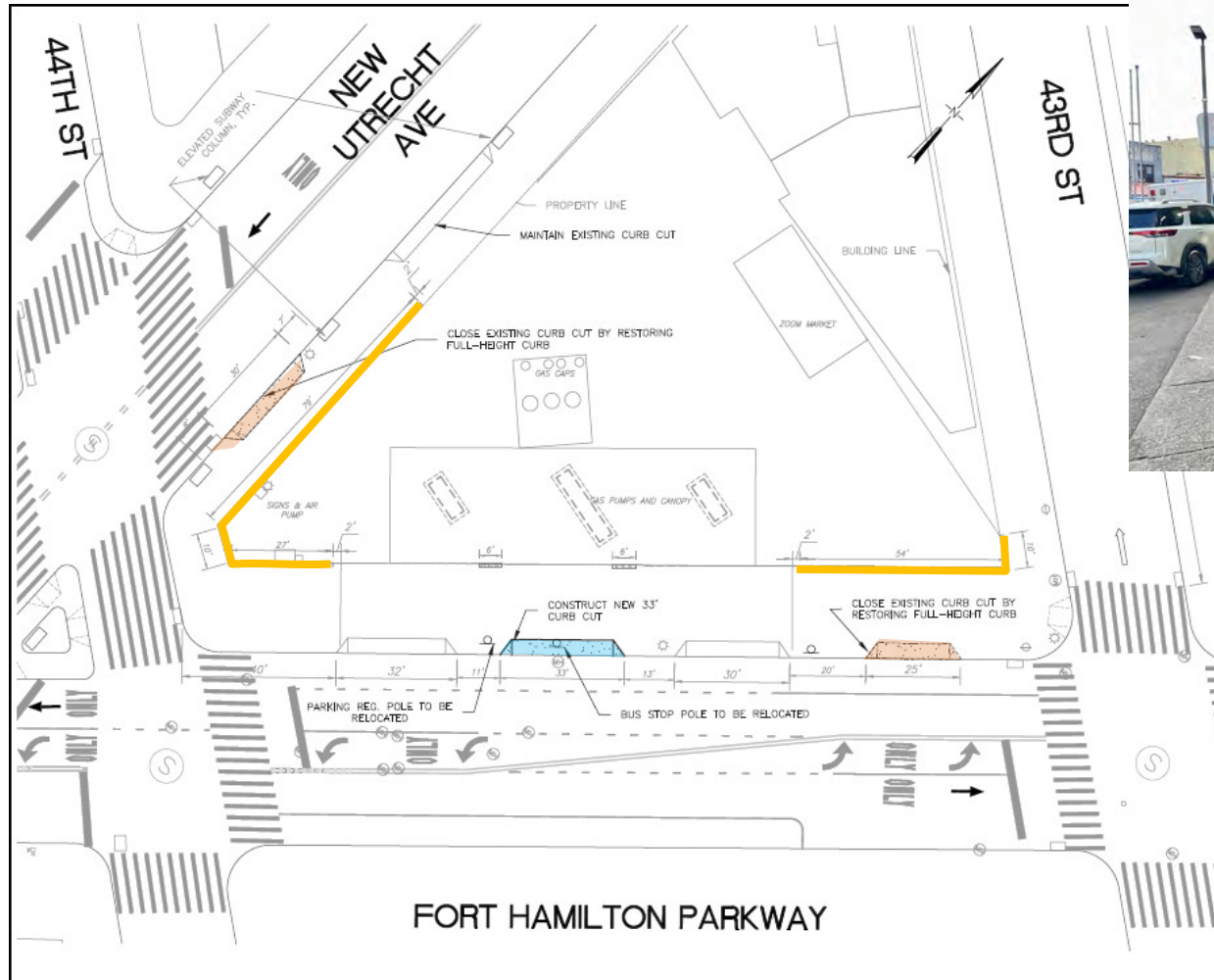


*Source:
NYC DOT*

Pilot Site

4308 Ft Hamilton Pkwy, Brooklyn

NYC DOT: planned Fall 2025

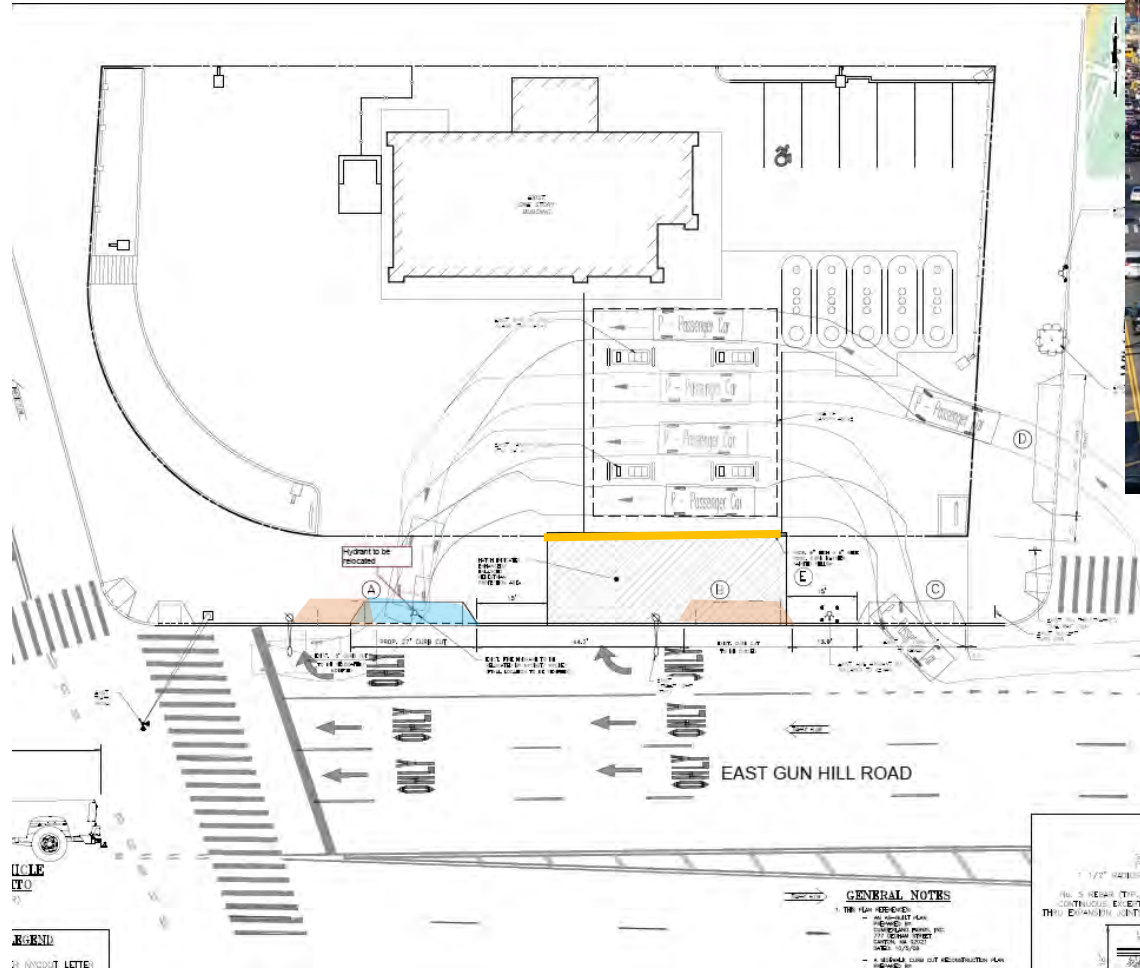


Source: NYC DOT

Pilot Site

641 E Gun Hill Rd, Bronx

BP Oil: completed October 2024

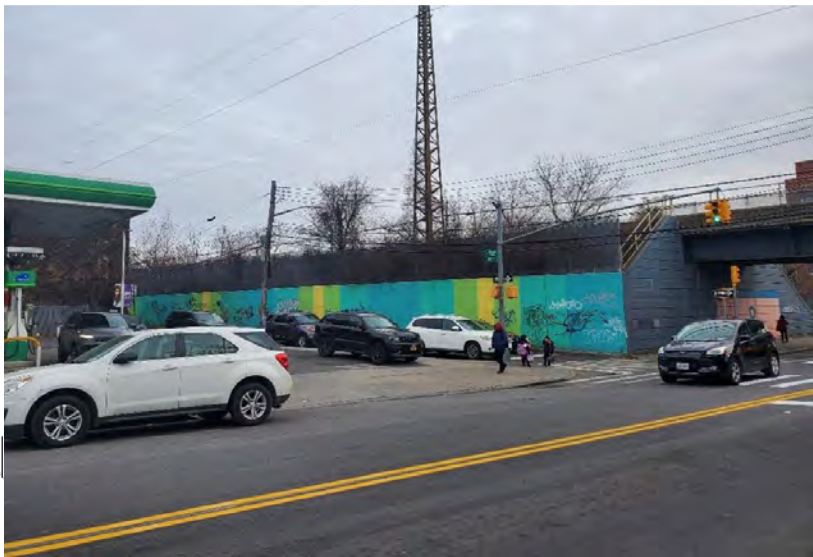
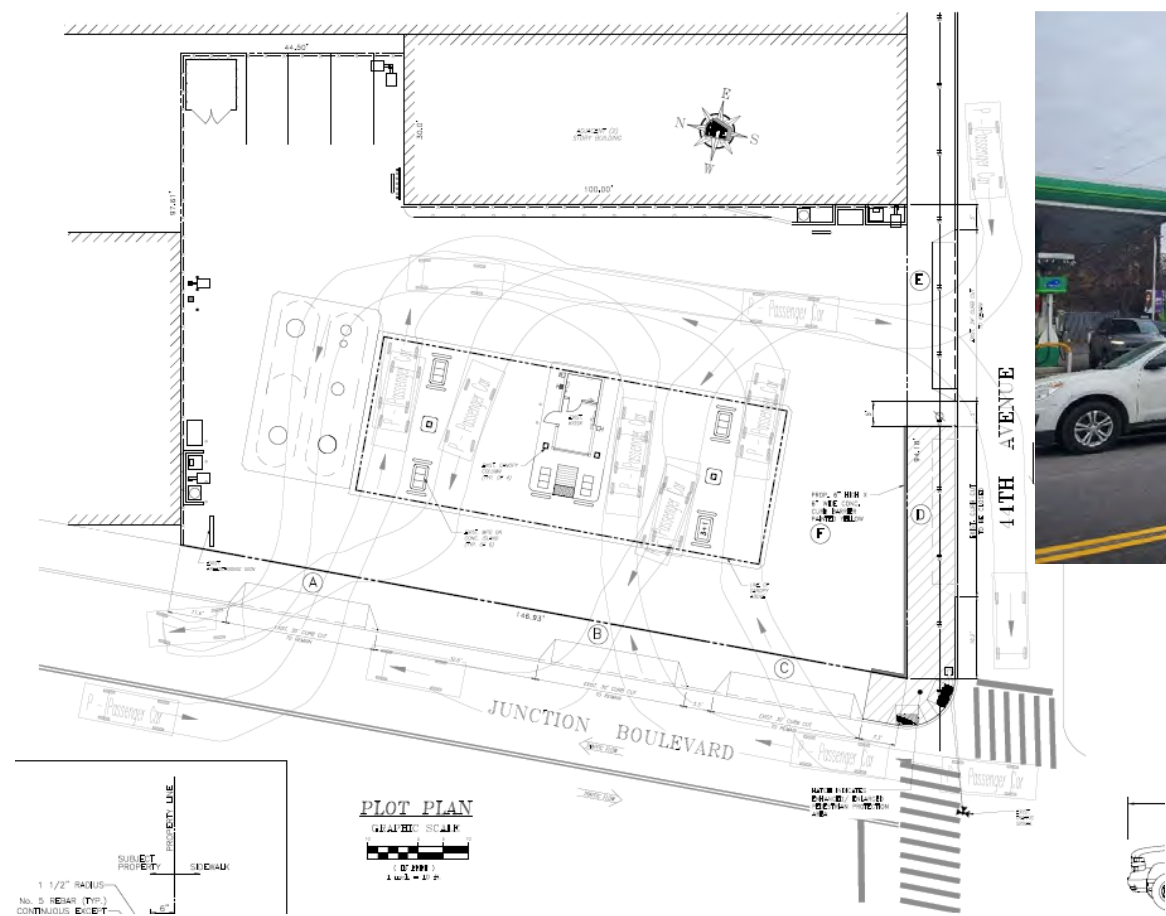


Source: NYC DOT

Pilot Site

43-21 Junction Blvd, Queens

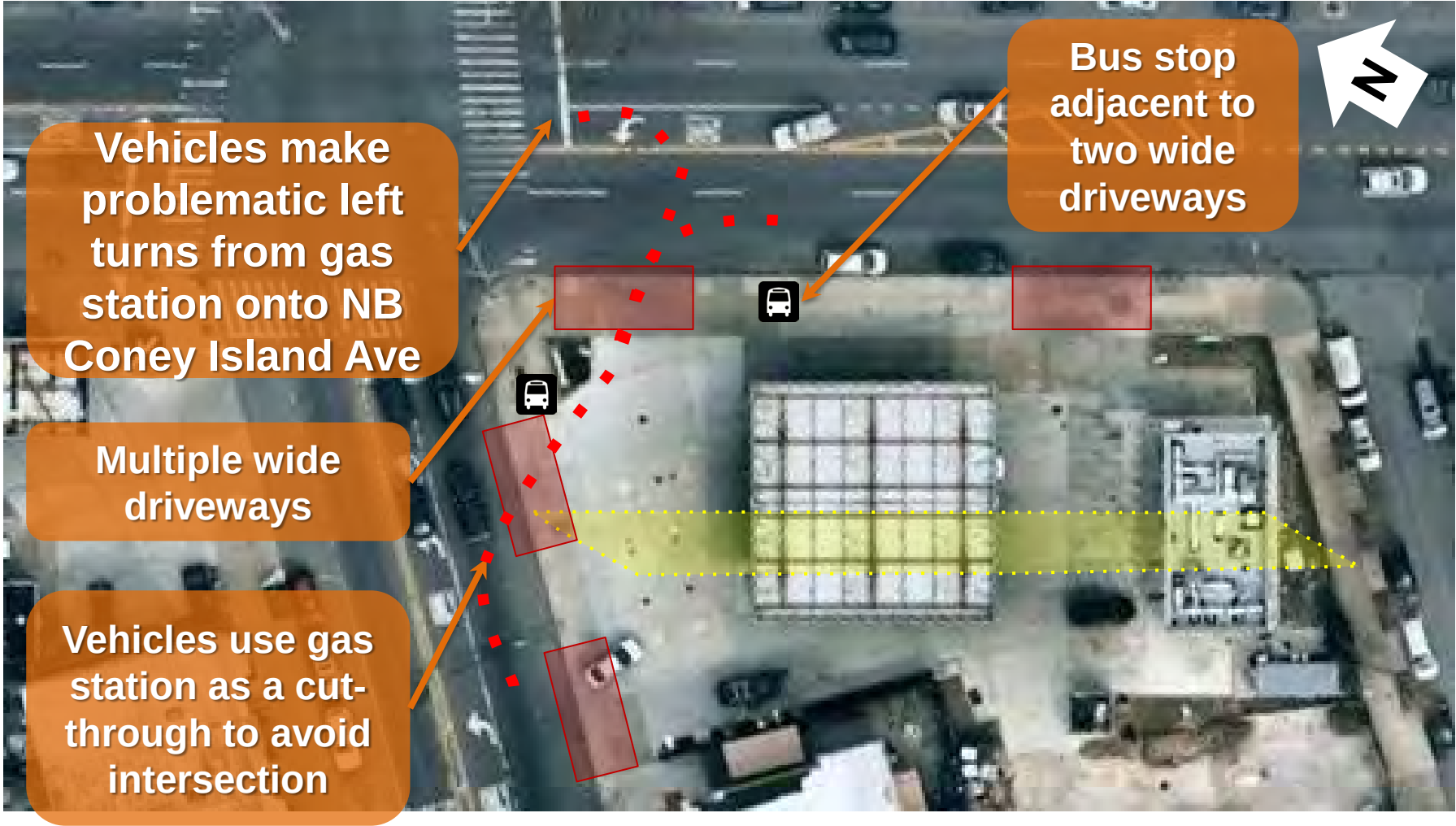
BP Oil: completed July 2024



Source: NYC DOT

BP Gas Station, 418 Coney Island Ave, BK

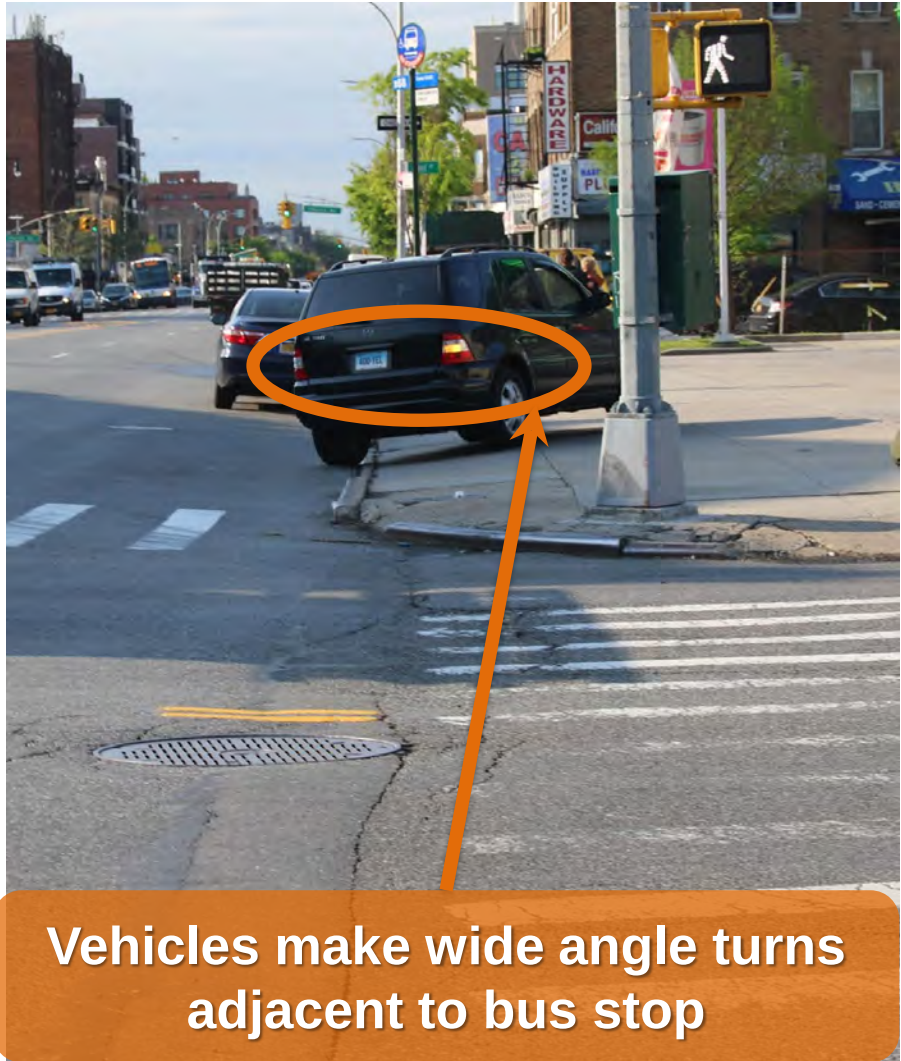
Before



Source:
NYC DOT

BP Gas Station, 418 Coney Island Ave, BK

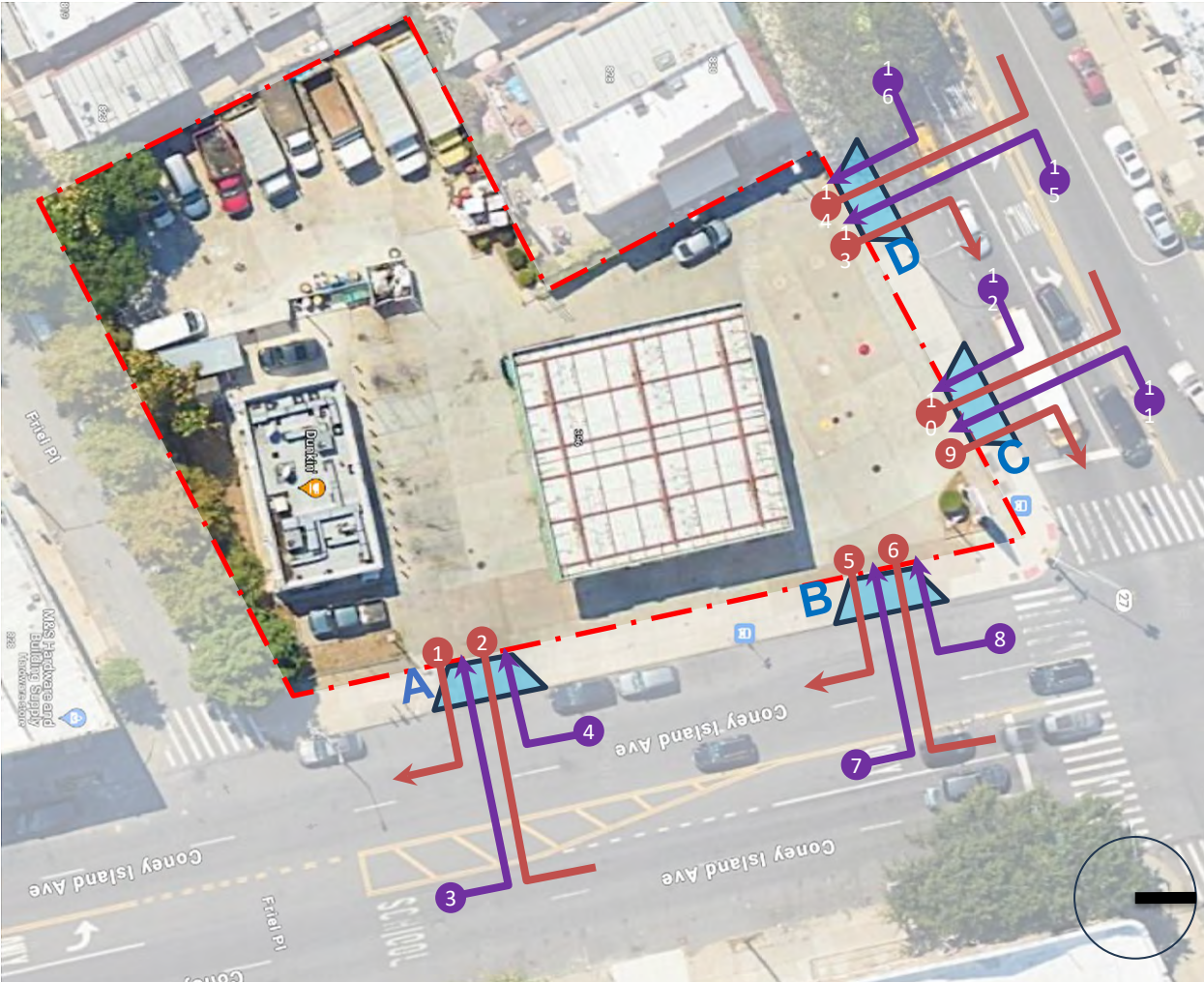
Before



Source:
NYC DOT

Turning Movement Count Methodology

418 Coney Island Ave, BK



Curb Cut A

1. EBR onto SB Coney Island Ave
2. EBL onto NB Coney Island Ave
3. NBL onto curb cut A
4. SBR onto curb cut A

Curb Cut B

5. EBR onto SB Coney Island Ave
6. EBL onto NB Coney Island Ave
7. NBL onto curb cut B
8. SBR onto curb cut B

Curb Cut C

9. NBR onto EB Caton Ave
10. NBL onto WB Caton Ave
11. WBL onto curb cut C
12. EBR onto curb cut C

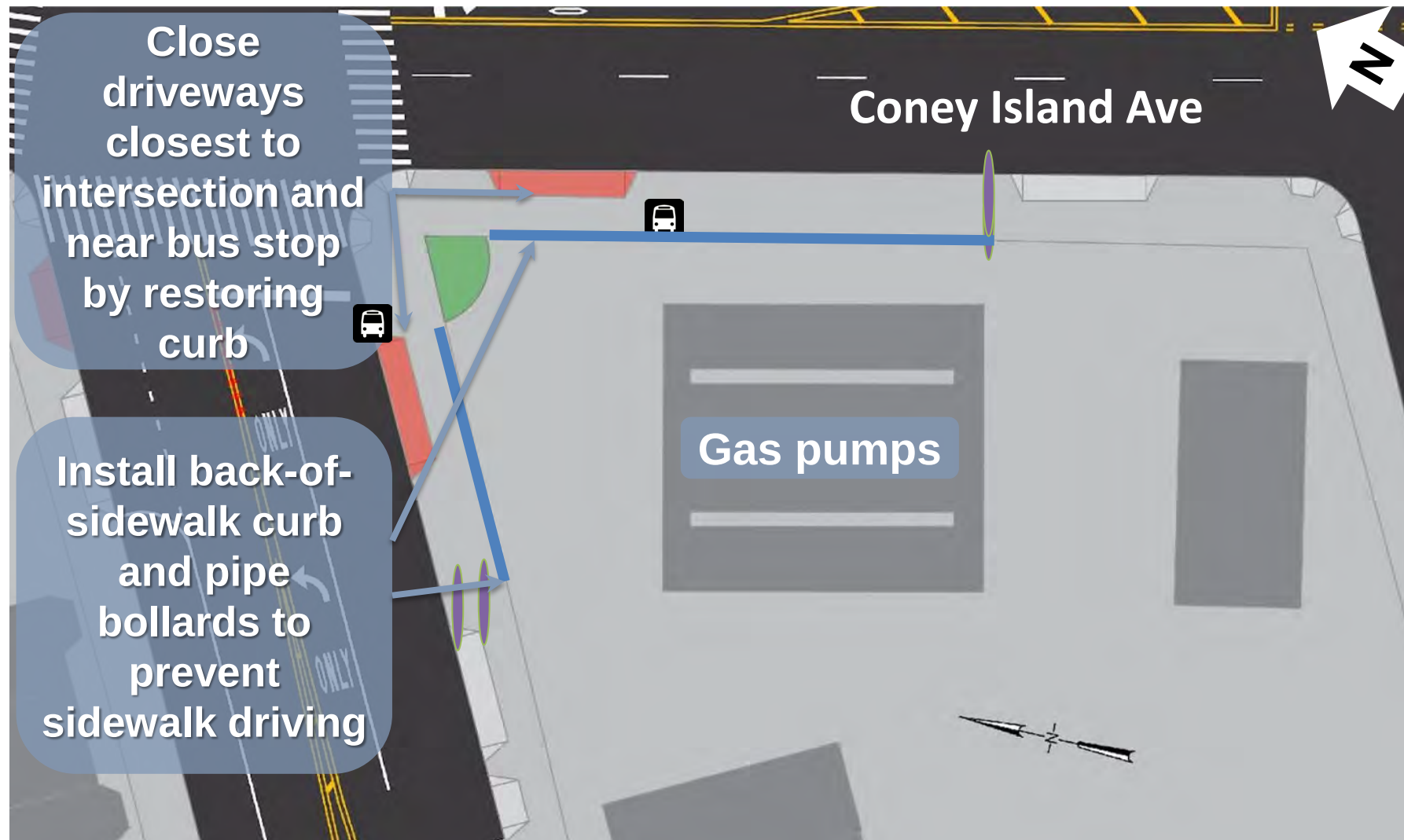
Curb Cut D

13. NBR onto EB Caton Ave
14. NBL onto WB Caton Ave
15. WBL onto curb cut C
16. EBR onto curb cut C

Source:
NYC DOT

BP Gas Station, 418 Coney Island Ave, BK

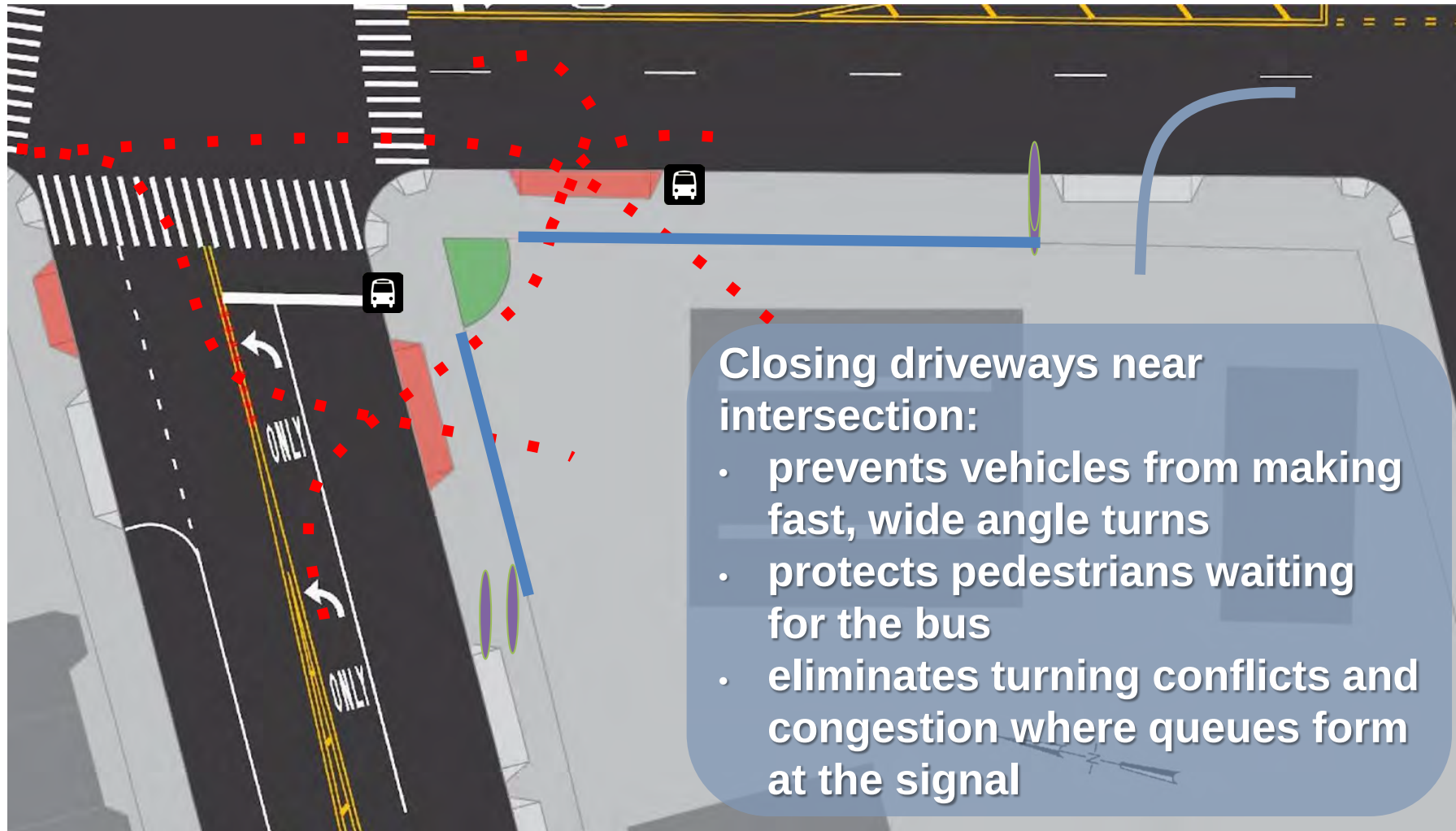
After



*Source:
NYC DOT*

BP Gas Station, 418 Coney Island Ave, BK

After



*Source:
NYC DOT*

BP Gas Station, 418 Coney Island Ave, BK

Before vs. After



Source: NYC DOT

Thank You!

nyc.gov/dot



NYCDOT



nyc_dot



nyc_dot



NYCDOT

Best Practices in Mitigating Air and Noise Pollution From Urban Highways

Paula Yaghi

September 10, 2025



Acknowledgments

- Julie Bero
- Kate Mikuliak
- Gloria Campbell
- Gretha Suarez
- Nina Spellman
- Salome Stulberg
- Heidi Wolf
- Karin Sommer
- Jeffrey Otto
- Hao Wang



Agenda

- Context and Objectives
- NYC Corridors of Concern
- Best Mitigation Practices
- Corridor-Specific Recommendations
- Conclusion

Cross Bronx Expressway

Source: NYC DOT



Disclaimer

- The recommendations presented in this deck are based on the work conducted as part of the Research Fellowship
- They do not represent official policy positions of NYC DOT

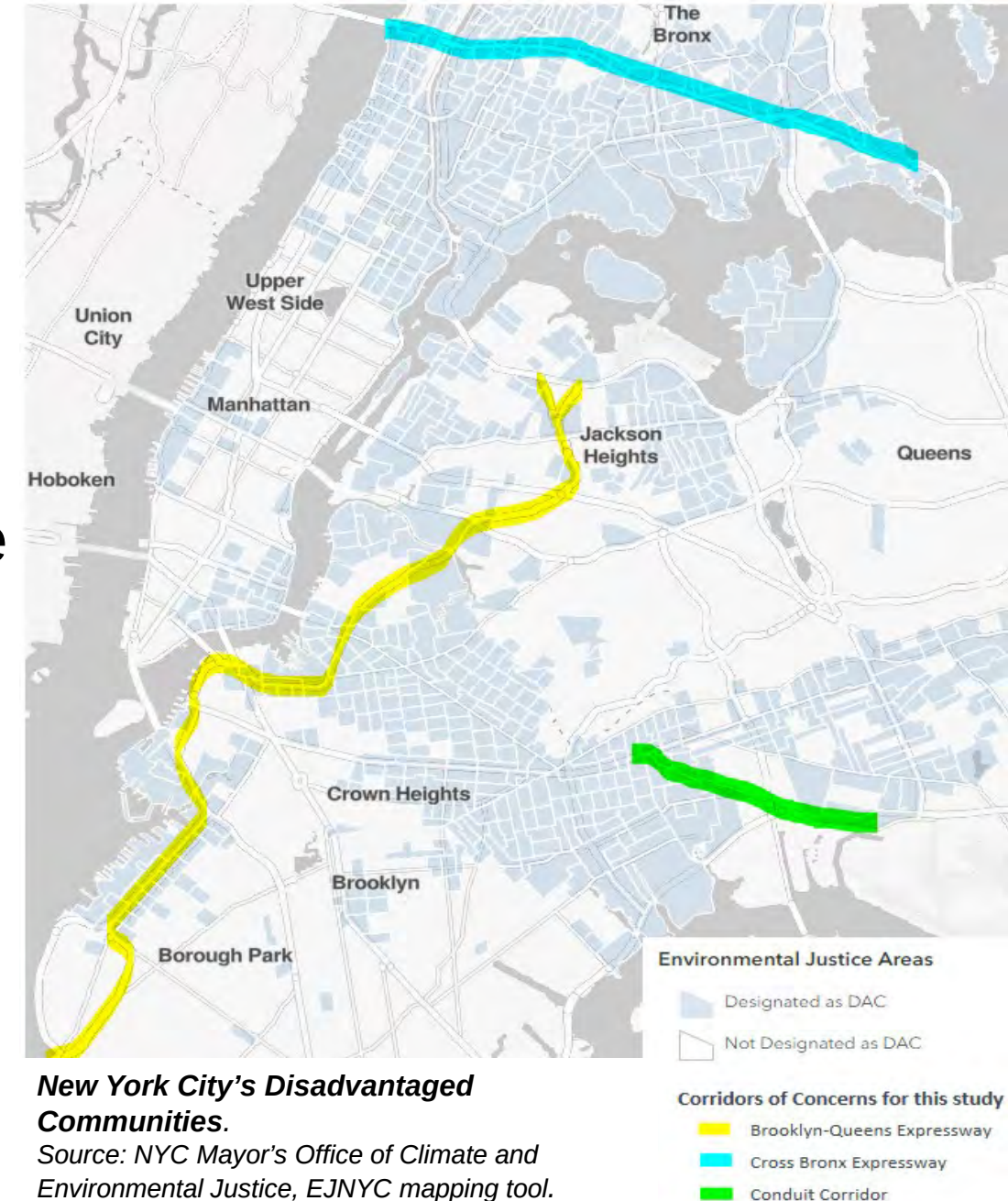
Brooklyn Queens Expressway
Source: NYC DOT.



Urban Highways: Mobility vs. Community Impacts

Context

- Regional mobility and economic lifeline
- Major source of air and noise pollution
- Disproportionate impacts on Disadvantaged Communities (DAC)
- Health disparities



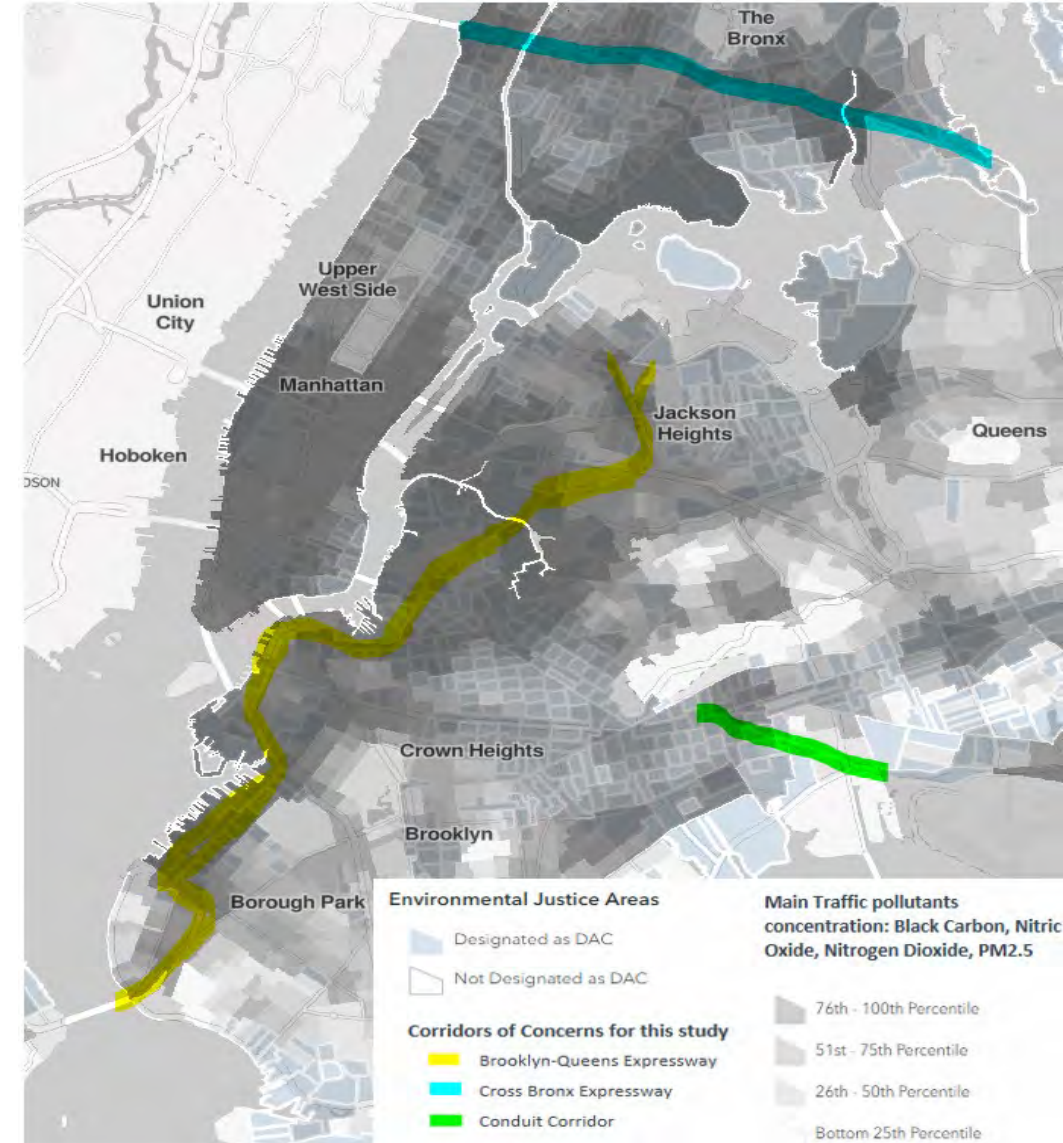
Turning a Challenge into an Opportunity

Motivation

- Legacy highways now require major repairs
- Infrastructure renewal

Objectives

- Survey global and local best practices
- Adapt strategies to NYC corridors
- Recommend actionable options



New York City's Disadvantaged Communities and traffic related air pollution

Source: NYC Mayor's Office of Climate and Environmental Justice, EJNYC mapping tool.

NYC Corridors of Concern

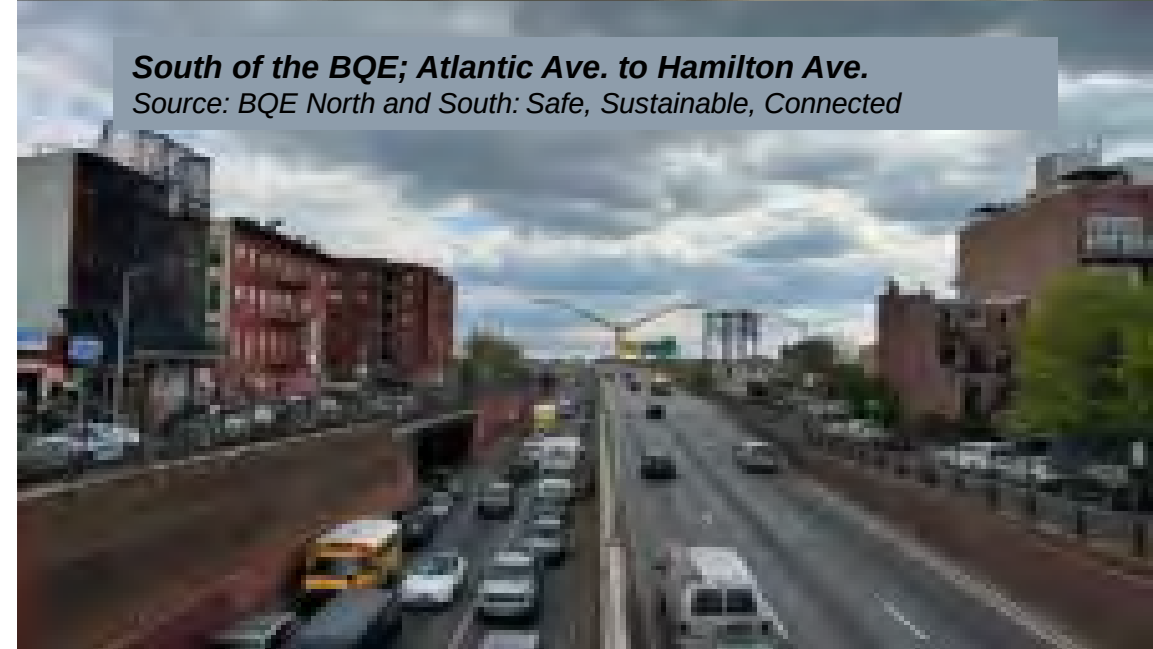


Brooklyn-Queens Expressway

- From the Grand Central Parkway to the Verrazzano-Narrows Bridge
- Essential freight corridor
- Mix of trench and elevated sections
- Dense residential adjacency



North of the BQE; Kosciuszko Bridge to Metropolitan Ave.
Source: BQE North and South: Safe, Sustainable, Connected



South of the BQE; Atlantic Ave. to Hamilton Ave.
Source: BQE North and South: Safe, Sustainable, Connected

Cross Bronx Expressway

- From Harlem River to the Throgs Neck Expressway
- High congestion and pollution burdens
- Long trench sections
- Densely populated DAC

Cross Bronx view south from Washington Bridge

Source: Reimagine the Cross Bronx Expressway: Connected, Safe, Healthy Communities – Final Vision



Macombs Avenue over the Cross Bronx Expressway

Source: Reimagine the Cross Bronx Expressway: Connected, Safe, Healthy Communities – Final Vision



Conduit Corridor

- From Atlantic Avenue to Lefferts Boulevard
- Divisive median corridor reinforcing inequities
- At-grade through residential districts
- Heat island and pollution overlap

South Conduit Avenue and 79th Street.

Source: NYC DOT



North Conduit Boulevard between Pitkin Avenue and Grant Avenue.

Source: NYC DOT



Best Mitigation Practices

2

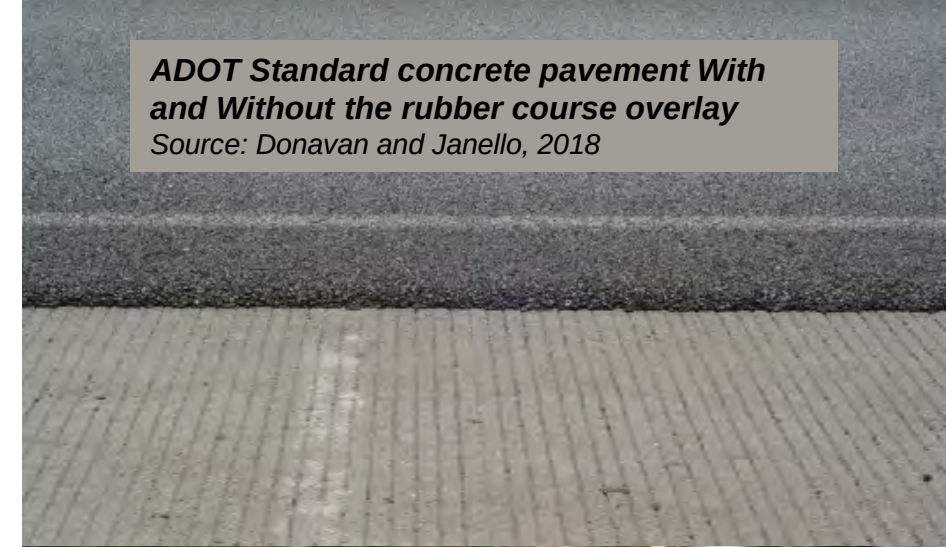
At the Source Level

- Reduce emissions/noise before they disperse
- Target vehicle and road interaction and traffic flow control

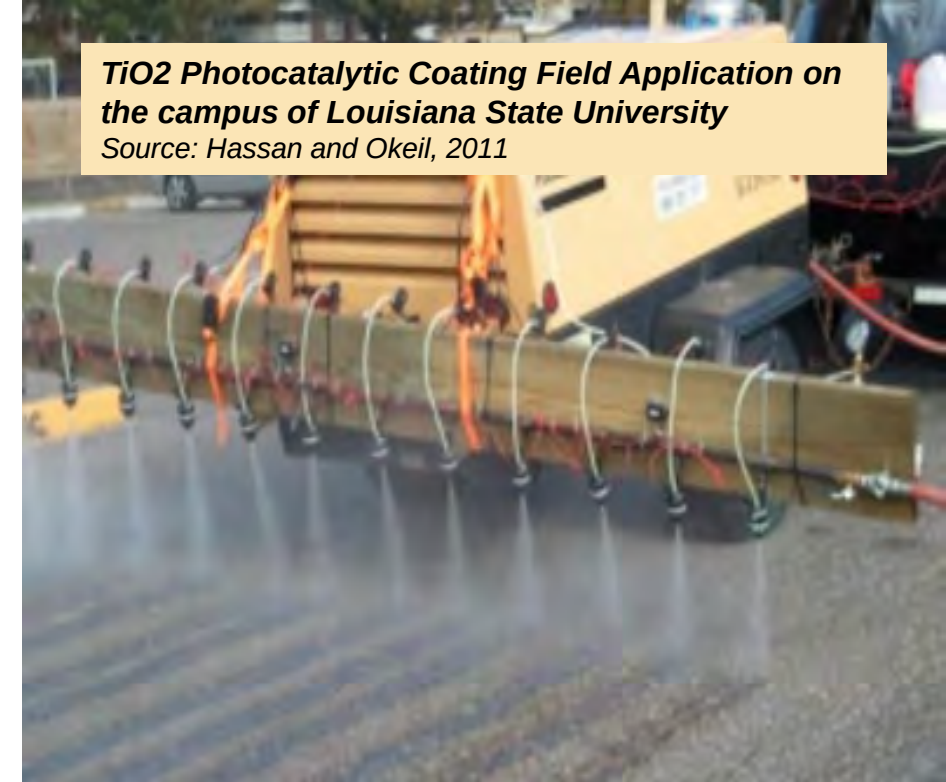
Examples

- Low-noise pavements (rubberized, porous asphalt, diamond grinding, etc.)
- Pollutants degrading pavement (TiO_2 coating)
- Active traffic management and driving behavior
- Electric buses and vehicles

ADOT Standard concrete pavement With and Without the rubber course overlay
Source: Donavan and Janello, 2018



TiO_2 Photocatalytic Coating Field Application on the campus of Louisiana State University
Source: Hassan and Okeil, 2011

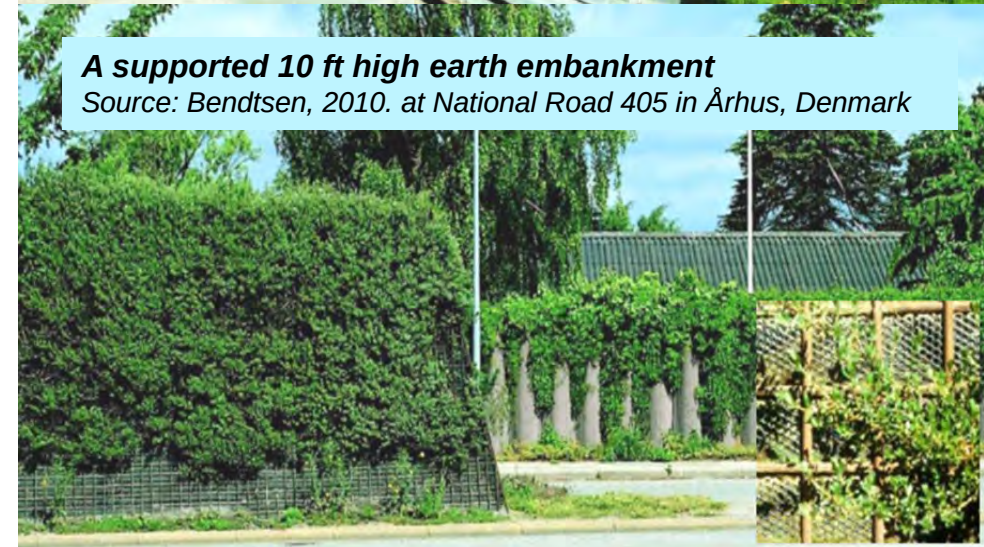
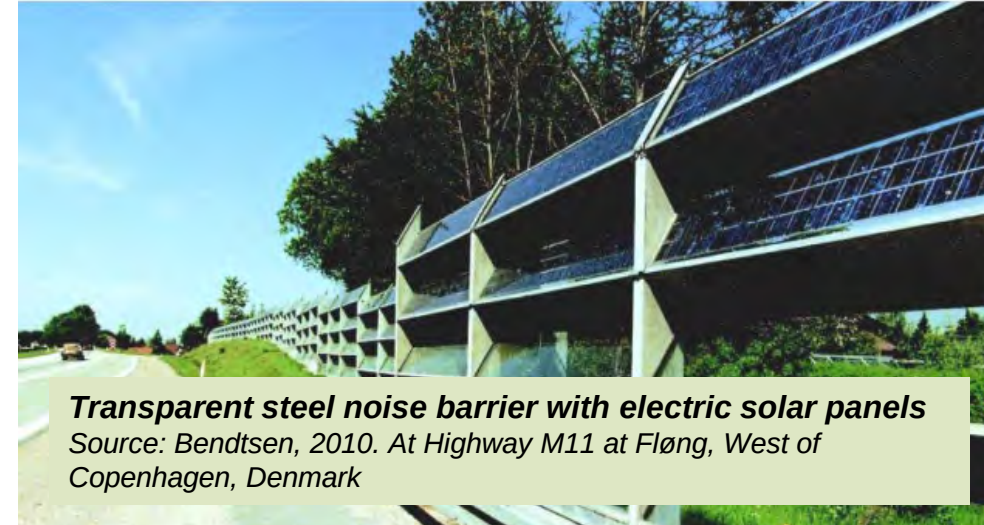


Along the Path (Propagation Control)

- Block or filter emission/noise before it reaches communities

Examples

- Innovative noise barrier designs (transparent, absorptive, vegetated, etc.)
- Vegetated belts and green buffers
- Earth berms
- Roadway caps / decking



At the Receiver (Private Protection)

- Directly protect buildings and residents from noise/air exposure
- Requires private owner cooperation and higher investment

Examples

- Building retrofits (better insulation, double/triple glazing)
- HVAC upgrades with filtration
- Vertical greenery on facades
- Vegetated/green roofs



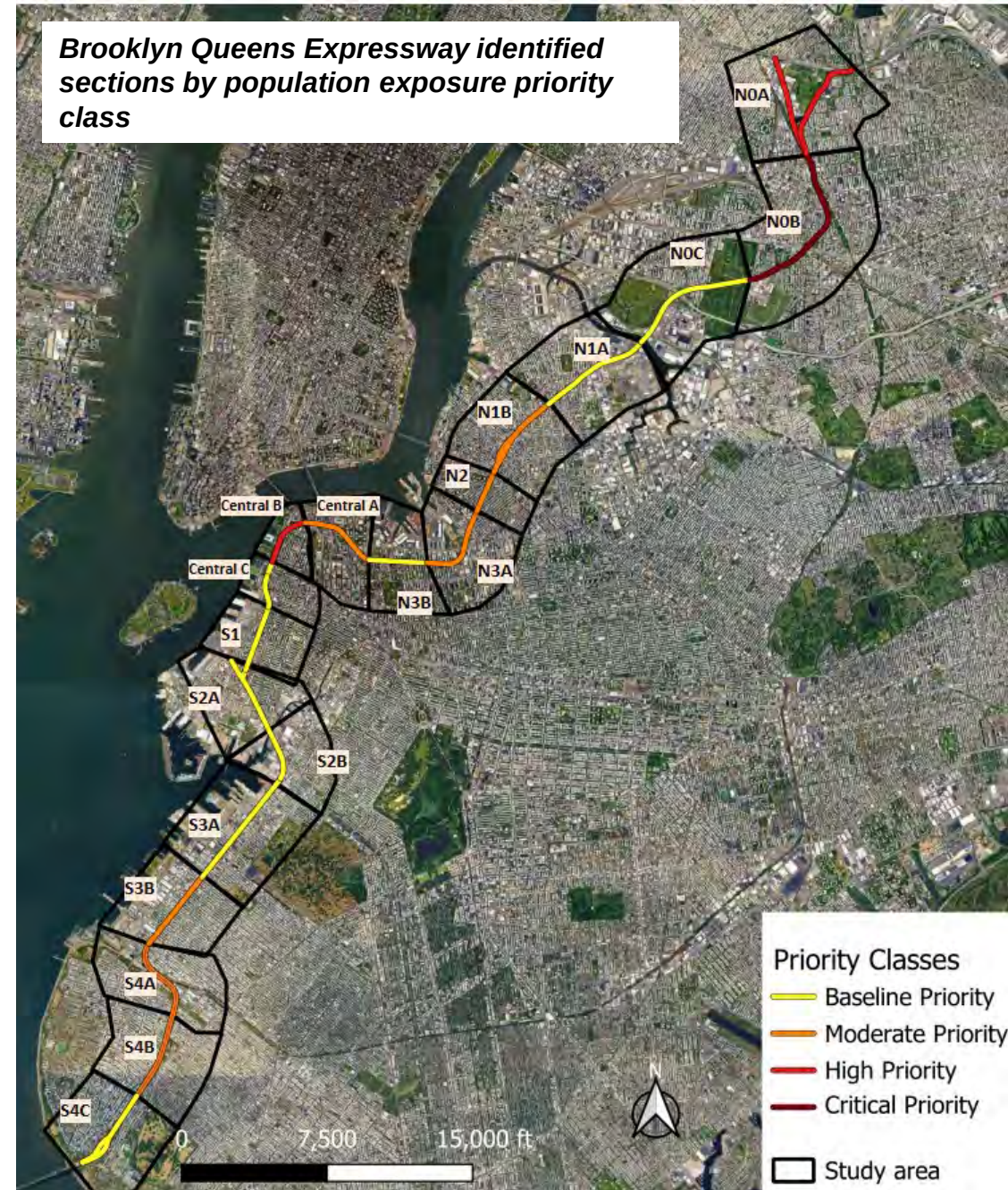
Building with an indirect green facade
Source: Yang B., 2020

Corridor-Specific Recommendations

3

Corridor Sectioning Analysis

- Divided into sections based on typology
- 0.5-mile buffer to capture residents exposed to traffic-related air and noise
- Clustering by concentrating census tracts with the affected populations
- Priority classes by population exposure



Linking Solutions to Corridors

- Representative sections chosen based on exposure priority, typology, and community context
- Close examination of representative sections
- Corridor-wide measures applied consistently
- Section-specific strategies tailored to unique characteristics

Cross Bronx Expressway
Source: Spencer Platt/Getty Images



Conclusion

4

Conclusion

- Corridor-wide strategies can be paired with section-specific solutions and policy interventions
- Community needs and preferences are central to effective mitigation and acceptance
- Cost-effective measures can often outperform large infrastructure changes
- Sustainable success requires balancing technical feasibility with social equity

Thank You!



NYCDOT



nyc_dot



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NYCDOT



WAGNER



Interborough Express

Public Realm Assessment & Planning Opportunities

NYMTC 9/11 Memorial Fellowship 2024-2025

Elliot Wareham
NYC Department of City Planning,
Urban Design Division

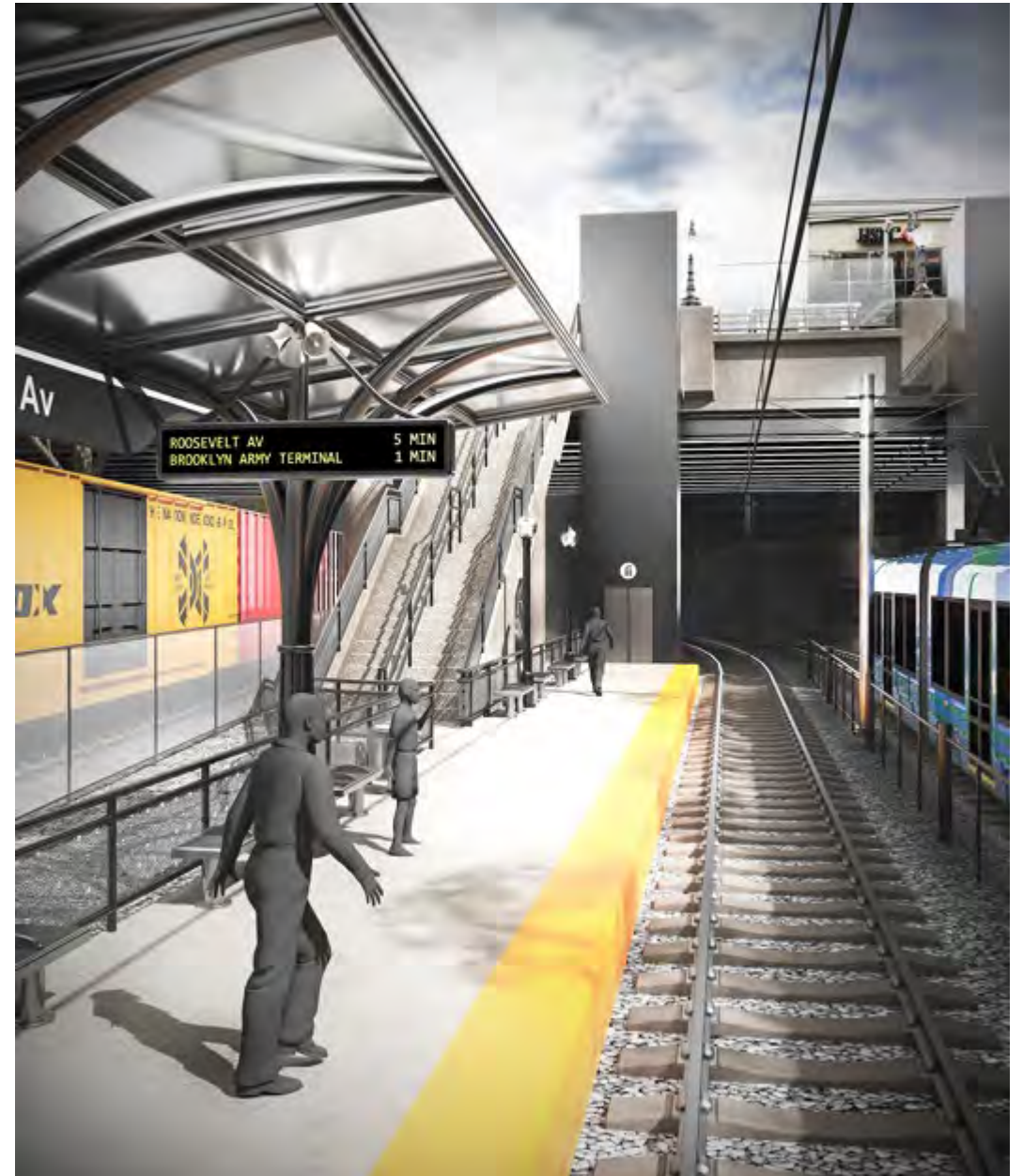
Acknowledgements

I would like to thank the entire UD team for their support and generosity, making my year at DCP truly special. A special thanks to Crystal Eksi, whose mentorship and collaboration made this project so rewarding.



Outline

1. IBX Background
2. Precedent Analysis
3. Data Analysis / Existing Conditions
4. Workshops
5. Site Visits
6. Typology Development
7. Public Realm
Recommendations and Toolkit



Background

- **14-mile** underutilized freight rail corridor in Brooklyn and Queens (LIRR Bay Ridge Branch and CSX Fremont Secondary)
- MTA completed PEL Study in 2024, recommending **light rail** as chosen mode
- **19 stations** planned with **transfers to 17 subway lines**
- Area surrounding the corridor is home to **900,000 people** and **260,000 jobs**
- **\$2.75 billion** of funding approved in the 2025–2029 MTA Capital Plan
- The MTA recently announced that engineering firms **Jacobs and HDR** have been selected as design consultants



DCP Approach

Planning Objectives and Rationale (DCP)

**Housing
growth**

**Reconnecting
neighborhoods**

**Supporting
industry and
job growth**

**Public realm
and street
safety**

**Climate
resilience**

Public Realm Themes (UD)

Access

How do riders get to the station from the street?

Connectivity

How do people transfer or connect to other modes?

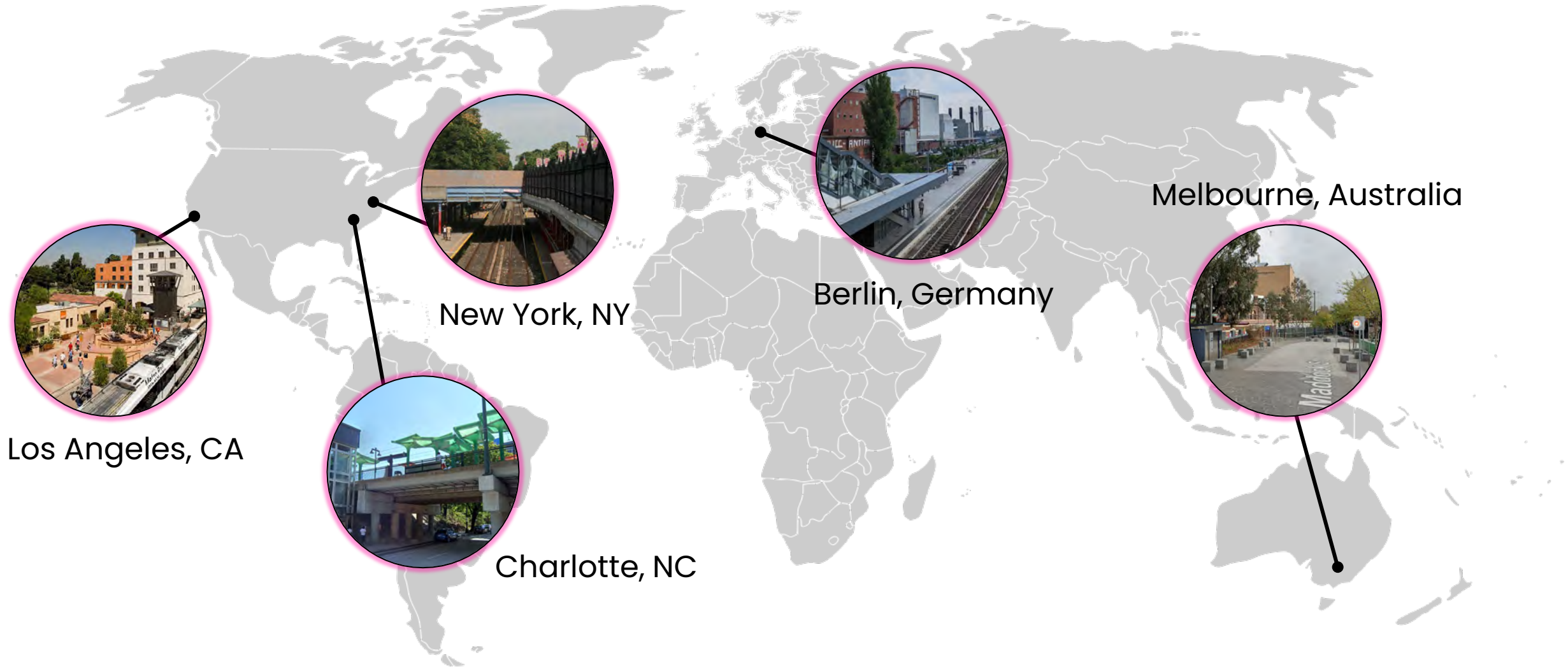
Open/Public Space

Where are opportunities for additional open space?

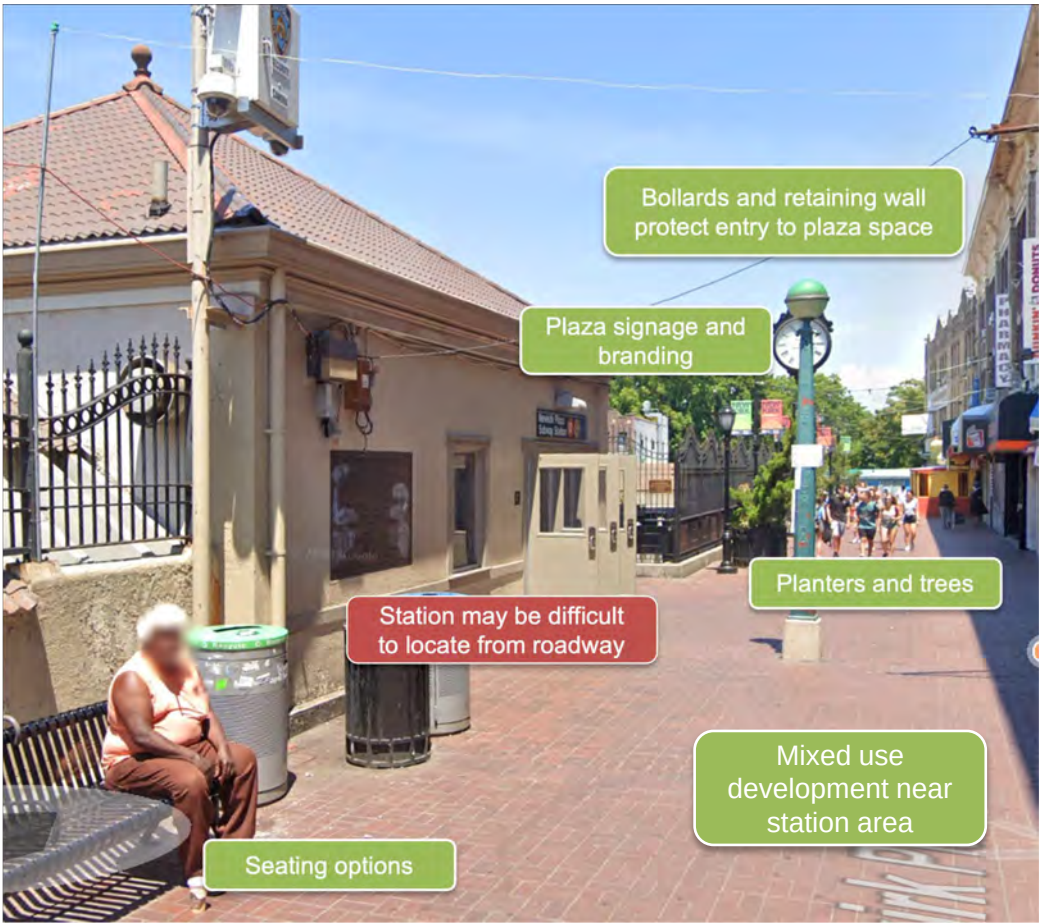
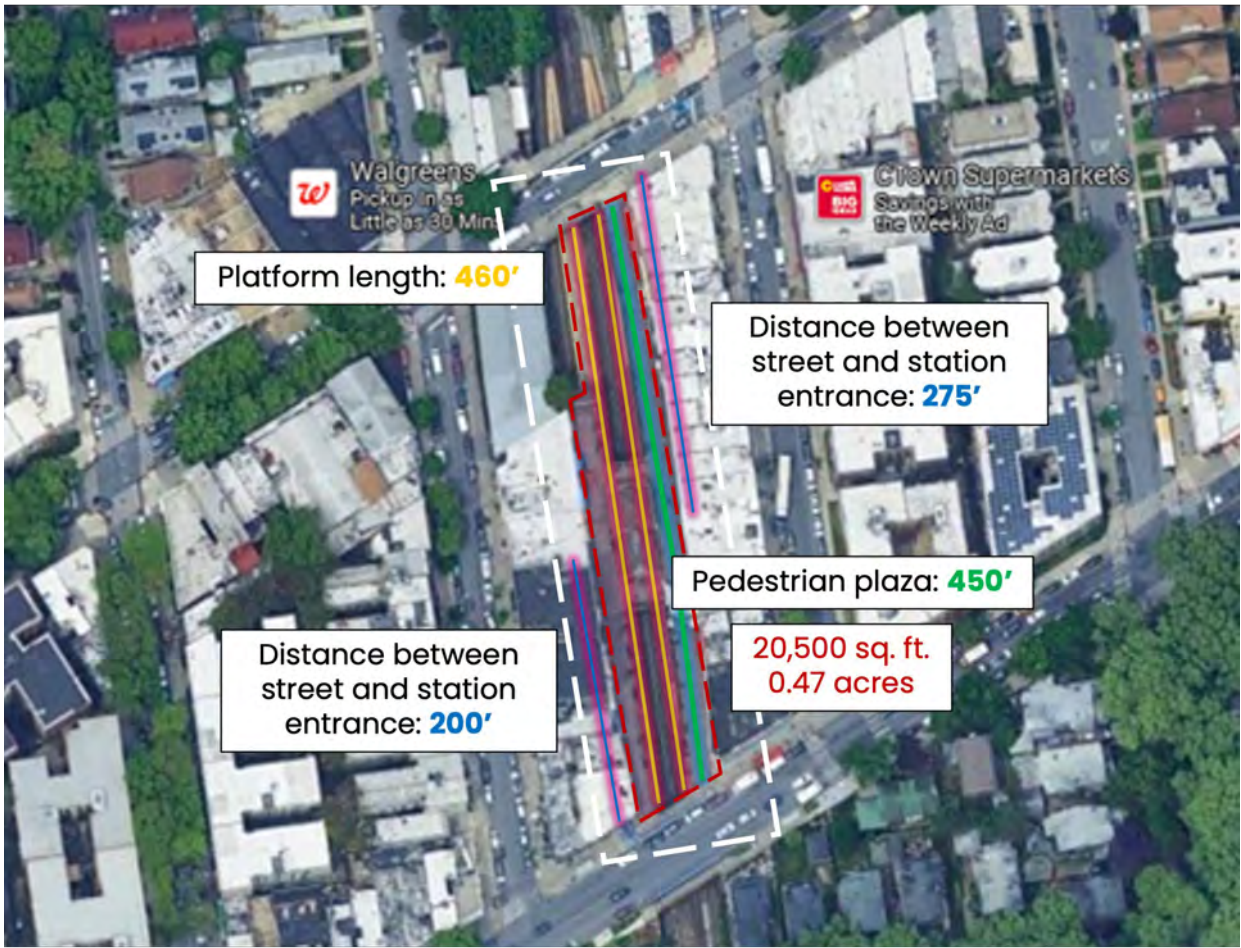
Adjacency

How does the station area support nearby land uses?

Precedent Analysis



Precedent Analysis Example – Newkirk Plaza Station (Brooklyn, NY)



Existing Conditions Analysis

Data



Land use



City ownership



Vacant sites



Bike routes



Pedestrian crashes



Transit routes



Flood risk

Other

Community District Needs Assessment

Land use applicants and projects

Streetscape and public realm

Conditions along the Line

Within ½ mile of the proposed station areas:

Opportunity for public realm improvements within city-owned properties

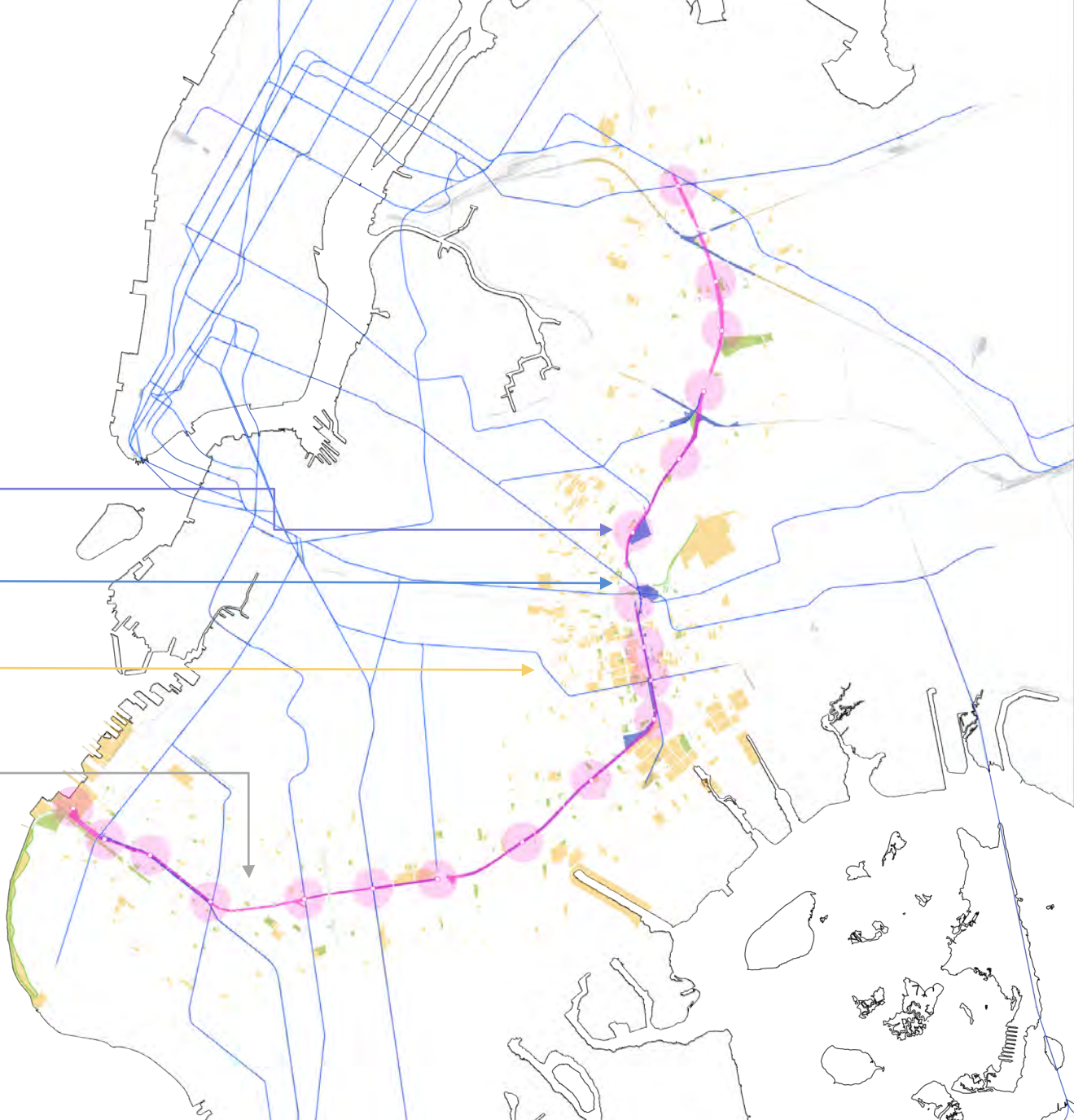
Opportunity to improve multimodal connections

Some areas have greater city-owned land available for improvements

Vacant land can be used for housing



- Station Locations
- IBX – MTA Properties for route of freight line
- MTA owned Properties
- City Owned Properties (other)
- Parks
- Vacant lots (very small in scale reference of image, defer to shared Carto Map)
- Subway Lines
- Other Rail Lines



Workshops



Example drawing: McDonald Avenue



Site Visits



Site of future Roosevelt Avenue Station



Existing New Utrecht Avenue Station



61st Street, near 8th Avenue Station



Site of future Atlantic Avenue Station



Site of future Myrtle Avenue Station



Streetscape near Metropolitan Avenue Station

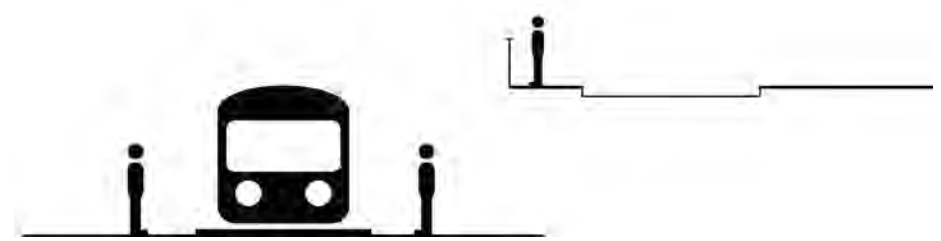
Typology Development



Station Typologies

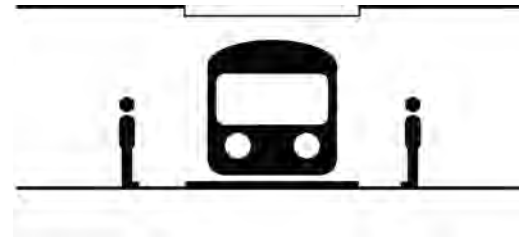
Open cut

Rail line is currently located within a cut, indentation to the surrounding context or topography and is supported by a gradual incline of topography and planting or retaining wall



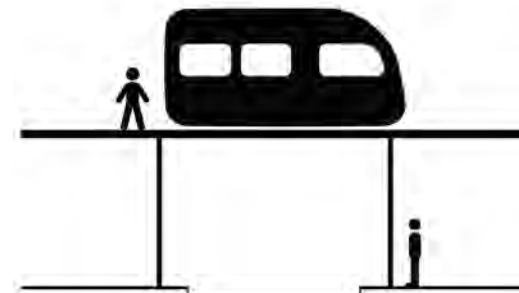
Below grade

Rail line is currently located below another structure, roadway or bridge



Above grade

Rail line is currently located within an embankment or elevated structure to the surrounding context



Station Area Typologies



Anchor Station

- High density residential (R5-R7)
- Transit interchange – high ridership
- High pedestrian activity
- Mixed land use

Industrial Center

- Primarily industrial (within or close to IBZ)
- Freight movement near station
- Mostly impervious
- Less pedestrian movement

Neighborhood Center

- Medium-high density (R5, R6)
- Mixed use
- Near commercial corridor
- Close to CBD area
- High pedestrian activity

Mid-Density Connector

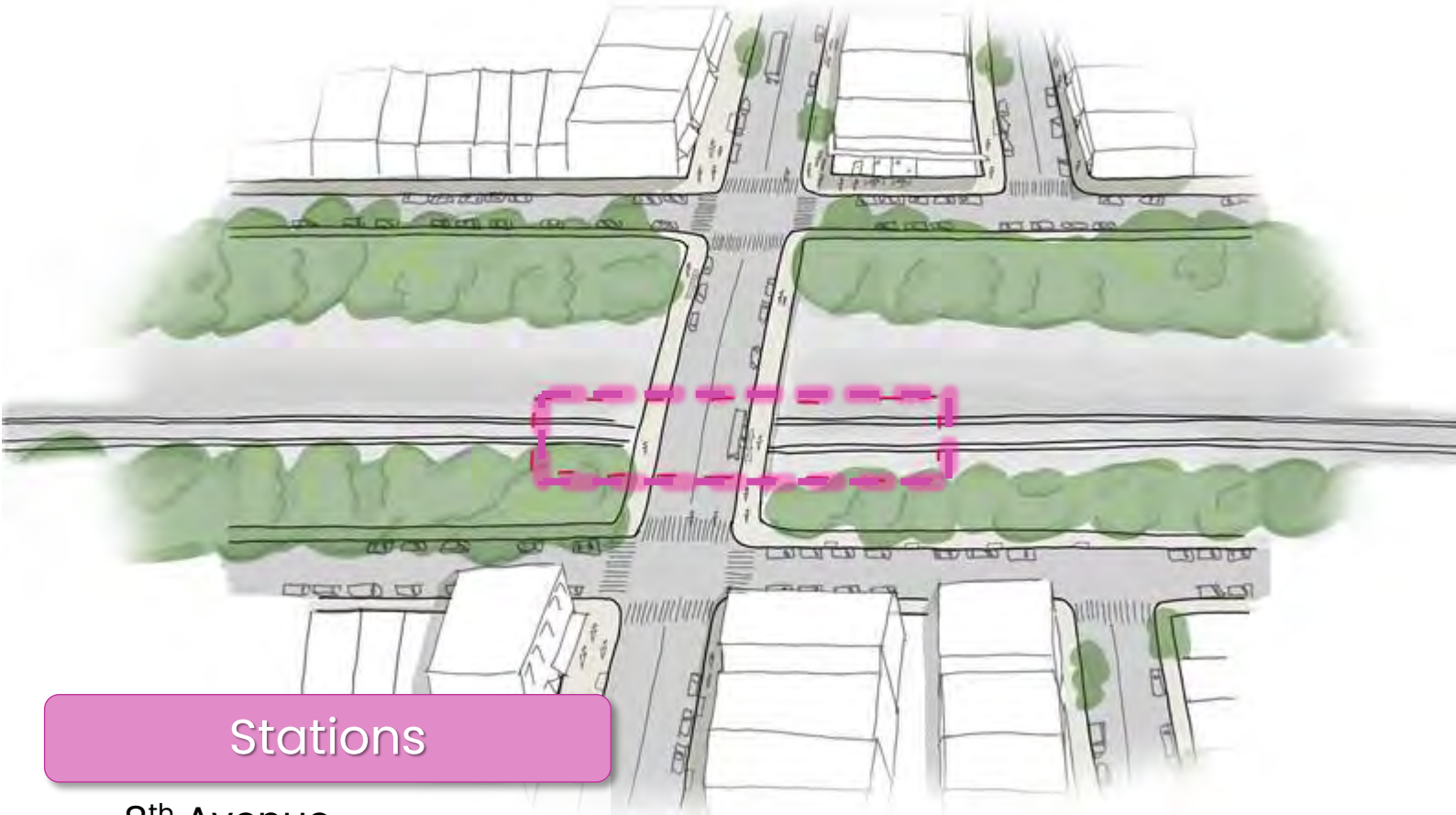
- Primarily residential
- Medium density (R6)
- Some commercial overlay; occasional ground floor commercial
- Existing transit access (maybe underutilized)

Low-Density Connector

- Primarily residential
- Low density (mostly R4 and below)
- Large low-scale commercial (mall, big box)
- Auto oriented; few transit connections and bike lanes

Station Area Typology Example

Neighborhood Center



Stations

- 8th Avenue
- New Utrecht Avenue
- Myrtle Avenue
- Flatbush Avenue

Challenges

- Transfers between different station conditions (e.g., elevated-cut)
- Key corridor high pedestrian activity; sidewalks may be insufficient
- Lack of greening on commercial/main streets
- Higher development pressure; need to integrate new and existing development

Opportunities

- Situate station entrances near anchor points/nodes
- High potential for additional transit supportive land uses
- Capping opportunities for additional public space
- Remove parking to extend sidewalks
- Add bus lanes and amenities

McDonald Avenue

Opportunities

MTA properties have more depth within IBX right-of-way to explore and address public realm needs: intermodal service connection, accessibility, sustainability

- **Prioritize a central platform**
- **Widen sidewalk** below elevated rail line, create public plaza with ADA accessible elevator adjacent to future station
- Create interconnected **greenway with pedestrian and bike access**; safer access for students going to/from schools; residents from transit/retail corridors
- **Reconnect streets**: bridge 19th Ave to **improve vehicular movement**, alleviate McDonald Ave traffic
- **Create a public plaza**: improve safe pedestrian access from low-density neighborhood streets to the west



Next Steps

- Public realm recommendations and toolkit for MTA
- Toolkit for DCP Borough Planners and Designers
- Interagency implementation strategies for public realm improvements (DCP, MTA, NYC DOT, NYC DPR, etc.)
- Potential for zoning changes to support **DCP's Strategic Objectives**



Thanks!

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ew2574@nyu.edu



Exploring Open and Crowdsourced Data for Transportation and Community Planning

A Research for the September 11th Memorial Program Fellowship
NYSDOT and NYMTC

Columbia University
EunJin Shin

Introduction



E.J. Shin

- 9-11 Memorial Fellow
- Columbia University
 - MS in Civil Engineering
 - Master of Architecture
- Co-founder at STUDIOIOIOIO
- AIA New York

Why Open/Crowd Source Data Now?

- Rise of “Big Data” in planning
- Growing public participation
- Real-time insight through geospatial tools



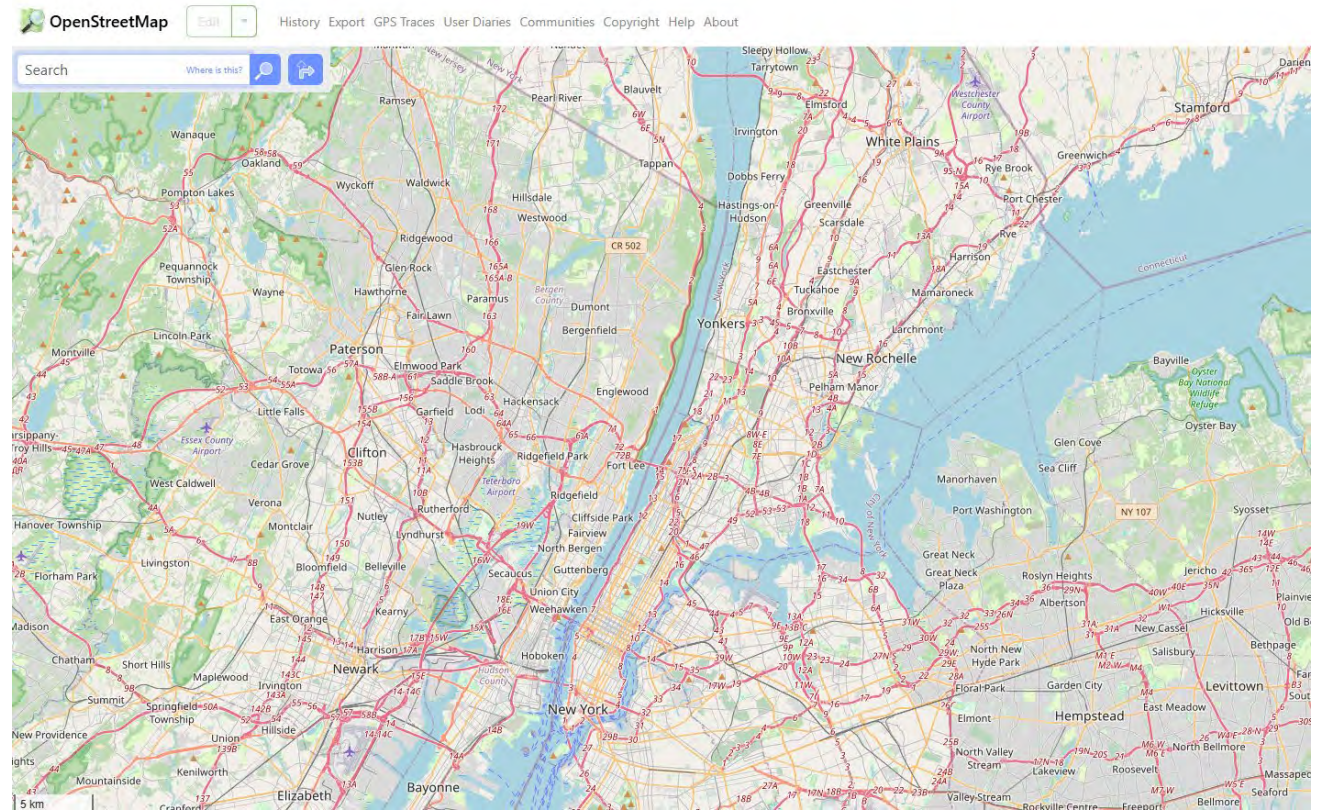
Research Objectives

Understand global best practices: five case studies

Identify scalable strategies for NYSDOT and NYMTC

What is OpenStreetMap (OSM)?

- User-generated geospatial database
- Used in planning, disaster response, infrastructure
- Funded by public-private partnerships



OpenStreetMap, www.openstreetmap.org. Accessed 22 Aug. 2025

Case Study Summary

	Transport for London	Land Transport Authority (LTA) Singapore	London Cycling Infrastructure Database (CID)	San Francisco Bike Lane	UrbanSim
Location	London, UK	Singapore	London, UK	San Francisco, CA	Global
Approach	“Data belongs to the public” engagement, trust	Real-time crowd monitoring through public Wi-Fi login	Delineation of cycling infrastructure	Public funded mobile application cycle tracks for data collection	NSF-funded project to develop planning simulation tool
Features	Real-time transport info for customers, optimizing bus services, managing traffic flow, growth planning	Passenger behavior insights on platforms (e.g. slower walking speeds) Can inform station design and operations	Direct OSM plug-in: infrastructure impacts on cyclist safety, cycling growth, economic effects of cycling	Public funded in-house open-source mobile app, data collection for in-depth analysis of bicycling behavior and infrastructure need	Open-source software, models urban land use, development, systems interactions over long periods. Used for policy development
Unique Aspects	Allows 3 rd party to develop software	Encryption algorithms utilized to protect privacy	High granularity & size, studies cycling economic impacts	Granular data collecting, developed by public funding	Microsimulation and comprehensive planning approaches

Case Study 1: Transport for London (TfL)

What it is: Public transport operator using open and crowdsourced data for real-time information and planning

Where: London, UK; ongoing since 2009 Open Data initiatives

Uses:

- Real-time travel info for staff and passengers
- Optimize bus services, traffic flow, city growth planning
- Public-reported maintenance and cycling/walking route planning

Data: Oyster cards, bus GPS, traffic lights, cameras; integrated with OSM and GTFS via open-source tools (OpenTripPlanner, GO_Sync)

GTFS = General Transit Feed Specification



<https://www.businessinsider.com/disappointing-photos-show-traveling-london-underground-really-like-2020-2>

Case Study 1: Transport for London (TfL)

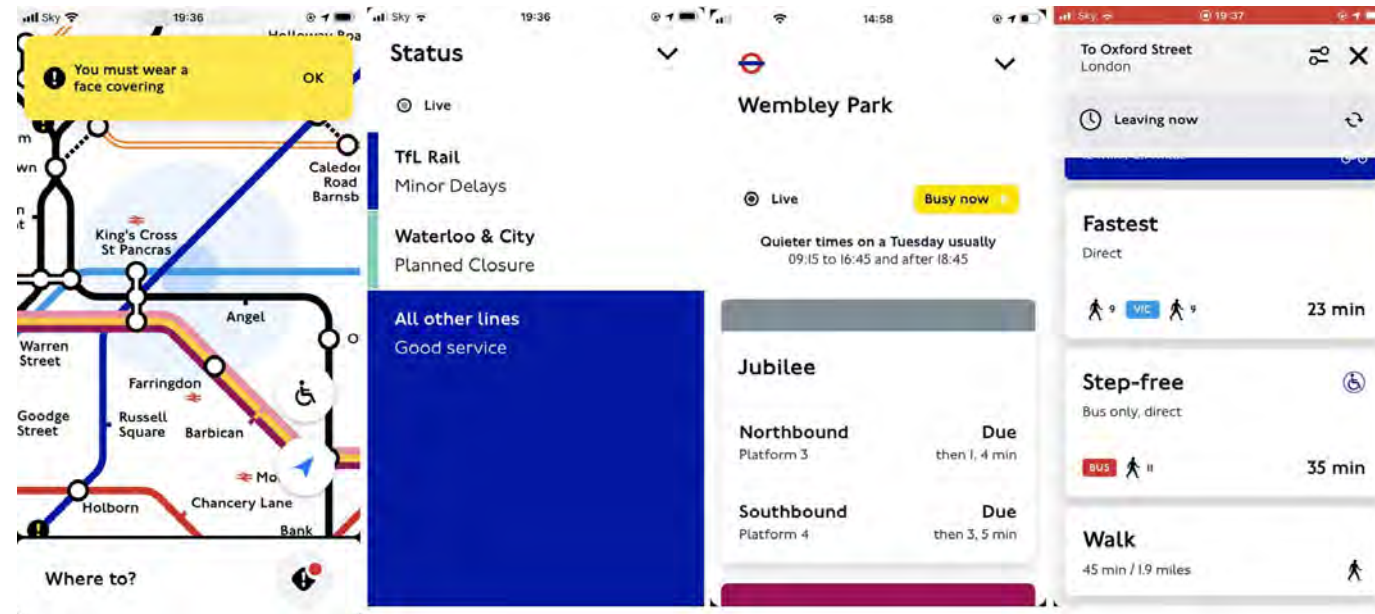
Impact

- Better service reliability
- Demand forecasting
- Efficient traffic management
- Higher public trust

Challenges

- Ensuring data quality
- Managing diverse data streams
- Presenting complex info clearly

Unique: Holistic integration of big data sources and strong 'data belongs to the public' philosophy; fosters innovation via third-party apps



“Transport for London Provides Real-Time Crowdedness Level on Tfl Go App.” *Mobility Innovators*, 1 July 2021, mobility-innovators.com/transport-for-london-provides-real-time-crowdedness-level-on-tfl-go-app

Case Study 2: Land Transport Authority (LTA) Singapore *Public Wi-Fi Crowd Heat Maps*

What it is: Public Wi-Fi logins in MRT stations, real-time crowd heat maps

Where: Singapore; 129k+ devices tested across Circle Line stations

Uses:

- Real-time crowd monitoring and prediction
- Train deployment and congestion management
- Passenger behavior and station design insights

Data: Wi-Fi sensors and big data framework; some OSM for risk maps and visualization



Cheung, M., Cheng, Y. & Fujiyama, T. Investigating passenger behaviour on the metro platform with Wi-Fi location tracking data: a case study of Singapore. *Transportation* (2024).
<https://doi.org/10.1007/s11116-024-10570-w>

Case Study 2: Land Transport Authority (LTA) Singapore *Public Wi-Fi Crowd Heat Maps*

Impact

- Improved service efficiency
- Accurate crowdedness prediction
- Passenger flow analysis

Challenges

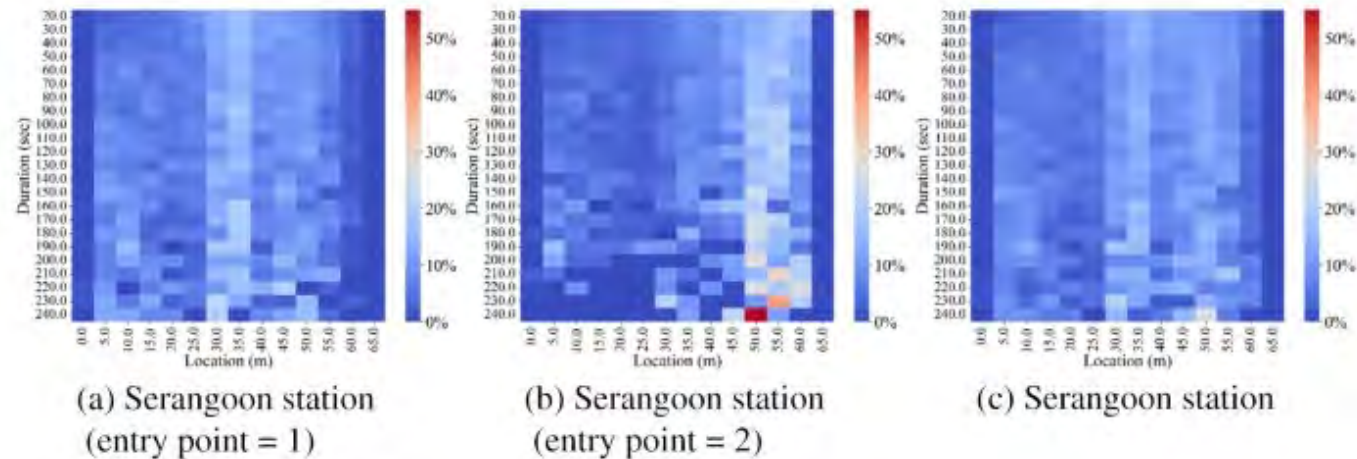
- Wi-Fi data requires cleaning
- Privacy managed via encryption
- Alternative to costly cameras

Unique: Non-invasive, cost-effective use of existing Wi-Fi infrastructure + ML (SMOTE + random forest) for crowd prediction

ML = Machine Learning

SMOTE = Synthetic Minority Over-sampling Technique

Random Forest = an ensemble machine learning for more accurate predictions



Cheung, M., Cheng, Y. & Fujiyama, T. Investigating passenger behaviour on the metro platform with Wi-Fi location tracking data: a case study of Singapore. *Transportation* (2024).
<https://doi.org/10.1007/s11116-024-10570-w>

Case Study 3 and 4: Bike Lane

London and San Francisco

Uses

- Inventory cycling facilities
- Assess safety
- Study economic impact on local businesses

Data Sources

OSM historical amenity data and crowdsourced inputs (danger spots, infrastructure quality)

- CycleTracks app (GPS)
- Strava Metro
- Bikeshare trip data
- OSM mapping



Case Study 3 and 4: Bike Lane

London and San Francisco

Impact

- Cycling growth and safer commutes (40 - 65% lower injury odds with protected lanes)
- \$3.3M investment → 14% cyclist increase
- 9,500 lane-block reports in nine months
- New shops and preference for bike lanes documented

Challenges

- Data quality and changing infrastructure mapping
- OSM contributor retention
- Participant recruitment
- Reliability of crowdsourced inputs

Unique

- First dataset at this scale linking cycling infra to business growth and economic activity
- Citizen reporting platform and tailored apps (CycleTracks) for municipal action

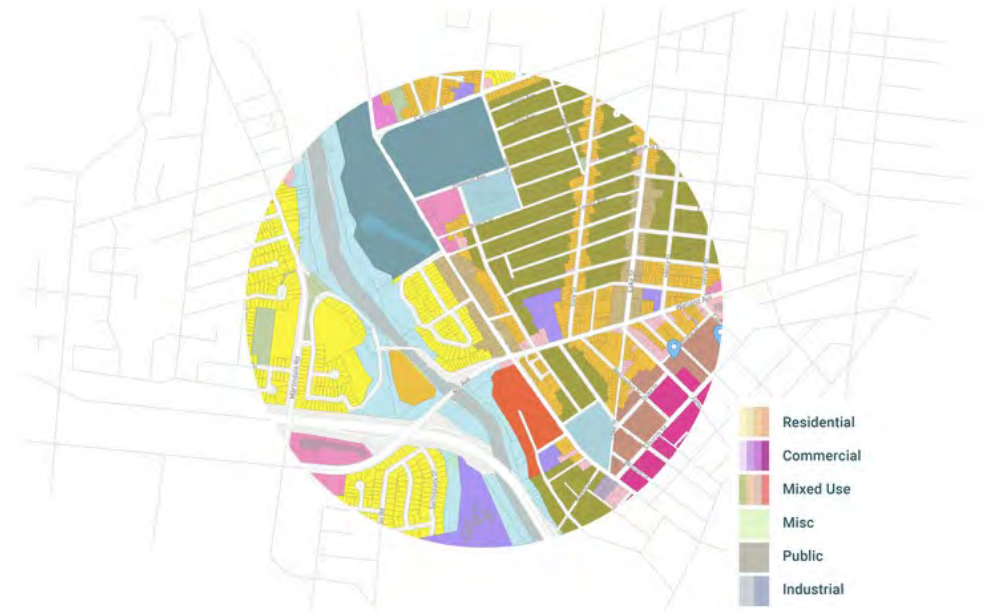
Case Study 5: UrbanSim

- **What it is:** Open-source tool to model land use and transportation over 20+ years
- **Where:** NSF-funded (USA), applied in US, Europe, Taipei
- **Uses:** Test policy impacts (transit, zoning, incentives) on growth, transport, energy, CO₂
- **Data:** Open-source, integrates with OSM; outputs as maps/charts
- **Impact:** Neutral, evidence-based support for planning decisions
- **Challenge:** Needs detailed data; OSM gaps
- **Unique:** Microsimulation (households/businesses), integrates land use and transportation

Case Study 5: UrbanSim



3D Rendering



2D Mapping

“UrbanSim Artificial Intelligence for Sustainable Development with AI.”
UrbanSim, www.urbansim.com Accessed 22 Aug. 2025

Building a Roadmap

Hybrid data models

Institutional partnerships

Privacy-focused, equity-driven strategies

What Could Go Wrong?

- Data quality and contributor fatigue (due to volunteer base work)
- Gaps in coverage (rural, underserved areas)
- Privacy and consent



Key Takeaways for NYSDOT and NYMTC

Promote public ownership of data

Integrate diverse datasets (e.g., GPS, fare cards, civic apps)

Democratize planning with open-source tools

Conclusion and Vision

- **Toward Open-Source Urbanism**
- Empowering citizens as co-creators – potential marketing and leverages
- Planning that is dynamic, inclusive, and evidence-informed
- A roadmap for resilient, responsive systems



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