



APPENDIX

Technical Memorandum 3: Draft Recommendations

Draft Plan

Area Plan

Corridor Transect Plan

Detailed Plan, Liberty Street to Cedar Street

Proposed Cross Section, Liberty Street to Cedar Street

Detailed Plan, Cedar Street to City Hall

Existing Perspective Looking west from CSX overpass

Proposed Perspective Looking west from CSX overpass

Detailed Plan, City Hall to Chester Street

Detailed Plan, Broadway to Jansen Avenue

Placemaking at Pine Grove Avenue

Placemaking at UPAC

Placemaking at Henry Street

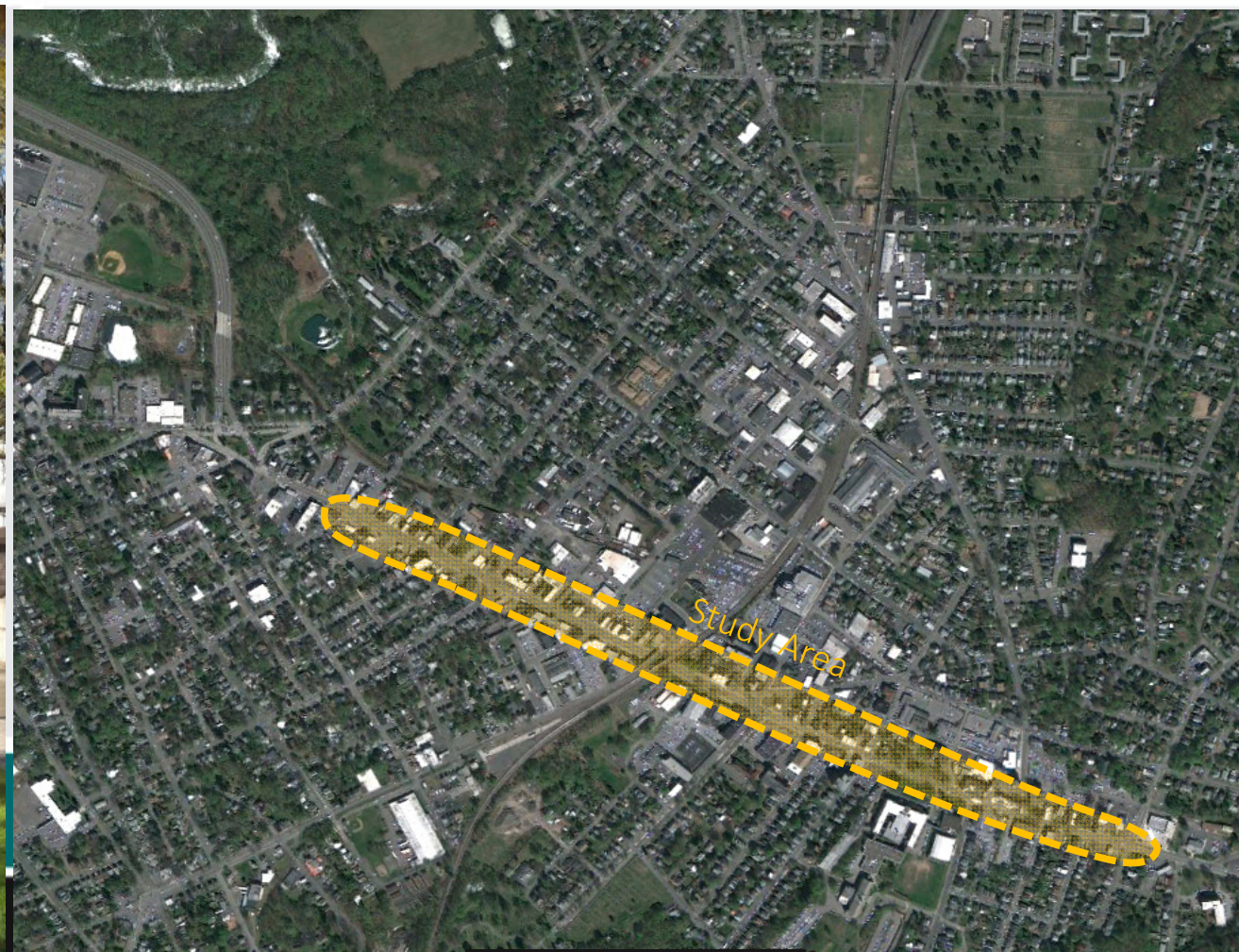
Separated Bike Lane Example

Draft Plan Cost Estimate

Bike Lane Alternatives Considered

Synchro Analyses Results

Building a Better Broadway Draft Plan



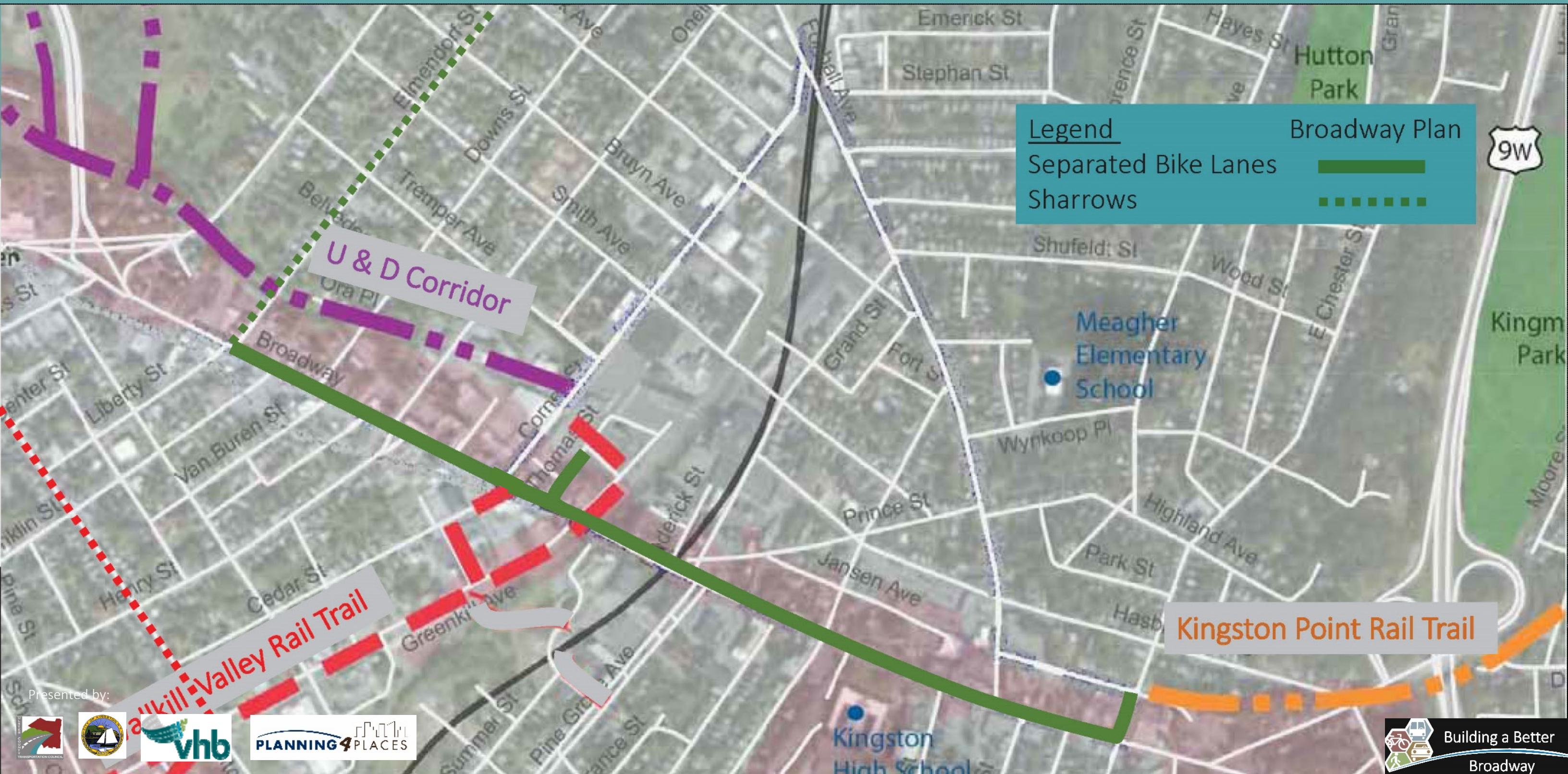
Presented by:



Building a Better
Broadway

Preferred Alternative Phase 2

Separated Bicycle Lane between parking and sidewalk

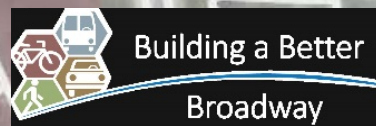
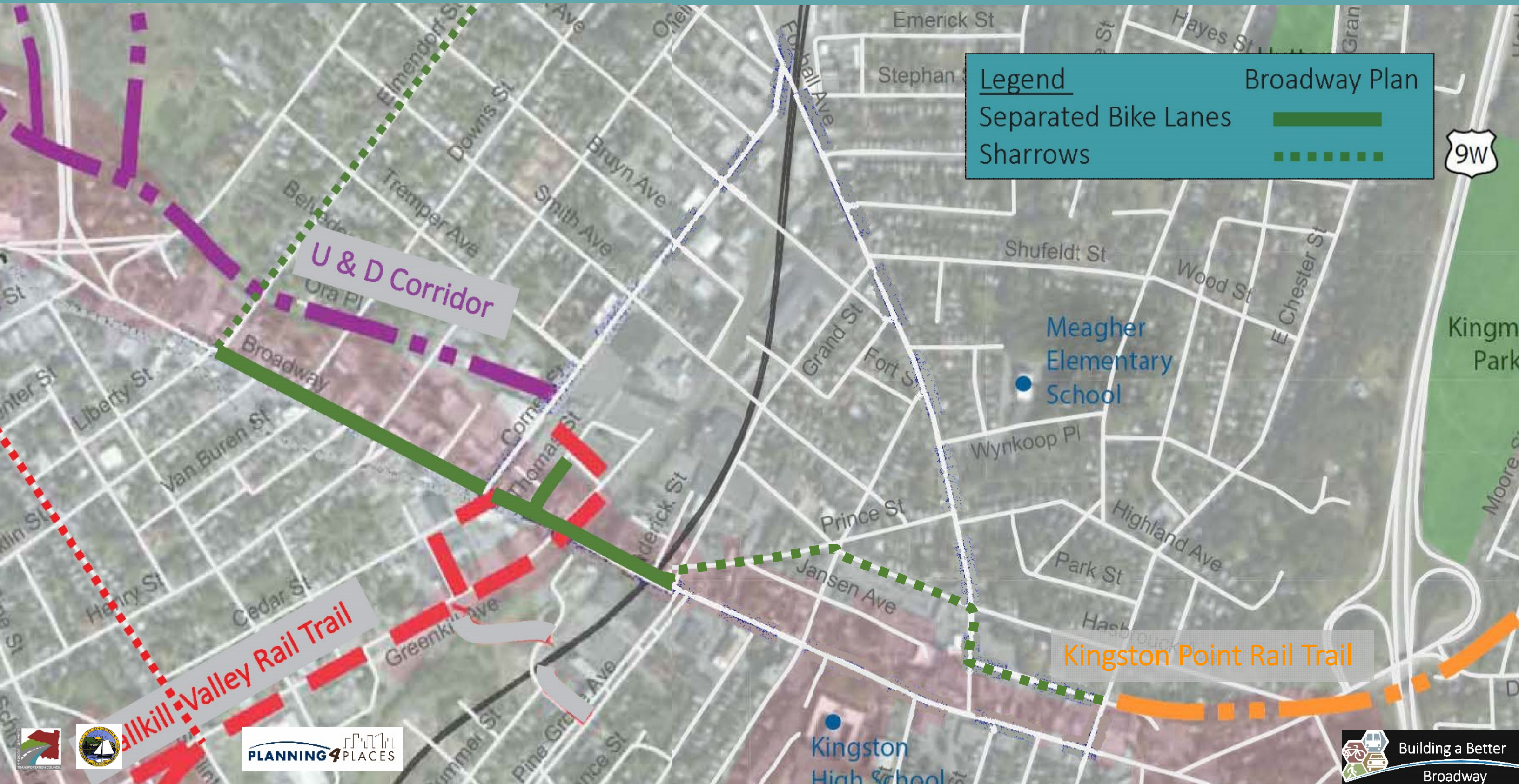


Presented by:

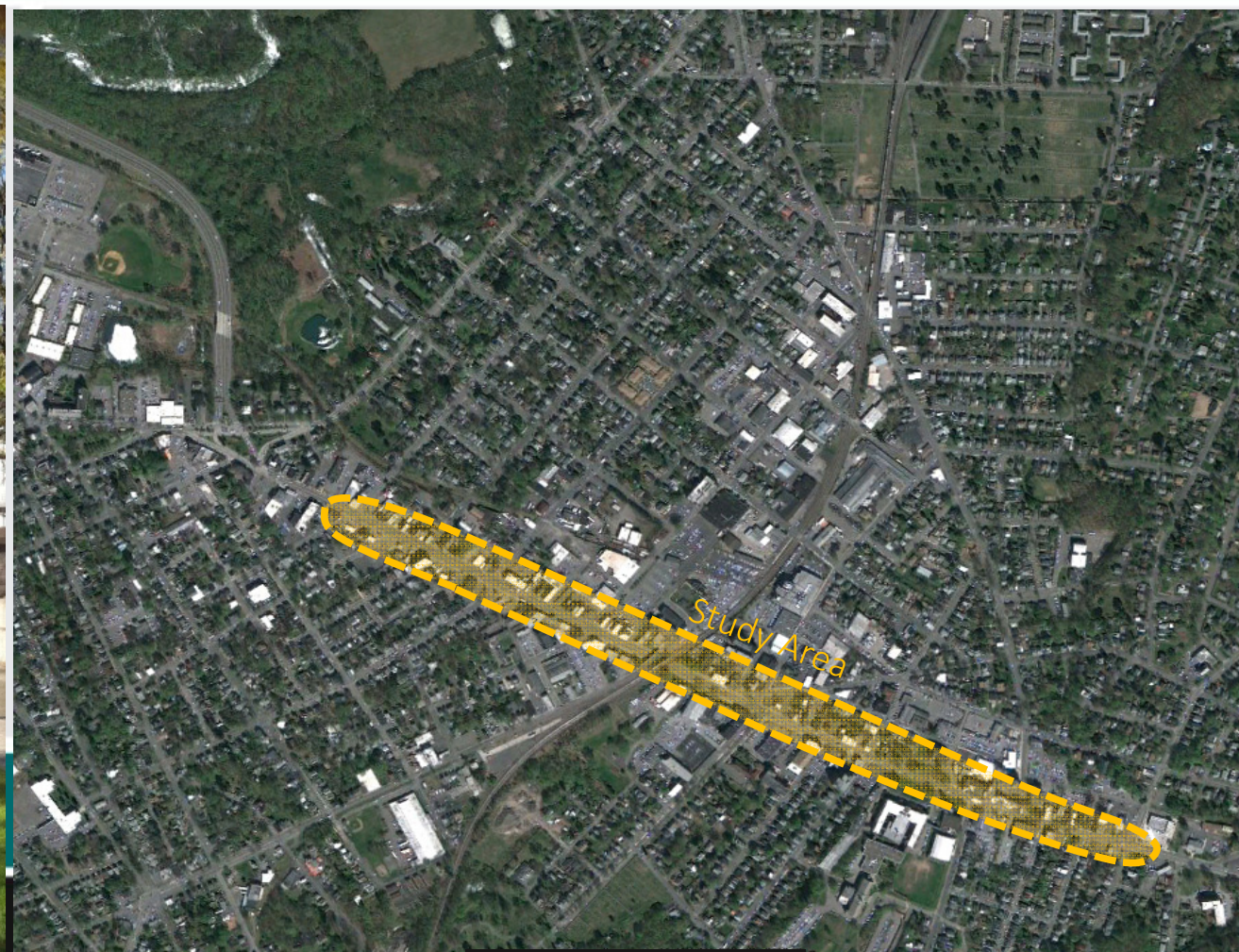


Building a Better
Broadway

Preferred Alternative Phase 1



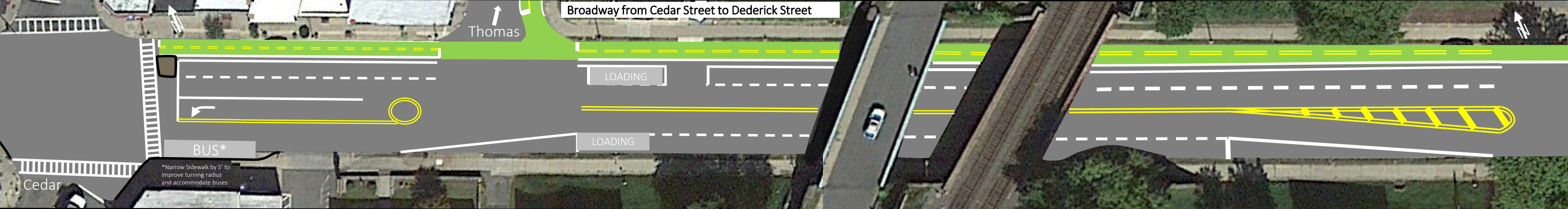
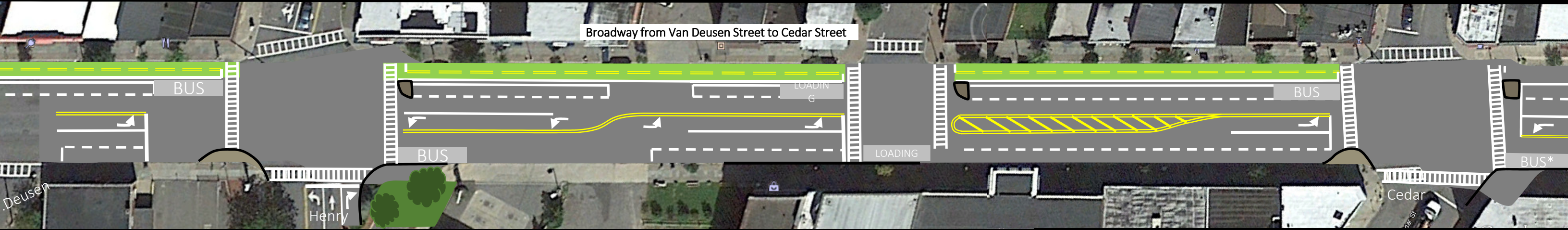
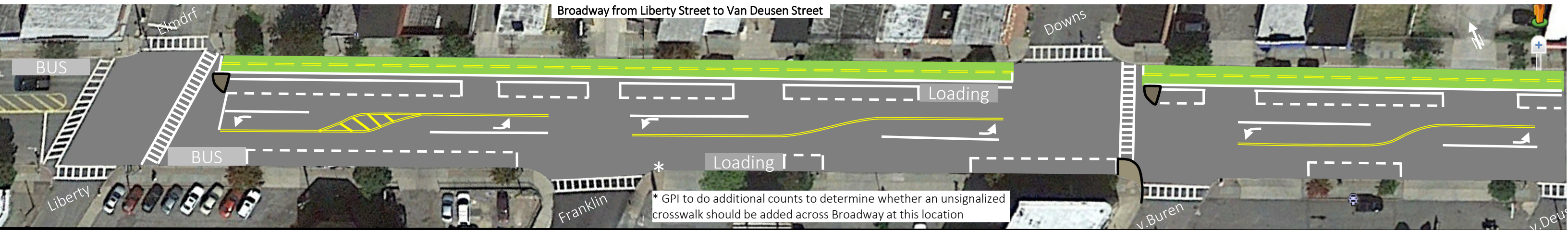
Building a Better Broadway Draft Plan Transect

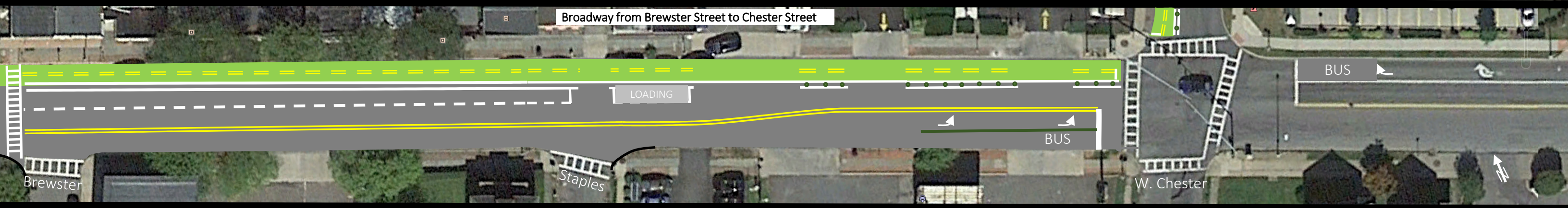
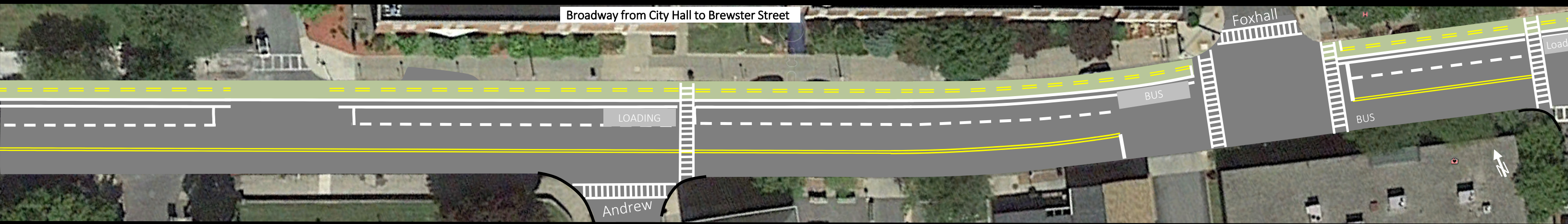
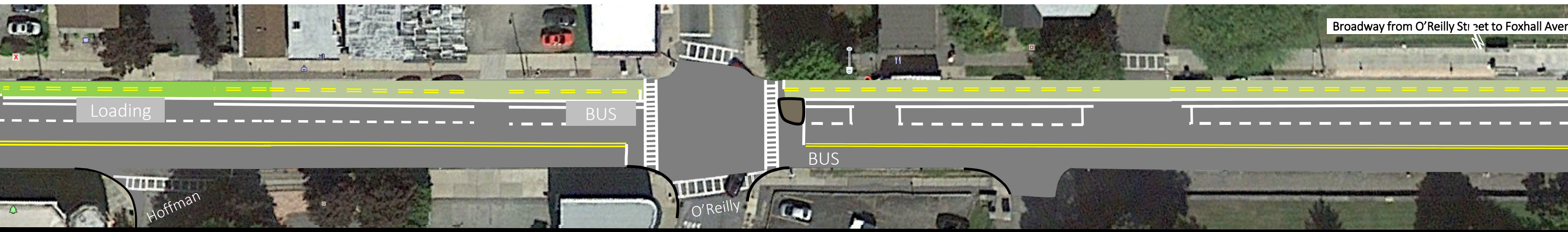


Presented by:



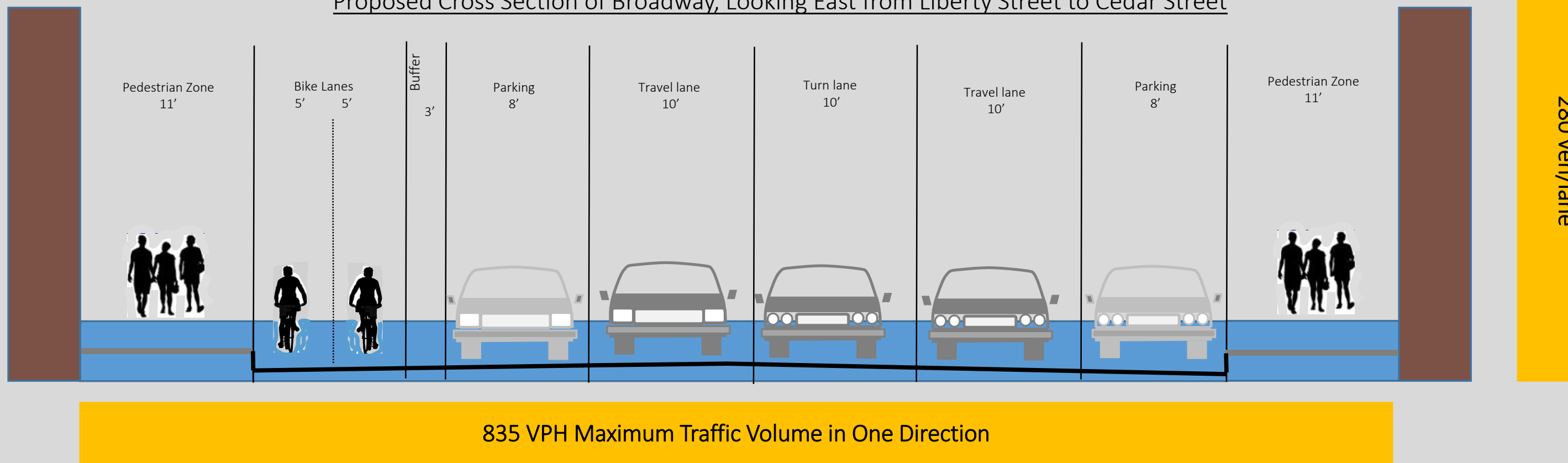
Building a Better
Broadway





Preferred Alternative Cross Section

Proposed Cross Section of Broadway, Looking East from Liberty Street to Cedar Street



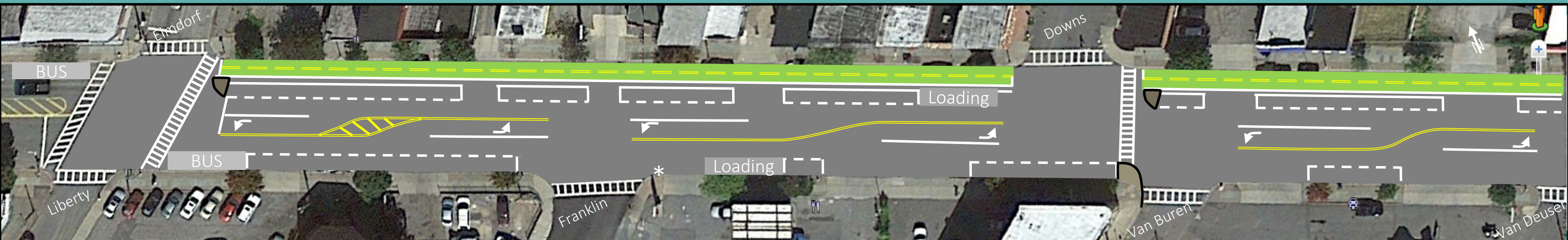
Presented by:



Building a Better
Broadway

Draft Plan

Proposed Section of Broadway from Liberty/Elmendorf Sts. to Van Duesen St.



PRESENTED TO:

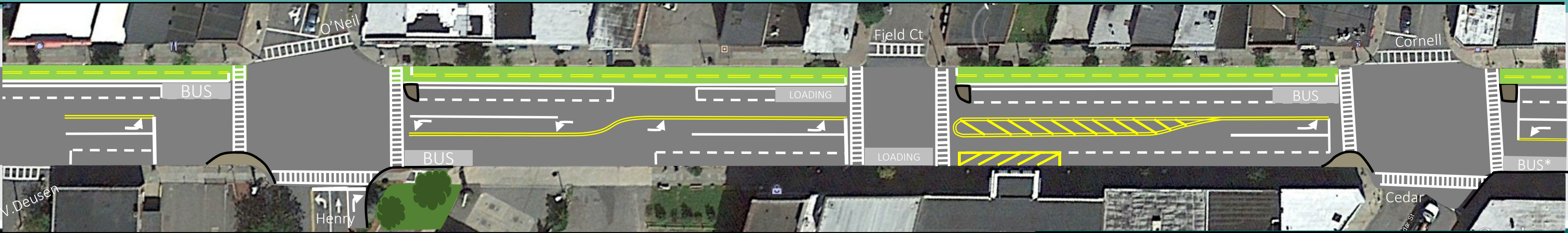
Ulster County Transportation Council, the City & People of Kingston

Presented by:



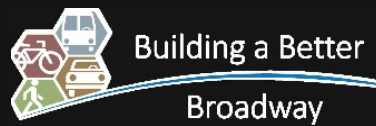
Draft Plan

Proposed Section of Broadway from Van Duesen Street to Cedar Street



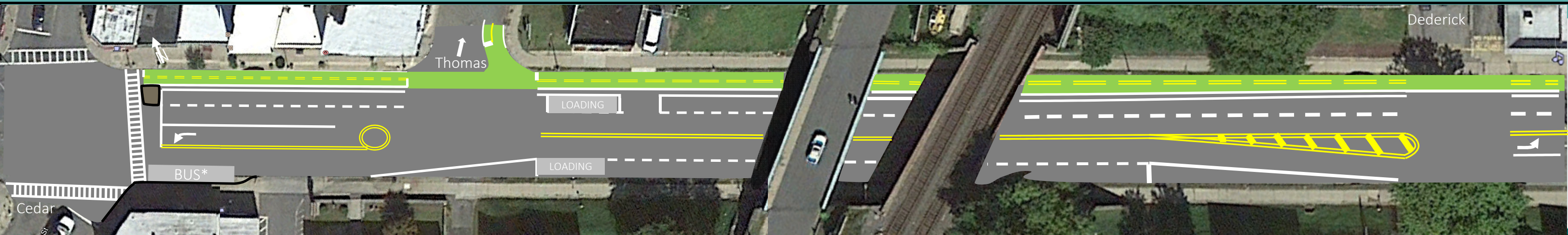
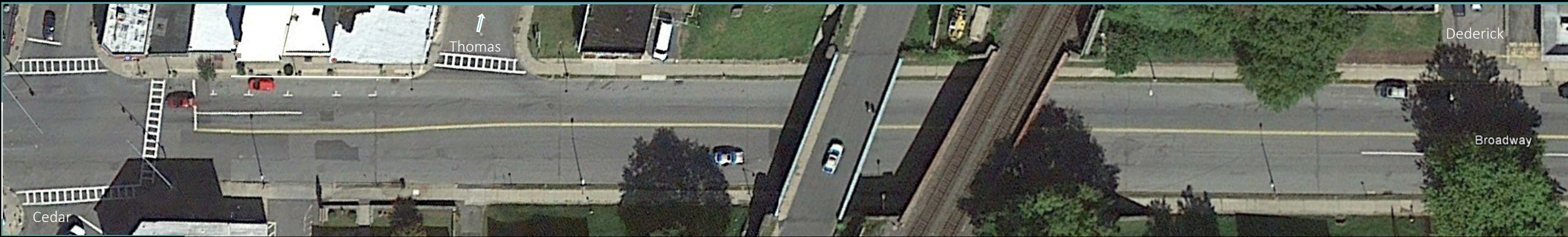
PRESENTED TO: Ulster County Transportation Council, the City & People of Kingston

Presented by:



Draft Plan

Proposed Section of Broadway from Cedar Street to Dederick Street



PRESENTED TO: Ulster County Transportation Council, the City & People of Kingston

Presented by:



Presentation

Building a Better Broadway

Broadway looking west from Greenkill Avenue Bridge



Before

Presented by:



Building a Better
Broadway

Presentation

Building a Better Broadway

Broadway looking west from Greenkill Avenue Bridge



Presented by:



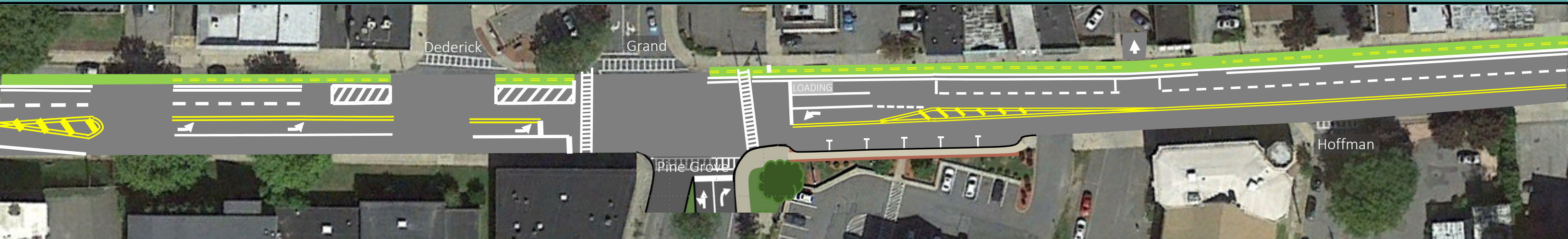
Building a Better
Broadway

Presentation

Draft Plan

Proposed Section of Broadway from Dederick Street to Hoffman Street

(to be completed in Phase 2)



PRESENTED TO:

Ulster County Transportation Council, the City & People of Kingston

Presented by:

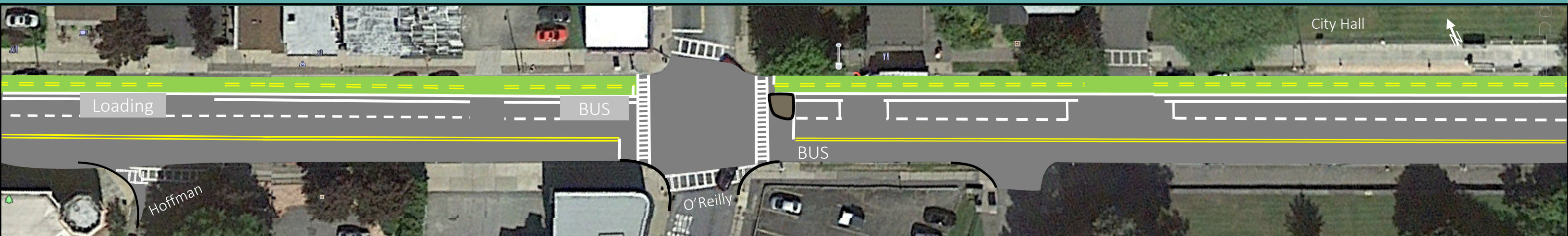


Building a Better
Broadway

Draft Plan (Phase 2)

Proposed Section of Broadway from Hoffman Street to City Hall

(to be completed in Phase 2)



PRESENTED TO:

Ulster County Transportation Council, the City & People of Kingston

Presented by:



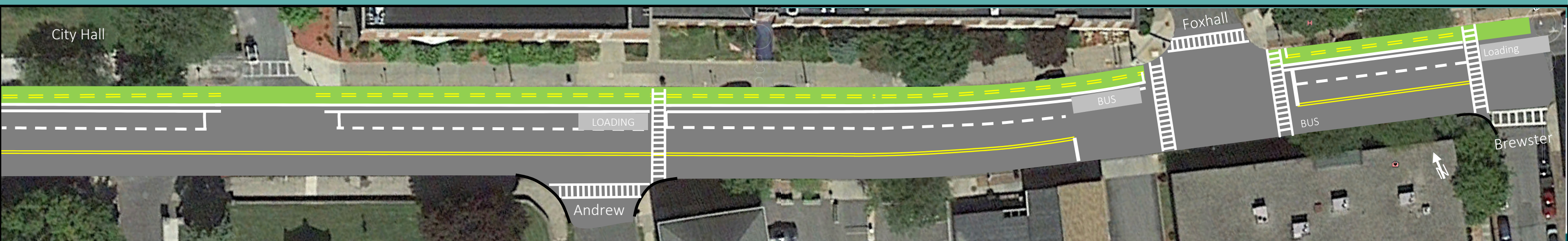
Building a Better
Broadway

Presentation

Draft Plan (Phase 2)

Proposed Section of Broadway from City Hall to Brewster Street

(to be completed in Phase 2)



PRESENTED TO:

Ulster County Transportation Council, the City & People of Kingston

Presented by:

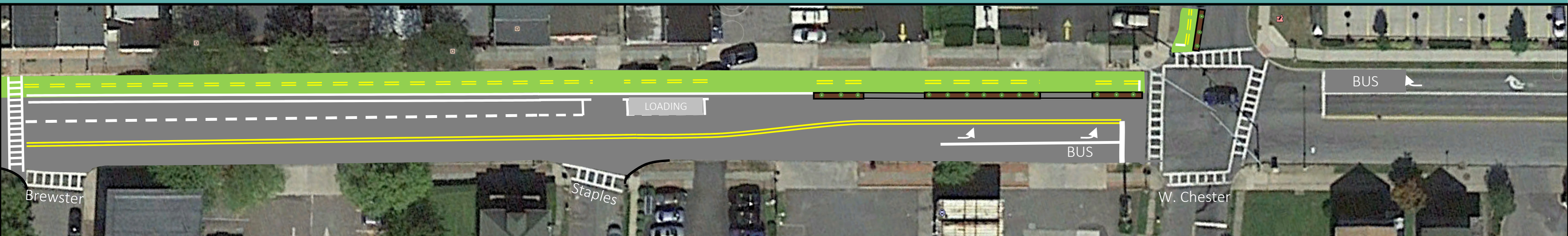
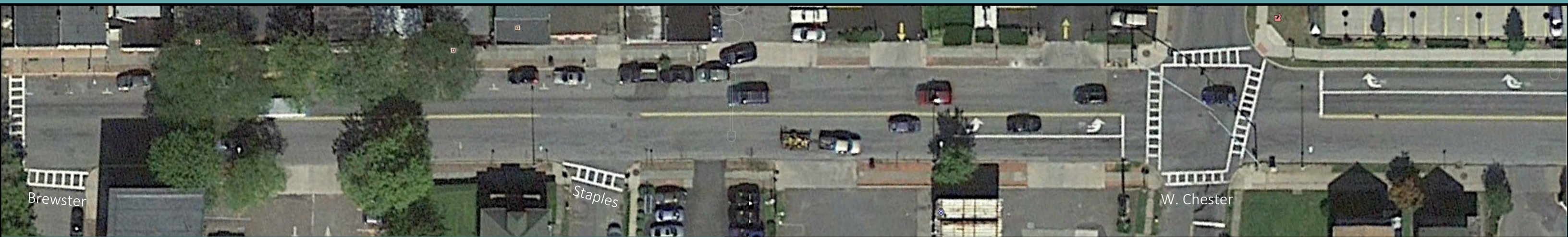


Building a Better
Broadway

Draft Plan (Phase 2)

Proposed Section of Broadway from Brewster Street to Chester Street

(to be completed in Phase 2)



PRESENTED TO:

Ulster County Transportation Council, the City & People of Kingston

Presented by:

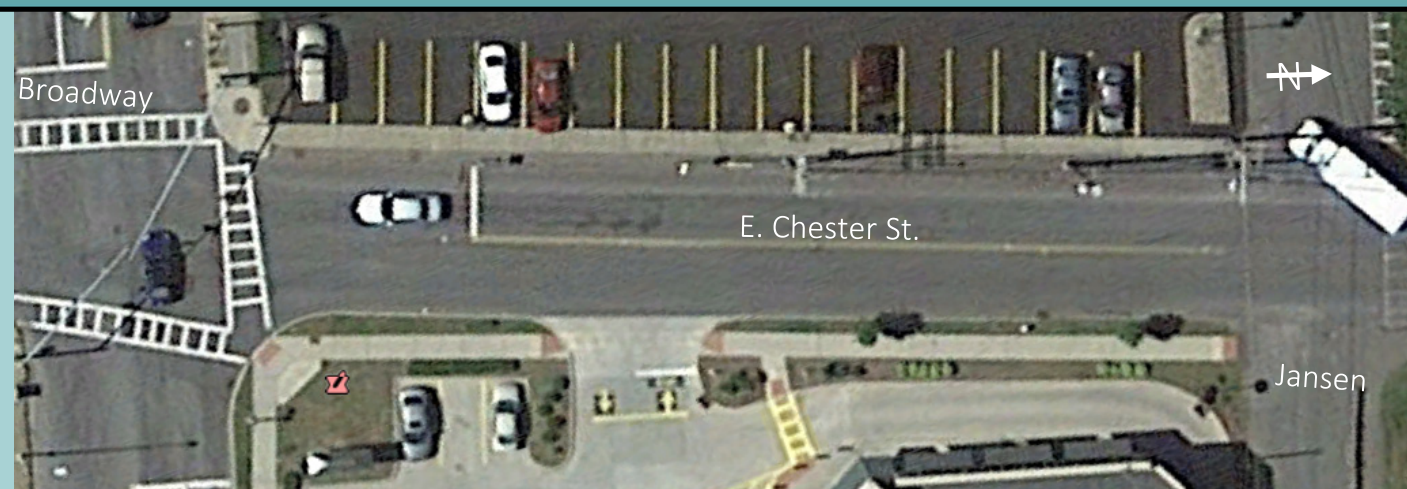


Building a Better
Broadway

Draft Alternative (Phase 2)

Proposed Section of East Chester Street from Broadway to Jansen Avenue

(to be completed in Phase 2)



PRESENTED TO:

Ulster County Transportation Council, the City & People of Kingston

Presented by:



Preferred Alternative

Examples of Separated Bike Lanes

(from cities such as New York, Buffalo and Syracuse)



PRESENTED TO:

Ulster County Transportation Council, the City & People of Kingston

Presented by:



Building a Better
Broadway

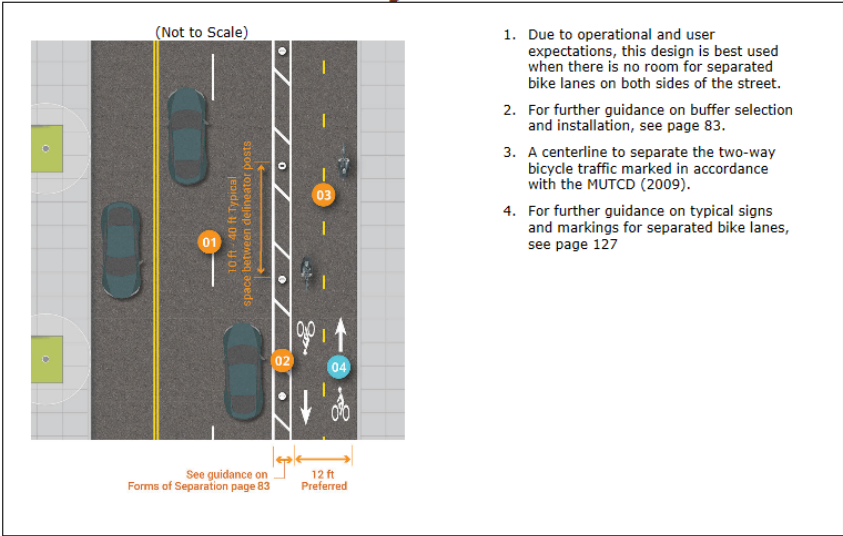
FHWA Separated Bike Lane Planning and Design Guide

Chapter 5: Menu of Design Recommendations

Direction and Width: Two-Way Separated Bike Lane on Right-Side of Two-Way Street

Providing a two-way separated bike lane on a two-way street may be desirable under certain circumstances such as minimizing conflicts on high frequency transit corridors or along corridors with a higher number of intersections or driveways on one side of the street (such as along a waterfront). This design does, however, create some challenges for roadway user expectancy at intersections and driveways. Additionally, the design limits intersection design options.

Figure 12



Design Guidance

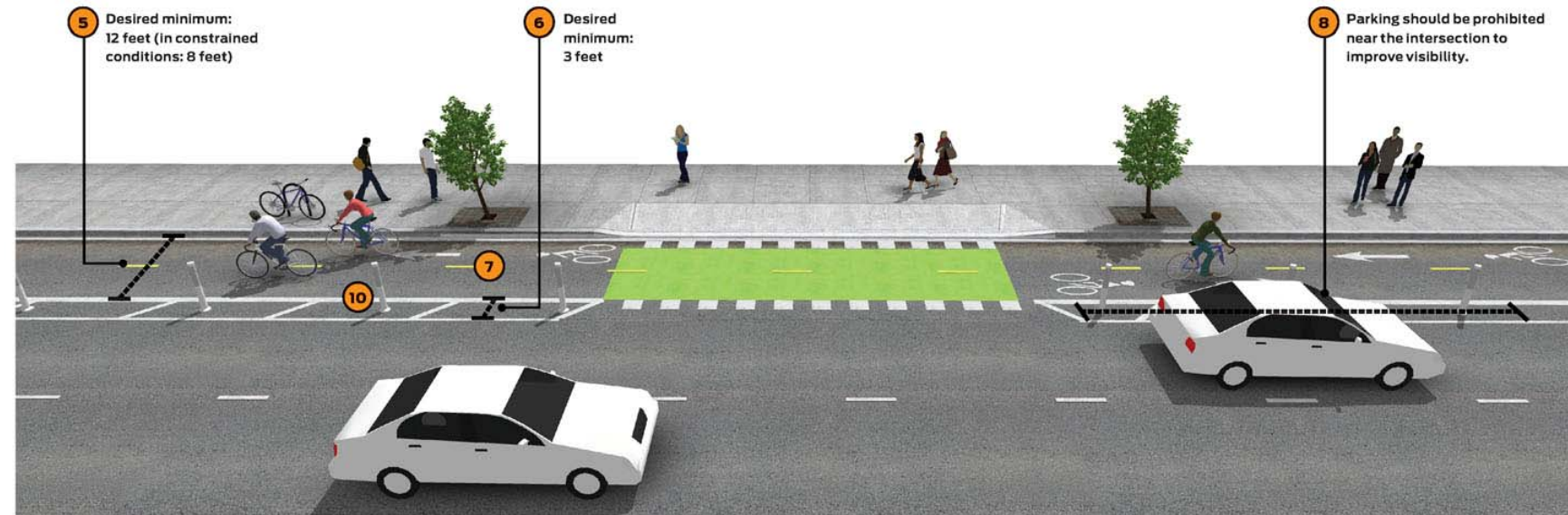
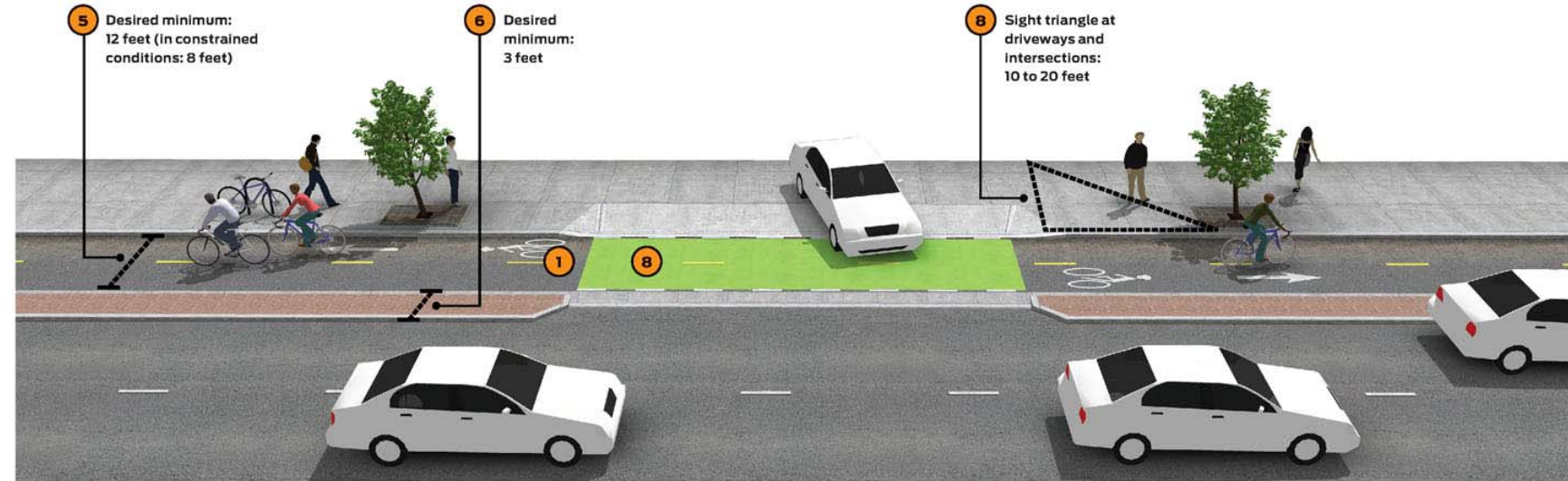
Two-Way Cycle Track

Required Features

- 1 Bicycle lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed at the beginning of a cycle track and at periodic intervals along the facility to define the bike lane direction and designate that portion of the street for preferential use by bicyclists.
- 2 If configured on a one-way street, a "ONE WAY" sign (MUTCD R6-1, R6-2) with "Except Bikes" plaque shall be posted along the facility and at intersecting streets, alleys, and driveways informing motorists to expect two-way traffic.
- 3 A "DO NOT ENTER" sign (MUTCD R5-1) with "EXCEPT BIKES" plaque shall be posted along the facility to only permit use by bicycles.
- 4 Intersection traffic controls along the street (e.g., stop signs and traffic signals) shall also be installed and oriented toward bicyclists traveling in the contra-flow direction.

Recommended Features

- 5 The desirable two-way cycle track width is 12 feet. Minimum width in constrained locations is 8 feet.⁴²
- 6 When protected by a parking lane, 3 feet is the desired width for a parking buffer to allow for passenger loading and to prevent dooring collisions.⁴³
- 7 A dashed yellow centerline should be used to separate two-way bicycle traffic and to help distinguish the cycle track from any adjacent pedestrian area.
- 8 Driveways and minor street crossings are a unique challenge to cycle track design. A review of existing facilities and design practice has shown that the following guidance may improve safety at crossings of driveways and minor intersections:
 - If the cycle track is parking protected, parking should be prohibited near the intersection to improve visibility. The desirable no-parking area is 30 feet from each side of the crossing.⁴⁴
 - For motor vehicles attempting to cross the cycle track from the side street or driveway, street and sidewalk furnishings and/or other features should accommodate a sight triangle of 20 feet to the cycle track from minor street crossings, and 10 feet from driveway crossing.
 - Color, yield lines, and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic.⁴⁵



- 9 Two-stage turn queue boxes should be provided to assist in making turns from the cycle track facility.
- 10 Tubular markers may be used to protect the cycle track from the adjacent travel lane. The

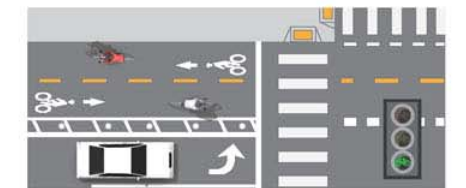
Optional Features

- 10 Tubular markers may be used to protect the cycle track from the adjacent travel lane. The

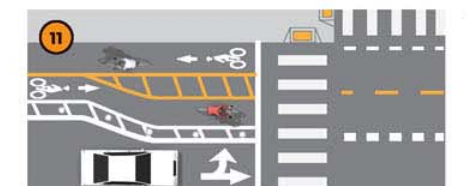
- 11 Cycle tracks may be more closely to the sidewalk on minor intersections to put bicyclists clearly in view of motorists.⁴⁸
- 12 A raised median, or curb extension configured in the cycle area to accommodate Cyclists should yield to crossing the roadway to reach the bus stop. Cycle tracks may be on the left side of a one-way road to avoid conflicts at transit stops.
- 13 May be configured to be the same color as the marking they supplement.

Intersection Configuration Alternatives

See the Cycle Track Intersection Approach and Bicycle Signals section details on design strategies at intersections.



Bicycle Signal
A dedicated bicycle signal eliminates the conflict between motor vehicles and bicyclists.



Bend-in-Visibility
Using a raised median or curb extension narrows the cycle track at the intersection to improve visibility for bicyclists.




U.S. Department
of Transportation
**Federal Highway
Administration**

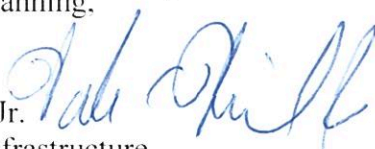
Memorandum


SENT BY ELECTRONIC MAIL

Subject: **GUIDANCE:** Bicycle and Pedestrian Facility Design Flexibility Date: August 20, 2013

From: Gloria M. Shepherd 
Associate Administrator for Planning,
Environment and Realty

In Reply Refer To:
HEPH-10

Walter C. (Butch) Waidelich, Jr. 
Associate Administrator for Infrastructure

Jeffrey A. Lindley 
Associate Administrator for Operations

Tony T. Furst 
Associate Administrator for Safety

To: Division Administrators
cc: Directors of Field Services

This memorandum expresses the Federal Highway Administration's (FHWA) support for taking a flexible approach to bicycle and pedestrian facility design. The American Association of State Highway and Transportation Officials (AASHTO) bicycle and pedestrian design guides are the primary national resources for planning, designing, and operating bicycle and pedestrian facilities. The National Association of City Transportation Officials (NACTO) [Urban Bikeway Design Guide](#) and the Institute of Transportation Engineers (ITE) [Designing Urban Walkable Thoroughfares](#) guide builds upon the flexibilities provided in the AASHTO guides, which can help communities plan and design safe and convenient facilities for pedestrian and bicyclists. FHWA supports the use of these resources to further develop nonmotorized transportation networks, particularly in urban areas.

AASHTO Guides

AASHTO publishes two guides that address pedestrian and bicycle facilities:

- [Guide for the Planning, Design, and Operation of Pedestrian Facilities](#), July 2004, (AASHTO Pedestrian Guide) provides guidelines for the planning, design, operation, and maintenance of pedestrian facilities, including signals and signing. The guide recommends methods for accommodating pedestrians, which vary among roadway and facility types, and addresses the effects of land use planning and site design on pedestrian mobility.
- [Guide for the Development of Bicycle Facilities 2012, Fourth Edition](#) (AASHTO Bike Guide) provides detailed planning and design guidelines on how to accommodate bicycle travel and operation in most riding environments. It covers the planning, design, operation,

maintenance, and safety of on-road facilities, shared use paths, and parking facilities. Flexibility is provided through ranges in design values to encourage facilities that are sensitive to local context and incorporate the needs of bicyclists, pedestrians, and motorists.

NACTO Guide

NACTO first released the [Urban Bikeway Design Guide](#) (NACTO Guide) in 2010 to address more recently developed bicycle design treatments and techniques. It provides options that can help create “complete streets” that better accommodate bicyclists. While not directly referenced in the AASHTO Bike Guide, many of the treatments in the NACTO Guide are compatible with the AASHTO Bike Guide and demonstrate new and innovative solutions for the varied urban settings across the country.

The vast majority of treatments illustrated in the NACTO Guide are either allowed or not precluded by the Manual on Uniform Traffic Control Devices (MUTCD). In addition, non-compliant traffic control devices may be piloted through the MUTCD experimentation process. That process is described in [Section 1A.10](#) of the MUTCD and a table on the FHWA's bicycle and pedestrian design guidance Web page is regularly updated ([FHWA Bicycle and Pedestrian Design Guidance](#)), and explains what bicycle facilities, signs, and markings are allowed in accordance with the MUTCD. Other elements of the NACTO Guide's new and revised provisions will be considered in the rulemaking cycle for the next edition of the MUTCD.

ITE Guide

In 2010, FHWA supported production of the ITE Guide [Designing Walkable Urban Thoroughfares: A Context Sensitive Approach](#). This guide is useful in gaining an understanding of the flexibility that is inherent in the AASHTO “Green Book,” [A Policy on Geometric Design of Highways and Streets](#). The chapters emphasize thoroughfares in “walkable communities” – compact, pedestrian-scaled villages, neighborhoods, town centers, urban centers, urban cores and other areas where walking, bicycling and transit are encouraged. It describes the relationship, compatibility and trade-offs that may be appropriate when balancing the needs of all users, adjoining land uses, environment and community interests when making decisions in the project development process.

Summary

FHWA encourages agencies to appropriately use these guides and other resources to help fulfill the aims of the 2010 [US DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations](#) – “...DOT encourages transportation agencies to go beyond the minimum requirements, and proactively provide convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities, and utilize universal design characteristics when appropriate.”

Accompanying this memo are the latest versions of the: 1) AASHTO Bike Guide, 2) NACTO Bike Guide; and 3) the ITE [Designing Walkable Urban Thoroughfares](#) Guide.

Attachment 1 – Example 1 & 2

Example 1: Michigan DOT's Buffered Bike Lanes

One of the innovative bicycle facilities discussed in the NACTO *Urban Bikeway Design Guide* is buffered bike lanes. Buffered bike lanes create more space between motor vehicles and bicycles by delineating extra space between the bike lane and parked cars and/or a motor vehicle lane. Buffered bike lanes can be implemented if the pavement markings and channelizing devices are compliant with the MUTCD (see [Bicycle Facilities and the Manual on Uniform Traffic Control Devices](#)). Michigan DOT developed a video that describes their efforts to install buffered bike lanes in Oakland County (see [Northwestern Highway Bicycle Lane: A Safer Place to Ride](#)). Michigan DOT also developed a brochure that explains buffered bike lanes to the public (see [What Every Michigan Driver Should Know About Bike Lanes](#)).

Example 2: Missoula's Colored Bike Lanes

MUTCD experimentation is a methodology that analyzes innovative traffic control devices through field deployment for the purpose of testing or evaluating its application or manner of use. An approved request to experiment numbered and titled as Official Ruling “[3\(09\)-3\(E\) – Colored Bike Lanes – Missoula, MT](#)” illustrates a successful experiment. The City of Missoula submitted a request to experiment in January 2010 in accordance with all Items in Paragraph 11 of [Section 1A.10](#) in the 2009 MUTCD.

The experiment was conducted for one year and revealed that approximately 70 percent of motorists noticed the color conspicuity enhancement to the bike lane. This was interpreted as an increased awareness by motorists of the potential presence of bicyclists at intersections where those motorists would be making a right turn.

The City also reported ancillary findings that were not anticipated in the original Evaluation Plan of the request to experiment. This included psychological discomfort of the cyclist with the lateral locations of the colored bicycle lane with respect to door zones in parallel parking corridors. In addition, the experiment revealed an unintended design weakness where colored bike lanes that achieve high compliance of little or no occupation of motorized vehicles can also be attractive to pedestrians who wish to use them to facilitate their travel in lieu of crowded sidewalks or to patronize parking meters. For these reasons, a successful experiment can reveal unanticipated findings, further demonstrating the value of official experimentation.

This particular experiment provided two conclusions that supported FHWA's decision to issue [Interim Approval](#) for green colored pavement for bicycle lanes in April 2011.

For more information see <http://mutcd.fhwa.dot.gov/reqdetails.asp?id=1135>.



Attachment 2

FHWA Bicycle and Pedestrian Staff Resources

Human Environment — Livability and Bicycle and Pedestrian Programs

- Shana Baker, Livability Team Leader, 202-366-4649, shana.baker@dot.gov: Livability, Context Sensitive Solutions
- Christopher Douwes, Trails and Enhancements Program Manager 202-366-5013, christopher.douwes@dot.gov: Transportation Alternatives Program/Enhancement Activities: Recreational Trails Program related activities; Bicycle and pedestrian policy and guidance
- Daniel Goodman, Transportation Specialist, 202-366-9064, daniel.goodman@dot.gov: Bicycle and pedestrian activities; Livability
- Wesley Blount, Program Manager, 202-366-0799, wesley.blount@dot.gov: Safe Routes to School, Discretionary programs

Planning

- Brian Gardner, 202-366-4061, brian.gardner@dot.gov: Modeling
- Jeremy Raw, 202-366-0986, jeremy.raw@dot.gov: Modeling
- Harlan Miller, 202-366-0847, harlan.miller@dot.gov: Planning Oversight
- Kenneth Petty, 202-366-6654 kenneth.petty@dot.gov: Planning Capacity Building

Policy

- Steven Jessberger, 202-366-5052, steven.jessberger@dot.gov, Traffic Monitoring Guide

Infrastructure — Design (including accessible design)

- Michael Matzke, 202-366-4658, michael.matzke@dot.gov

Resource Center— Design (including accessible design)

- Brooke Struve, Safety and Design Team, 720-963-3270, brooke.struve@dot.gov
- Peter Eun, Safety and Design Team, 360-753-9551, peter.eun@dot.gov

Operations — Manual on Uniform Traffic Control Devices

- Kevin Dunn, Transportation Specialist, 202-366-6054, kevin.dunn@dot.gov: MUTCD Team

Pedestrian and Bicycle Safety

- Gabe Rousseau, Safety Operations Team Leader, 202-366-8044, gabe.rousseau@dot.gov: Bicycle and pedestrian safety programs
- Tamara Redmon, Pedestrian Safety Program Manager, 202-366-4077, tamara.redmon@dot.gov: Pedestrian safety

Pedestrian and Bicyclist Safety Research

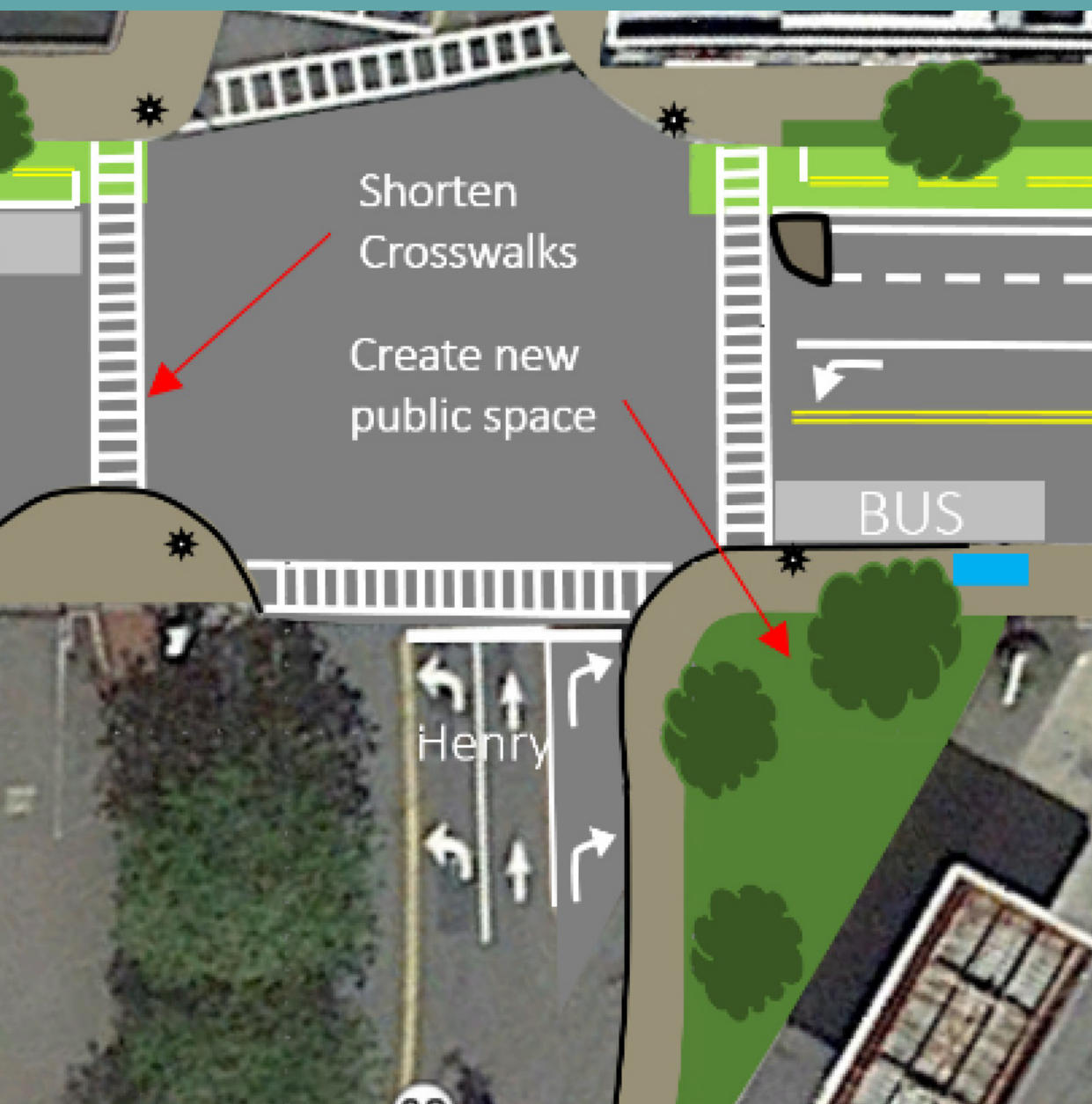
- Ann Do, 202-493-3319, ann.do@dot.gov
- Jim Shurbutt, 202-493-3420, jimmy.shurbutt@dot.gov

Civil Rights — Accessibility Policy and Compliance

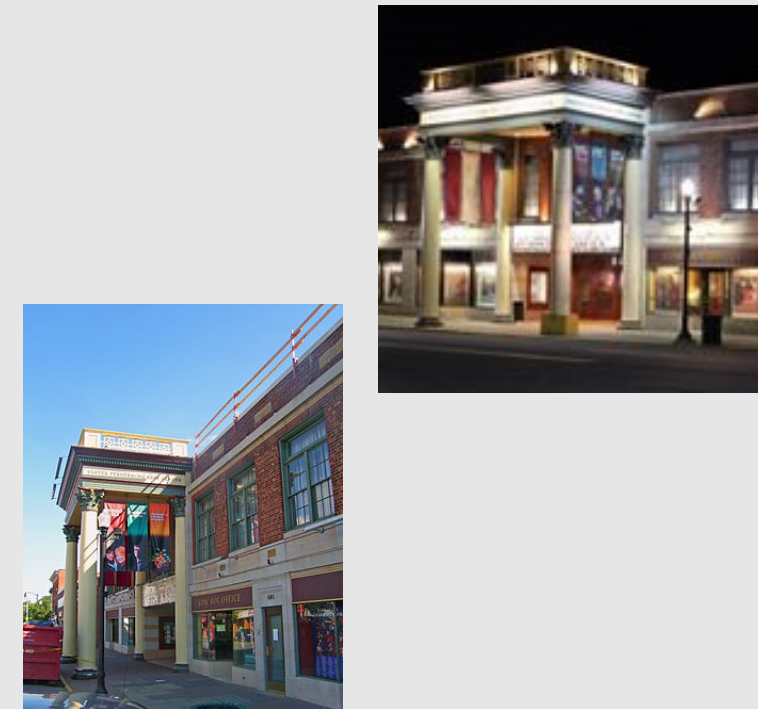
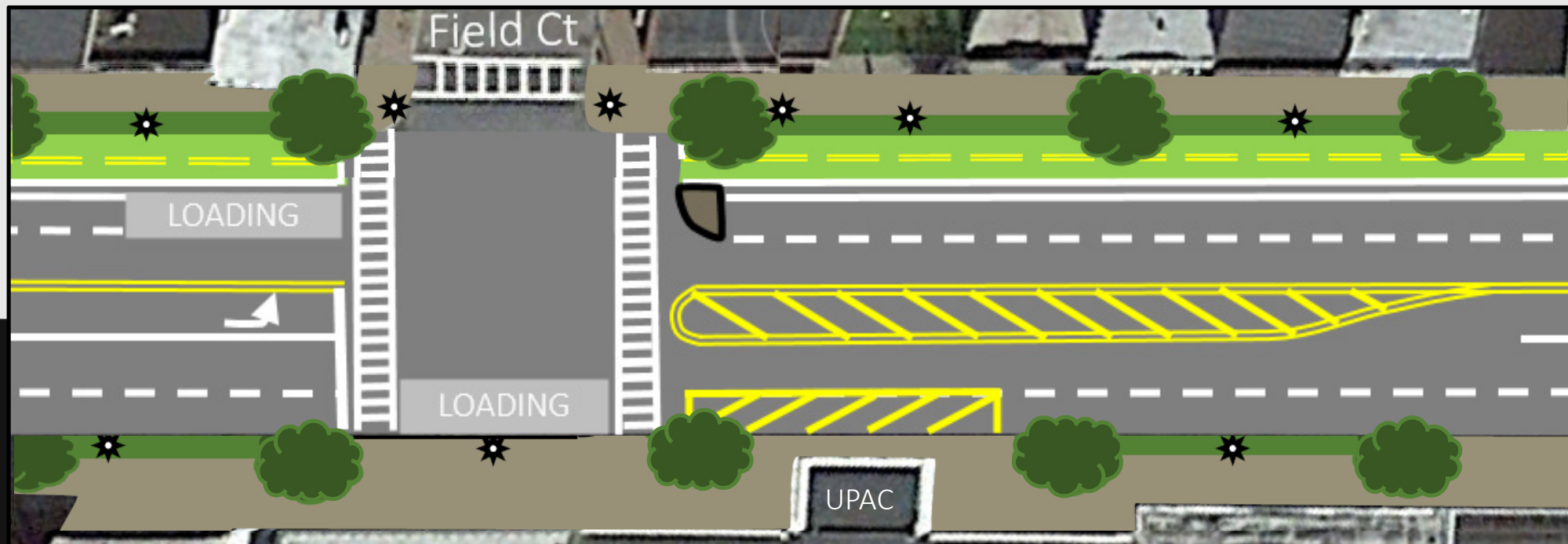
- Patrick Gomez, Resource Center Civil Rights Team, 720-963-3269, patrick.gomez@dot.gov
- Candace Groudine, Director of External Civil Rights Programs, 202-366-4634, candace.groudine@dot.gov

Placemaking Improvements

Broadway at Henry Street and Pine Grove Avenue



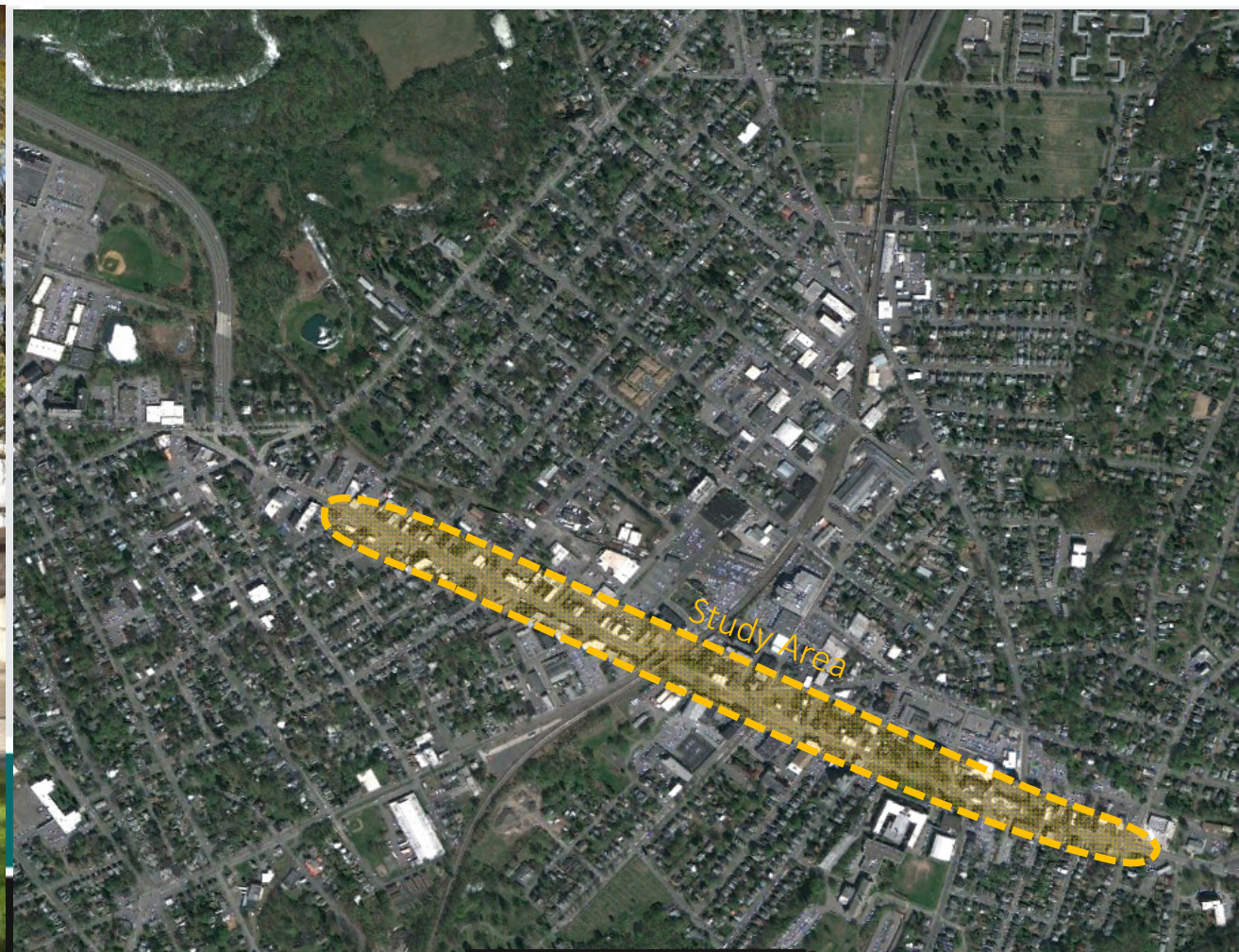
Placemaking Improvements Broadway near UPAC



Presented by:



Building a Better Broadway Draft Plan Cost Estimate



Presented by:



Building a Better
Broadway



Building a Better Broadway

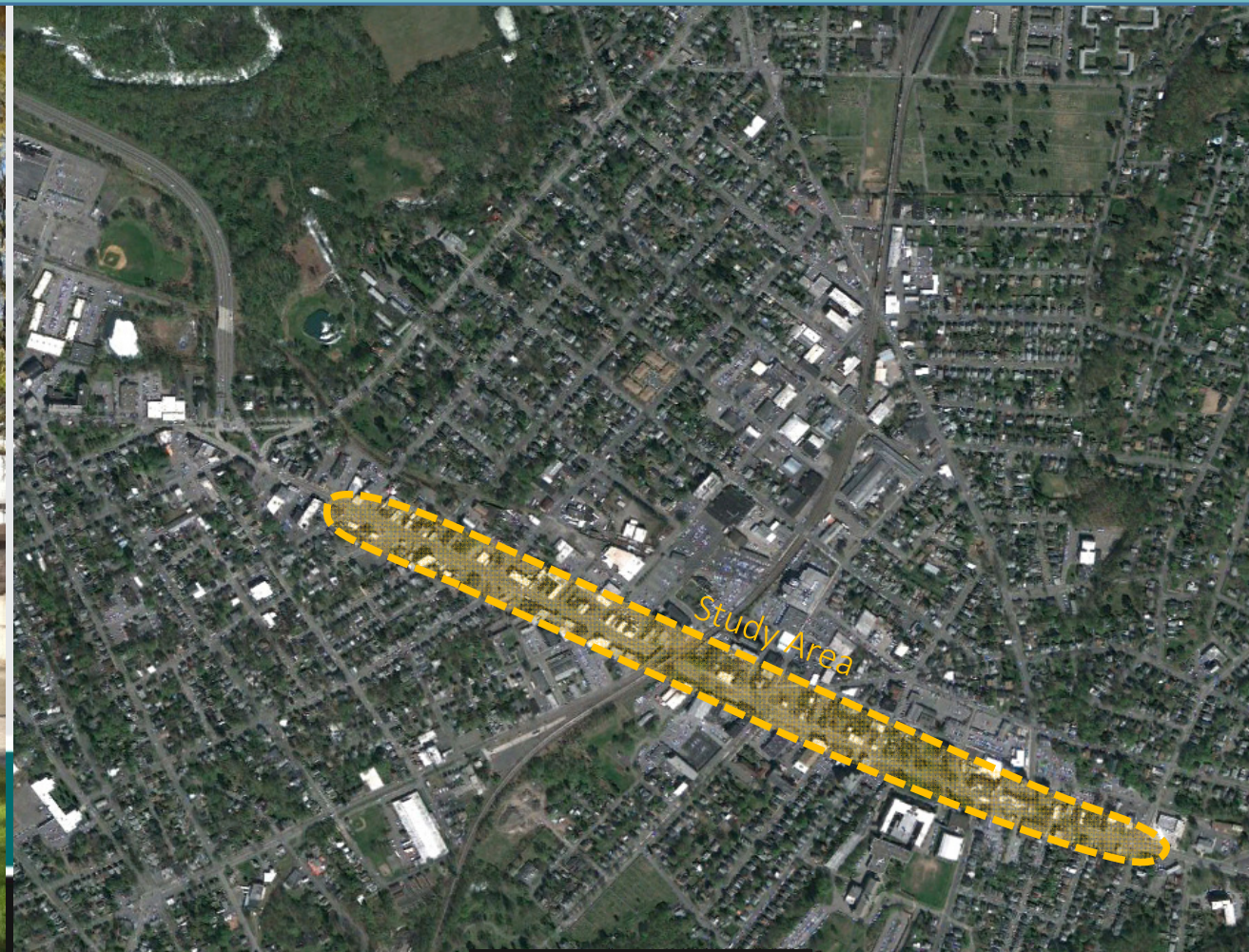
Broadway Corridor Conceptual Design Plan, Kingston, NY

Plan Component	Estimated Cost ¹	Funding Source	Timeline
Phase 1 Construction Plan Development (Elmendorf Street to Foxhall Avenue)	\$ 250,000.00	Grant Funding	Year 1
Pedestrian Study at Franklin Street	\$ 20,000	Outside Source	Year 1
Parking Study and Parking Management Plan	\$ 25,000	Outside Source	Year 1
Determine ROW Acquisition Needs, if any	\$ 15,000	Grant Funding	Year 1
Modify Turning Radii at Key intersections (Hoffman and Andrew Streets)	\$ 40,000	Grant Funding	Year 2
Prohibit Right-turns on Red (Liberty to O'Reilly Streets)	\$ 6,500	Grant Funding	Year 2
Replace Substandard Street Signs (Liberty Street to Foxhall Avenue)	\$ 26,000	Grant Funding	Year 2
Bus Stop Infrastructure (Liberty Street to Foxhall Avenue) (Bus Fleet is considered a separate project cost)	\$ 175,000	Grant Funding	Year 2
New sidewalk pavement and furniture (Liberty Street to Foxhall Avenue)	\$ 1,250,000	Grant Funding	Year 2
Trees and Landscaping (Liberty Street to Foxhall Avenue)	\$ 80,000	Grant Funding	Year 2
New Light Fixtures (Liberty Street to Foxhall Avenue)	\$ 600,000	Grant Funding	Year 2
Loading Zones (Liberty Street to Foxhall Avenue)	\$ 0		Year 2
Sidewalk Bumpouts (Liberty Street to Foxhall Avenue)	\$ 130,000	Grant Funding	Year 2
Placemaking at Henry Street, Pine Grove Avenue and Grand Street	\$ 125,000	Grant Funding	Year 2
Upgrade curb ramps to ADA requirements (Liberty Street to Foxhall Avenue)	\$ 40,000	Grant Funding	Year 2
Upgrade existing midblock pedestrian crossings (Liberty Street to Foxhall Avenue)	\$ 17,000	Grant Funding	Year 2
Upgrade Existing Traffic Signals (Liberty Street to Foxhall Avenue)	\$ 1,200,000	Grant Funding	Year 2
Separated Bike Lanes (Liberty to Pine Grove - Street Improvements to Foxhall) <i>or</i> Separated Bike Lanes (Liberty to O'Reilly Street - Street Improvements to Foxhall)	\$ 415,000 \$ 418,000	Grant Funding	Year 2
Sharrows and Signs (Elmendorf, Manor, Prince, Hasbrouck, Foxhall & Jansen) – <i>or</i> – Sharrows and Signs (Elmendorf, Manor, O'Reilly, Hasbrouck, Foxhall & Jansen)	\$ 40,000.00 \$ 40,000.00	Outside Source	Year 2
Phase 2 Construction Plan Development (Foxhall Avenue to KP Rail Trail)	\$ 150,000.00	Outside Source	Year 2
Modify Turning Radii at Key intersections (Staples Street)	\$ 20,000	Outside Source	Year 3
Prohibit Right-turns on Red (E/W Chester Street)	\$ 1,500	Outside Source	Year 3
Replace Substandard Street Signs (Foxhall Avenue to E/W Chester Street)	\$ 4,000	Outside Source	Year 3
Bus Stop Infrastructure (Foxhall Avenue to E/W Chester Street) (Bus Fleet is considered a separate project cost)	\$ 25,000	Outside Source	Year 3
New sidewalk pavement and furniture (Foxhall Avenue to E/W Chester Street)	\$ 250,000	Outside Source	Year 3
Trees and Landscaping (Foxhall Avenue to KP Rail Trail)	\$ 20,000	Outside Source	Year 3
New Light Fixtures (Foxhall Avenue to KP Rail Trail)	\$ 200,000	Outside Source	Year 3
Loading Zones (Foxhall Avenue to E/W Chester Street)	\$ -	Outside Source	Year 3
Sidewalk Bumpouts (Foxhall Avenue to E/W Chester Street)	\$ 20,000	Outside Source	Year 3
Upgrade curb ramps to ADA requirements (Foxhall Avenue to KP Rail Trail)	\$ 10,000	Outside Source	Year 3
Upgrade existing midblock pedestrian crossings (Foxhall Avenue to E/W Chester St)	\$ 3,000	Outside Source	Year 3
Upgrade Existing Traffic Signals (E/W Chester Street)	\$ 200,000	Outside Source	Year 3
Separated Bike Lanes (Pine Grove Avenue to Kingston Point Rail Trail) – <i>or</i> – Separated Bike Lanes (O'Reilly Street to Kingston Point Rail Trail)	\$ 124,000 \$ 121,000	Outside Source	TBD
Total	\$ 5,482,000		

1. Does not include construction inspection or Right-of-Way costs. Little or no ROW acquisition is expected

Building a Better Broadway

Bike Lane Alternatives Considered



Presented by:



Building a Better
Broadway

Broadway
Liberty to Henry

BUS

Conventional Bike Lanes
Code Compliant*
Striping \$9,000
* 2' buffer acceptable
2' Widening for 3' buffer
\$145,000 – one side
\$265,000 – both sides

BUS

8'
2'
5'
10'
10'
10'
5'
2'
8'

BUS

Conventional Bike Lanes
Code Compliant
1' widening each side
\$265,000
2' widening one side
\$145,000

BUS

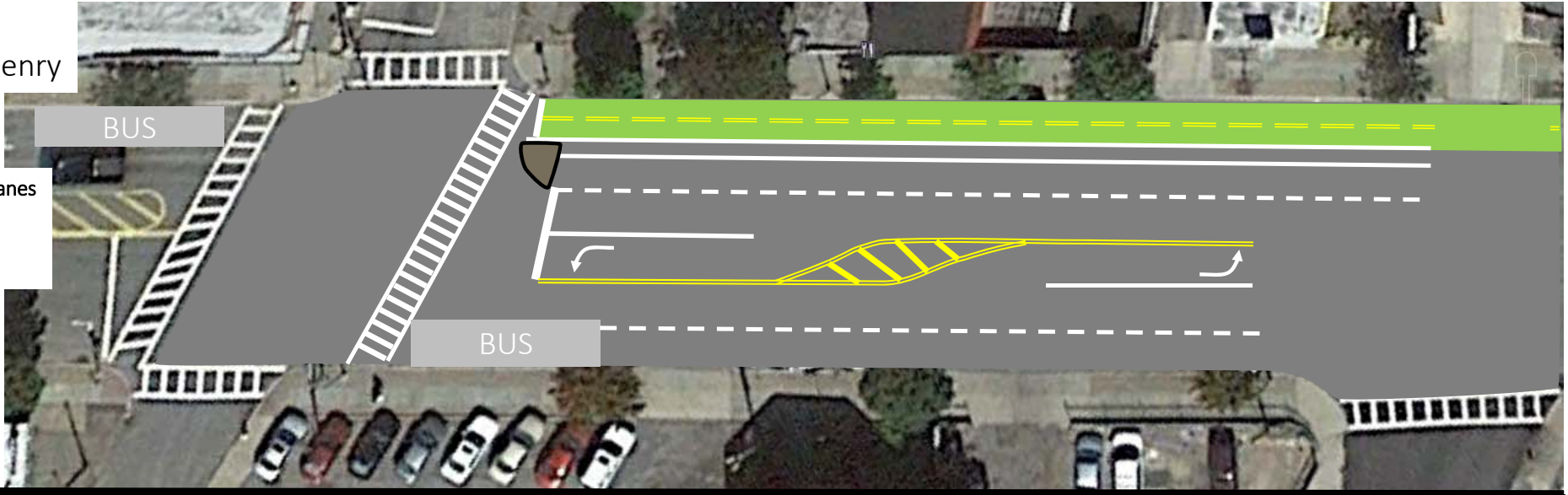
5'
3'
8'
10'
10'
10'
8'
3'
5'

No Buffer Required, 3' Buffer Preferred



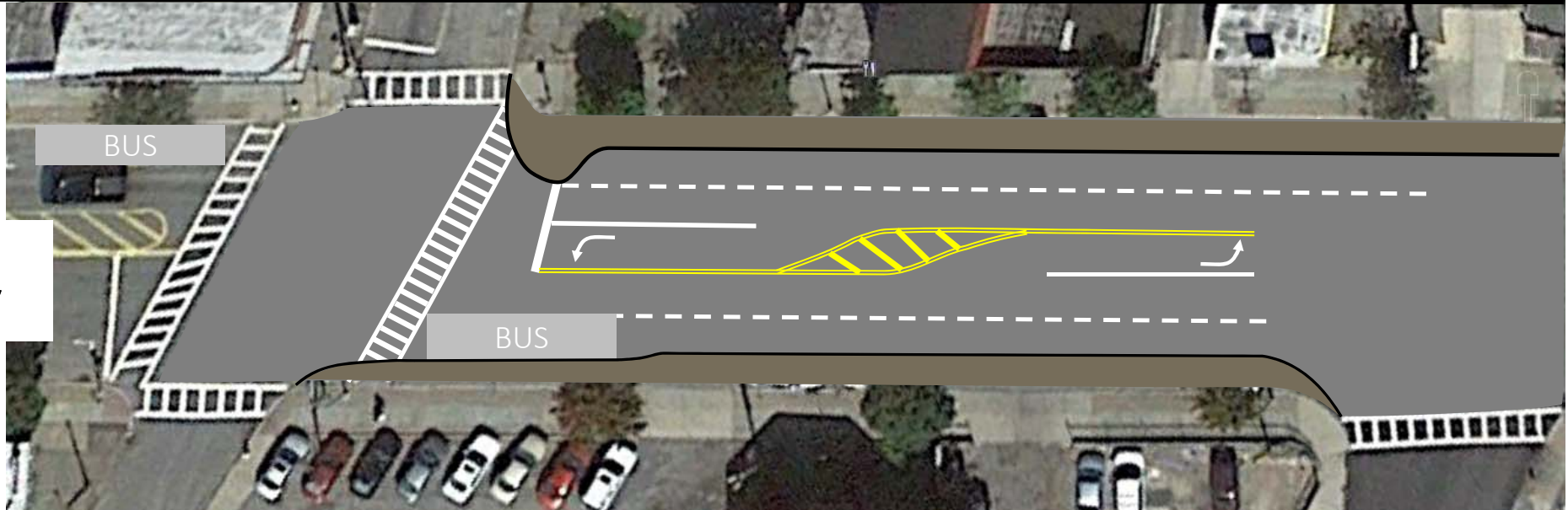
Broadway
Liberty to Henry

BUS
Separated Bike Lanes
Code Compliant
Striping
\$19,000



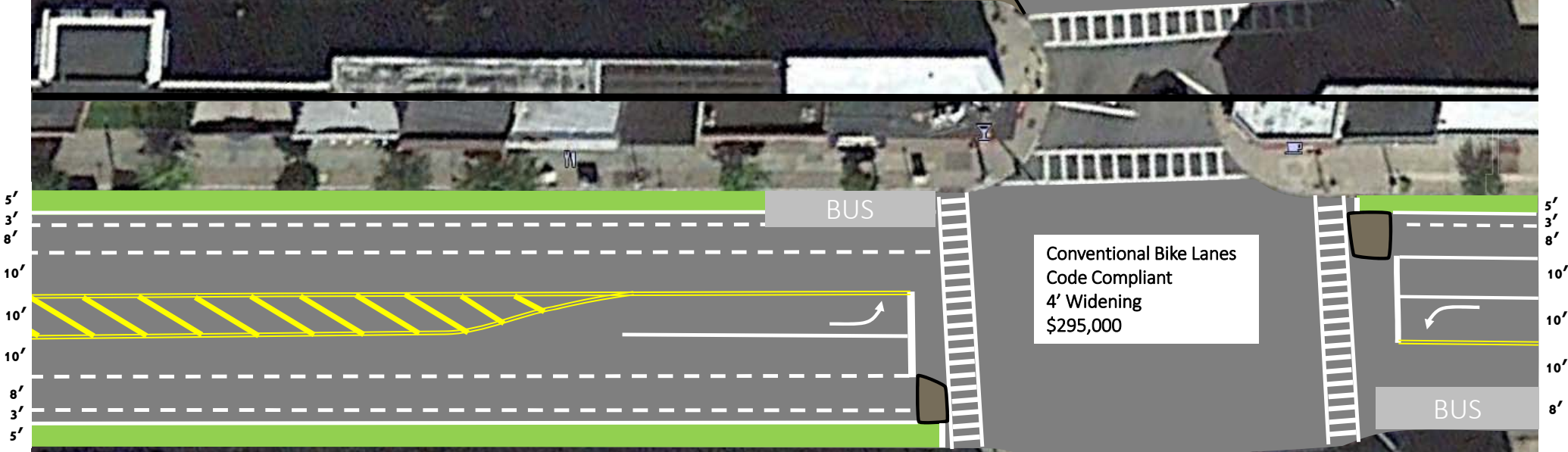
5'
5'
4'
8'
10'
10'
10'

BUS
Wider Sidewalk
Code Compliant
Narrow Roadway
\$138,000



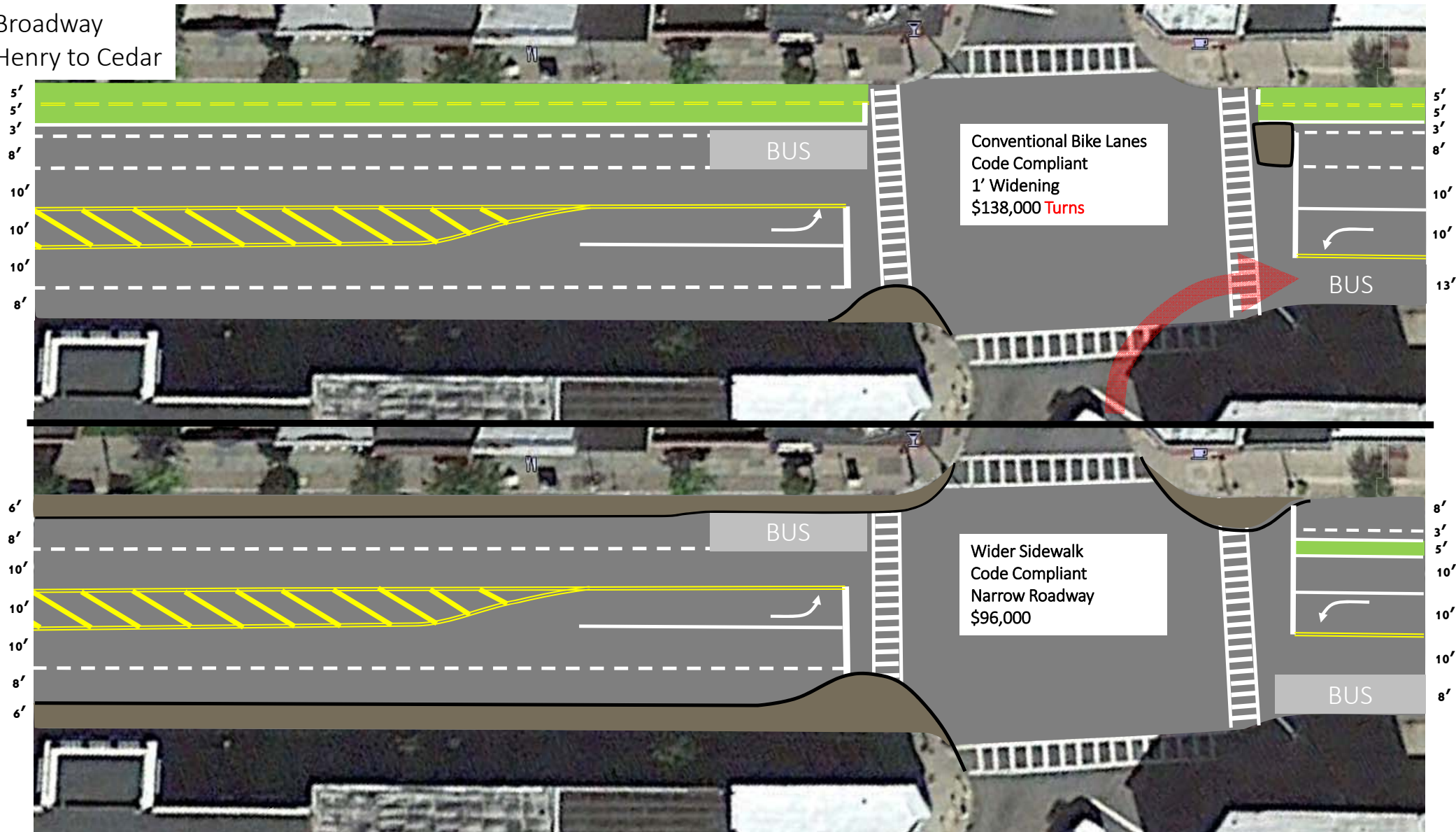
7'
8'
10'
10'
10'
8'
7'

Broadway
Henry to Cedar

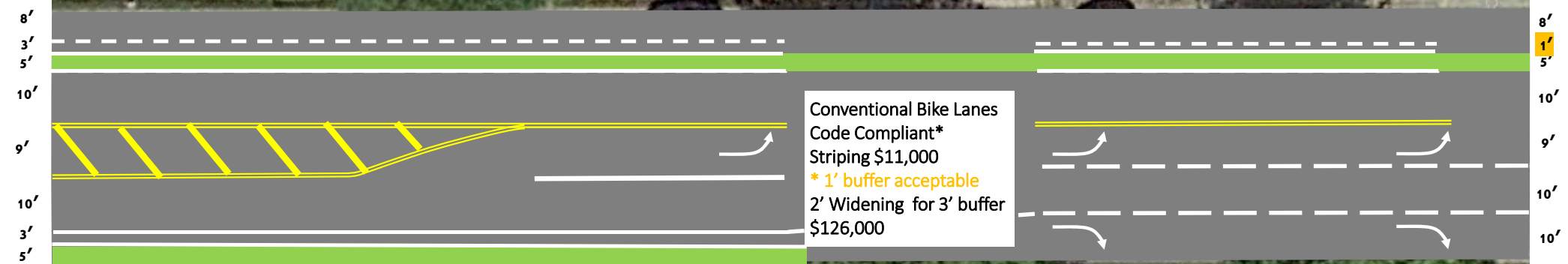


No Buffer Required, 3' Buffer Preferred

Broadway
Henry to Cedar

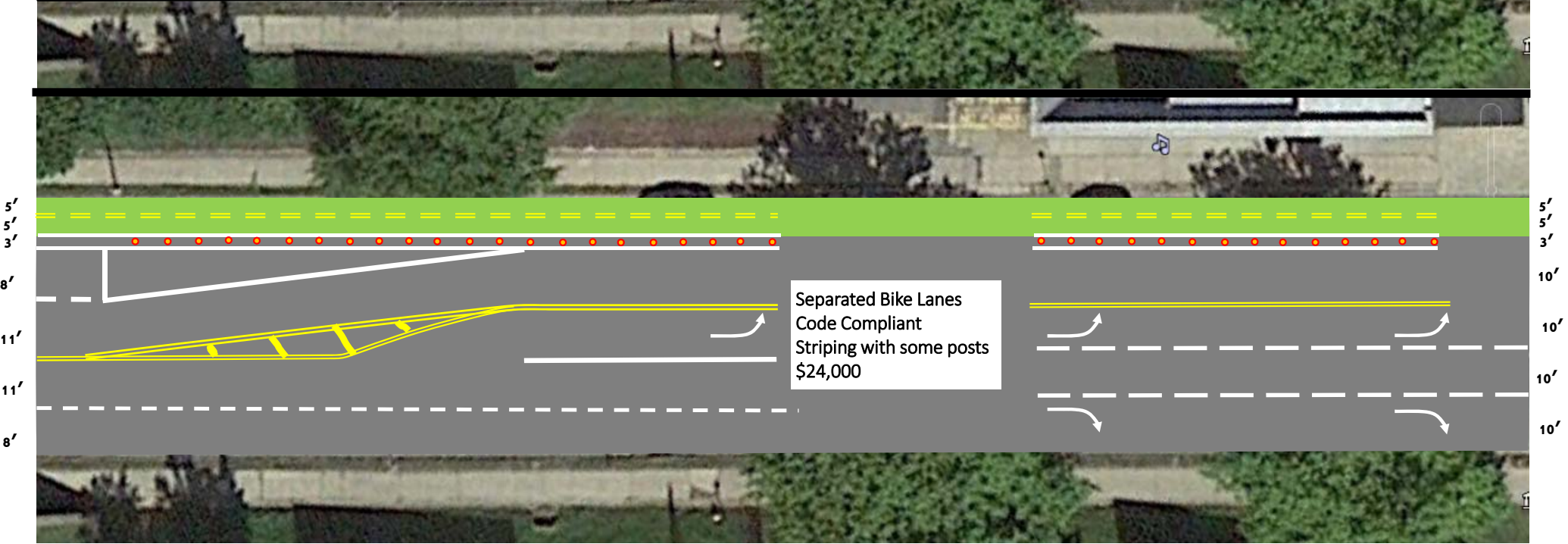
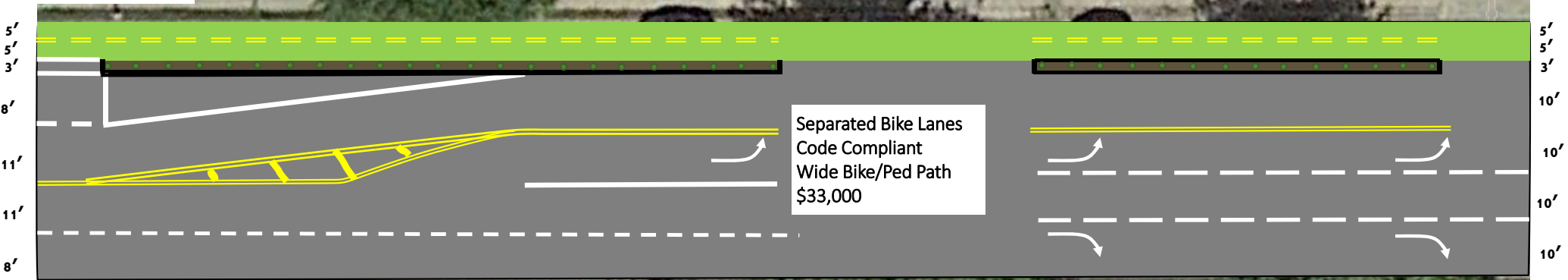


Broadway
Cedar to Grand



No Buffer Required, 3' Buffer Preferred

Broadway
Cedar to Grand



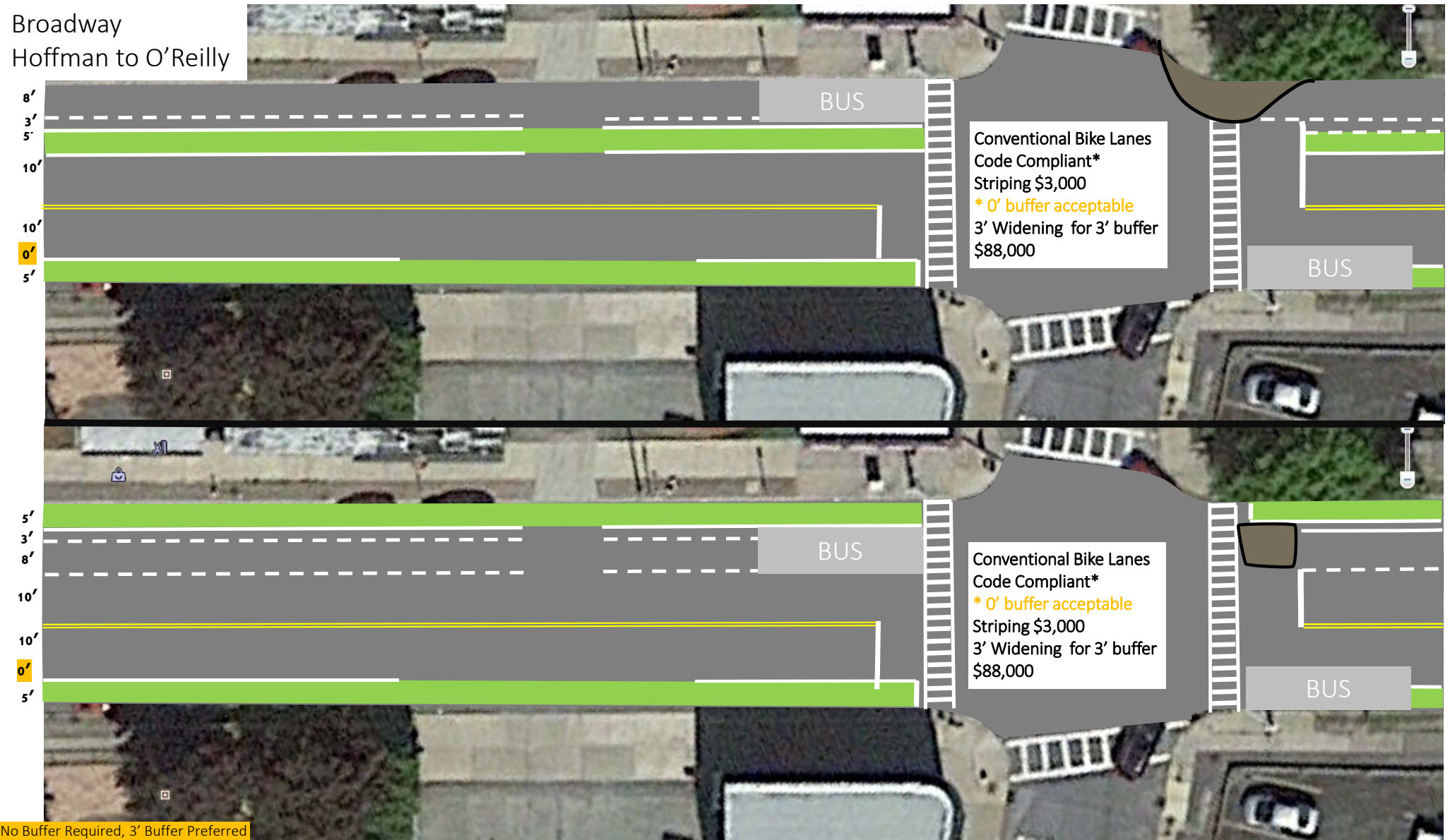
Broadway
Grand to Hoffman



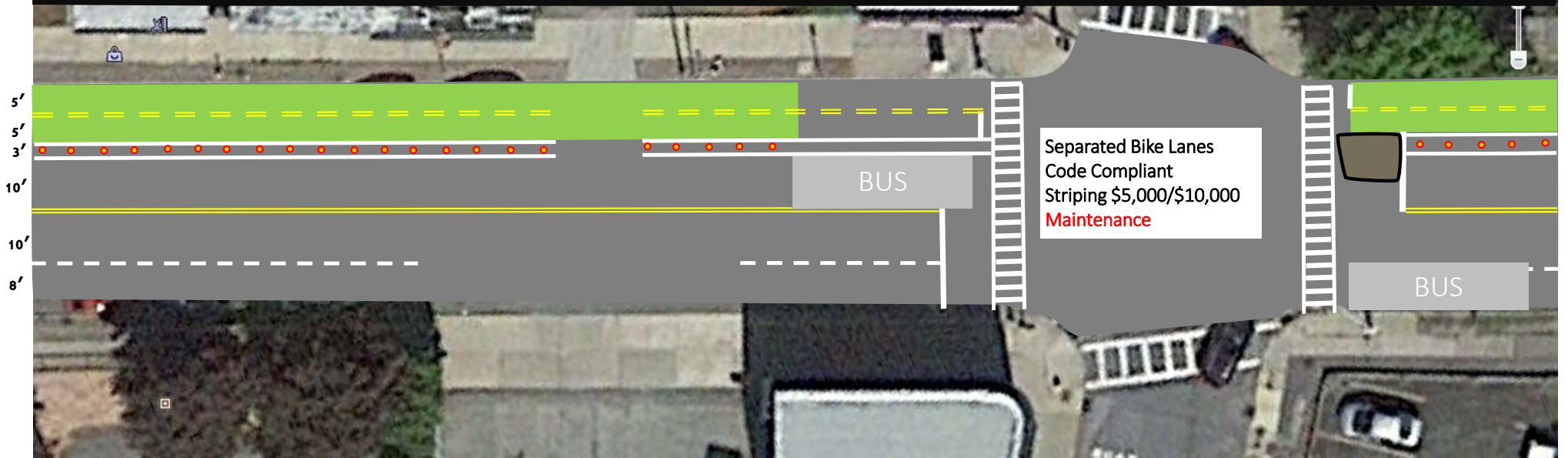
Broadway
Grand to Hoffman



Broadway
Hoffman to O'Reilly



Broadway
Hoffman to O'Reilly



Broadway
O'Reilly to Foxhall



Broadway
O'Reilly to Foxhall



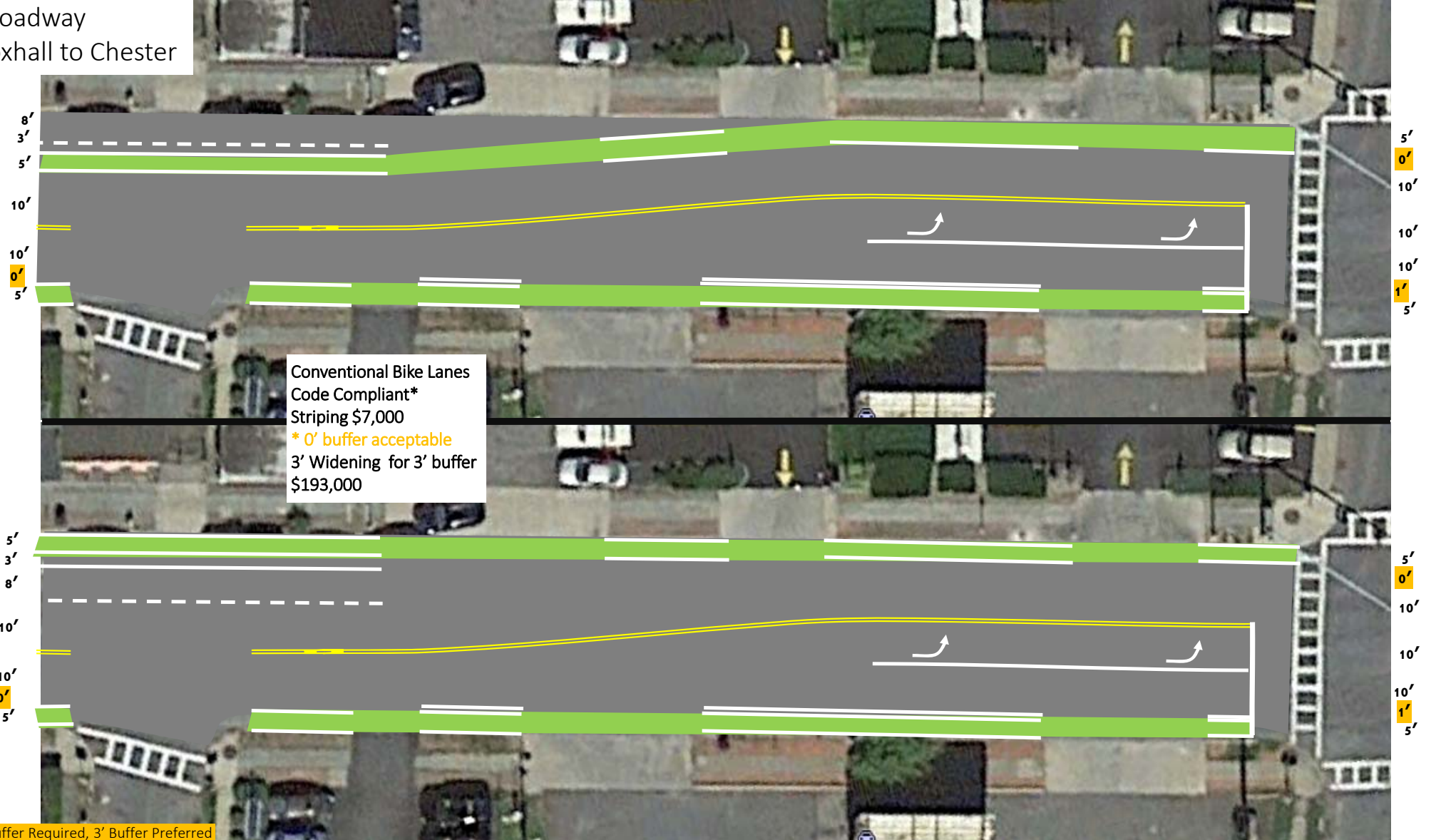
Broadway
O'Reilly to Foxhall



Broadway
O'Reilly to Foxhall



Broadway
Foxhall to Chester

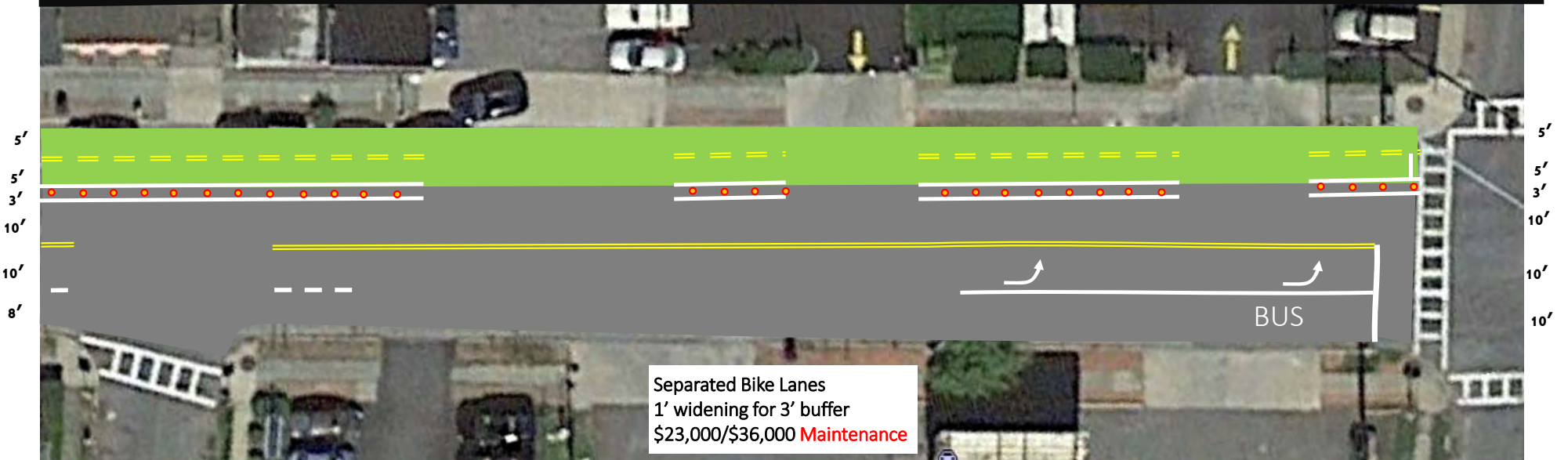


Conventional Bike Lanes
Code Compliant*
Striping \$7,000
* 0' buffer acceptable
3' Widening for 3' buffer
\$193,000

No Buffer Required, 3' Buffer Preferred

Broadway
Foxhall to Chester

Separated Bike Lanes
1' widening for 3' buffer
\$17,000 Turns



Separated Bike Lanes
1' widening for 3' buffer
\$23,000/\$36,000 Maintenance

Chester
Broadway to Jansen



Conventional Bike Lanes
Code Compliant*
Striping \$3,000
* 0' buffer acceptable

5'
10'
10'
5'

Conventional Bike Lanes
3' Widening for 2x1.5' buffer
\$88,000

5'
1.5'
10'
1.5'
5'

No Buffer Required, 3' Buffer Preferred

Chester
Broadway to Jansen



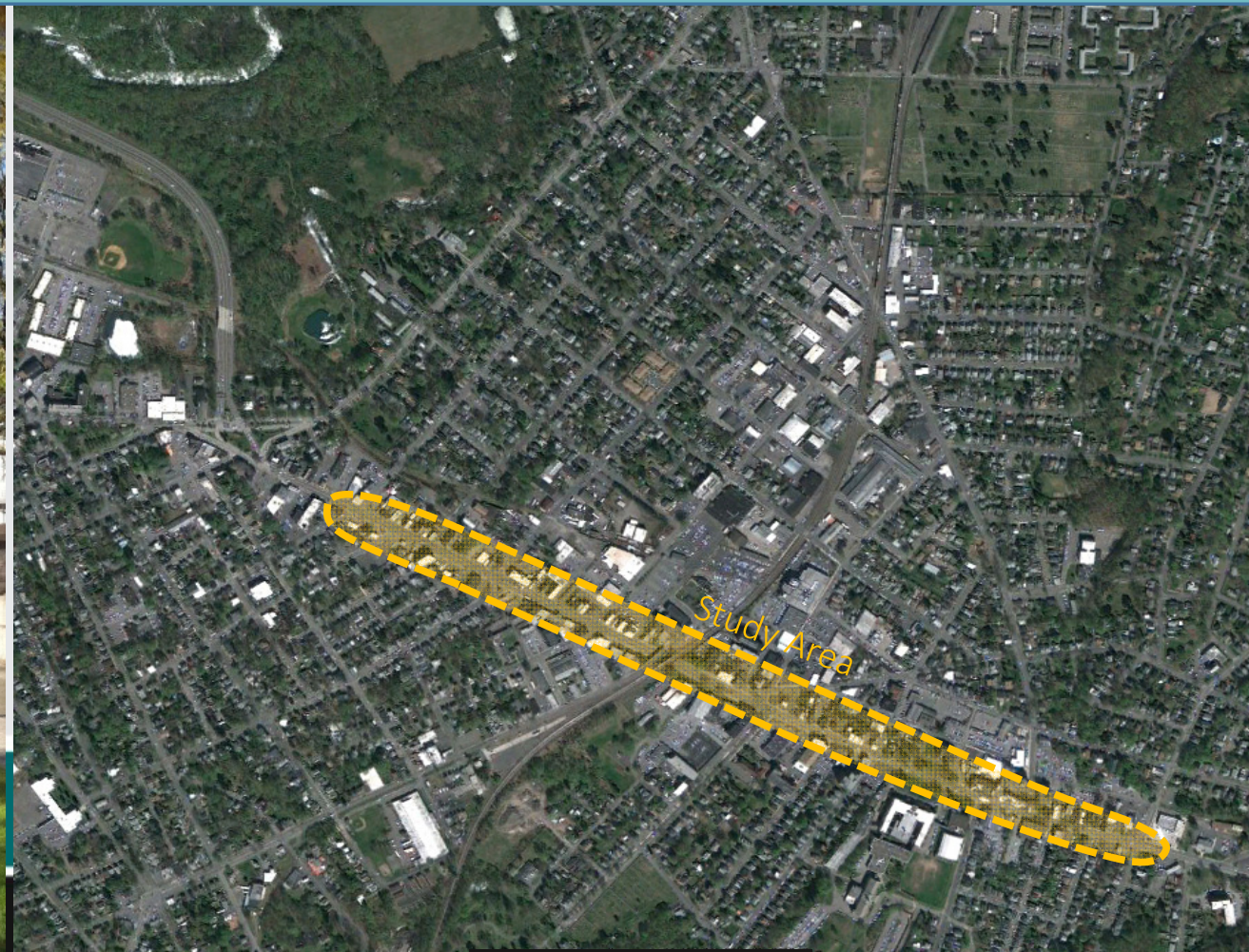
Conventional Bike Lanes
3'' widening to provide
2 x 1.5' buffers \$88,000

Separated Bike Lanes
3'' widening for 3' buffer
\$100,000/\$105,000
Maintenance, Turns

No Buffer Required, 3' Buffer Preferred

Building a Better Broadway

Draft Plan Synchro Analyses Results



Presented by:



Building a Better
Broadway

Network Totals

Number of Intersections	25
Total Delay / Veh (s/v)	11
Stops / Veh	0.30
Average Speed (mph)	11
Total Travel Time (hr)	203
Distance Traveled (mi)	2186
Fuel Consumed (gal)	233
Fuel Economy (mpg)	9.4
CO Emissions (kg)	16.28
NOx Emissions (kg)	3.17
VOC Emissions (kg)	3.77
Performance Index	152.0

Lanes and Geometrics

Draft Plan PM Pk Hr with 25% growth

2: W. Chester St/E. Chester St & Broadway

7/18/2015

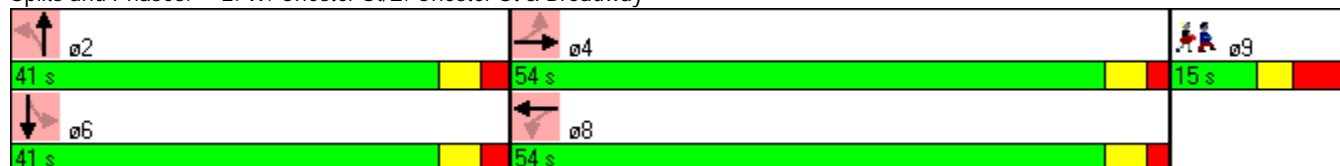


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Volume (vph)	85	461	18	15	315	100	30	85	45	90	87	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	1848	0	1770	1779	0	0	1755	0	0	1728	0
Flt Permitted	0.291			0.221				0.857			0.742	
Satd. Flow (perm)	539	1848	0	409	1779	0	0	1517	0	0	1299	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		24			22			30			30	
Link Distance (ft)		243			293			258			270	
Travel Time (s)		6.9			9.1			5.9			6.1	
Lane Group Flow (vph)	112	631	0	20	546	0	0	210	0	0	344	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	54.0	54.0		54.0	54.0		41.0	41.0		41.0	41.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5			6.0			6.0	
Act Effect Green (s)	48.5	48.5		48.5	48.5			35.0			35.0	
Actuated g/C Ratio	0.44	0.44		0.44	0.44			0.32			0.32	
v/c Ratio	0.47	0.77		0.11	0.70			0.43			0.83	
Control Delay	20.6	23.5		14.6	26.3			33.2			53.7	
Queue Delay	0.0	0.5		0.0	0.9			0.0			0.0	
Total Delay	20.6	24.0		14.6	27.1			33.2			53.7	
LOS	C	C		B	C			C			D	
Approach Delay		23.5			26.7			33.2			53.7	
Approach LOS		C			C			C			D	

Intersection Summary

Area Type:	Other
Cycle Length:	110
Actuated Cycle Length:	110
Offset:	20 (18%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Control Type:	Pretimed
Maximum v/c Ratio:	0.83
Intersection Signal Delay:	31.1
Intersection LOS:	C
Intersection Capacity Utilization:	81.7%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 2: W. Chester St/E. Chester St & Broadway



DRAFT

Lanes and Geometrics

Draft Plan PM Pk Hr with 25% growth

3: Liberty St/Elmendorf St & Broadway /Broadway

7/18/2015

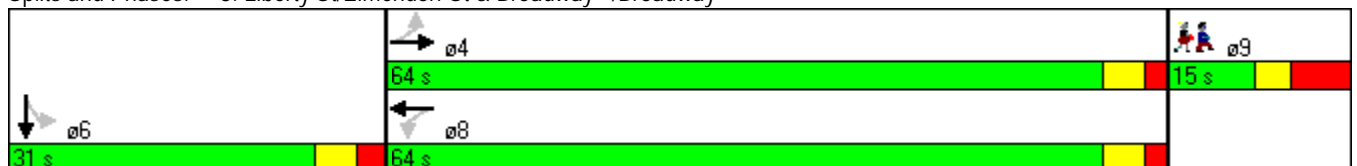


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	727	53	30	563	28	0	0	0	25	15	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	100		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	1422	0	1770	1430	0	0	0	0	0	1655	0
Flt Permitted	0.306			0.190							0.987	
Satd. Flow (perm)	570	1422	0	354	1430	0	0	0	0	0	1623	0
Right Turn on Red			No			No			Yes			No
Satd. Flow (RTOR)												
Link Speed (mph)		23			22			30			30	
Link Distance (ft)		574			386			575			741	
Travel Time (s)		17.0			12.0			13.1			16.8	
Lane Group Flow (vph)	39	1027	0	39	778	0	0	0	0	0	123	0
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		4			8							6
Permitted Phases	4			8						6		
Total Split (s)	64.0	64.0		64.0	64.0					31.0	31.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5						6.0	
Act Effect Green (s)	83.6	83.6		83.6	83.6						14.9	
Actuated g/C Ratio	0.76	0.76		0.76	0.76						0.14	
v/c Ratio	0.09	0.95		0.14	0.72						0.56	
Control Delay	4.8	32.2		7.3	14.5						53.4	
Queue Delay	0.0	0.0		0.0	0.0						0.0	
Total Delay	4.8	32.2		7.3	14.5						53.4	
LOS	A	C		A	B						D	
Approach Delay		31.2			14.1						53.4	
Approach LOS		C			B						D	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 32 (29%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 25.6 Intersection LOS: C
 Intersection Capacity Utilization 70.6% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 3: Liberty St/Elmendorf St & Broadway /Broadway



Lanes and Geometrics
6: Broadway & Foxhall Ave

Draft Plan PM Pk Hr with 25% growth
7/18/2015

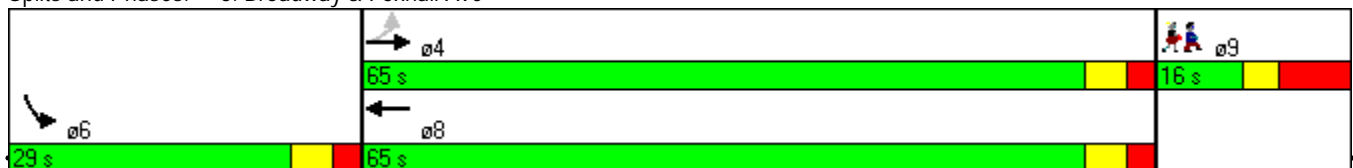


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø9
Lane Configurations		↕	↔		↕		
Volume (vph)	50	508	415	25	56	75	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	
Grade (%)		0%	0%		0%		
Storage Length (ft)	0			0	0	0	
Storage Lanes	0			0	1	0	
Taper Length (ft)	25				25		
Satd. Flow (prot)	0	1800	1779	0	1571	0	
Flt Permitted		0.904	*0.940		0.979		
Satd. Flow (perm)	0	1633	1724	0	1555	0	
Right Turn on Red				No		No	
Satd. Flow (RTOR)							
Link Speed (mph)		24	22		30		
Link Distance (ft)		295	170		530		
Travel Time (s)		8.4	5.3		12.0		
Lane Group Flow (vph)	0	734	579	0	173	0	
Turn Type	Perm	NA	NA		NA		
Protected Phases		4	8		6		9
Permitted Phases	4						
Total Split (s)	65.0	65.0	65.0		29.0		16.0
Total Lost Time (s)		6.0	6.0		6.0		
Act Effect Green (s)		80.7	80.7		17.3		
Actuated g/C Ratio		0.73	0.73		0.16		
v/c Ratio		0.61	0.44		0.70		
Control Delay		6.2	3.9		58.4		
Queue Delay		0.0	0.1		0.0		
Total Delay		6.3	4.0		58.4		
LOS		A	A		E		
Approach Delay		6.3	4.0		58.4		
Approach LOS		A	A		E		

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 27 (25%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 11.4 Intersection LOS: B
 Intersection Capacity Utilization 92.0% ICU Level of Service F
 Analysis Period (min) 15
 * User Entered Value

Splits and Phases: 6: Broadway & Foxhall Ave



Existing 7/9/2014 Baseline

Lanes and Geometrics
15: Henry St/O'Neil St & Broadway

Draft Plan PM Pk Hr with 25% growth
7/18/2015

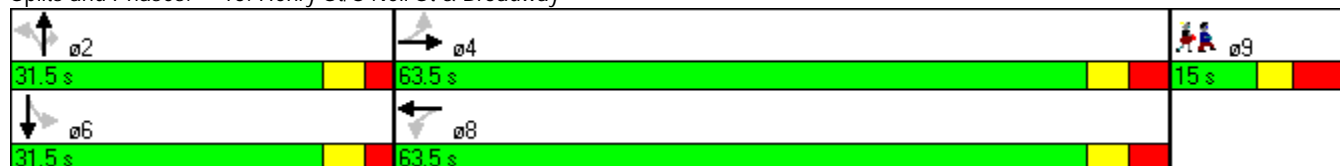


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗	↗	↖	↗	
Volume (vph)	28	640	61	30	601	39	40	50	66	45	64	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	100		0	100		50	100		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	1324	0	1770	1331	0	1770	1863	1583	1770	1705	0
Flt Permitted	0.283			0.244			0.588			0.716		
Satd. Flow (perm)	527	1324	0	455	1331	0	1070	1863	1503	1295	1705	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		32			31			30			30	
Link Distance (ft)		328			305			146			880	
Travel Time (s)		7.0			6.7			3.3			20.0	
Lane Group Flow (vph)	35	885	0	38	808	0	51	63	83	57	142	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		
Total Split (s)	63.5	63.5		63.5	63.5		31.5	31.5	31.5	31.5	31.5	
Total Lost Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	
Act Effect Green (s)	80.2	80.2		80.2	80.2		16.8	16.8	16.8	16.8	16.8	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.09	0.92		0.11	0.83		0.31	0.22	0.36	0.29	0.54	
Control Delay	2.7	17.3		3.9	13.3		44.5	40.7	44.6	43.1	49.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	2.7	17.3		3.9	13.3		44.5	40.7	44.6	43.1	49.9	
LOS	A	B		A	B		D	D	D	D	D	
Approach Delay		16.7			12.9			43.3			47.9	
Approach LOS		B			B			D			D	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 52 (47%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 20.5 Intersection LOS: C
 Intersection Capacity Utilization 77.2% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 15: Henry St/O'Neil St & Broadway



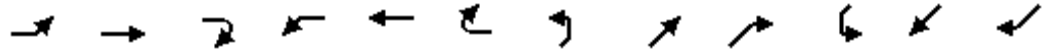
DRAFT

Lanes and Geometrics

Draft Plan PM Pk Hr with 25% growth

18: Cedar St /Cornell St & Broadway /Broadway

7/18/2015

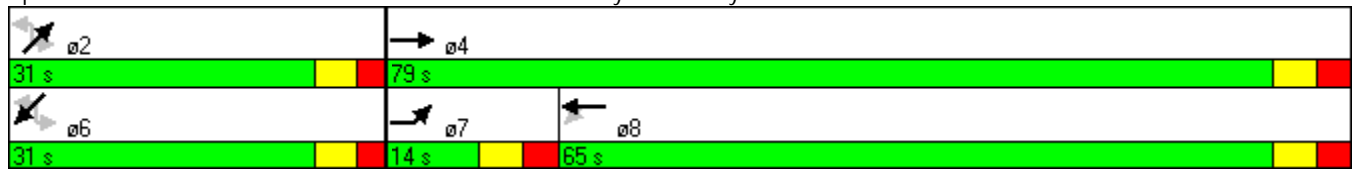


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	36	651	64	52	563	0	27	76	175	65	100	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	10	12	12	12	10	10	10	10	10
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	70		0	0		100	0		100
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1652	1373	0	1652	1602	0	0	1716	1478	0	1706	1478
Flt Permitted	0.950			0.214				0.718			0.761	
Satd. Flow (perm)	1630	1373	0	370	1602	0	0	1244	1438	0	1321	1416
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		10							181			
Link Speed (mph)		24			22			30			30	
Link Distance (ft)		346			218			1359			734	
Travel Time (s)		9.8			6.8			30.9			16.7	
Lane Group Flow (vph)	48	961	0	70	757	0	0	138	235	0	221	108
Turn Type	Prot	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2		2	6		6
Total Split (s)	14.0	79.0		65.0	65.0		31.0	31.0	31.0	31.0	31.0	31.0
Total Lost Time (s)	6.5	5.5		6.5	6.5			6.0	6.0		6.0	6.0
Act Effct Green (s)	7.3	76.8		64.5	64.5			21.7	21.7		21.7	21.7
Actuated g/C Ratio	0.07	0.70		0.59	0.59			0.20	0.20		0.20	0.20
v/c Ratio	0.44	1.00		0.32	0.81			0.56	0.55		0.85	0.39
Control Delay	52.2	39.5		5.4	11.8			48.4	15.2		70.2	41.6
Queue Delay	0.0	7.4		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	52.2	47.0		5.4	11.8			48.4	15.2		70.2	41.6
LOS	D	D		A	B			D	B		E	D
Approach Delay		47.2			11.3			27.5			60.8	
Approach LOS		D			B			C			E	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 38 (35%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 34.4 Intersection LOS: C
 Intersection Capacity Utilization 89.3% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 18: Cedar St /Cornell St & Broadway /Broadway



Lanes and Geometrics
25: Pine Grove Ave./Grand St & Broadway

Draft Plan PM Pk Hr with 25% growth
7/18/2015



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Volume (vph)	262	502	123	37	469	0	42	48	39	21	50	282
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	100		0	0		0	0		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1758	0	1770	1863	0	1770	1702	0	1770	1863	1583
Flt Permitted	0.950			0.356			0.714			0.684		
Satd. Flow (perm)	1582	1758	0	638	1863	0	1274	1702	0	1247	1863	1479
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		20						36				
Link Speed (mph)		28			28			30				30
Link Distance (ft)		132			513			505				111
Travel Time (s)		3.2			12.5			11.5				2.5
Lane Group Flow (vph)	345	823	0	49	617	0	55	114	0	28	66	371
Turn Type	Prot	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2				6
Permitted Phases				8			2			6		6
Total Split (s)	30.0	74.0		44.0	44.0		36.0	36.0		36.0	36.0	36.0
Total Lost Time (s)	6.5	7.5		7.5	6.5		7.5	7.5		7.5	7.5	6.5
Act Effect Green (s)	23.5	66.5		36.5	37.5		28.5	28.5		28.5	28.5	29.5
Actuated g/C Ratio	0.21	0.60		0.33	0.34		0.26	0.26		0.26	0.26	0.27
v/c Ratio	0.94	0.77		0.23	0.97		0.17	0.24		0.09	0.14	0.93
Control Delay	60.2	20.5		24.1	57.2		33.3	23.4		31.9	32.3	71.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.2	20.5		24.1	57.2		33.3	23.4		31.9	32.3	71.8
LOS	E	C		C	E		C	C		C	C	E
Approach Delay		32.2			54.8			26.6				63.8
Approach LOS		C			D			C				E

Intersection Summary

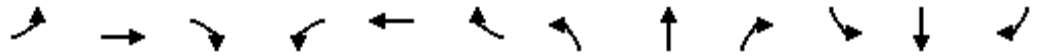
Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 94 (85%), Referenced to phase 2:NBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 43.9
 Intersection LOS: D
 Intersection Capacity Utilization 76.9%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 25: Pine Grove Ave./Grand St & Broadway



Lanes and Geometrics
32: W. O'Reilly St/E. O'Reilly St & Broadway

Draft Plan PM Pk Hr with 25% growth
7/18/2015

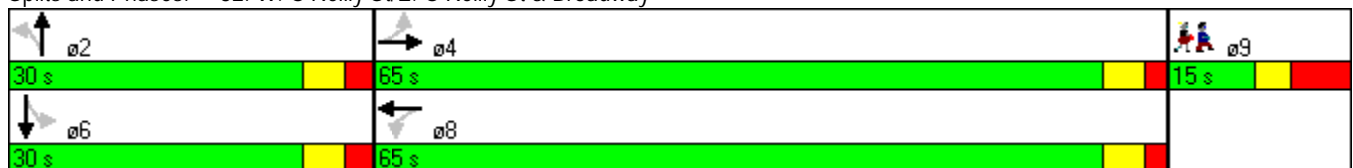


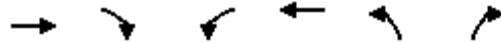
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	55	436	40	20	403	67	79	33	30	20	66	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1814	0	0	1793	0	0	1752	0	0	1761	0
Flt Permitted		0.880			0.960			0.662			0.923	
Satd. Flow (perm)	0	1600	0	0	1723	0	0	1184	0	0	1637	0
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		6						11				
Link Speed (mph)		24			22			30			30	
Link Distance (ft)		251			145			536			519	
Travel Time (s)		7.1			4.5			12.2			11.8	
Lane Group Flow (vph)	0	699	0	0	644	0	0	186	0	0	156	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	65.0	65.0		65.0	65.0		30.0	30.0		30.0	30.0	
Total Lost Time (s)		5.5			5.5			6.0			6.0	
Act Effct Green (s)		77.2			77.2			21.3			21.3	
Actuated g/C Ratio		0.70			0.70			0.19			0.19	
v/c Ratio		0.62			0.53			0.78			0.49	
Control Delay		4.2			9.3			60.6			43.5	
Queue Delay		0.1			0.0			0.0			0.0	
Total Delay		4.3			9.3			60.6			43.5	
LOS		A			A			E			D	
Approach Delay		4.3			9.3			60.6			43.5	
Approach LOS		A			A			E			D	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 106 (96%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 16.1
 Intersection LOS: B
 Intersection Capacity Utilization 95.0%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 32: W. O'Reilly St/E. O'Reilly St & Broadway



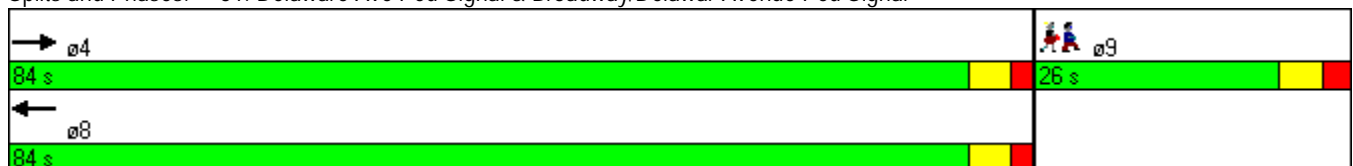


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	ø9
Lane Configurations	↑			↑			
Volume (vph)	616	0	0	420	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	0		0	0	
Storage Lanes		0	0		0	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	1863	0	0	1863	0	0	
Flt Permitted							
Satd. Flow (perm)	1863	0	0	1863	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (mph)	24			22	30		
Link Distance (ft)	123			42	50		
Travel Time (s)	3.5			1.3	1.1		
Lane Group Flow (vph)	811	0	0	553	0	0	
Turn Type	NA			NA			
Protected Phases	4			8			9
Permitted Phases							
Total Split (s)	84.0			84.0			26.0
Total Lost Time (s)	5.5			5.5			
Act Effect Green (s)	91.1			91.1			
Actuated g/C Ratio	0.83			0.83			
v/c Ratio	0.53			0.36			
Control Delay	1.9			5.4			
Queue Delay	0.1			0.0			
Total Delay	2.0			5.4			
LOS	A			A			
Approach Delay	2.0			5.4			
Approach LOS	A			A			

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 32 (29%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.53
 Intersection Signal Delay: 3.4
 Intersection LOS: A
 Intersection Capacity Utilization 45.1%
 ICU Level of Service A
 Analysis Period (min) 15

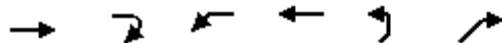
Splits and Phases: 51: Delaware Ave Ped Signal & Broadway/Delawar Avenue Ped Signal



HCM Unsignalized Intersection Capacity Analysis

9: Franklin St & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↔		↔	↔	↔	↔
Volume (veh/h)	738	14	72	607	14	98
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	971	18	95	799	18	129
Pedestrians	3			14	12	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	386			525		
pX, platoon unblocked			0.35		0.42	0.35
vC, conflicting volume			1001		1983	1006
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			65		1887	79
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		30	61
cM capacity (veh/h)			529		26	334

Direction, Lane #	EB 1	WB 1	WB 2	NE 1
Volume Total	989	95	799	147
Volume Left	0	95	0	18
Volume Right	18	0	0	129
cSH	1700	529	1700	136
Volume to Capacity	0.58	0.18	0.47	1.09
Queue Length 95th (ft)	0	16	0	205
Control Delay (s)	0.0	13.3	0.0	166.9
Lane LOS		B		F
Approach Delay (s)	0.0	1.4		166.9
Approach LOS				F

Intersection Summary			
Average Delay		12.7	
Intersection Capacity Utilization		75.7%	ICU Level of Service D
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

11: Broadway & Downs St

7/18/2015



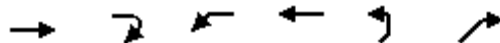
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Volume (veh/h)	73	763	619	35	17	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	96	1004	814	46	22	79
Pedestrians		2	3		12	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		477	434			
pX, platoon unblocked	0.63				0.61	0.63
vC, conflicting volume	873				2049	852
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	509				1045	475
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				83	79
cM capacity (veh/h)	662				130	369

Direction, Lane #	EB 1	EB 2	WB 1	SW 1
Volume Total	96	1004	861	101
Volume Left	96	0	0	22
Volume Right	0	0	46	79
cSH	662	1700	1700	263
Volume to Capacity	0.15	0.59	0.51	0.39
Queue Length 95th (ft)	13	0	0	43
Control Delay (s)	11.4	0.0	0.0	27.1
Lane LOS	B			D
Approach Delay (s)	1.0		0.0	27.1
Approach LOS				D

Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization	64.9%		ICU Level of Service C
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Van Buren St & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↔		↔	↔		
Volume (veh/h)	729	51	35	654	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	959	67	46	861	0	0
Pedestrians	2			3	15	
Lane Width (ft)	12.0			12.0	0.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	583			328		
pX, platoon unblocked			0.44		0.63	0.44
vC, conflicting volume			1041		1962	1011
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			446		865	376
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		100	100
cM capacity (veh/h)			485		183	291

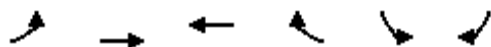
Direction, Lane #	EB 1	WB 1	WB 2
Volume Total	1026	46	861
Volume Left	0	46	0
Volume Right	67	0	0
cSH	1700	485	1700
Volume to Capacity	0.60	0.09	0.51
Queue Length 95th (ft)	0	8	0
Control Delay (s)	0.0	13.2	0.0
Lane LOS		B	
Approach Delay (s)	0.0	0.7	
Approach LOS			

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		62.9%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

23: Broadway & Dederick St

7/18/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑	↗		↙	
Volume (veh/h)	5	881	780	13	6	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	1159	1026	17	8	7
Pedestrians		15	29		65	
Lane Width (ft)		11.3	16.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	3		5	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		905	132			
pX, platoon unblocked	0.65				0.65	0.65
vC, conflicting volume	1108				1722	1115
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	898				1841	908
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				80	96
cM capacity (veh/h)	463				39	169

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	SB 1
Volume Total	7	580	580	1043	14
Volume Left	7	0	0	0	8
Volume Right	0	0	0	17	7
cSH	463	1700	1700	1700	60
Volume to Capacity	0.01	0.34	0.34	0.61	0.24
Queue Length 95th (ft)	1	0	0	0	21
Control Delay (s)	12.9	0.0	0.0	0.0	82.8
Lane LOS	B				F
Approach Delay (s)	0.1			0.0	82.8
Approach LOS					F

Intersection Summary					
Average Delay			0.6		
Intersection Capacity Utilization		66.3%		ICU Level of Service	C
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis

29: Grand St & Prince Street

7/18/2015



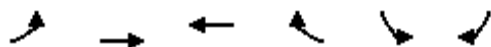
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	0	10	50	0	0	10	291	36	0	293	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	13	66	0	0	13	383	47	0	386	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)								111				
pX, platoon unblocked												
vC, conflicting volume	818	842	386	832	818	407	386			430		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	818	842	386	832	818	407	386			430		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	77	100	100	99			100		
cM capacity (veh/h)	292	297	662	280	307	644	1173			1129		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	66	443	386
Volume Left	0	66	13	0
Volume Right	13	0	47	0
cSH	662	280	1173	1129
Volume to Capacity	0.02	0.23	0.01	0.00
Queue Length 95th (ft)	2	22	1	0
Control Delay (s)	10.5	21.7	0.4	0.0
Lane LOS	B	C	A	
Approach Delay (s)	10.5	21.7	0.4	0.0
Approach LOS	B	C		

Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization	48.9%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 35: Broadway & City Hall Entrance

7/18/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔			
Volume (veh/h)	24	487	445	30	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	641	586	39	0	0
Pedestrians		10	10		10	
Lane Width (ft)		12.0	12.0		0.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		504	449			
pX, platoon unblocked	0.90				0.89	0.90
vC, conflicting volume	635				1329	625
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	536				1050	525
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	100
cM capacity (veh/h)	926				216	492

Direction, Lane #	EB 1	WB 1
Volume Total	672	625
Volume Left	32	0
Volume Right	0	39
cSH	926	1700
Volume to Capacity	0.03	0.37
Queue Length 95th (ft)	3	0
Control Delay (s)	0.9	0.0
Lane LOS	A	
Approach Delay (s)	0.9	0.0
Approach LOS		

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
37: Broadway & City Hall Exit

7/18/2015



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑		↘	
Volume (veh/h)	0	466	480	0	20	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	613	632	0	26	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		201	752			
pX, platoon unblocked	0.95				0.85	0.95
vC, conflicting volume	632				1245	632
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	588				1072	588
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				87	92
cM capacity (veh/h)	940				207	485

Direction, Lane #	EB 1	WB 1	SW 1
Volume Total	613	632	66
Volume Left	0	0	26
Volume Right	0	0	39
cSH	1700	1700	316
Volume to Capacity	0.36	0.37	0.21
Queue Length 95th (ft)	0	0	19
Control Delay (s)	0.0	0.0	19.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	19.4
Approach LOS			C

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization		43.0%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 39: High School Entrance & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←		
Volume (veh/h)	466	20	20	490	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	613	26	26	645	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	145			808		
pX, platoon unblocked			0.82		0.84	0.82
vC, conflicting volume			639		1324	626
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			450		1186	434
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	100
cM capacity (veh/h)			910		170	510

Direction, Lane #	EB 1	WB 1
Volume Total	639	671
Volume Left	0	26
Volume Right	26	0
cSH	1700	910
Volume to Capacity	0.38	0.03
Queue Length 95th (ft)	0	2
Control Delay (s)	0.0	0.8
Lane LOS		A
Approach Delay (s)	0.0	0.8
Approach LOS		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization	55.8%		ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
41: High School Exit & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↘	
Volume (veh/h)	486	0	0	445	35	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	639	0	0	586	46	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	450			503		
pX, platoon unblocked			0.84		0.88	0.84
vC, conflicting volume			639		1225	639
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			475		974	475
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		81	93
cM capacity (veh/h)			913		246	495

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	639	586	79
Volume Left	0	0	46
Volume Right	0	0	33
cSH	1700	1700	312
Volume to Capacity	0.38	0.34	0.25
Queue Length 95th (ft)	0	0	25
Control Delay (s)	0.0	0.0	20.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	20.4
Approach LOS			C

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		43.0%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
44: Broadway & Thomas Street

7/18/2015



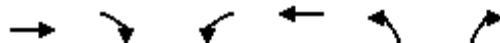
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↕	↔			
Volume (veh/h)	5	886	615	170	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	1166	809	224	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		218	819			
pX, platoon unblocked	0.68				0.49	0.68
vC, conflicting volume	1033				2100	921
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	813				1256	649
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	553				92	320

Direction, Lane #	EB 1	WB 1
Volume Total	1172	1033
Volume Left	7	0
Volume Right	0	224
cSH	553	1700
Volume to Capacity	0.01	0.61
Queue Length 95th (ft)	1	0
Control Delay (s)	0.5	0.0
Lane LOS	A	
Approach Delay (s)	0.5	0.0
Approach LOS		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
46: Andrew St & Broadway

7/18/2015



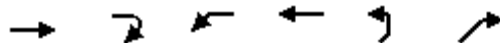
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	467	20	50	440	35	91
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	614	26	66	579	46	120
Pedestrians	19			19	43	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	4	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	658			295		
pX, platoon unblocked				0.87	0.93	0.87
vC, conflicting volume	684			1400	690	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	563			1086	570	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	92			76	72	
cM capacity (veh/h)	847			196	431	

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	641	645	166
Volume Left	0	66	46
Volume Right	26	0	120
cSH	1700	847	323
Volume to Capacity	0.38	0.08	0.51
Queue Length 95th (ft)	0	6	69
Control Delay (s)	0.0	2.0	27.3
Lane LOS		A	D
Approach Delay (s)	0.0	2.0	27.3
Approach LOS			D

Intersection Summary			
Average Delay		4.0	
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
48: Hoffman St & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑			↑	↑	
Volume (veh/h)	521	41	19	496	10	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	686	54	25	653	13	13
Pedestrians	1			6	31	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			1	3	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	513			251		
pX, platoon unblocked			0.67		0.75	0.67
vC, conflicting volume			770		1447	750
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			418		968	387
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		93	97
cM capacity (veh/h)			749		199	432

Direction, Lane #	EB 1	WB 1	NE 1
Volume Total	739	678	26
Volume Left	0	25	13
Volume Right	54	0	13
cSH	1700	749	273
Volume to Capacity	0.43	0.03	0.10
Queue Length 95th (ft)	0	3	8
Control Delay (s)	0.0	0.9	19.6
Lane LOS		A	C
Approach Delay (s)	0.0	0.9	19.6
Approach LOS			C

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		63.7%	ICU Level of Service B
Analysis Period (min)		15	

DRAFT

HCM Unsignalized Intersection Capacity Analysis 53: Delawar Avenue Ped Signal/Broadway & Delaware Ave

7/18/2015



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↕	↕			
Volume (veh/h)	235	381	420	20	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	309	501	553	26	0	0
Pedestrians		10	10		15	
Lane Width (ft)		12.0	12.0		0.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		42				
pX, platoon unblocked					0.83	
vC, conflicting volume	594				1711	591
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	594				1754	591
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	69				100	100
cM capacity (veh/h)	982				53	503

Direction, Lane #	EB 1	WB 1
Volume Total	811	579
Volume Left	309	0
Volume Right	0	26
cSH	982	1700
Volume to Capacity	0.31	0.34
Queue Length 95th (ft)	34	0
Control Delay (s)	6.8	0.0
Lane LOS	A	
Approach Delay (s)	6.8	0.0
Approach LOS		

Intersection Summary			
Average Delay		4.0	
Intersection Capacity Utilization	86.7%		ICU Level of Service E
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
56: Orchard St. & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	↖	↗
Volume (veh/h)	566	30	40	380	50	50
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	745	39	53	500	66	66
Pedestrians	2			2	15	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	293			123		
pX, platoon unblocked				0.72	0.77	0.72
vC, conflicting volume				799	1387	781
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol				530	1075	505
tC, single (s)				4.1	6.4	6.2
tC, 2 stage (s)						
tF (s)				2.2	3.5	3.3
p0 queue free %				93	62	84
cM capacity (veh/h)				740	171	404

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	784	553	132
Volume Left	0	53	66
Volume Right	39	0	66
cSH	1700	740	241
Volume to Capacity	0.46	0.07	0.55
Queue Length 95th (ft)	0	6	74
Control Delay (s)	0.0	1.9	36.7
Lane LOS		A	E
Approach Delay (s)	0.0	1.9	36.7
Approach LOS			E

Intersection Summary			
Average Delay		4.0	
Intersection Capacity Utilization		81.1%	ICU Level of Service D
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
58: Brewster St & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←		
Volume (veh/h)	544	20	10	440	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	716	26	13	579	0	0
Pedestrians					37	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	170			471		
pX, platoon unblocked			0.81		0.91	0.81
vC, conflicting volume			779		1371	766
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			614		901	598
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			786		275	409

Direction, Lane #	EB 1	WB 1
Volume Total	742	592
Volume Left	0	13
Volume Right	26	0
cSH	1700	786
Volume to Capacity	0.44	0.02
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	0.5
Lane LOS		A
Approach Delay (s)	0.0	0.5
Approach LOS		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization	42.3%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
60: Staples St & Broadway

7/18/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↑	
Volume (veh/h)	544	0	0	430	20	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	716	0	0	566	26	26
Pedestrians	6			1	40	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			0	3	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	398			243		
pX, platoon unblocked			0.82		0.89	0.82
vC, conflicting volume			756		1328	757
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			591		845	592
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	93
cM capacity (veh/h)			779		284	400

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	716	566	53
Volume Left	0	0	26
Volume Right	0	0	26
cSH	1700	1700	332
Volume to Capacity	0.42	0.33	0.16
Queue Length 95th (ft)	0	0	14
Control Delay (s)	0.0	0.0	17.9
Lane LOS			C
Approach Delay (s)	0.0	0.0	17.9
Approach LOS			C

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		46.1%	ICU Level of Service A
Analysis Period (min)		15	