

Willard Street Drainage Improvements Project

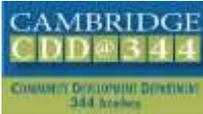
Community Meeting #2

June 15, 2017

Consultants:

HDR Engineering, Inc.
McMahon Associates
Horsley-Witten Group
Halvorson Design Partnership

Project Team



Project Manager/DPW..... Jerry Friedman, PE
 Traffic Calming Project Manager/CDD..... Juan Avendano



Project Manager..... Roch Larochelle, PE
 Civil & Utility Design..... Travis Lucia, EIT/Todd Undzis, PE



Stormwater Modelling..... Richard Claytor, PE
 Permitting..... Amy Ball, PWS



Community Relations..... Christi Apicella, AICP
 Traffic Analysis..... Erin Fredette, PE



Landscape Architecture &
 Streetscape..... Cynthia Smith, FASLA

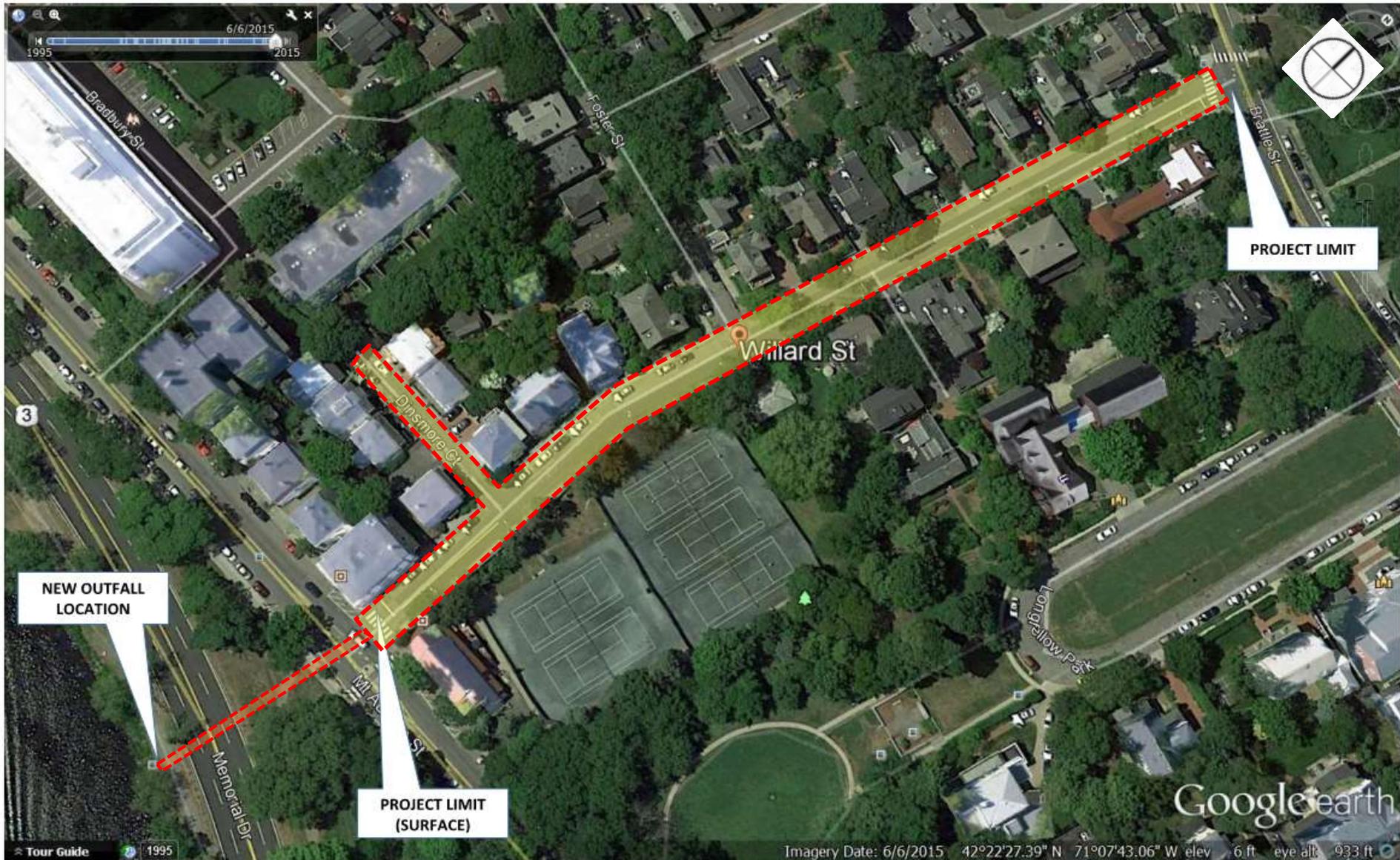


Geotechnical Investigations.... Ileene Gladstone, LSP, PE

Tonight's Agenda

- Project Location & Background
- Reason for Project/Goals & Objectives
- What We've Done So Far
- What We Heard at Public Meeting #1
- Traffic Data Analysis & Summary
- Design Solutions Evaluated
- Watershed Overview & Treatment Requirements
- Treatment Options
- Streetscape Evaluation/Tree Inventory
- Schedule & Next Steps
- Questions

Project Location & Background

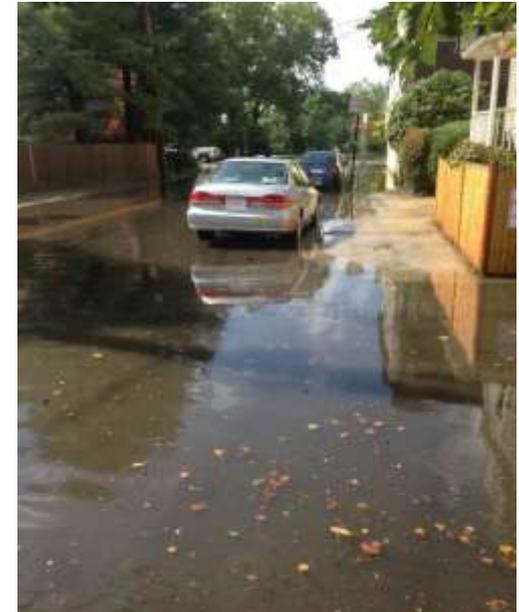


Reasons for Project

1. Stormwater

Reduce periodic flooding in Willard Street neighborhood

- Insufficient hydraulic capacity
- Aging stormwater infrastructure
- Nuisance flooding during significant storm events.



2. Surface Transportation

Improve Transportation and Streetscape Conditions

- Narrow, inaccessible sidewalks
- No designated bicycle accommodations
- “Missing” Crosswalks
- Deteriorated Hardscape/landscape



Goals & Objectives

1. Reduce Flooding

- Stormwater Improvements
- Additional Treatment Opportunities
- Sewer Separation/New Sewer Line
- Repair Outfall to Charles River (across Memorial Drive)

2. Utility Upgrades

- New Water Main (Willard & Dinsmore)
- New Gas Main (by Eversource)
- Possible Roadway Lighting

3. Surface Improvements

- Sidewalk Condition/ADA Compliance
- Bicycle Accommodations*
- Traffic Calming Opportunities
- Landscape Upgrades

**On Cambridge Bicycle Network Plan: Reduce Speed & Volume.*

What We've Done So Far

- Field Survey..... Complete (Nov. '16)
- Sewer/Storm Drain Video Inspection..... Complete (Jan. '17)
- Community Meeting #1..... Complete (Mar. '17)
- Additional Traffic Data Analysis..... Complete (Apr. '17)
- Development of Conceptual Solutions..... Underway (June '17)
- Community Meeting #2..... June 15, 2017

Community Meeting #1 (March 30, 2017)



What We Heard



Flooding & Drainage

- Flooding issues
- Water management



Utilities

- Overhead utilities interfere with tree branches
- Improve lighting



Pedestrian

- Narrow sidewalks
- Poor condition
- Foster Street crosswalk
- Raised/lighted crosswalks



Bicycles

- Greater northbound volumes
- Unsafe for children



Vehicles

- Speed
- Greater northbound volumes
- Narrow St. Convert to one-way



Streetscape

- Loss of street trees
- Consistent signage
- More amenities



Parking

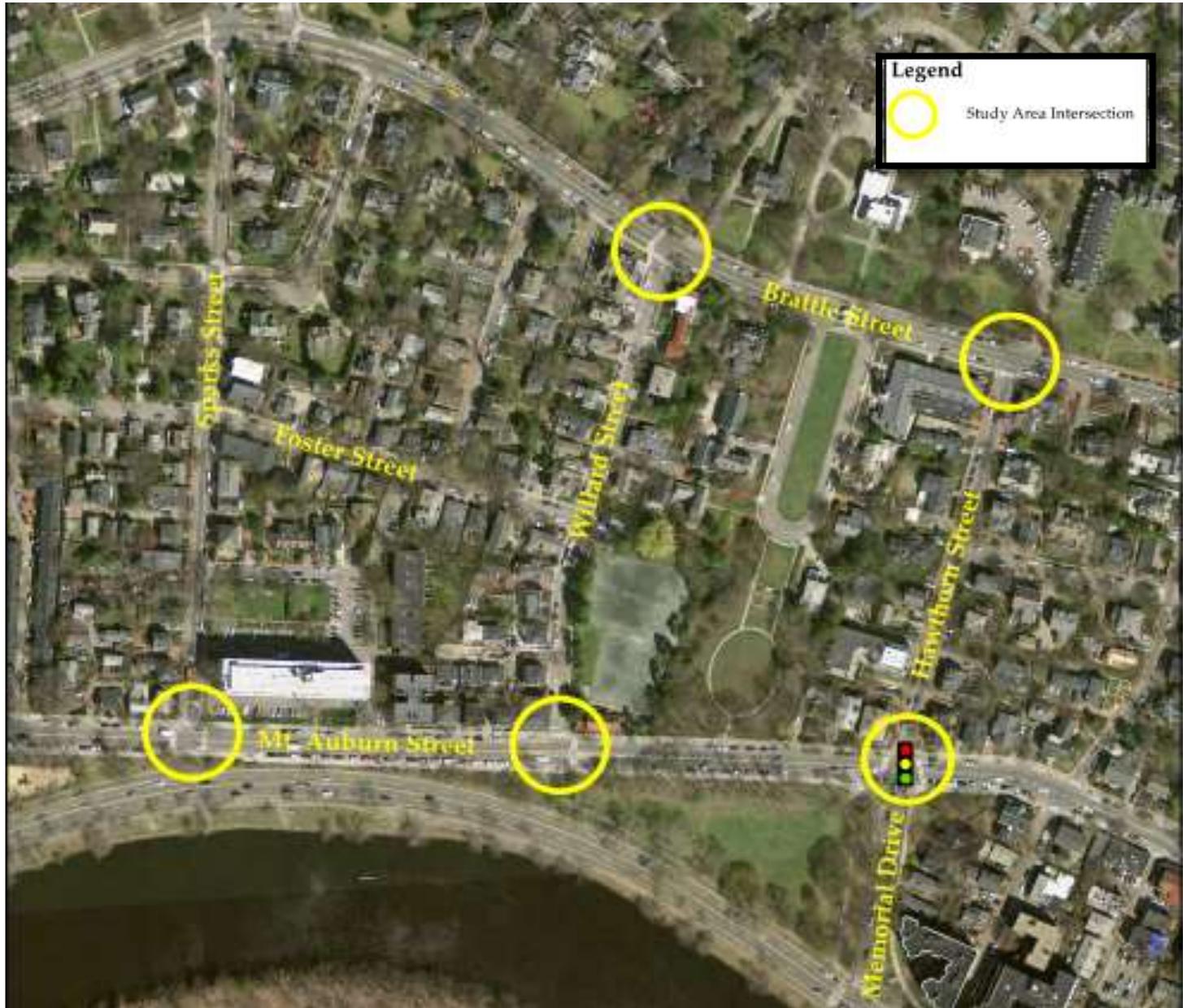
- Remove parking? - mixed



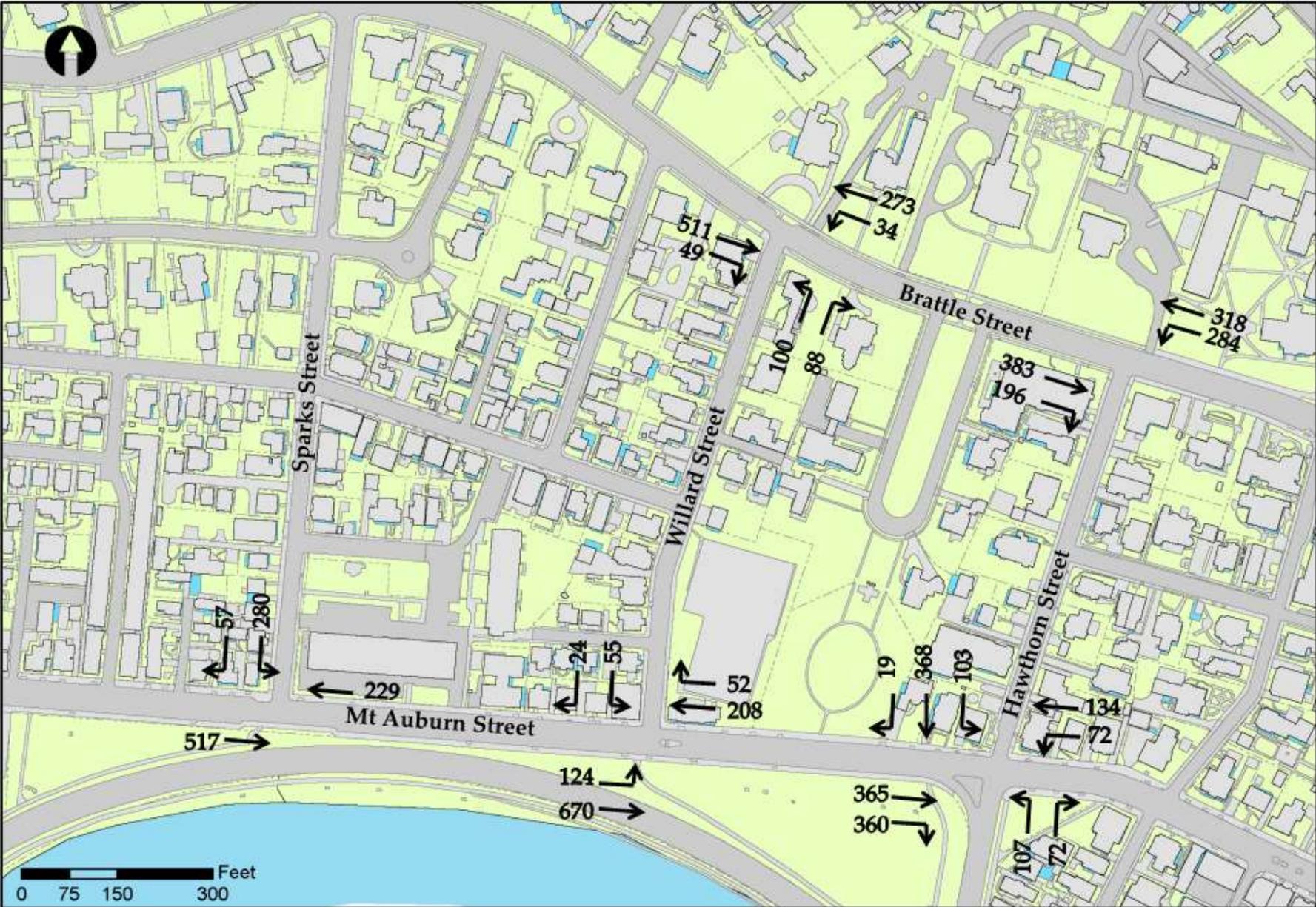
Safety

- Left turns from Mt. Auburn
- Cut-through traffic
- Mt. Auburn crossing island

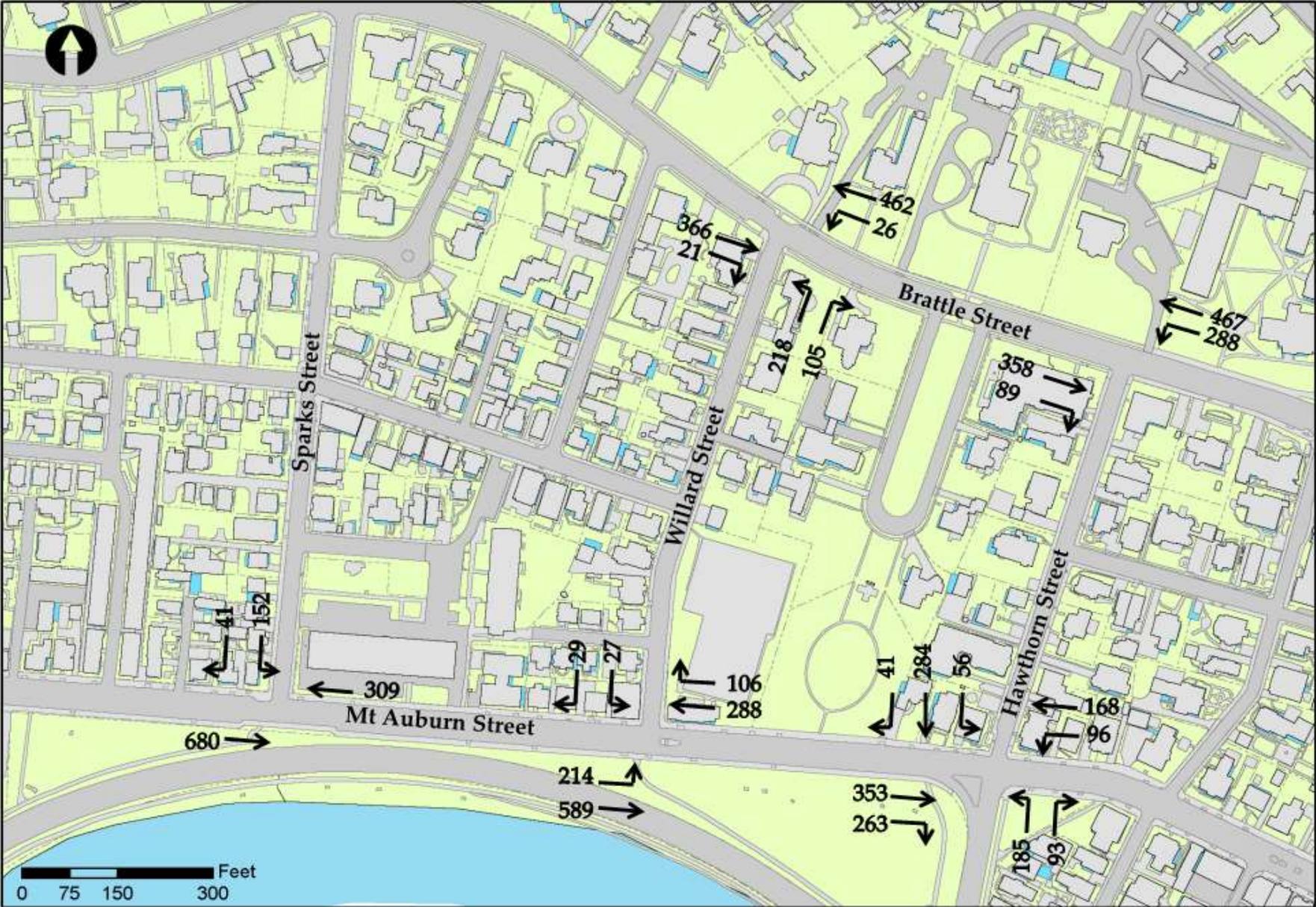
Traffic Data Collection



Current Conditions –Traffic Data Summary (Weekday AM)



Current Conditions –Traffic Data Summary (Weekday PM)



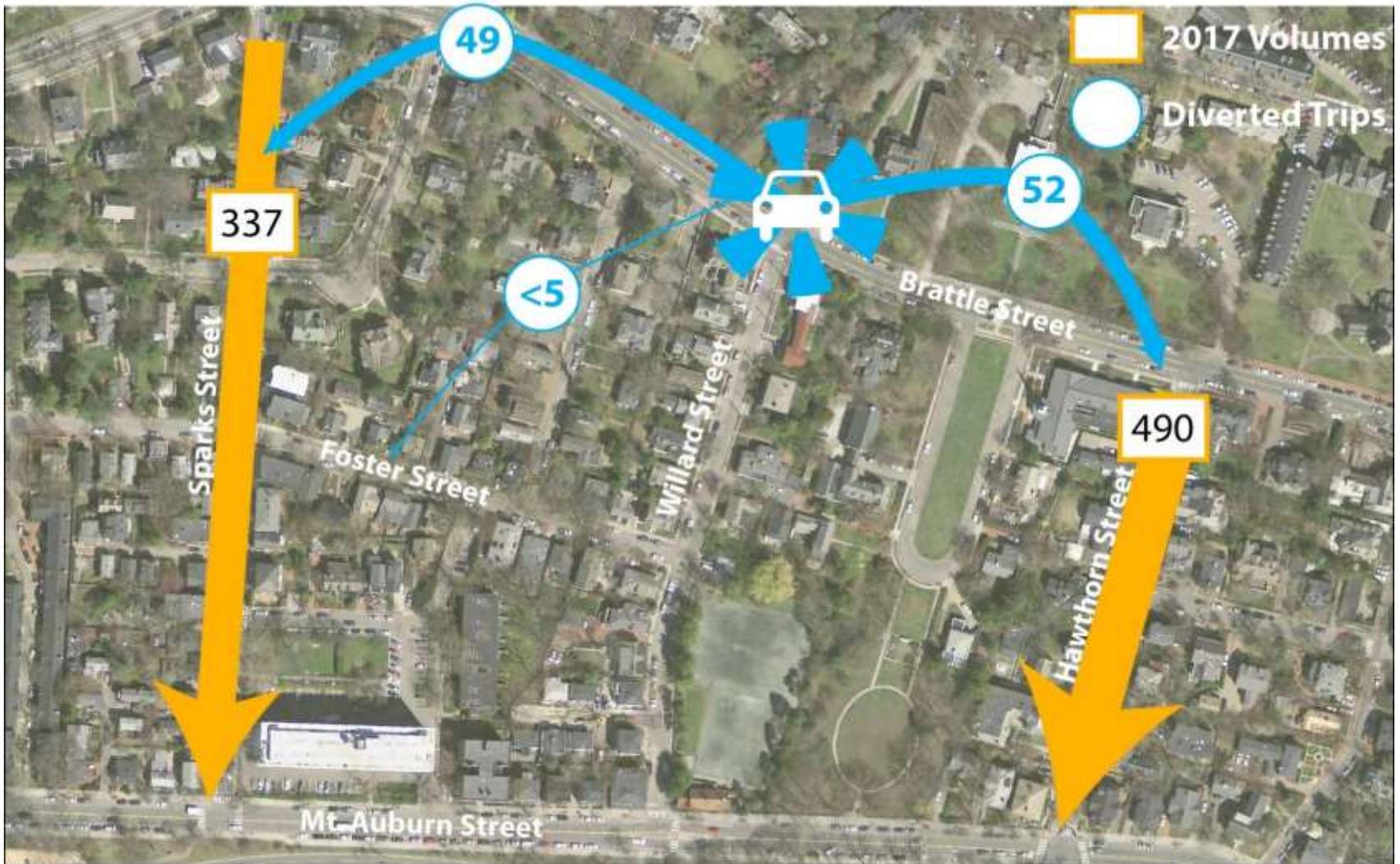
Current Conditions – Traffic Data Summary (Weekday AM)



Current Conditions – Traffic Data Summary (Weekday PM)

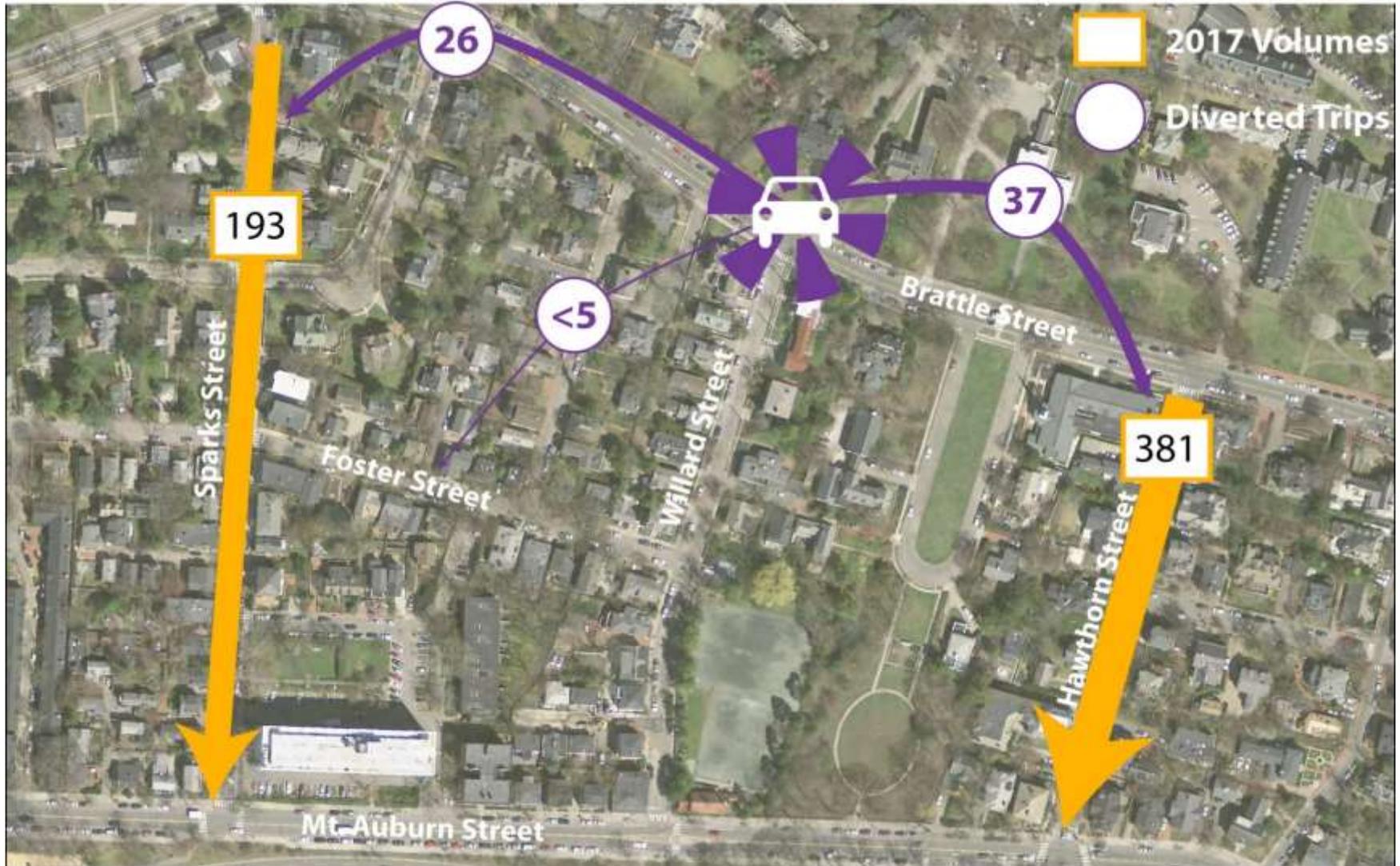


One-Way NB Option - Southbound Diverted Trips (AM Peak Hour)



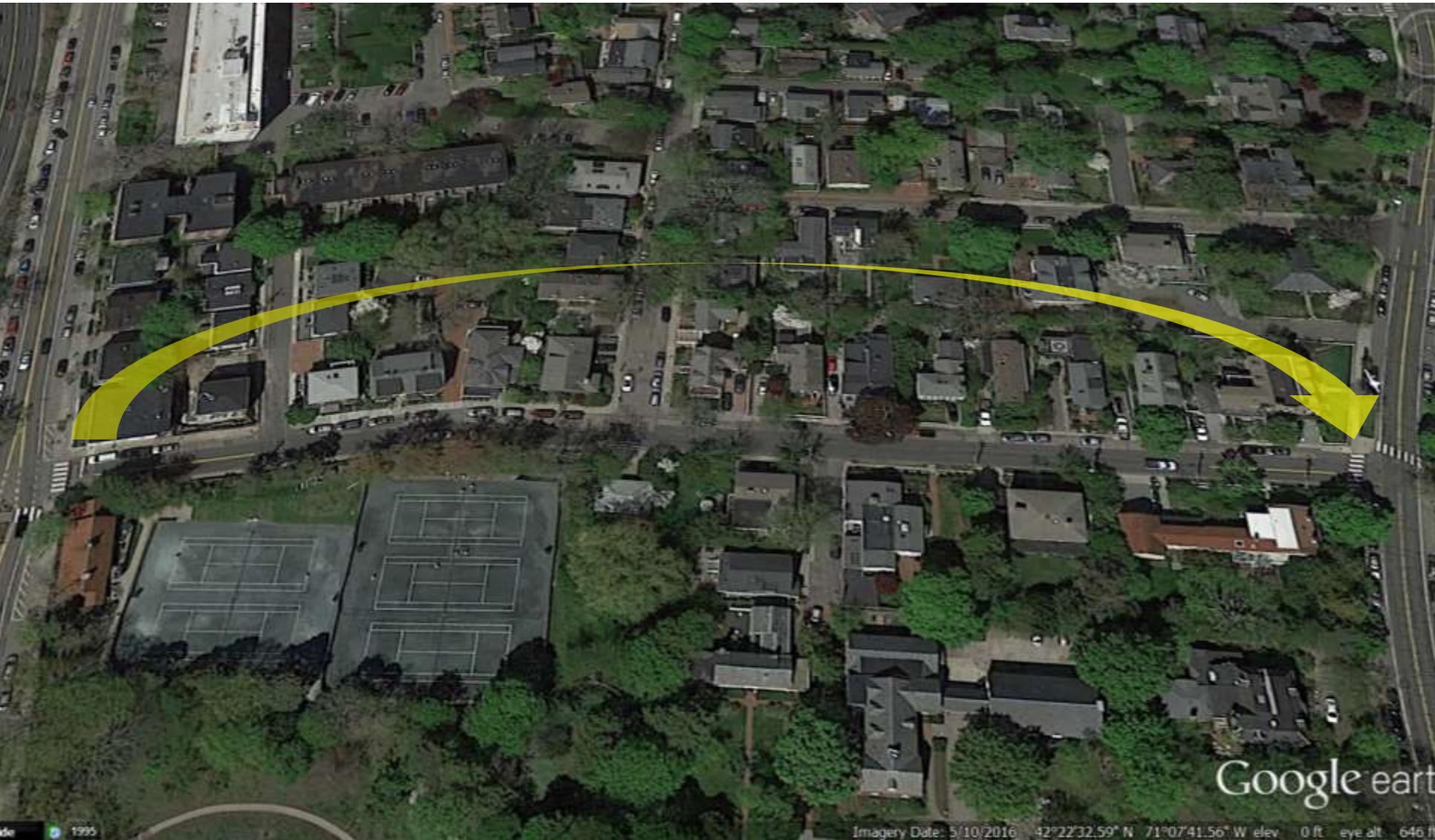
*SB vehicles diverted to Sparks St. and Hawthorn St. include those from Willard St. S as well as those originating from Willard St. and those from the surrounding area that are assumed to take these streets southbound instead of Willard St. B

One-Way NB Option - Southbound Diverted Trips (PM Peak Hour)

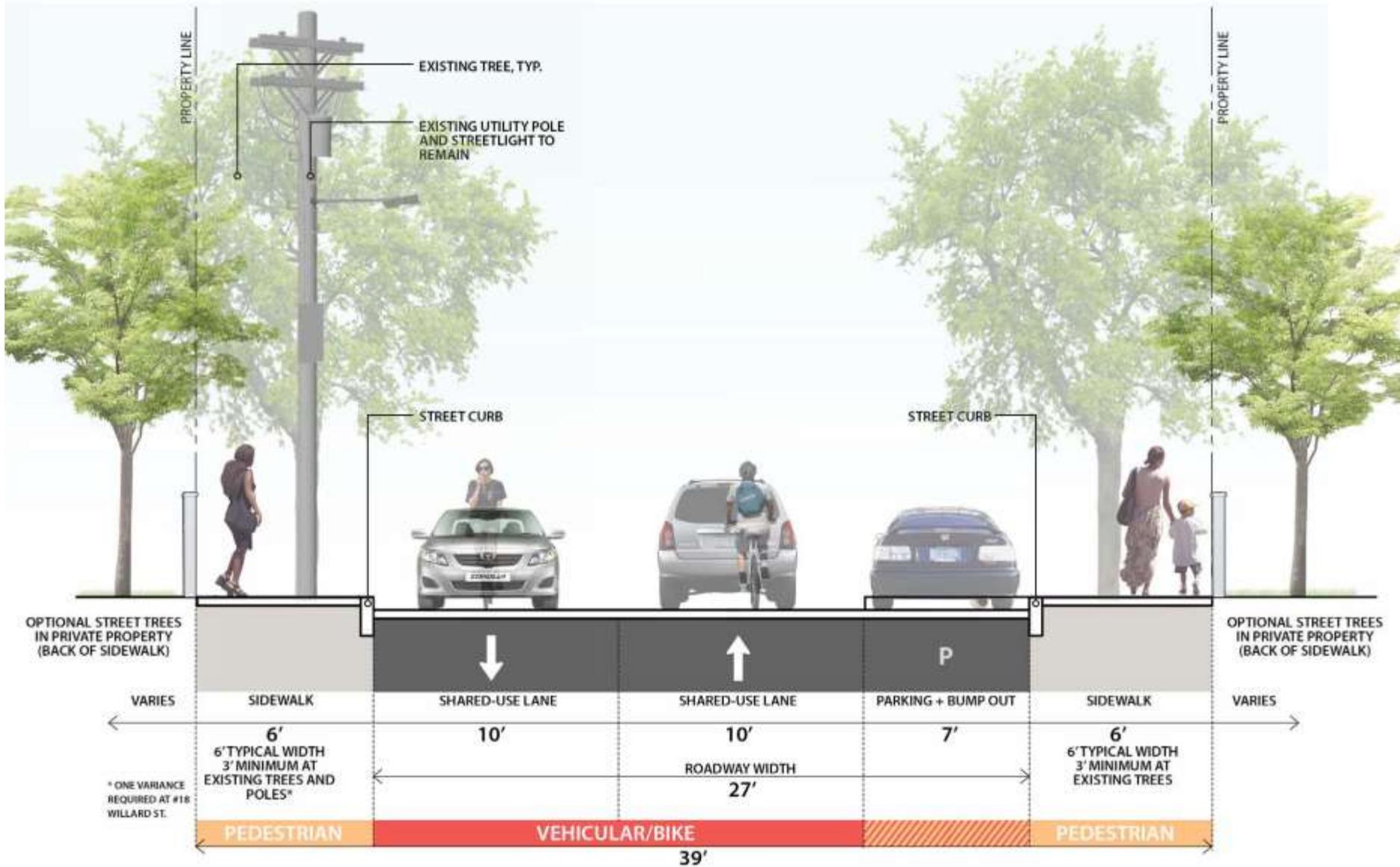


*SB vehicles diverted to Sparks St. and Hawthorn St. include those from Willard St. SB as well as those originating from Willard St. and those from the surrounding area that are assumed to take these streets southbound instead of Willard St.

Design Solutions Evaluated



TWO-WAY TRAFFIC WITH SHARED LANES (Looking South to Mt. Auburn Street)



TWO-WAY TRAFFIC WITH SHARED LANES



TWO-WAY TRAFFIC WITH SHARED LANES

Features

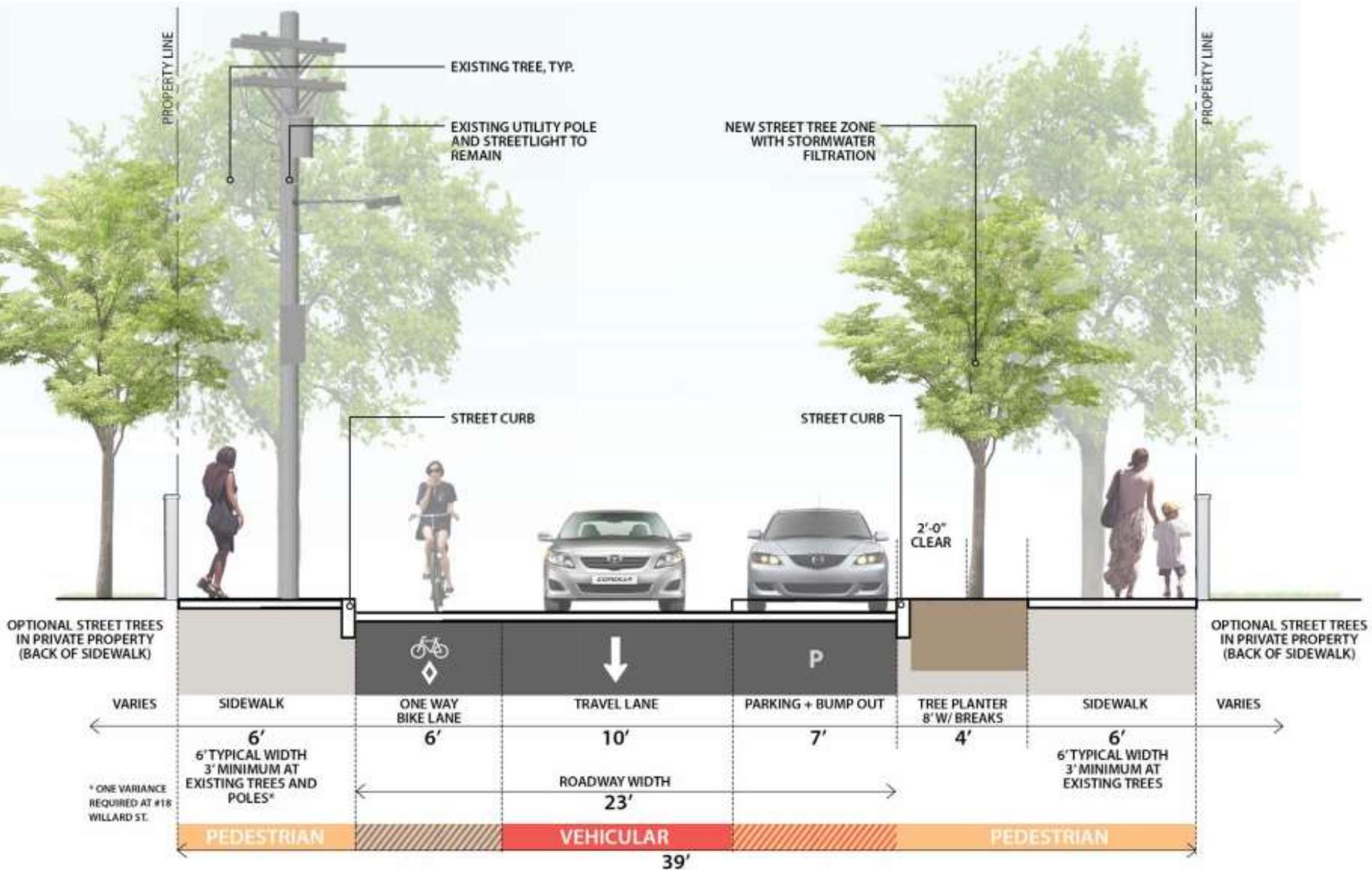
- MAINTAINS TWO WAY TRAFFIC CIRCULATION FOR VEHICLES AND BICYCLES

Considerations

- CYCLISTS MUST SHARE LANES WITH VEHICLES
- WOULD REQUIRE AN ADA VARIANCE FOR ONE NON-COMPLIANT SIDEWALK LOCATION (EAST SIDE)
- LIMITED OPPORTUNITY FOR ADDITIONAL STREET TREES
- NO OPPORTUNITY FOR ENHANCED STORMWATER TREATMENT
- NO PEDESTRIAN CROSSING AT FOSTER



ONE-WAY NB TRAFFIC WITH BIKE LANE "A" (Looking South to Mt. Auburn Street)



ONE-WAY NB TRAFFIC WITH BIKE LANE "A"



ONE WAY (NB) TRAFFIC WITH BIKE LANE "A"

Features

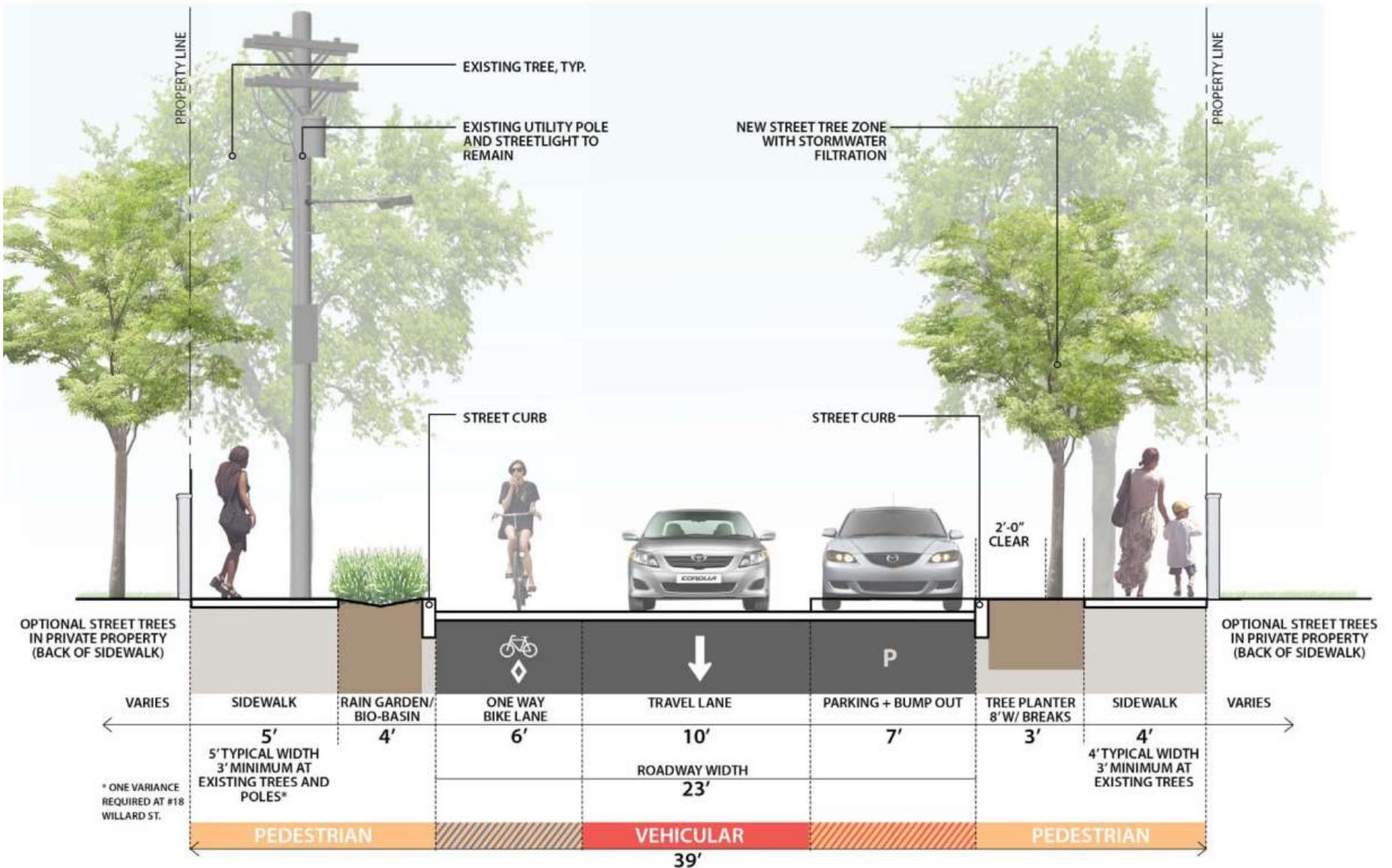
- DEDICATED BICYCLE LANE PROVIDES BETTER BIKE ACCOMMODATIONS AND IS POSITIONED AWAY FROM THE PARKED CARS "DOOR ZONE"
- CONSISTENT WITH THE 2015 BIKE NETWORK PLAN (REDUCES TRAFFIC VOLUMES AND IMPROVES LEVEL OF COMFORT FOR CYCLISTS)
- CURB EXTENSIONS PROVIDE TRAFFIC CALMING FEATURE
- REDUCES TURN CONFLICTS AT MT. AUBURN
- ADDITIONAL STREET TREE ZONE WITH STORMWATER FILTRATION (WEST SIDE)

Considerations

- ELIMINATES SOUTHBOUND VEHICULAR AND BICYCLE MOVEMENTS
- NEIGHBORHOOD ADJUSTMENT PERIOD TO NEW CIRCULATION PATTERNS
- WOULD REQUIRE AN ADA VARIANCE FOR ONE NON-COMPLIANT SIDEWALK LOCATION (EAST SIDE)



ONE-WAY NB TRAFFIC WITH BIKE LANE "B" (Enhanced Stormwater Treatment Option) (Looking South to Mt. Auburn Street)



ONE-WAY NB TRAFFIC WITH BIKE LANE "B" (Enhanced Stormwater Treatment Option)



ONE WAY (NB) TRAFFIC WITH BIKE LANE "B"

Features

Considerations

- DEDICATED BICYCLE LANE PROVIDES BETTER BIKE ACCOMMODATIONS AND IS POSITIONED AWAY FROM THE PARKED CARS "DOOR ZONE"
- CONSISTENT WITH THE 2015 BIKE NETWORK PLAN (REDUCES TRAFFIC VOLUMES AND IMPROVES LEVEL OF COMFORT FOR CYCLISTS)
- CURB EXTENSION PROVIDES TRAFFIC CALMING FEATURE
- REDUCES TURN CONFLICTS AT MT. AUBURN
- ADDITIONAL ROOM FOR STORMWATER BIOSWALE (EAST SIDE)
- ADDITIONAL NARROW STREET TREE ZONE WITH STORMWATER FILTRATION (WEST SIDE)

- ELIMINATES SOUTHBOUND VEHICULAR AND BICYCLE MOVEMENTS
- NEIGHBORHOOD ADJUSTMENT PERIOD TO NEW CIRCULATION PATTERNS

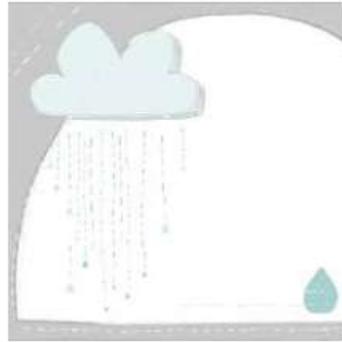


Surface Options Evaluation Criteria

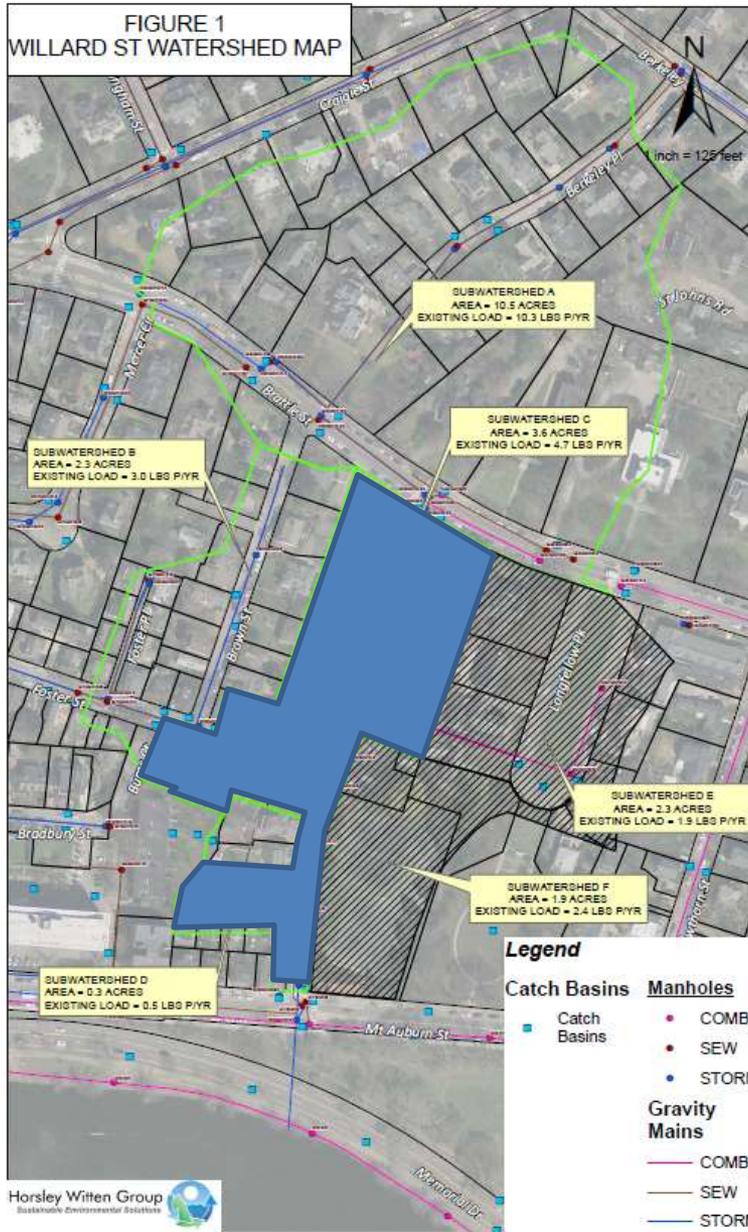
Project Goals... What We Heard

Design Option	Reduces Flooding 	Upgrades Stormwater Conveyance Methods	Improves Stormwater Treatment	Improves Street Trees 	Improves Pedestrian Environment 	Improves Bicycling 	Improves Safety 	Improves Multimodal Circulation 	Allows Emergency Vehicle Access
Maintain two-way									
One-way North-A									
One-way North-B									

Watershed Overview & Treatment Options



Watershed Overview

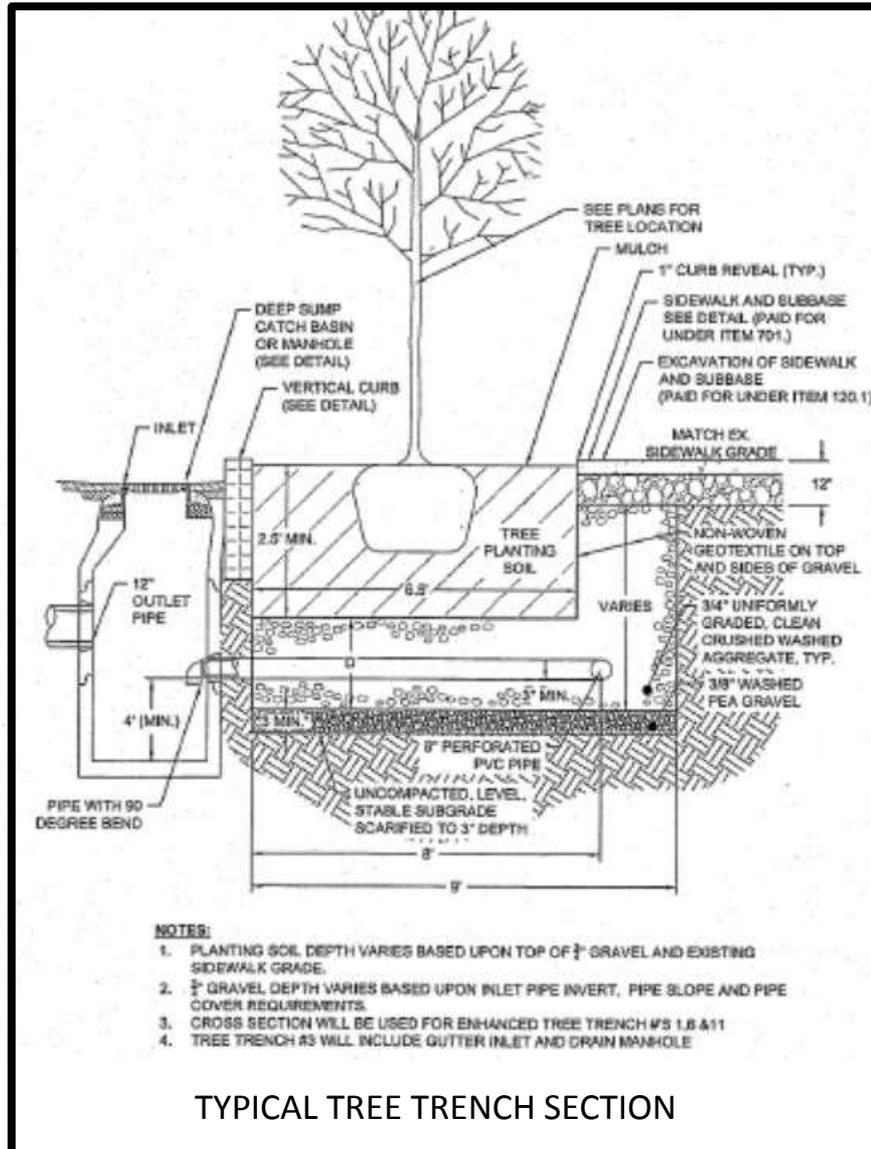


- Total Area: 20.9 acre watershed
- Made up of 6 sub-watersheds
- 3.6 acres of direct drainage from Willard Street ■
- 17.3 acres of “Offsite” drainage □
 - 4.2 acres (Longfellow and Cambridge Skate Club) – stay in sewer
 - 13.1 ac (to new outfall)

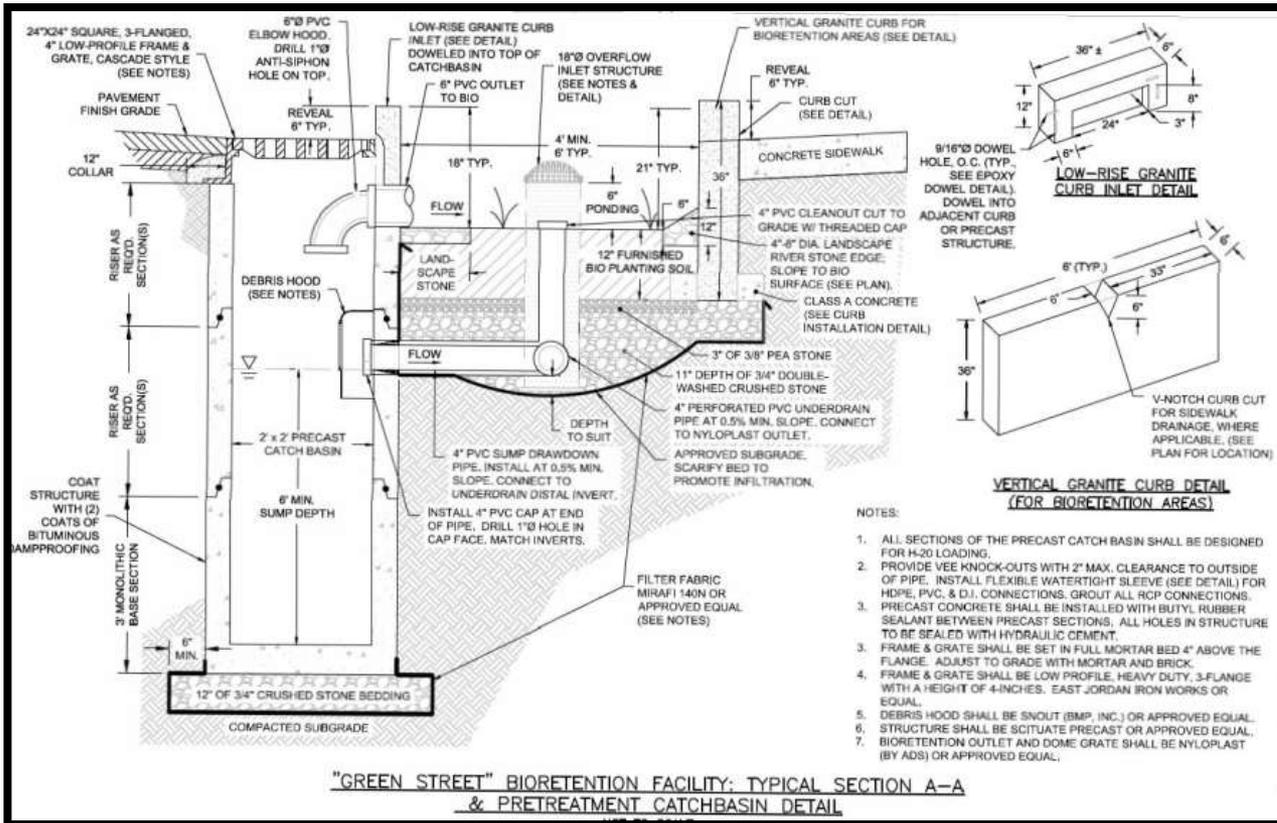
Treatment Requirements – Why and Who?

- Lower Charles Total Maximum Daily Load (TMDL) for phosphorus
- New outfall triggers treatment requirements
- 51% phosphorus reduction
- Onsite treatment options using green infrastructure (GI) controls
- Offsite treatment options – some now, some to phase in over time (underground storage/infiltration, GI, maybe some to sewer)?

Green Infrastructure (GI) Treatment Alternatives - Tree Trenches



Green Infrastructure (GI) Treatment Alternatives- Bio Swales



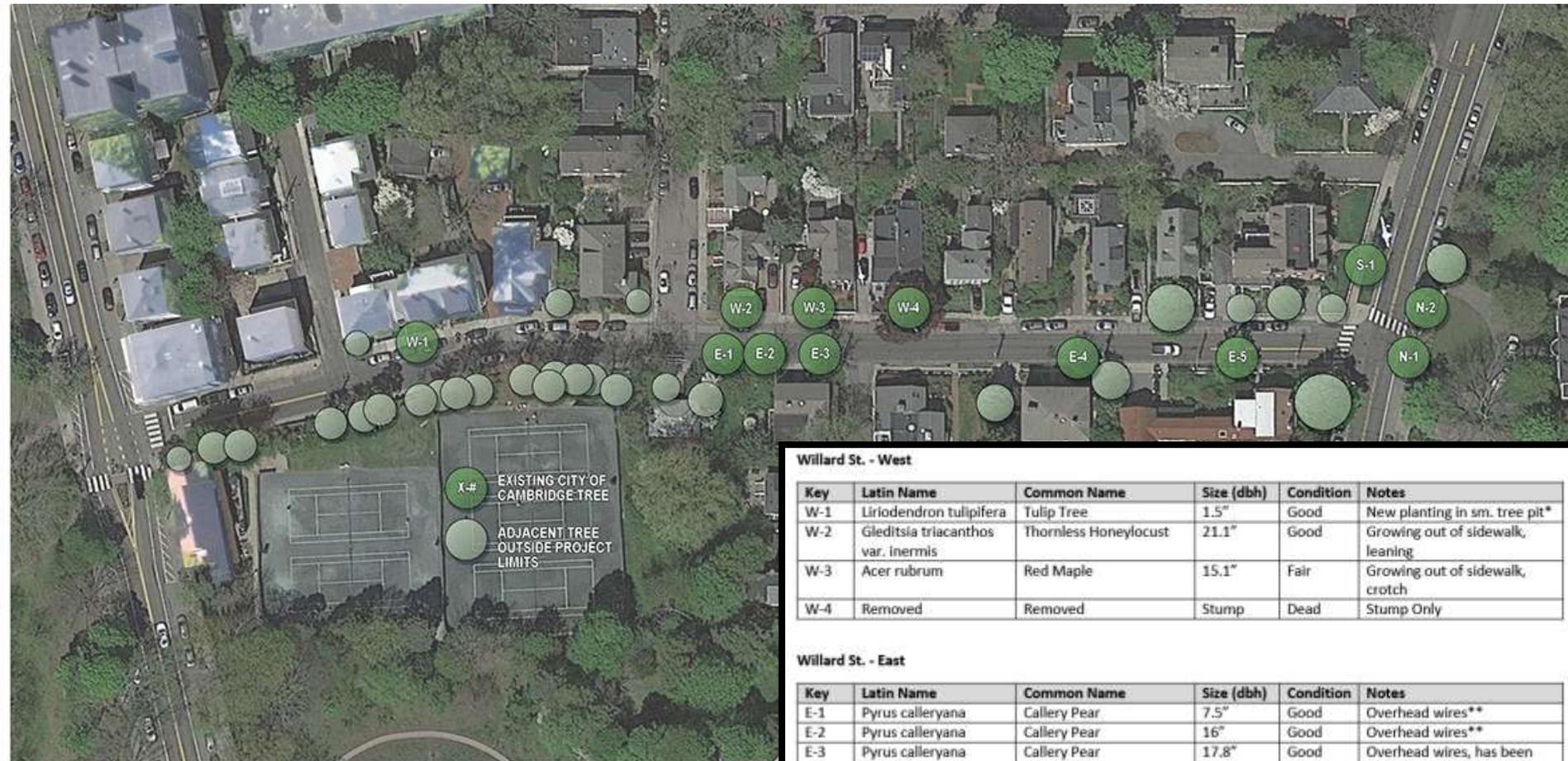
GI Alternatives & Levels of Effectiveness

	TWO WAY TRAFFIC W/SHARED LANES	ONE WAY NB TRAFFIC W/BIKE LANE "A"	ONE WAY NB TRAFFIC W/BIKE LANE "B"
PROPOSED STORMWATER TREATMENT	<ul style="list-style-type: none"> Permeable pavement in parking lane 	<ul style="list-style-type: none"> Permeable pavement bike and parking lane, if subsurface conditions are conducive Bioretention tree filters 	<ul style="list-style-type: none"> Tree trench along west side of street Bioswale along east side of street
ADVANTAGES	<ul style="list-style-type: none"> Provides water quality benefits 	<ul style="list-style-type: none"> One way travel lane allows for linear stormwater treatment options Provides water quality benefits 	<ul style="list-style-type: none"> No permeable pavement maintenance Provides greening of the streetscape Provides water quality benefits Meets subwatershed 51% load reduction target
DISADVANTAGES	<ul style="list-style-type: none"> Limits the use and types of stormwater treatment BMPs with two way traffic and 6' width for ADA compliant sidewalks on both sides of the street Utilities along west side of street could limit the extent of permeable pavement or be cost prohibitive Does not meet the 51% watershed TMDL load reduction target 	<ul style="list-style-type: none"> Placement of 10' wide sidewalk on west side of street has more constraints limiting the opportunities for stormwater treatment and potential for underdrains to tie into central drain line. Maintaining a 6' sidewalk width for ADA compliance limits the use and types of stormwater management options on the east side adjacent to the sidewalk Does not meet the 51% watershed TMDL load reduction target 	<ul style="list-style-type: none"> Does not meet the 51% watershed TMDL load reduction target
GI LOAD REDUCTION (LBS P/YR)*	1.6	2.2	3.4
GREATER WATERSHED LOAD REDUCTION (%)**	9%	12%	19%
WILLARD STREET PROJECT AREA SUBWATERSHED LOAD REDUCTION (%)**	35%	48%	73%

*All phosphorus load reduction GI practices are proposed in Subcatchment C, along Willard Street

** 51% TMDL load reduction required for the Charles River

Current Conditions – Tree Inventory



TREE INVENTORY PLAN

Willard St. - West

Key	Latin Name	Common Name	Size (dbh)	Condition	Notes
W-1	<i>Liriodendron tulipifera</i>	Tulip Tree	1.5"	Good	New planting in sm. tree pit*
W-2	<i>Gleditsia triacanthos</i> var. <i>inermis</i>	Thornless Honeylocust	21.1"	Good	Growing out of sidewalk, leaning
W-3	<i>Acer rubrum</i>	Red Maple	15.1"	Fair	Growing out of sidewalk, crotch
W-4	Removed	Removed	Stump	Dead	Stump Only

Willard St. - East

Key	Latin Name	Common Name	Size (dbh)	Condition	Notes
E-1	<i>Pyrus calleryana</i>	Callery Pear	7.5"	Good	Overhead wires**
E-2	<i>Pyrus calleryana</i>	Callery Pear	16"	Good	Overhead wires**
E-3	<i>Pyrus calleryana</i>	Callery Pear	17.8"	Good	Overhead wires, has been cut back significantly**
E-4	<i>Pyrus calleryana</i>	Callery Pear	14"	Fair	Overhead wires**
E-5	<i>Acer platanoides</i>	Norway Maple	14"	Fair	Overhead wires**

Brattle St. - North & South

Key	Latin Name	Common Name	Size (dbh)	Condition	Notes
S-1	<i>Platanus x acerifolia</i>	London Plane Tree	18" +/-	Good	In lawn, back of curb
N-1	<i>Ulmus</i> sp.	Elm	36" +/-	Fair-Good	In lawn, back of curb
N-2	<i>Acer platanoides</i>	Norway Maple	18" +/-	Good	In lawn, back of curb

*Could be transplanted

** Need structural pruning and pruning to improve "aesthetics"

Schedule & Next Steps

- Community Meeting #2..... June 15, 2017
- Refine Design Options..... July-Aug 2017
- Additional Sewer Inspections (Dye Testing)..... July-Aug 2017
- Community Meeting #3 (tentative)..... Fall 2017
- Final Design & Permitting..... Winter-Spr. 2018
- Construction Begins (tentative)..... 2018

Questions?

Stay in Touch!

For more information visit:

www.cambridgema.gov/theworks/willardstreet

To join email distribution list for updates visit:

bit.ly/WillardSt

For questions about this project, contact:

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