Cambridge Green Streets Guidance Project

This project has been financed with Federal Funds from the Environmental Protection Agency (EPA) to the Massachusetts Department of Environmental Protection (the Department) under a s. 604(b) competitive grant. The contents do not necessarily reflect the views and policies of EPA or of the Department nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

About Charles River Watershed Association

Program Areas

- Field Science
- Blue Cities Initiative (low impact development and green infrastructure)
- Climate Change Adaptation
- Law, Advocacy and Policy
- Education and outreach

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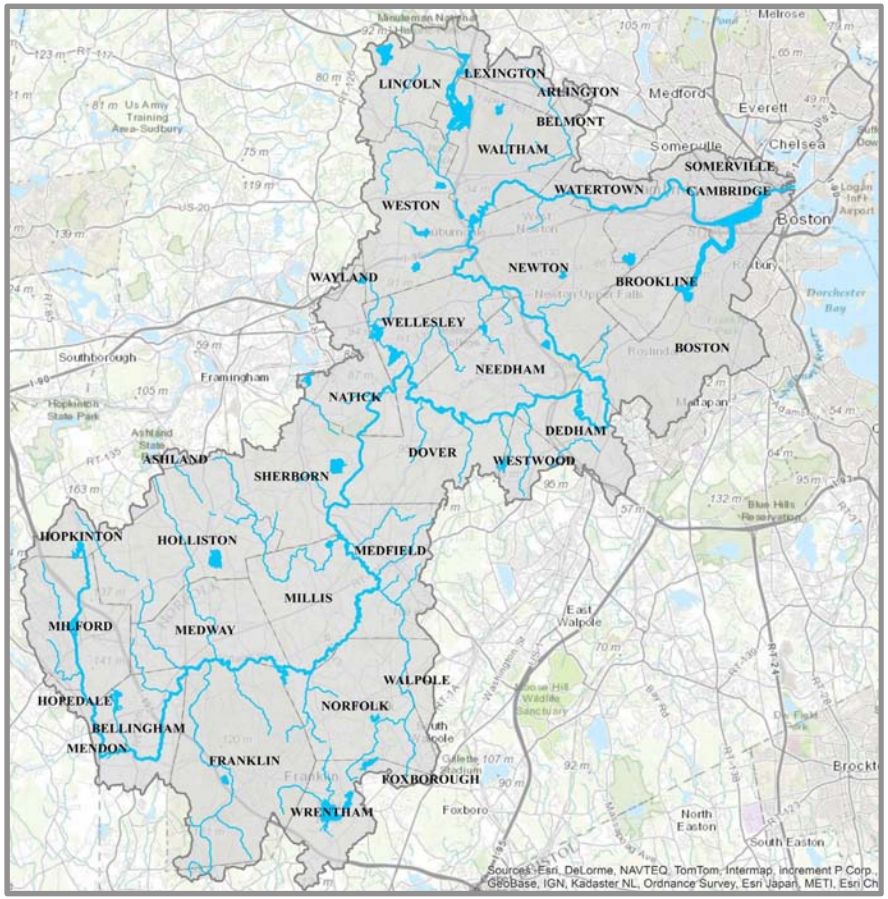
About the Charles River Watershed

- Stretches 80 miles from Hopkinton to Boston Harbor
- Drains approximately 308 square miles
- Home to over 1million people
- Encompasses 35 MA cities and towns, 23 on the river
- Many species of fish, including Alewife, Blueback Herring and American Shad



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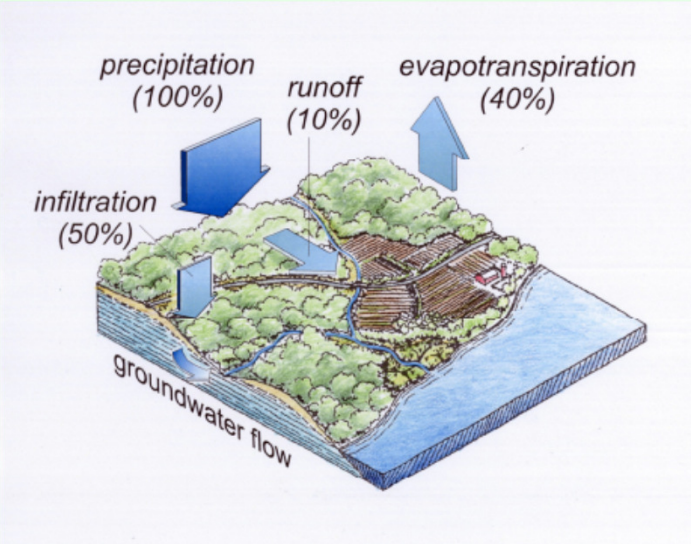
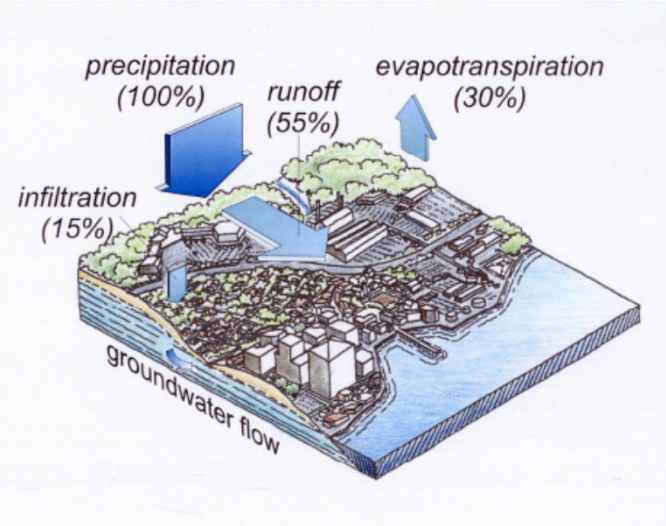
Human Infrastructure Interacts with Nature





1890s 2005

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Building Nature-Based Infrastructure
Blue Cities Initiative

Blue Cities goes beyond "green" building, embracing blue-green infrastructure design with the aim of restoring the natural water cycle in the built environment

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Cambridge Green Streets Project

- Federal 604(b) funds via MassDEP
- City of Cambridge DPW partnered with CRWA
- Goals:
  - Develop conceptual green street design plans for three public rights of way
  - Integrate GI guidance with the City's five-year roadway improvement plan.
  - Facilitate green street implementation in Cambridge

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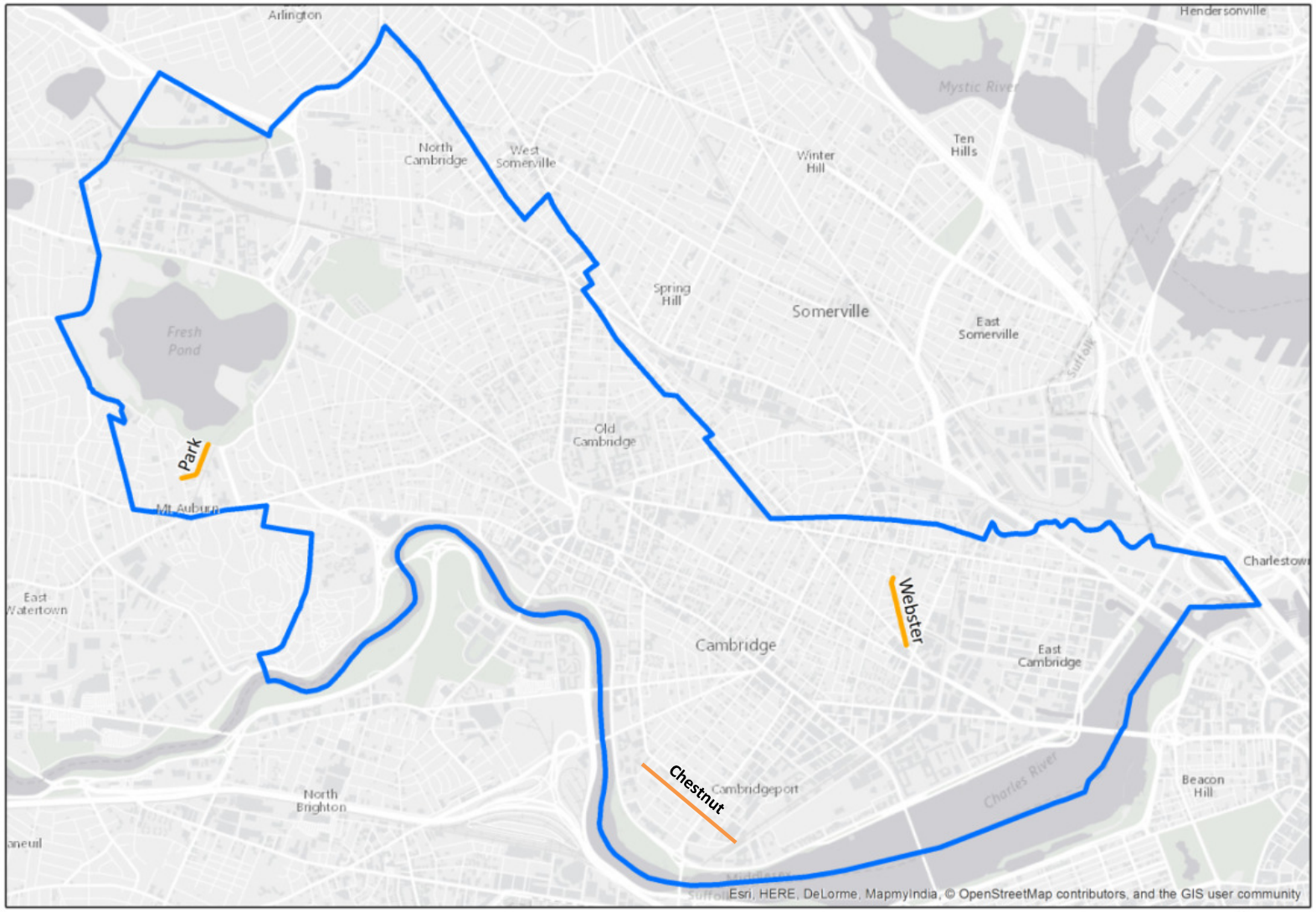

Locus Map
Project Streets
City of Cambridge

City Boundary

Project Streets

0 Miles 1

N
W E
S

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Design Challenges

- Narrow roadways
- Narrow sidewalks
- Utilities
- Parking demand
- Groundwater levels & soils
- Topography

Design Opportunities

- Corners of street intersections
- Sites where stormwater drains converge
- Relative low points
- Brick or concrete plazas
- Stretches of sidewalk that lack street trees
- Existing sidewalk pinch points caused by growth of trees out existing tree wells
- Parking lanes for underground infiltration systems
- Open space including city parks, abandoned railroads, and private property (apartment complexes)

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Webster Ave

- Combined stormwater catchment system draining to Charles River
- Located within the Wellington-Harrington neighborhood – primarily residential
- Relatively flat street with soils that are well-suited for infiltration
- Two-way ROW with parking on both sides

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Webster Ave

Table 2. Webster Avenue Watershed Design Targets & Results	
Total Drainage Area	7.30 acres
Impervious Area	5.90 acres
Target Runoff Volume (1″)	21,417 cubic feet
Total BMP Area	0.35 acres
Total Runoff Volume Captured	24,479 cubic feet

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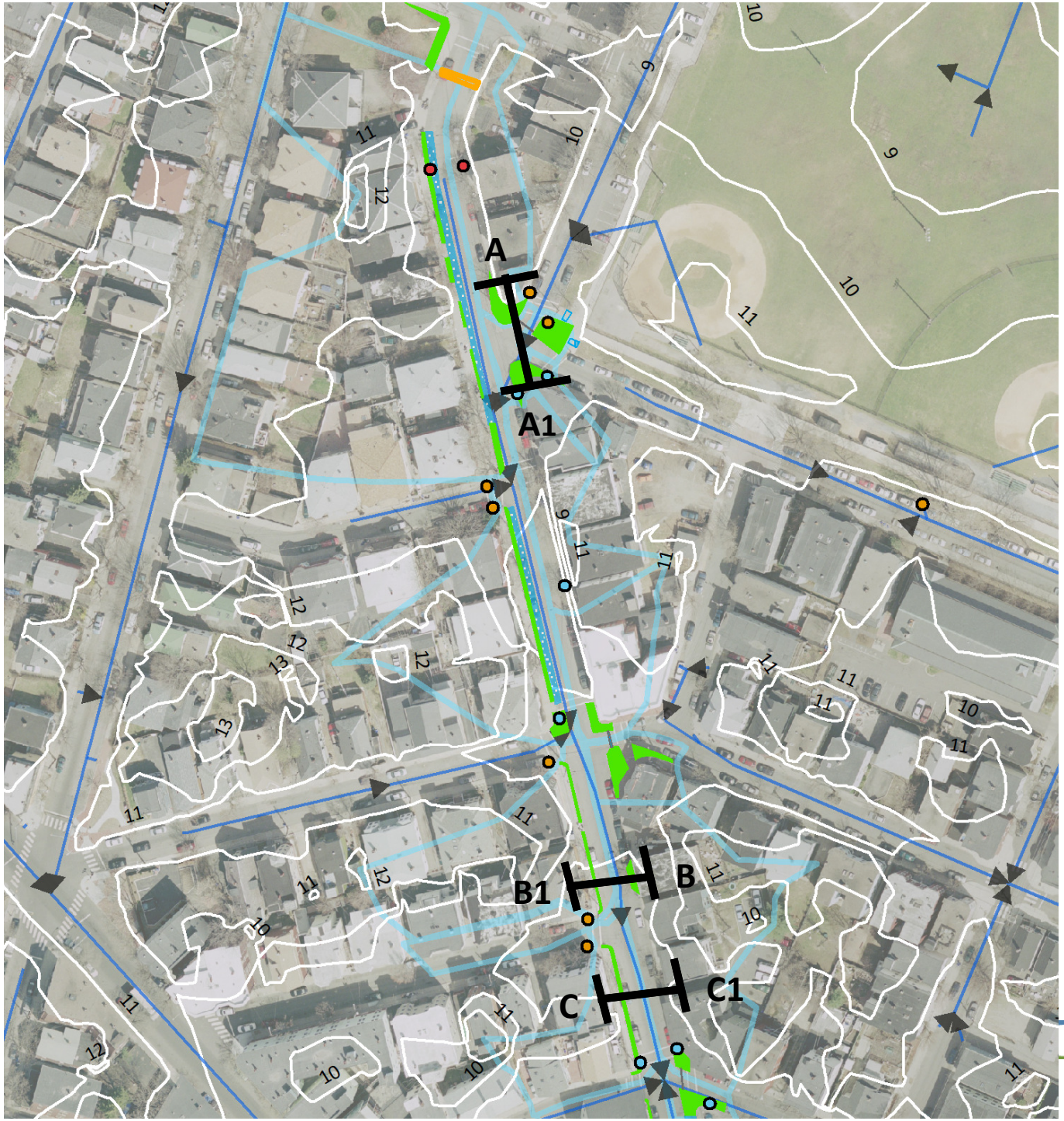
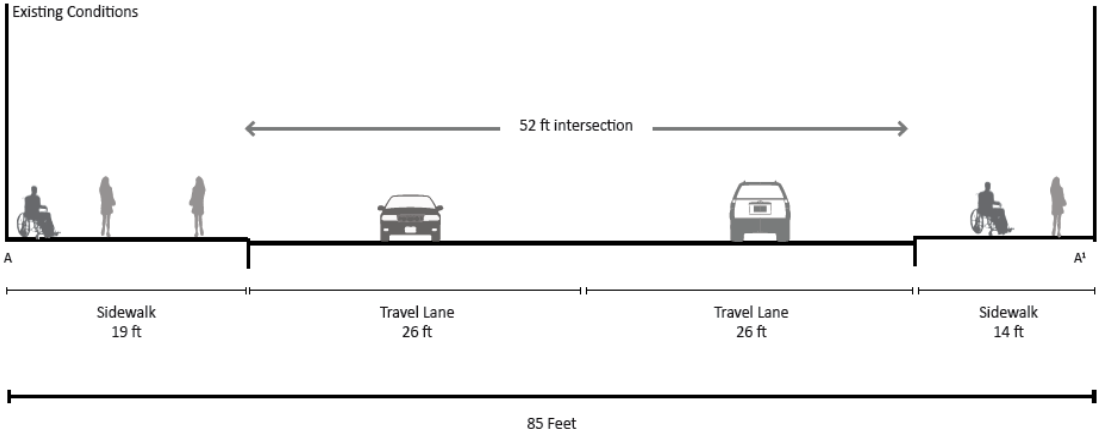
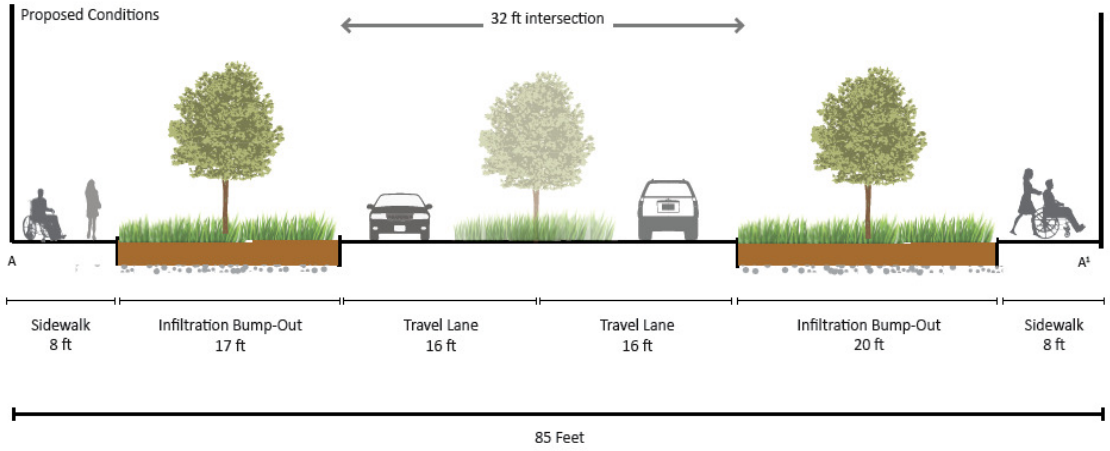

A
A1
B
B1
C
C1

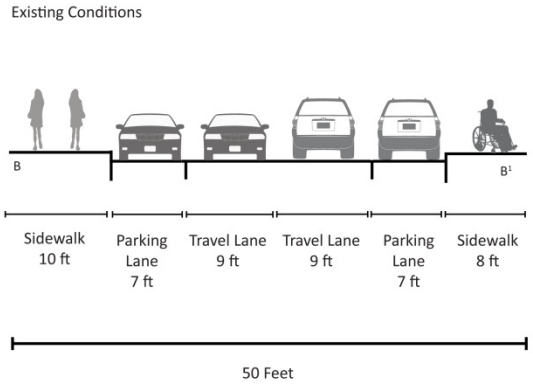
Webster Cross Sections

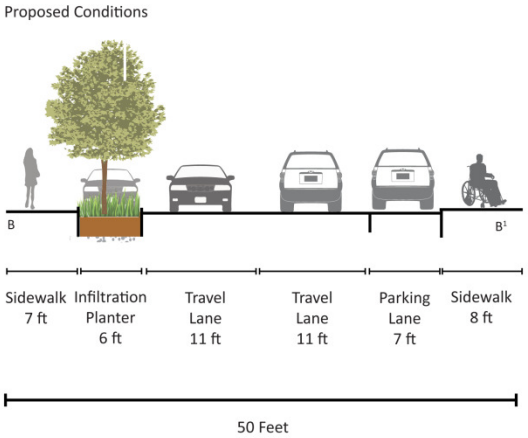
Webster Avenue Cross Section A–A¹
At the intersection of York and Willow Streets, Facing Donnelly Field





Webster Avenue Cross Section B–B¹
Looking North





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Chestnut St

- Lies in four distinct separated stormwater catchment areas
- East-west oriented public right-of-way located within the Cambridgeport neighborhood
- Series of rolling hills, narrow ROW and sidewalks
- Two-way with parking on both sides
- Identified as low-speed, bicycle friendly

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Chestnut Street

Table 3. Chestnut Street Watershed Design Targets & Results	
Total Drainage Area	11.05 acres
Impervious Area	7.90 acres
Total Runoff Volume (1″)	28,677 cubic feet
Total BMP Area	0.64 acres
Total Runoff Volume Captured	38,179 cubic feet

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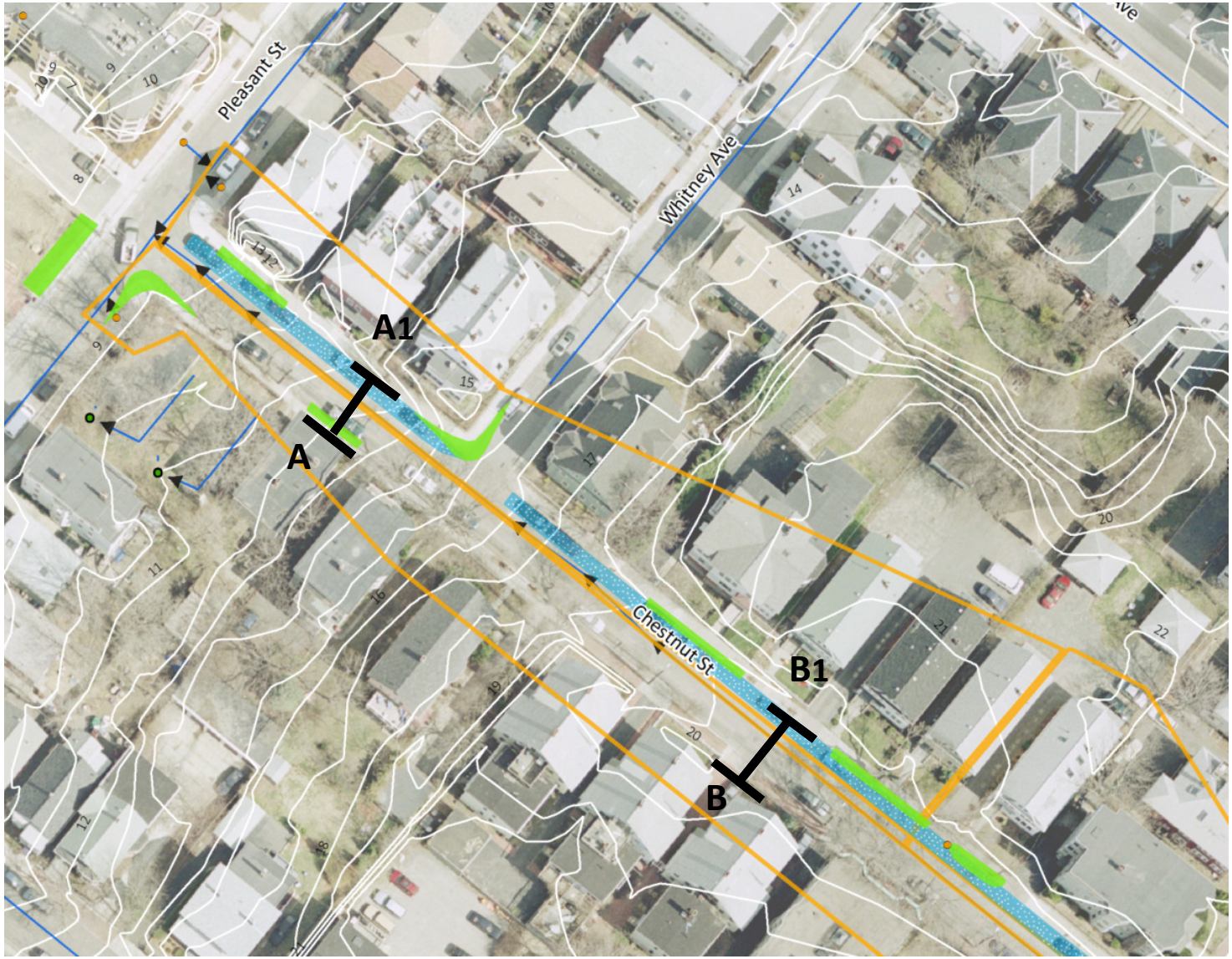
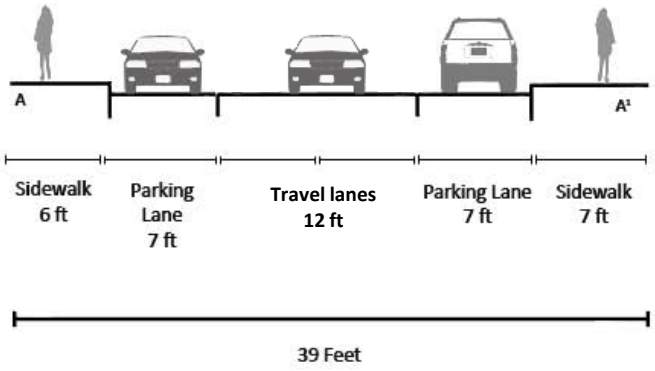
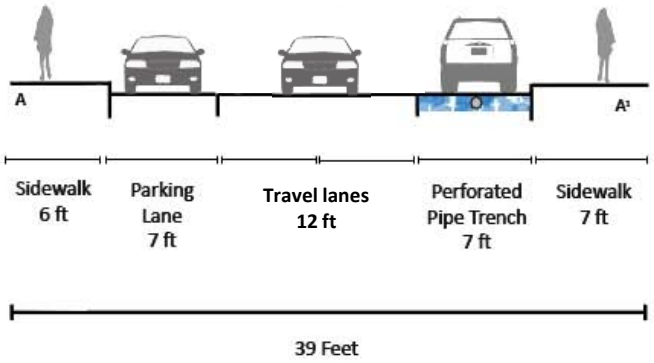

Pleasant St
Whitney Ave
Chestnut St
A1
A
B1
B

Chestnut Street Cross Section A–A¹
Near Pleasant Street, Looking North

Existing Conditions

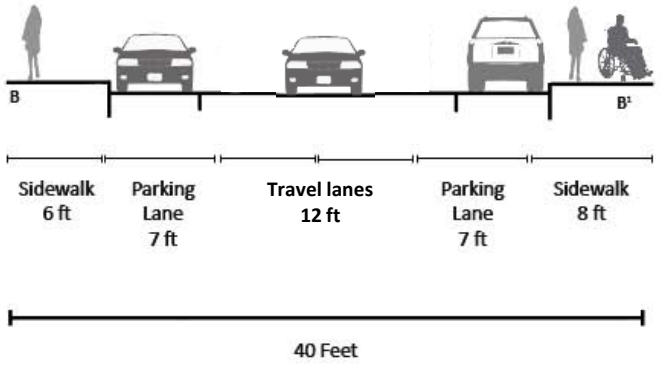


Proposed Conditions

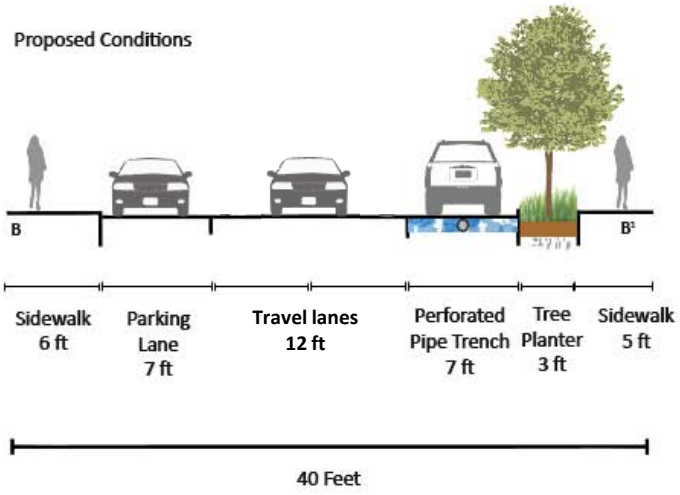


Chestnut Street Cross Section B–B¹
Near Whitney Avenue, Looking North

Existing Conditions



Proposed Conditions



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Park Ave

- Combined stormwater catchment system situated just south of Fresh Pond and north of the Charles River
- Two-way public right-of-way in the Strawberry Hill neighborhood
- Slopes downhill from north to south
- High groundwater according to NRCS data
- Wide roadway and sidewalks, low parking demand
- Identified as low-speed, bicycle friendly

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Park Ave

Table 4. Park Avenue Watershed Design Targets & Results	
Total Drainage Area	6.09 acres
Impervious Area	4.30 acres
Total Runoff Volume (1″)	15,579 cubic feet
Total BMP Area	0.20 acres
Total Runoff Volume Captured	16,077 cubic feet

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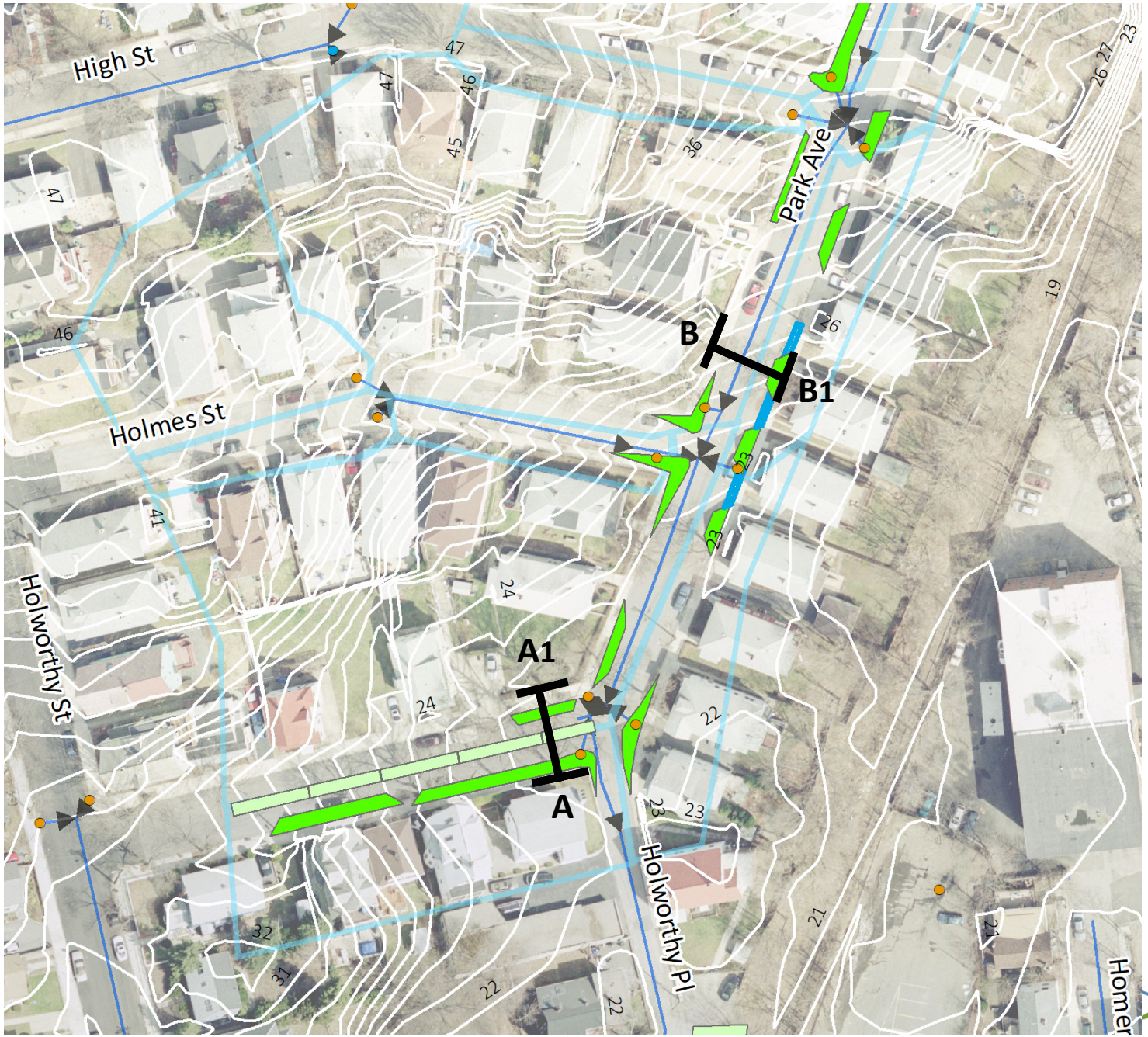
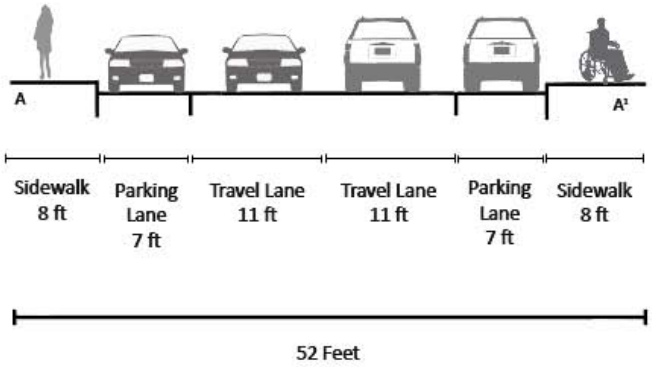
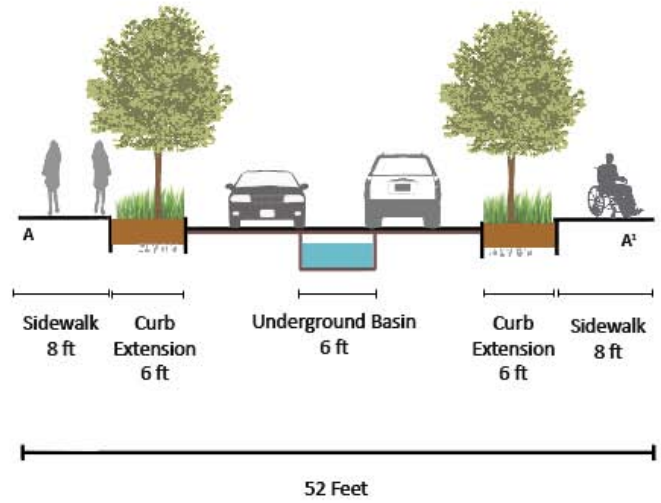

High St
Holmes St
Holworthy St
Holworthy Pl
Park Ave
A
A1
B
B1

Park Avenue Cross Section A–A¹
At Elbow Intersection with Holworthy Place, Looking East

Existing Conditions

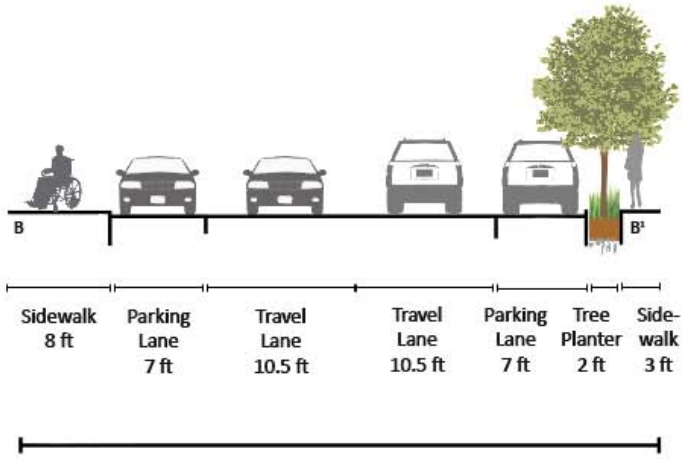


Proposed Conditions



Park Avenue Cross Section B–B¹
North of Elbow Intersection with Holworthy Pl, Looking North

Existing Conditions



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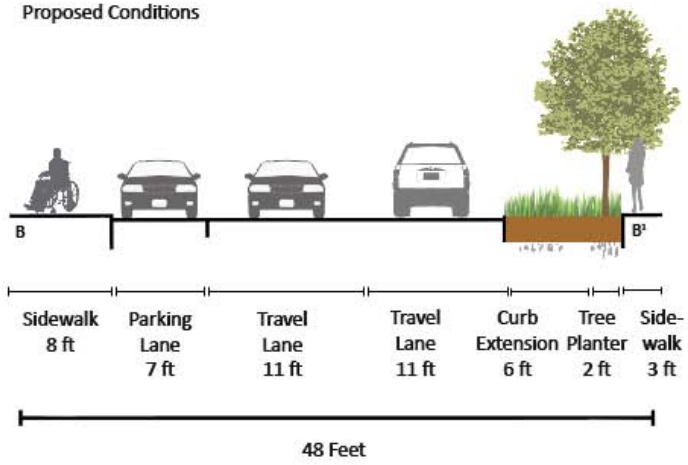

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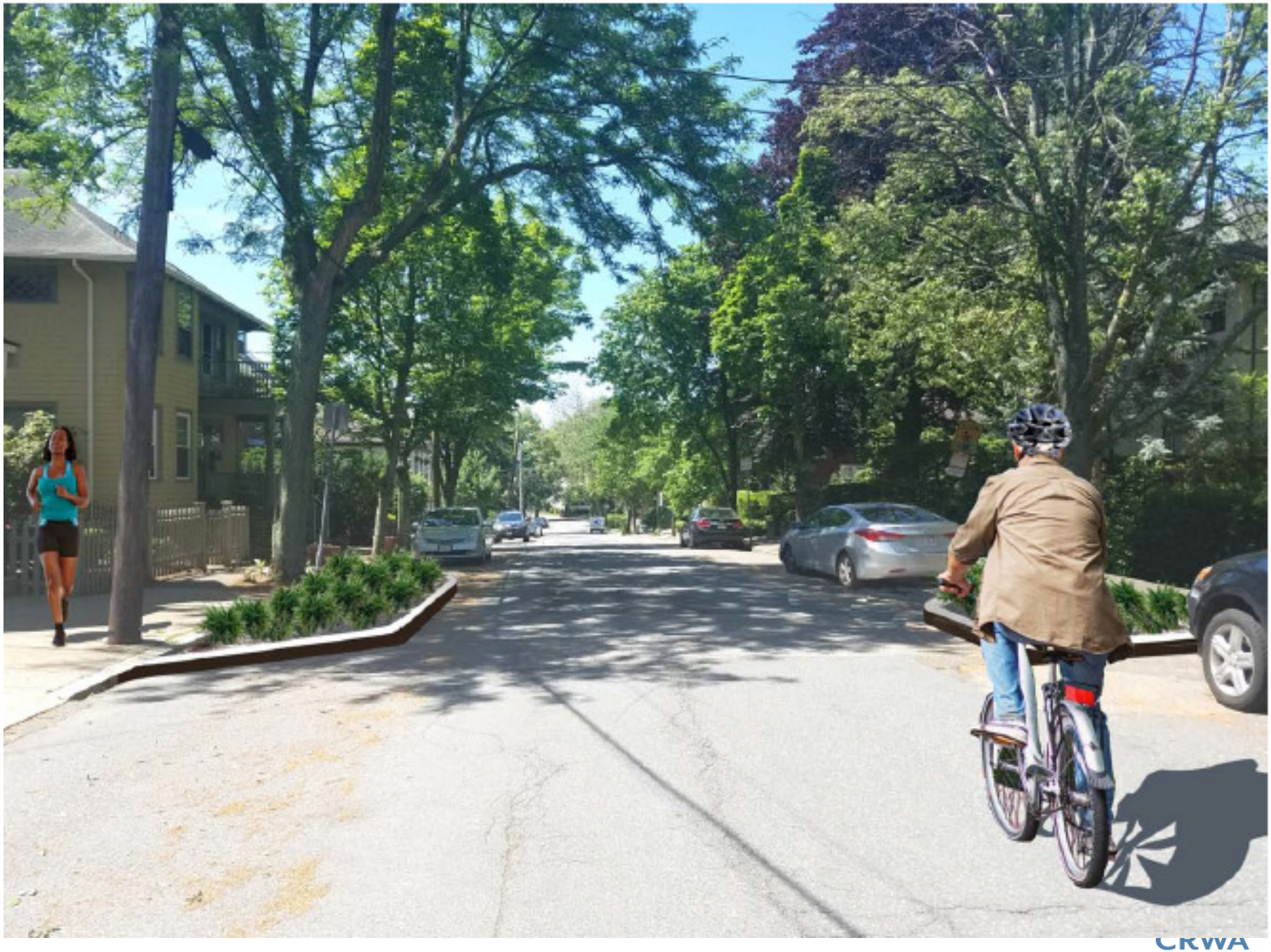

Additional Tasks

- Green Street Guidance Document
- Multi-sector city-wide engagement
  - *Open space plan*
  - *Tree canopy goals*
  - *Bike-ped initiatives / vision zero*
  - *Climate change planning*
- Online resident survey
- Expansion modeling

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City-wide Modeling: Phosphorus Load Reductions

- Green infrastructure designs were successful in reducing phosphorus loading by 93% on Webster Ave, 77% on Chestnut Street, and 53% on Park Avenue.

- Overall, infiltration systems were more successful at reducing phosphorus loading when compared to biofiltration systems.

- By calculating the average phosphorus load reduction per linear foot of all three project streets, CRWA was able to calculate potential pollution load reductions based on projections of 10%, 25%, and 50% city-wide green residential street implementation targets (Table 8).

Table 8. Phosphorus load reduction projections

City-wide residential green streets			
Projection	10%	25%	50%
Phosphorus reduction	136 kg/year	341 kg/year	682 kg/year

CRWA

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QUESTIONS AND COMMENTS?

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