



CAMBRIDGE  
DEPARTMENT  
OF PUBLIC  
**THE  
WORKS**

**City of Cambridge**  
Department of Public Works

# Five Year **Sidewalk and Street** Reconstruction Plan

April 2021



# 5 YEAR PLAN | TABLE OF CONTENTS

		<u>Page</u>
<b>INTRODUCTION</b>	Complete Streets   Bicycle Ordinance   Vision Zero	2-4
<b>PRIORITIES</b>	Constraints   High Priority Areas   Sidewalk Conditions   Pavement Conditions   Equity   Transit	5-12
<b>5 YEAR PLAN</b>	Scope of Work   Completed Streets   Planned Construction   Funding	13-16
<b>PROGRAMS</b>	Sewer Separation & Stormwater   Street & Sidewalk   Miscellaneous Sidewalk   Climate Change   Healthy Forest - Healthy City	17-25
<b>DESIGN/SCOPE</b>	Pedestrian Ramps   Pedestrian Access   Sidewalk Materials   Bicycle Facilities   Transit   New Construction   Street Trees   Green Infrastructure   Traffic Signals	26-36
<b>CONSTRUCTION</b>	Pedestrian Access   Bicycle Access   Transit	37-39
<b>NEXT STEPS</b>	Conclusion	40



## INTRODUCTION | COMPLETE STREETS

Complete Streets are **streets for everyone**. They are designed and operated to enable **safe access for all users**. Pedestrians, bicyclists, motorists, and public transportation (transit) users of all ages and abilities are able to safely move along and across a Complete Street. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They help buses run on time and make it safe for people to walk to and from train stations.

More sidewalks and bicycle facilities are included in Complete Streets, which provide **increased accessibility for pedestrians and cyclists**.

During design and construction of Complete Streets, the City's goal is to communicate projects with neighborhoods, facilitate an integrated design process, minimize disruption to community life, and provide reasonable access for all users during reconstruction.

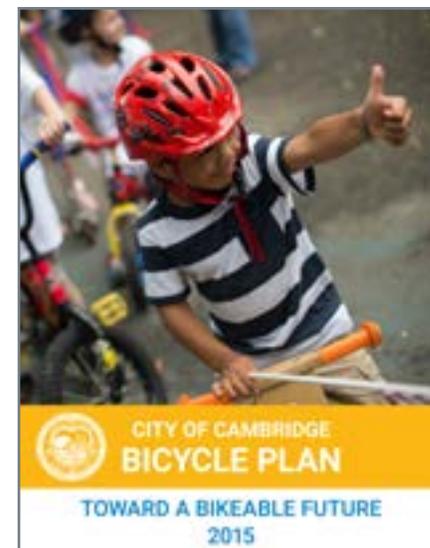
# INTRODUCTION | BICYCLE ORDINANCE

In 2019, the Cambridge City Council passed a **Cycling Safety Ordinance** to support the City's commitment to Vision Zero and the construction of a connected network of permanent separated bicycle lanes across the City. The 2020 amendments to the Ordinance aim to **increase the rate that protected bike lanes are created in the City** by adding ambitious requirements for the installation of approximately 25 miles of separated bike lanes within the next six to eight years.

Under the Ordinance, whenever improvements are made under the City's Five Year Sidewalk and Street Reconstruction Plan, **the improvements shall be consistent with the Cambridge Bicycle Plan**. If improvements are made to a segment of the separated bicycle network, a permanent separated bicycle lane shall be installed along that segment.

Improvements do not include routine maintenance, repairs, restriping of the road surface, or emergency repairs to the surface of the roadway.

[www.cambridgema.gov/streetsandtransportation/policiesordinancesandplans/cyclingsafetyordinance](http://www.cambridgema.gov/streetsandtransportation/policiesordinancesandplans/cyclingsafetyordinance)



# INTRODUCTION | VISION ZERO

On March 21, 2016, the Cambridge City Council unanimously passed resolutions put forth by the City Manager to formally adopt Complete Streets and Vision Zero policies, showing that the City is committed to achieving these goals, assuring safe access for all users.



**Vision Zero calls for the elimination of fatalities and serious injuries resulting from traffic crashes**, and emphasizes that they can and should be prevented. The City of Cambridge is the 17th city in the U.S. to commit to a Vision Zero policy.



# PRIORITIES | CONSTRAINTS

Projects are constrained when:

- Budget predictions are uncertain.
- Sewer separation/storm water management project schedules are uncertain.
- Future street condition assessments change.
- Utility failure, repair, or replacement is not considered.
- Severe winter conditions lead to higher-than-expected levels of deterioration on streets.



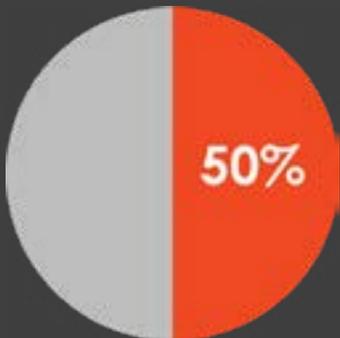
The Department of Public Works (DPW) will review the Five Year Plan on an annual basis. The variables and constraints are significant, and thus the annual revisions may need to reflect these uncertainties.

# PRIORITIES | HIGH PRIORITY AREAS



Reconstruct sidewalks and streets in poor condition in **High Priority Areas**:

- Areas within a 150-foot buffer of parks, major squares, libraries, schools, youth centers, senior housing, and senior centers.
- Areas within a 40-foot buffer of bus routes.
- Major thoroughfares to maintain the structural integrity of streets under heavy traffic.
- Streets on Cambridge Bicycle Plan's Bicycle Network Vision.
- Priorities identified by the Commission for Persons with Disabilities.



Just over 50% of City sidewalks and streets are located outside High Priority Areas. These corridors serve residential connections and need to be maintained to the extent that funding allows.



Approximately 20% of street and sidewalk funding will be reserved for areas located outside High Priority Areas.

# PRIORITIES | HIGH PRIORITY AREAS



Projects are evaluated in coordination with the **Cambridge Bicycle Plan** to identify streets with non-existent or inadequate bicycle facilities, particularly where reconstruction could improve route connectivity and continuity for cyclists. The Plan is set to be updated in 2021.

For more information, visit: [www.cambridgema.gov/CDD/Transportation/bikesincambridge/bicyclenetworkplan](http://www.cambridgema.gov/CDD/Transportation/bikesincambridge/bicyclenetworkplan)

# PRIORITIES | SIDEWALK CONDITIONS



Each block of sidewalk received a rating between 0 (excellent) and 35 (poor) based on the following criteria:

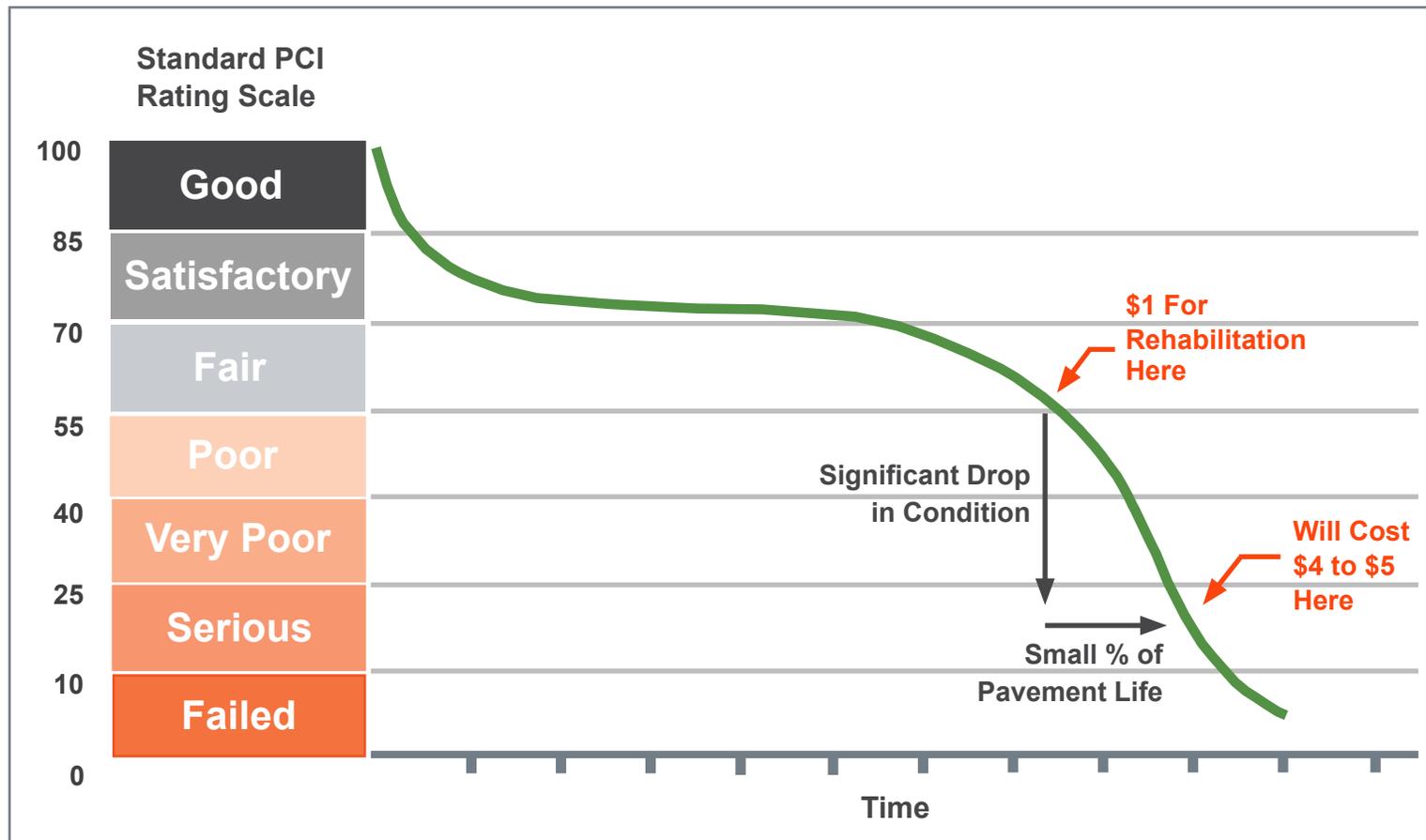
- Driveway conditions
- Trees or other obstructions
- Cross-slope
- Overall structural condition

# PRIORITIES | PAVEMENT CONDITIONS



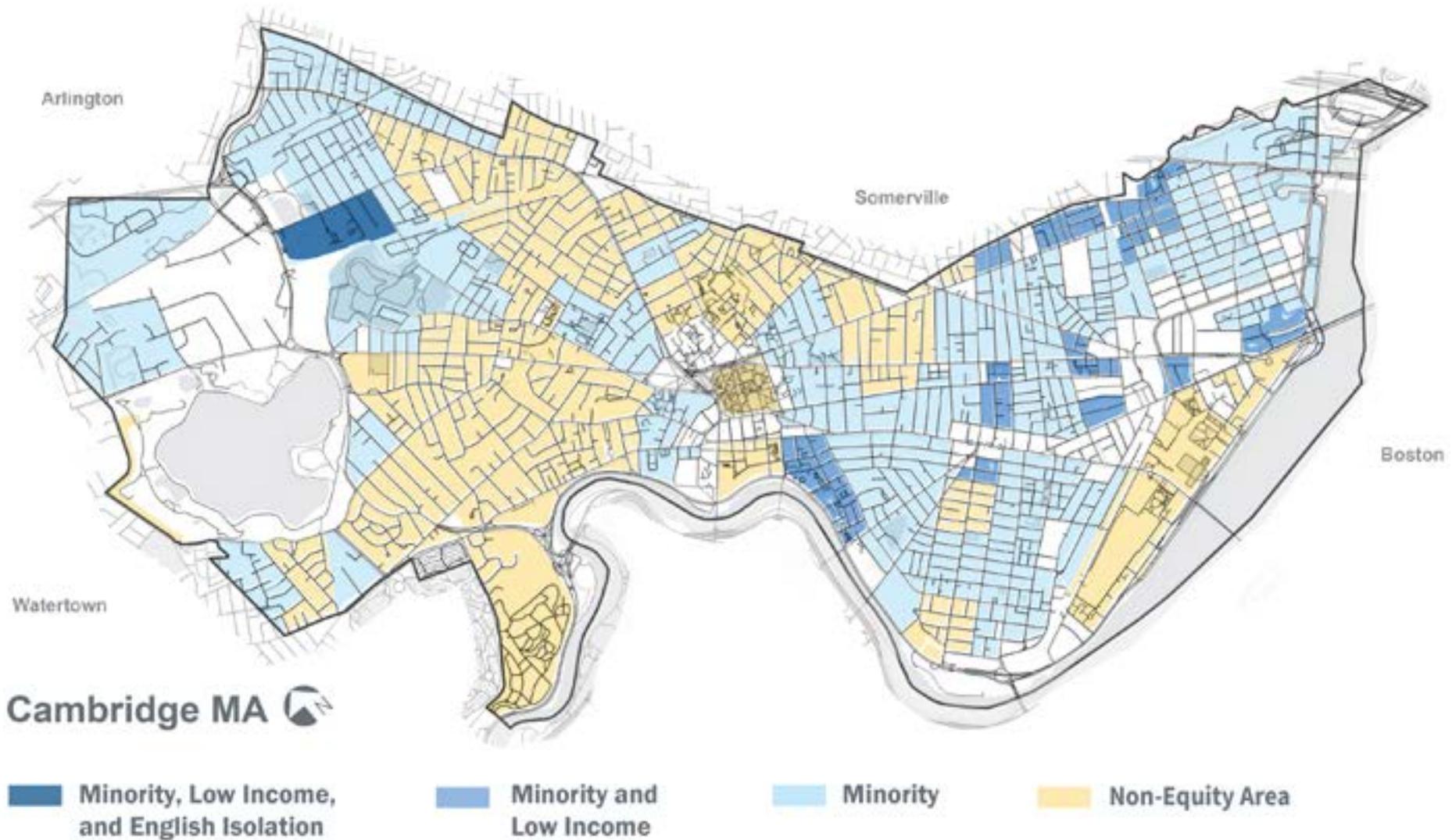
New street condition assessments are completed every three years and the plan is updated accordingly.

# PRIORITIES | PAVEMENT CONDITIONS



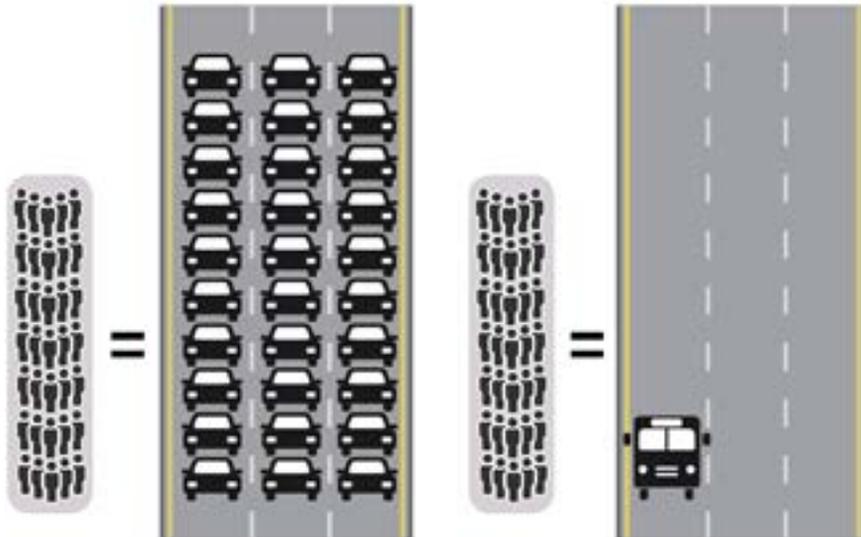
Based on the Pavement Condition Index (PCI), the City's average rating is 66.2. The average is holding steady year to year. A combination of capital construction and maintenance have resulted in a decrease of \$2.4 million in the backlog of repairs.

# PRIORITIES | EQUITY



The Five Year Plan considers many factors beyond condition, including ensuring that infrastructure in neighborhoods across the City is equitably maintained.

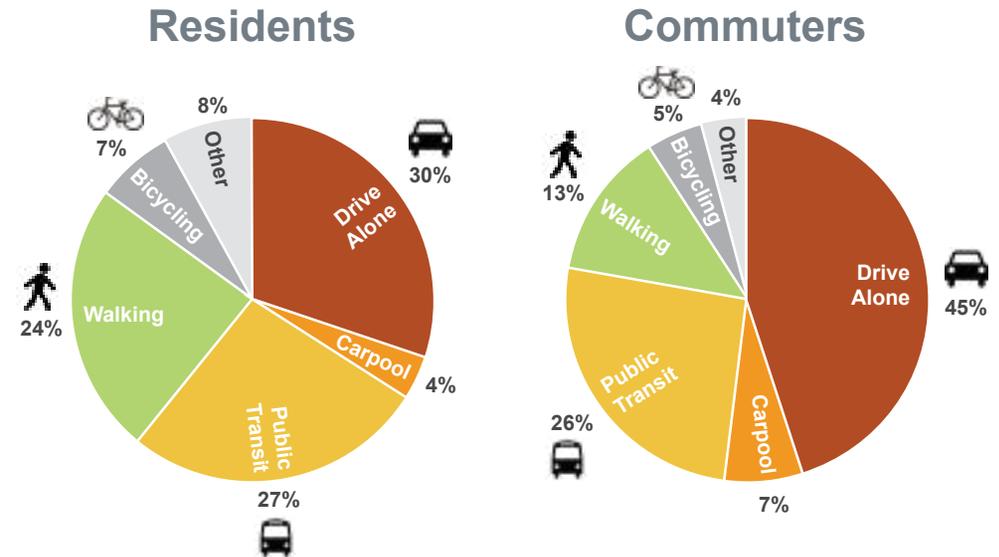
# PRIORITIES | TRANSIT



The graphics above illustrate the same number of people in cars versus in a bus.



## Cambridge Commuting: Getting Around



### Benefits of good transit access:

- A sustainable and efficient mode of transportation that moves people safely compared to driving in private automobiles.
- In some cases, more people on the road may be on buses than in private cars.
- Dense economic and commercial centers thrive (e.g., Kendall Square).

# 5 YEAR PLAN | SCOPE OF WORK

Our approach emphasizes **streets designed and operated for everyone**. The following elements allow pedestrians, bicyclists, motorists, and transit users of all ages and abilities to safely move along and across **Complete Streets**.



Accessibility: Ensure pedestrian ramps and sidewalks are accessible for all, and implement universal design



Vision Zero: Eliminate fatalities and serious injuries resulting from traffic crashes



Transit: Provide accessibility of bus stops and prioritization of transit



Bicycle network: Support people of all ages and abilities to bike safely throughout the City

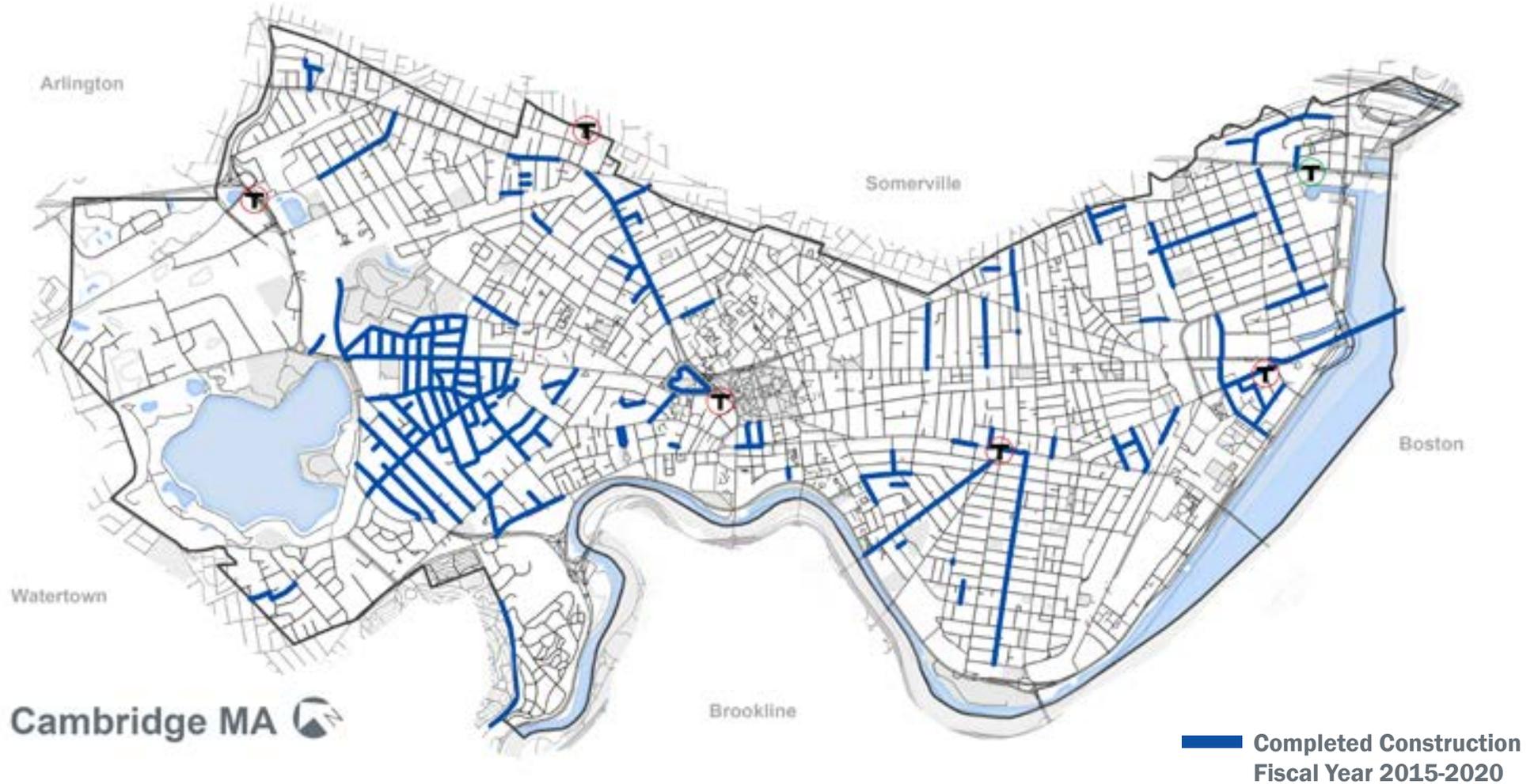


Street trees & green infrastructure: Reduce urban heat island and improve water quality



Infrastructure: Maintain and improve City infrastructure; coordinate with private utilities to facilitate upgrades

# 5 YEAR PLAN | COMPLETED STREETS



# 5 YEAR PLAN | **PLANNED CONSTRUCTION**



For an interactive construction map, visit: [www.cambridgema.gov/theworks/constructionmap](http://www.cambridgema.gov/theworks/constructionmap)

# 5 YEAR PLAN | FUNDING

Each year, approximately **\$13.5 million** is spent on the Complete Streets Program:

- \$2.5 million comes from the State (Chapter 90)
- \$6 million comes from the City budget
- \$5 million per year starting in 2022 to further implementation of separated bike lanes

Due to more demand than **funding** or **ability to construct**, the City must identify streets:

- In high priority locations that benefit the most people
- That have overlapping needs/benefits
- That prioritize accessibility, active transportation, and safety
- That maintain infrastructure

In addition to the Complete Streets funding summarized above, the City allocated **\$232 million** for the following projects in this year's plan:

- \$38 million for Central Square improvements
- \$6 million for Eliot Street improvements
- \$9 million for Inman Square improvements
- \$45 million for Kirkland Street improvements
- \$80 million for The Port improvements
- \$54 million for River Street reconstruction



# PROGRAMS | SEWER SEPARATION & STORMWATER

The City has an ongoing Five Year Capital Program for sewer separation, stormwater management and infrastructure renewal. The City is committed to **restoring** and **enhancing streets, sidewalks,** and **bicycle facilities** as an integral part of the Capital Program. These projects are subject to change in the schedule due to financial, legal, environmental, and level of service considerations.



# PROGRAMS | SEWER SEPARATION & STORMWATER

Twenty-five years of major investment in sewer and stormwater infrastructure and maintenance has had a **significant, positive impact on improving the water quality** of discharges to receiving waters.

The amount of Combined Sewer Overflows to the Charles River and Alewife Brook have **significantly decreased** over the past two decades: Charles River by 98%, Alewife Brook by 85%. In the Lower Charles, **water quality has improved from a grade of D to a B**. This is a significant accomplishment, but the work is not done to reach the goal of a swimmable Charles River.



Investment in infrastructure over a long period of time provides a more reliable system that better serves residents, who experience fewer backups, reduced flooding, and fewer emergency repairs.

To view the Ten Year Sewer and Drain Infrastructure Plan, visit: [www.cambridgema.gov/theworks/tenyearplan](http://www.cambridgema.gov/theworks/tenyearplan)

# PROGRAMS | SEWER SEPARATION & STORMWATER

Since the 1800s, thousands of hours of engineering and hundreds of millions of dollars of construction have been allocated to realize a more efficient and environmentally friendly system.



1931



2016

- Sewer separation continues today, and the City's collection system currently includes approximately 113 miles of sanitary sewer, 99 miles of stormwater drains, and 40 miles of combined sewer.
- Approximately 55% of the collection system owned and maintained by Cambridge has been separated — much work remains.
- Over 270 illicit connections have been removed, reducing this sewage going untreated to the river.
- Projects involve intense construction and typically include rebuilding roadways and sidewalks.

# PROGRAMS | STREET & SIDEWALK

Street and sidewalk construction projects generally include:

- Paving
- Sidewalk and pedestrian ramps
- Traffic calming
- Street trees
- Stormwater management and green infrastructure
- Bike and transit improvements

The City actively maintains and ensures safe, accessible City-owned street and sidewalks by:

- Conducting pothole repairs
- Paving streets through Miscellaneous Patch Contract
- Removing sidewalk obstructions, such as botanical, bicycle, signs, etc.
- Enforcing snow and ice removal

**TOOLBOX DESIGN ELEMENTS**  
STREET & SIDEWALK RECONSTRUCTION



**Raised Crosswalks**  
[at side streets]





**New Sidewalks**  
[brick & concrete]





**Flexi Pave**  
[at trees]





**Curb Extensions & Ramps**  
[for accessibility]





**Sidewalk Construction**





**New Tree Plantings**



# PROGRAMS | MISCELLANEOUS SIDEWALK

- Budget: \$800,000 per year
- Program is used to address discrete sections of sidewalk throughout the City.
- Repairs typically a block in length, but can be as small as one panel.
- Priority given to sidewalks and curb cuts in High Priority Areas, and as identified by **Commission for Persons with Disabilities and the DPW**.
- The DPW makes smaller repairs throughout the year to maintain accessibility across the City.
- Portion of Miscellaneous Sidewalk Program funding reserved for **sidewalks and curb cuts** where access is of acute importance.
- If you know of a location that is a critical access issue and is not addressed in the Five Year Plan, please contact the Commission.



## Cambridge Commission for Persons with Disabilities

**Rachel Tanenhaus**, Executive Director  
**Kate Thurman**, Disability Project Coordinator  
51 Inman Street, Second Floor  
Cambridge, MA 02139  
ccpd@cambridgema.gov  
Voice: 617-349-4692 / TTY: 617-492-0235  
Fax: 617-349-4766  
[www.cambridgema.gov/disabilities](http://www.cambridgema.gov/disabilities)

# PROGRAMS | CLIMATE CHANGE

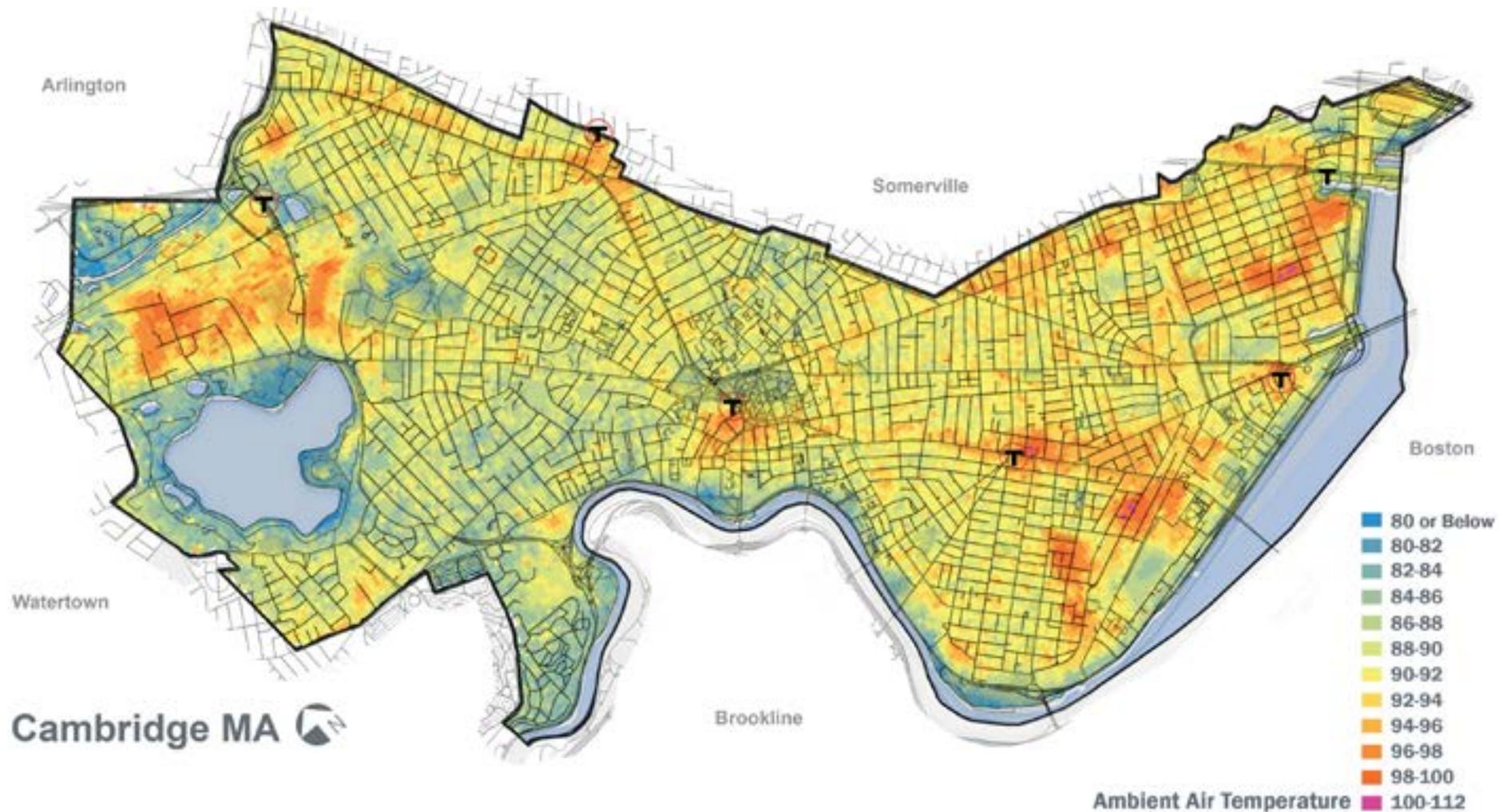
Our climate is changing, bringing more severe storms, more extreme floods, and more intense heat waves. Through projects in the Five Year Plan, we have opportunities to implement resiliency strategies, ranging from green infrastructure to improved drainage to additional tree plantings.



*Courtesy photo:  
Chicago Heat  
Wave of 1995*



# PROGRAMS | CLIMATE CHANGE



The Urban Heat Index (UHI) shows the “feels-like” temperature based on a 90-degree day with 46% humidity. Factors, such as increasing temperatures and tree canopy loss, are increasing the “feels-like” temperature over time. Young children and older residents are most at risk of heat-related illness.

For more information, visit: [www.cambridgema.gov/CDD/Projects/Climate/climatechangeresilienceandadaptation](http://www.cambridgema.gov/CDD/Projects/Climate/climatechangeresilienceandadaptation)

# PROGRAMS | HEALTHY FOREST - HEALTHY CITY

A healthy urban forest is a vital part of a healthy city. Trees - whether they are on streets and in parks, on private properties and campuses - help us lower sidewalk temperatures in the summer, reduce home cooling costs, improve air quality, and support a living ecosystem.

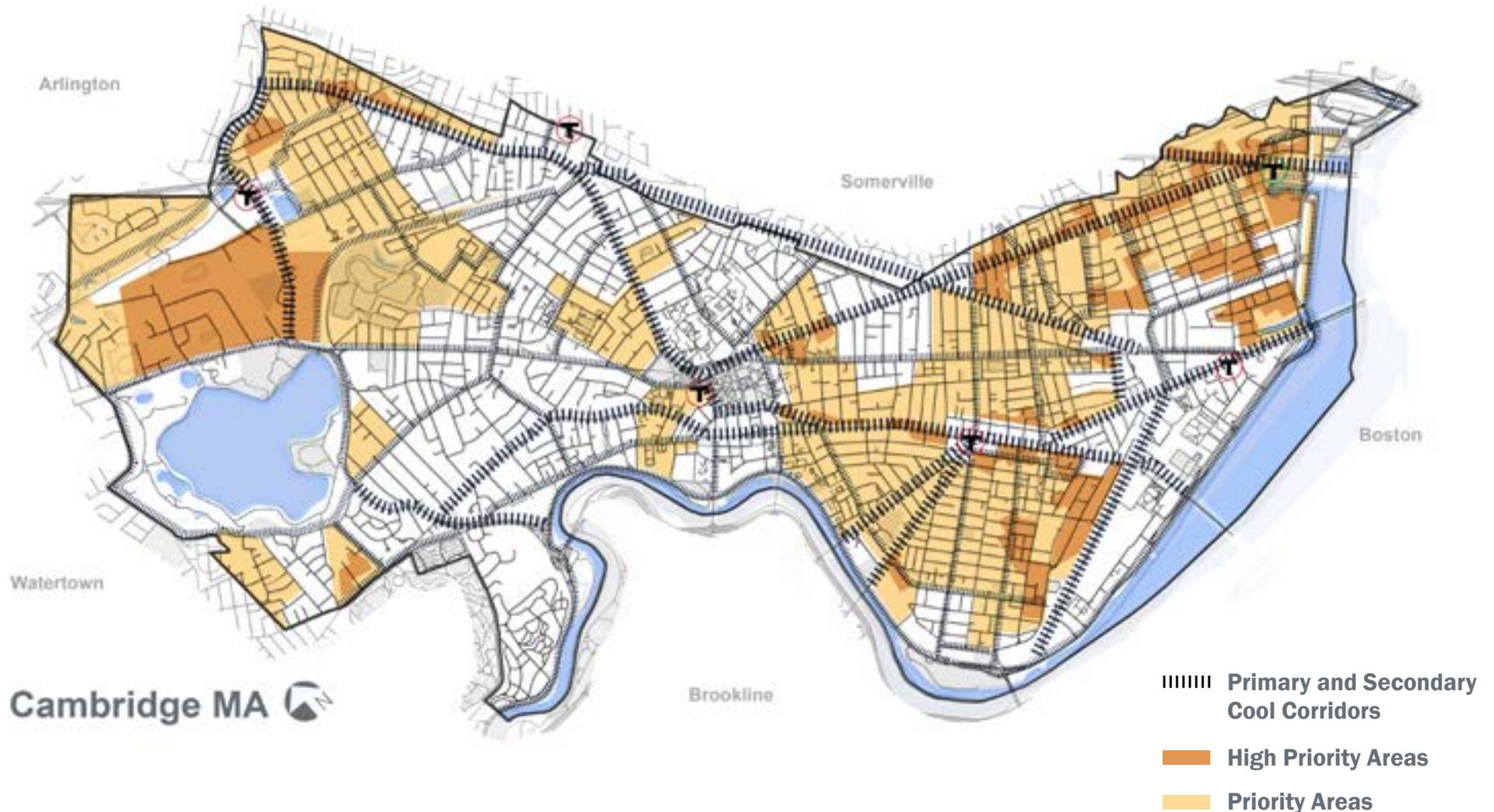
The City maintains over 19,000 trees and has developed an Urban Forest Master Plan to guide the development of the urban forest into the future. The goals are: increase canopy cover where lacking; enhance canopy cover in the public realm to create “cool corridors”; and incentivize each landowner to increase canopy cover.



The images above show the cooling impact on a 90-degree day relative to streetscape. As the tree canopy increases, the “feels like” temperature decreases. It is our common responsibility to plant and maintain trees every year to sustain our urban forest and foster a healthy city.

For more information, visit: [www.cambridgema.gov/Departments/publicworks/urbanforestmasterplan](http://www.cambridgema.gov/Departments/publicworks/urbanforestmasterplan)

# PROGRAMS | HEALTHY FOREST - HEALTHY CITY



The map shows the priority planting areas through the City on both public and private properties. The City is committed to increasing the tree canopy on streets and sidewalks through our construction projects.

# DESIGN | PEDESTRIAN RAMPS



Pedestrian ramps are a critical element of the accessible sidewalk. The details of the design and construction have a significant impact on their usability.

- All new pedestrian ramps, including landing areas, will be concrete and include tactile warning strips.
- All slopes will meet ADA/AAB requirements.
- All new pedestrian ramps will be designed to:
  - Minimize ponding
  - Locate ramps as close to the intersection as possible

The best design for pedestrian crossings, particularly on narrow side streets, may be a modified raised crosswalk that:

- Allows pedestrians to cross the street without having to ramp down.
- Reduces the risk of ponding.
- Keeps the crossing more in line with the sidewalk.

# DESIGN | PEDESTRIAN ACCESS



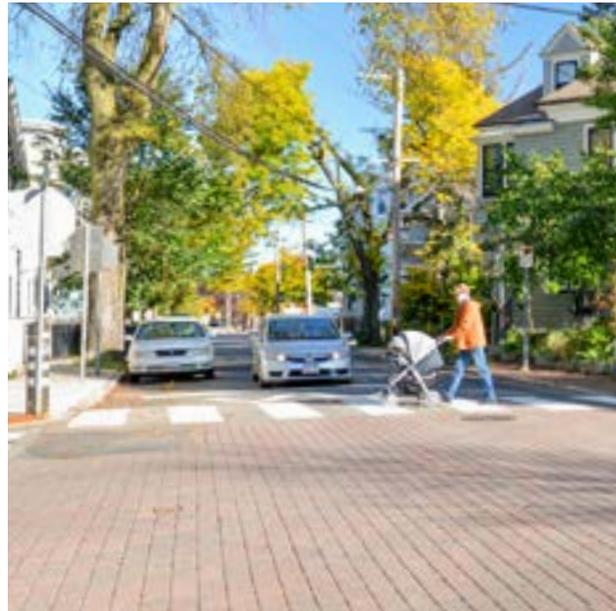
## MID-BLOCK CROSSINGS

These are generally not used, unless the blocks are especially long or there is an especially large pedestrian flow.



## 4-WAY INTERSECTIONS

Unless site conditions warrant a different treatment, four crosswalks and eight pedestrian ramps should be provided.



## 'T' INTERSECTIONS

At least one crosswalk and two pedestrian ramps are required for accessible path of travel along the main corridor. Site conditions are considered to determine if crosswalks should be provided.

# DESIGN | SIDEWALK MATERIALS



Concrete and wire-cut brick without beveled edges, placed on a smooth asphalt base, will be utilized as the sidewalk materials of choice throughout the City. Concrete is the material most frequently used in the city (~70%) and provides a relatively inexpensive, durable, and easy-to-maintain accessible sidewalk.

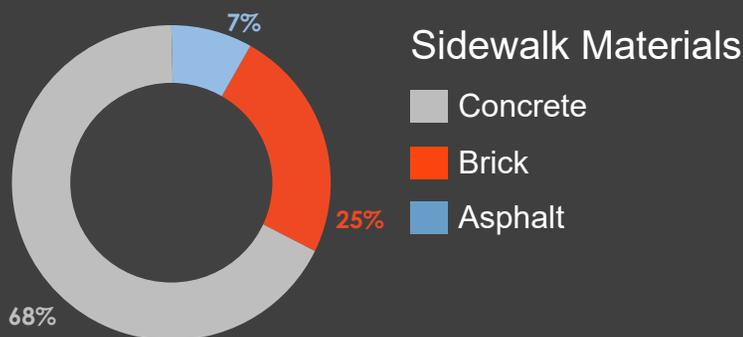
The City policy is to replace existing sidewalks with the same material at no cost to the property owner. However, during construction, property owners are contacted and may choose to change the sidewalk material. On larger projects, a more unified approach to sidewalk materials has been implemented as part of a community process.

## Historic Districts

The DPW works collaboratively with the Historic Commission to ensure that sidewalk reconstruction work is appropriate and not incongruous to the district.

## Standard Details

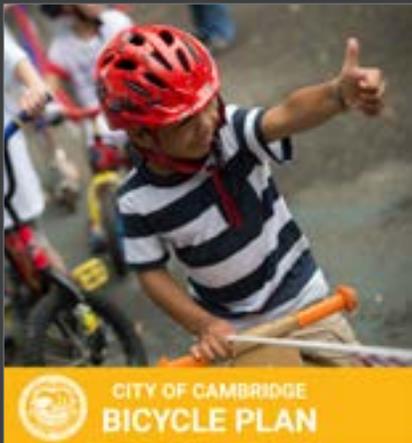
For more information, visit: [www.cambridgema.gov/theworks/ourservices/engineering/Resources/standarddetails](http://www.cambridgema.gov/theworks/ourservices/engineering/Resources/standarddetails)



# DESIGN | BICYCLE FACILITIES



Photo courtesy of  
Nichol Figueiredo



CITY OF CAMBRIDGE  
BICYCLE PLAN

## Bicycle Facilities

Many sections of Cambridge are well served by bicycle-friendly infrastructure, but there are still significant gaps and areas in need of improvement. Improvements for bicycling are considered in all projects undertaken by the City.

The design of bicycle facilities will be guided by the **Cycling Safety Ordinance** and the **Bicycle Plan**. The fundamental guiding principle for this Plan is to enable people of all ages and abilities to bicycle safely and comfortably throughout the City.

# DESIGN | TRANSIT

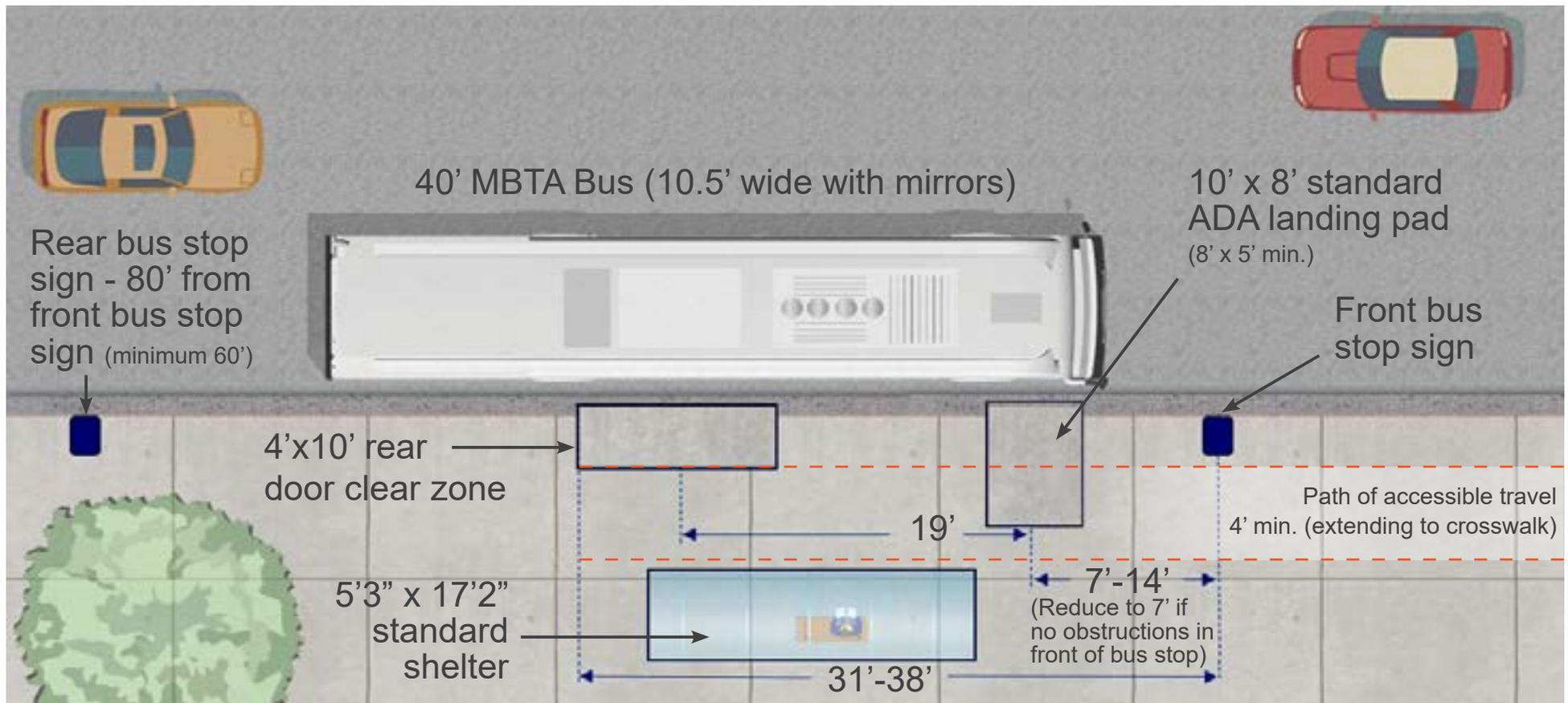
Transit considerations include:

## Priority

The City performed a bus delay and reliability assessment to explore options for transit priority (e.g., dedicated lanes) in roadway projects where there are expected benefits.

## Accessibility

The City developed a bus stop standard to ensure accessibility and also provide amenities when appropriate.

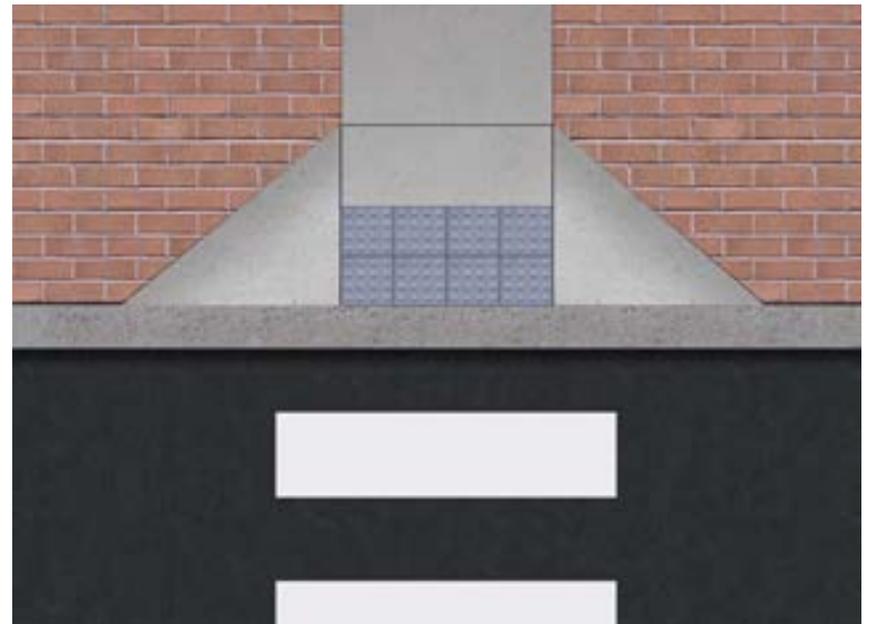


# SCOPE | NEW CONSTRUCTION

## City Projects

Below are the requirements specific to all City construction projects in the public Right-of-Way. The goals of these requirements are to meet state and federal regulations, maximize **accessibility improvements**, and minimize the extent to which work has to be reconstructed in the future.

- New sidewalks (concrete or brick) will **meet ADA/AAB requirements**.
- Roadway paving that abuts pedestrian ramps will include the **reconstruction of abutting non-compliant pedestrian ramps**.
- **15 Foot Rule:** To minimize the need for non-compliant transition segments between old and new sidewalks, if a compliant segment within 15 feet of the end of proposed new work is identified, work will be extended to the compliant segment.
- If a significant portion of sidewalk on a given side of a block is reconstructed, the **entire sidewalk on that side should be compliant**.



# SCOPE | NEW CONSTRUCTION

## Private Utilities

Below are the requirements specific to all street and sidewalk reconstruction projects constructed by private utilities within the City public Right-of-Way.



- Sidewalk construction subsequent to utility work will meet ADA/AAB requirements.
- Roadway paving (subsequent to utility work) that abuts pedestrian ramps, will include the reconstruction of abutting non-compliant pedestrian ramps.
- If a full block of sidewalk is being reconstructed, due to utility work, a Professional Engineer must submit a stamped design prior to construction, and a certification of compliance after construction is complete.
- If more than 30 feet of contiguous sidewalk, a curb cut, or a driveway is being constructed due to utility work, a survey and design will generally be required. Survey and design requirements will be determined by the DPW based on the specific location.
- In lieu of final restoration, payments made by utility companies (Street Preservation Offset Fees) will include the complete cost of necessary sidewalk restoration.

# SCOPE | NEW CONSTRUCTION



## Private Entities

Requirements specific to street and sidewalk reconstruction projects constructed by private entities within the City of Cambridge public Right-of-Way will adhere to the same requirements as City projects in addition to the below requirements:

- If a full block of sidewalk is being reconstructed, a Professional Engineer must submit a stamped design prior to construction and a certification of compliance after construction is complete.
- If more than 30 feet of sidewalk, a curb cut, or a driveway is being constructed, a survey and design will generally be required. Survey and design requirements will be determined by the DPW based on the specific location.

# SCOPE | STREET TREES

## Existing Street Trees

Existing street trees will be protected during construction and the sidewalks will be carefully evaluated to ensure adequate accessible routes through the neighborhood.

## New Tree Plantings

The City Arborist will review each street and sidewalk project to determine tree planting opportunities, with a goal of 20-foot spacing, evaluating the location of overhead and underground utilities, proximity to intersections, site lines, building setbacks, locations of entrances, etc.

- On **narrow sidewalks** (less than 8 feet wide), a minimum of 4 feet of sidewalk width will be retained adjacent to new trees.
- On **wider sidewalks** (8 feet wide or greater), a minimum of half of the overall sidewalk width will be retained for pedestrians.

## Back of Sidewalk Trees

The Arborist will work with residents interested in back of sidewalk tree plantings.



## Goals

- **Protect existing** street trees during construction.
- Increase the number of street trees while maintaining **accessible sidewalks**.

# SCOPE | GREEN INFRASTRUCTURE

Stormwater discharges are contributing to at least 55% of impairments to Massachusetts' assessed waters. The goal is to **improve the water quality** of stormwater before discharging to outfalls at the Alewife Brook and Charles River.

The City is incorporating green infrastructure on projects, as conditions and space allow.



*Installation of site infiltration system at Longfellow Park.*

## Types of Improvements

- Porous asphalt
- Infiltrating catch basins
- Rain gardens/bio basins
- Site infiltration

## Siting Evaluation

- Soil conditions
- Groundwater
- Space constraints
- Maintenance

# SCOPE | TRAFFIC SIGNALS

## Accessible Pedestrian Signals (APS)

APS works in conjunction with visual pedestrian signals to provide additional information to pedestrians, including pedestrians who are blind or visually impaired. APS typically uses a combination of auditory and vibrotactile information to alert pedestrians as to when they should cross the street.

The City is implementing APS at new and existing signalized intersections. The Traffic Department consults with the Commission for Persons with Disabilities to prioritize location.

## Signal Control Cabinets

Traffic signal control cabinets mounted on poles do not meet accessibility requirements as they are not detectable to pedestrians who are blind or visually impaired. In coordination with construction projects and in High Priority Areas, control cabinets are moved to ground mounted locations.



# CONSTRUCTION | PEDESTRIAN ACCESS



Where pedestrian routes are closed, alternate pedestrian routes shall be provided.



The Manual on Uniform Traffic Control Devices (MUTCD), published by the U.S. Department of Transportation/Federal Highway Administration, includes specific requirements for pedestrian access in work zones.



Whenever possible, work should be done in a manner that does not create a need to detour pedestrians from existing routes or crossings.

# CONSTRUCTION | BICYCLE ACCESS

Construction sites must:

- Maintain bicycle access through construction sites at all times. Where maintaining bike lanes is not possible:
  - Ensure adequate space for bicycles in travel lane.
  - Post “*Bicycles May Use Full Lane*” signs.
- Place all road signs outside the bicycle lanes.
- Use asphalt as a temporary surface.
- Place asphalt around edges for a smooth and uniform transition.
- Provide advance notice and smooth transition when steel plates are required.
- Spray paint the edges pink and post caution signs where raised castings are exposed.



For the City of Cambridge Bicycle Accommodation During Construction Guidelines, visit:  
[www.cambridgema.gov/theworks/ourservices/engineering/Resources/contractorresources](http://www.cambridgema.gov/theworks/ourservices/engineering/Resources/contractorresources)

# CONSTRUCTION | TRANSIT



Communicate closely with the Massachusetts Bay Transportation Authority (MBTA) on any impact (diversions) to transit routes.

- Hold monthly interdepartmental meetings with the MBTA.
- Coordinate with the DPW and MBTA service planning staff as needed.

During construction, routes and stops may be moved.

- Communicate relocated bus stops to the public via notices and signage.
- Ensure accessibility at temporary stops.

## NEXT STEPS | CONCLUSION

The Five Year Plan is a living document that will be updated regularly. As part of that process, the DPW will:

- Review the plan annually with the Commission for Persons with Disabilities and Pedestrian, Bicycle, and Transit Committees.
- Update the pavement condition and sidewalk condition data and corresponding maps.
- Annually update the Five Year Plan to account for the changing conditions of our streets and sidewalks.



**Send questions or comments to:**  
**Katherine Watkins, PE**  
City Engineer  
Department of Public Works  
[kwatkins@cambridgema.gov](mailto:kwatkins@cambridgema.gov)  
617-349-4751



**For more information:**

City of Cambridge  
Department of Public Works  
147 Hampshire Street  
Cambridge, MA 02139  
617-349-4800

[www.cambridgema.gov/theworks/fiveyearplan](http://www.cambridgema.gov/theworks/fiveyearplan)

*Photos & Graphics by Kleinfelder*

