

CAMBRIDGE
DEPARTMENT
OF PUBLIC
**THE
WORKS**



City of Cambridge
Department of Public Works

Five Year **Sidewalk and Street** Reconstruction Plan

June 2019

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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**.

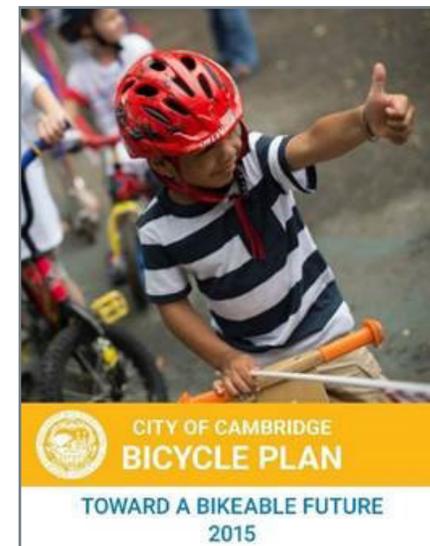
During design and construction of Complete Streets, the City's goal is to communicate projects with neighborhoods, facilitate an integrated design process, minimize disruption to community life, and provide reasonable access for all users during reconstruction.

INTRODUCTION | BICYCLE ORDINANCE

On April 8, 2019, the Cambridge City Council passed a **Cycling Safety Ordinance** (12.22.) to support the City's commitment to Vision Zero and the construction of a connected network of permanent separated bicycle lanes across the City.

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.



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.



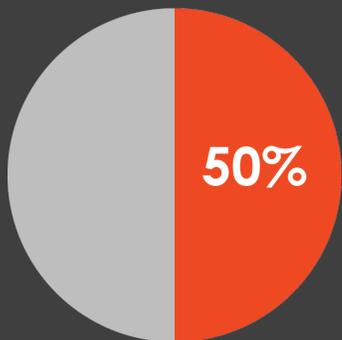
The Department of Public Works (DPW) will review the Five Year Plan on an annual basis. The variables and constraints are significant, and thus the annual revisions may need to reflect these uncertainties.

PRIORITIES | HIGH PRIORITY AREAS

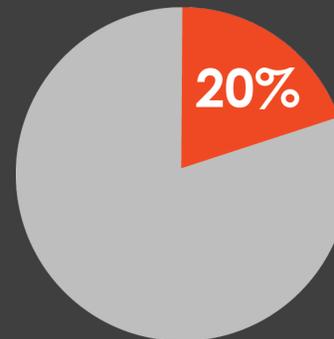


Reconstruct sidewalks and streets in poor condition in **High Priority Areas**:

- 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.

For more information, visit: 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 (updated 2018):

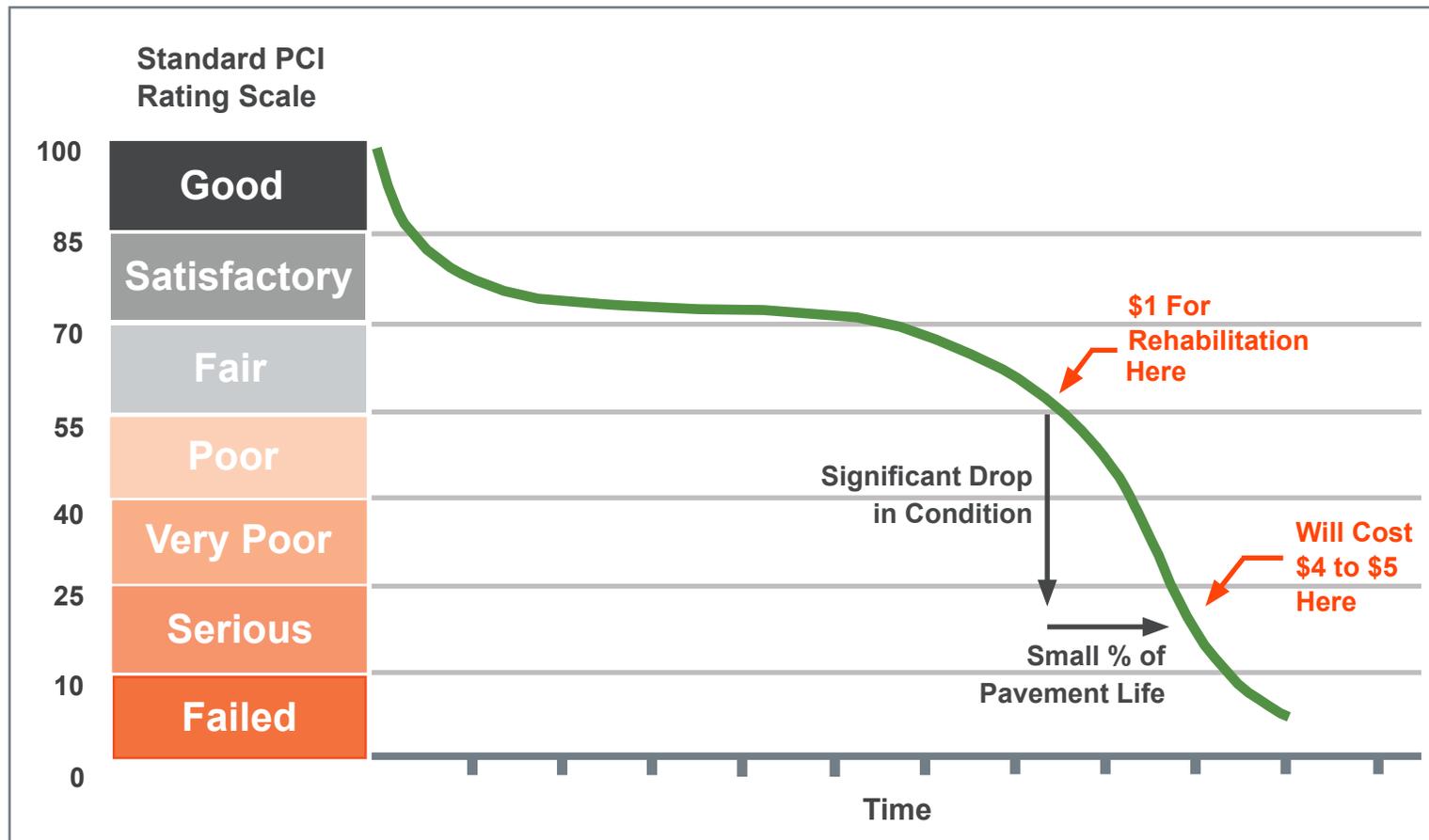
- Driveway conditions
- Trees or other obstructions
- Cross-slope
- Overall structural condition

PRIORITIES | PAVEMENT CONDITIONS



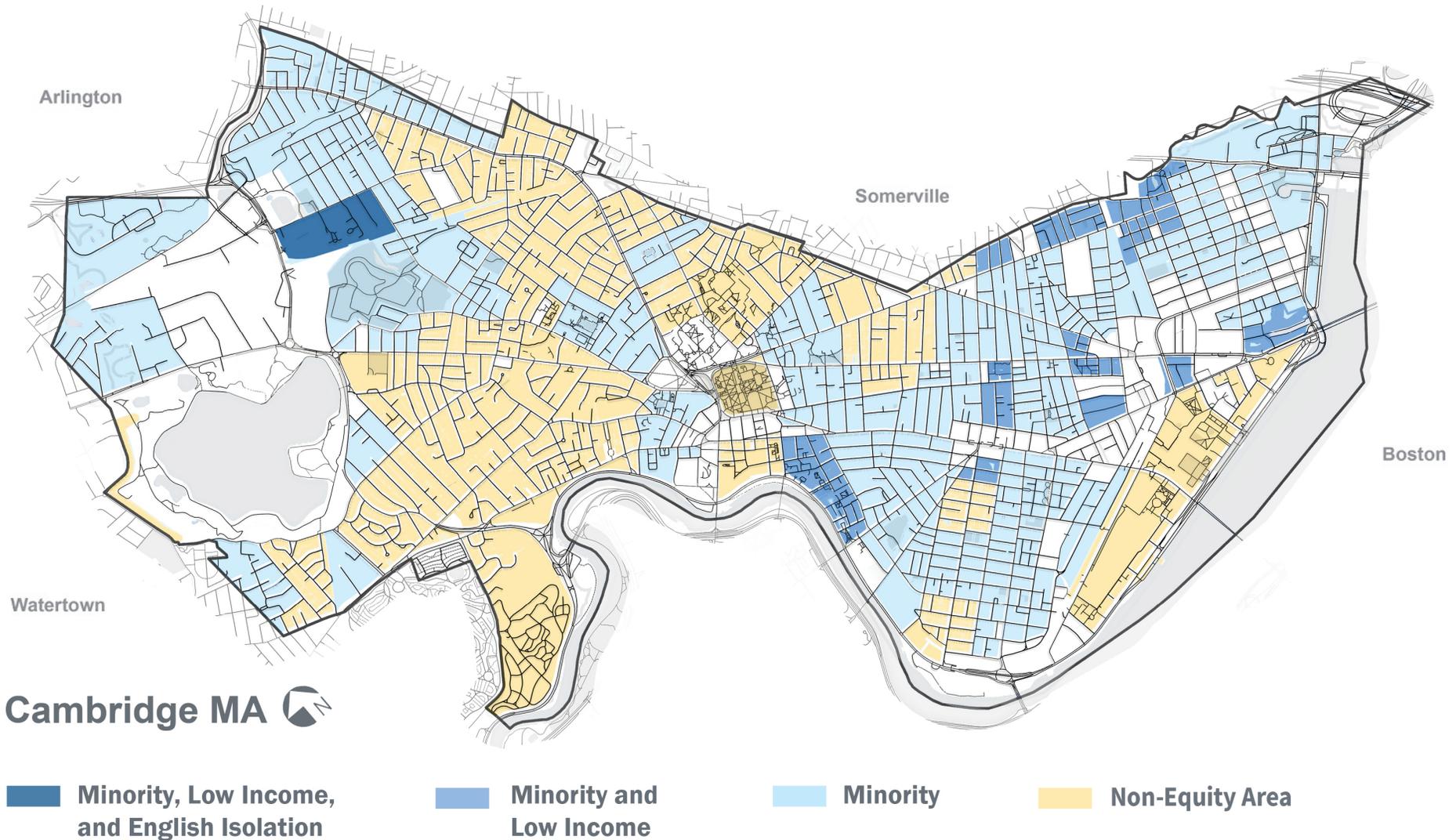
New street condition assessments are completed every three years and the plan is updated accordingly.

PRIORITIES | PAVEMENT CONDITIONS



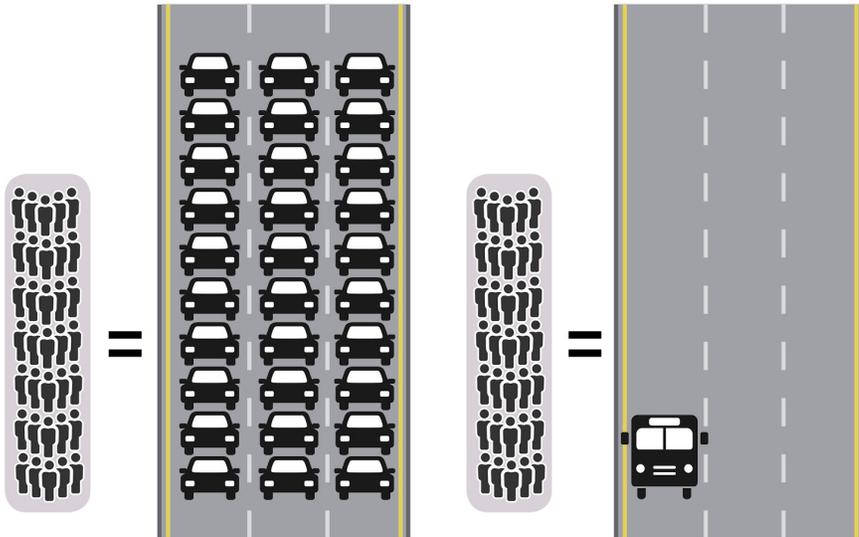
Based on the Pavement Condition Index (PCI), the City's average rating is 66.4. The average is holding steady year to year. However, the backlog is growing as the number of streets in the Base Rehabilitation range (0-20) increases.

PRIORITIES | EQUITY



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

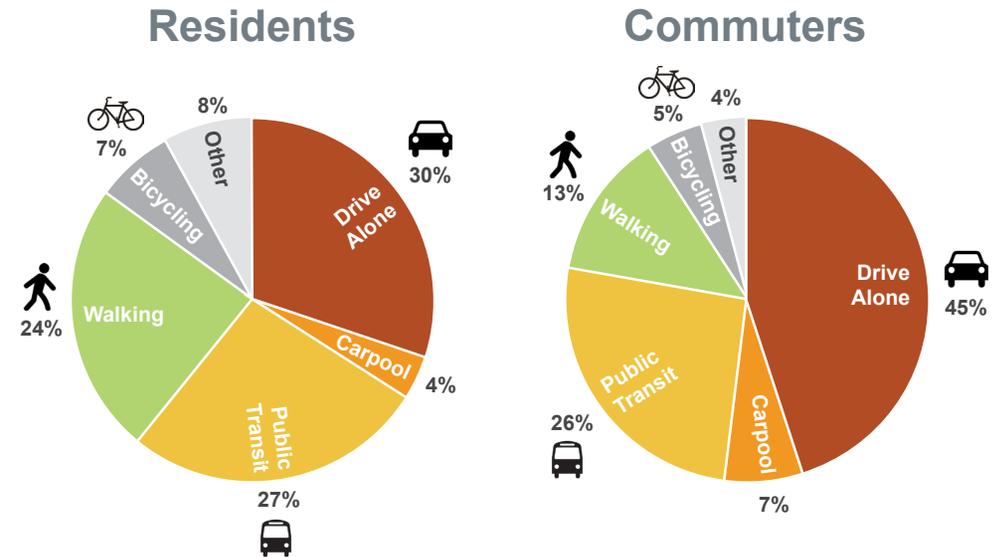
PRIORITIES | TRANSIT



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, as feasible



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

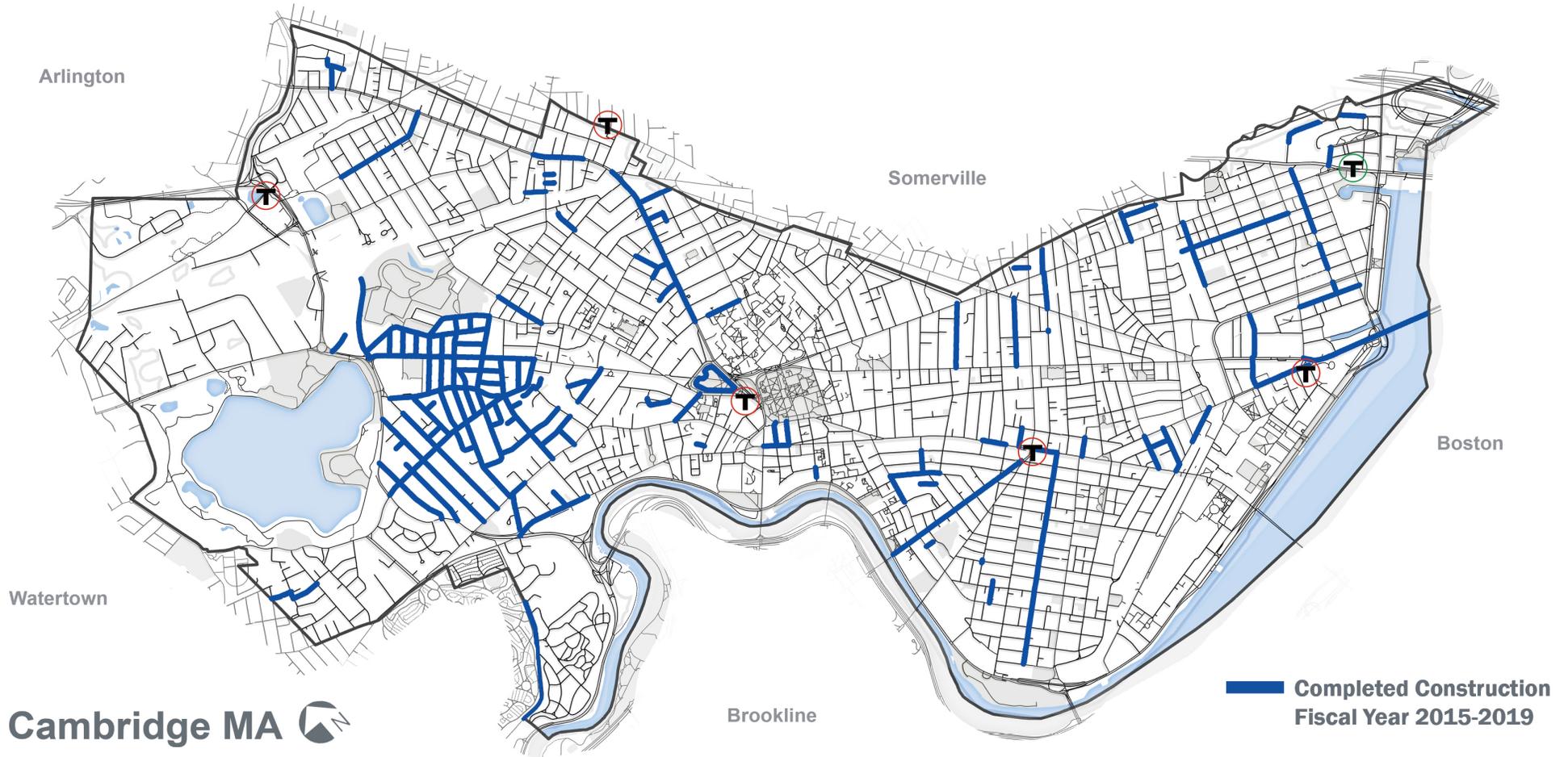


Street trees & green infrastructure: Reduce urban heat island and improve water quality

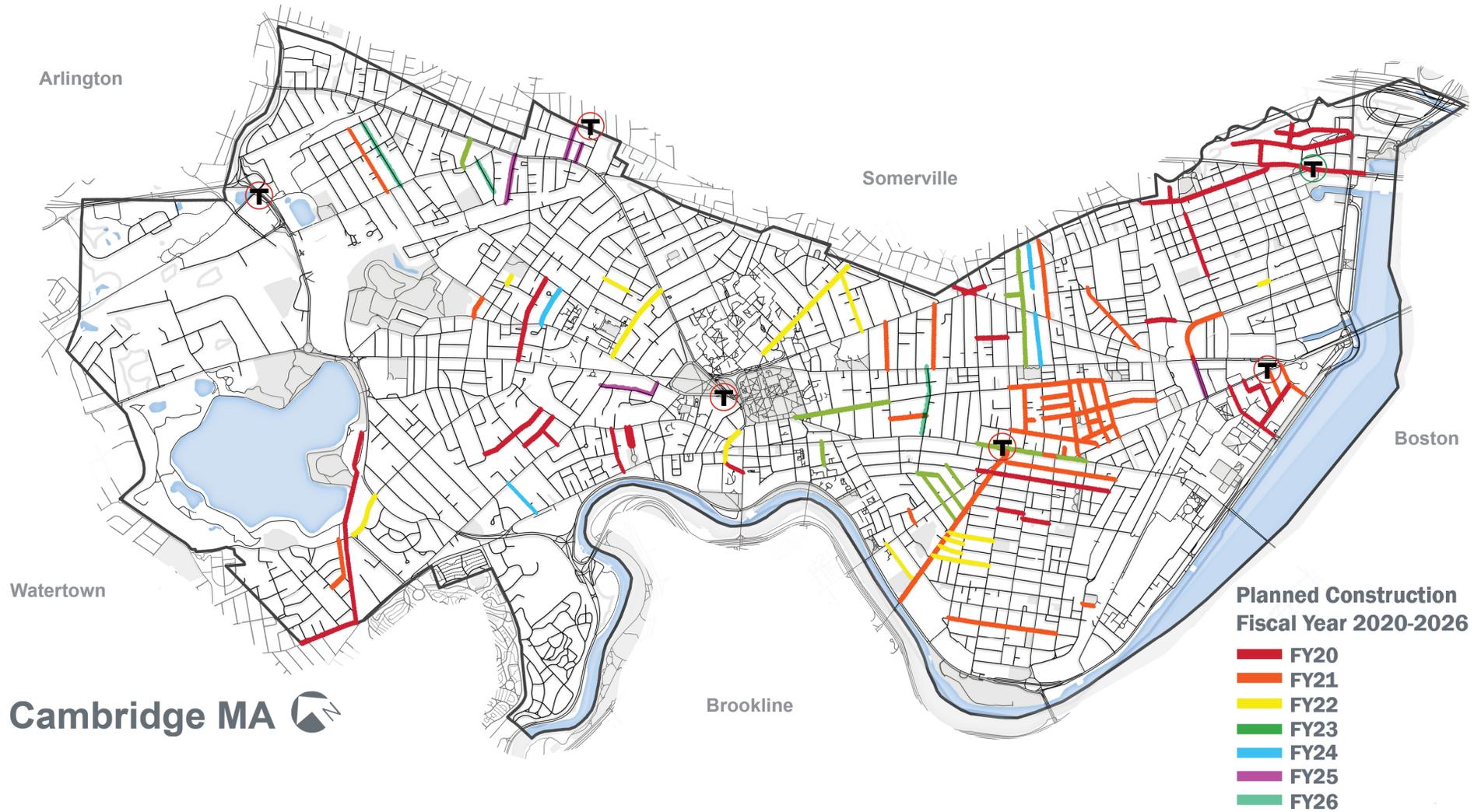


Infrastructure: Maintain and improve City infrastructure; coordinate with private utilities to facilitate upgrades

5 YEAR PLAN | COMPLETED STREETS



5 YEAR PLAN | **PLANNED CONSTRUCTION**



For an interactive construction map, visit: www.cambridgema.gov/theworks/constructionmap

5 YEAR PLAN | FUNDING

Every year, approximately **\$6 million** is spent on street and sidewalk projects:

- \$2.5 million comes from the State (Chapter 90)
- \$3.5 million comes from the City budget

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

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

The City allocated approximately **\$106 million** for the following projects, which include street and sidewalk reconstruction:

- \$9 million for Inman Square improvements
- \$34 million for River Street reconstruction
- \$28 million for Central Square improvements
- \$35 million for The Port improvements



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



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Department of Public Works

Photo courtesy of Stantec

Ten Year Sewer and Drain Infrastructure Plan

April 2019

To view the 10 Year Plan, visit: 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.
- Projects involve intense construction and typically include rebuilding roadways and sidewalks.

PROGRAMS | STREET & SIDEWALK

Street and sidewalk contracts are funded locally and by the State. These contracts are managed by the DPW. Construction generally includes surface enhancements such as:

- 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]



Flexi Pave
[at trees]



Curb Extensions & Ramps
[for accessibility]



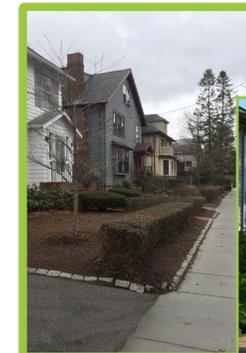
New Sidewalks
[brick & concrete]



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

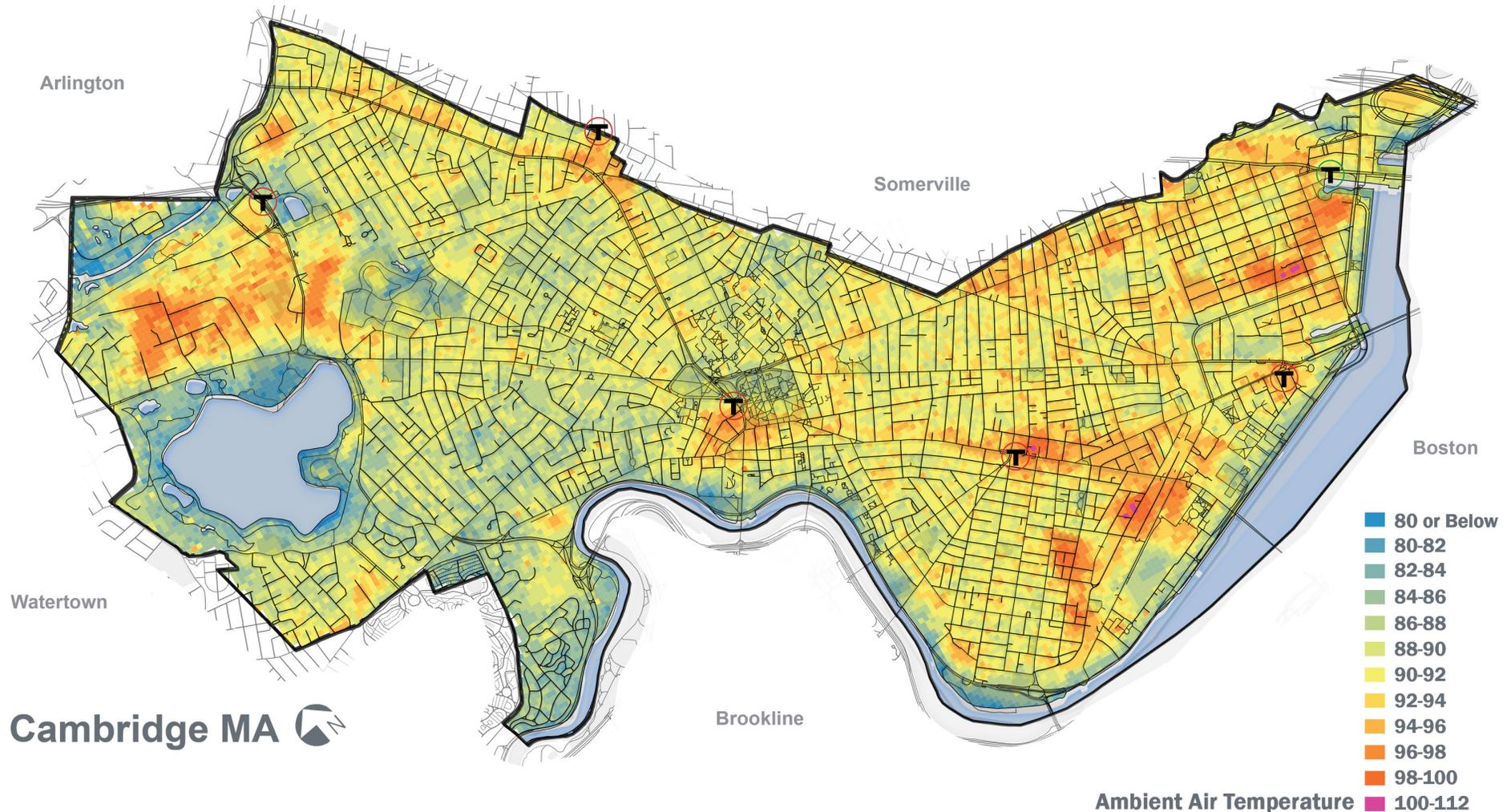
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PROGRAMS | CLIMATE CHANGE

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.



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

PROGRAMS | URBAN FOREST

What Can We Do?

Trees help us lower sidewalk temperatures in the summer, reduce home cooling costs, and improve air quality.

The City maintains over 19,000 trees and is currently developing an Urban Forest Master Plan to guide the development of the urban forest into the future. The plan will include strategies to evaluate, maintain and expand the urban forest canopy while being more resilient to climate change, reducing the urban heat island effect, mitigating stormwater runoff, reducing nutrient runoff, and contributing to community well-being.



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.

For more information, visit: www.cambridgema.gov/Departments/publicworks/urbanforestmasterplan

PROGRAMS | URBAN FOREST



The map shows the existing tree canopy throughout the City in 2018 on both public and private property. 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.

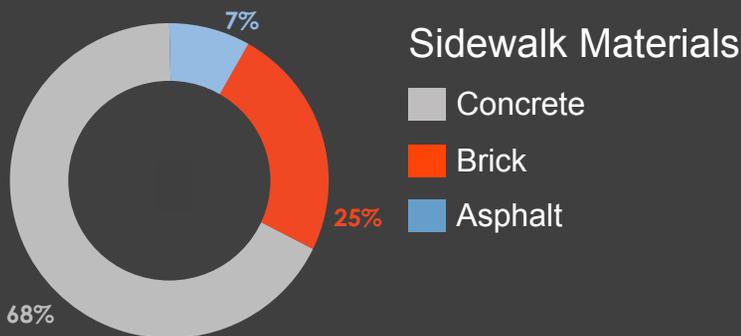
The City policy is to replace existing sidewalks with the same material at no cost to the property owner. However, during construction, property owners are contacted and may choose to change the sidewalk material. On larger projects, a more unified approach to sidewalk materials has been implemented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



DESIGN | BICYCLE FACILITIES

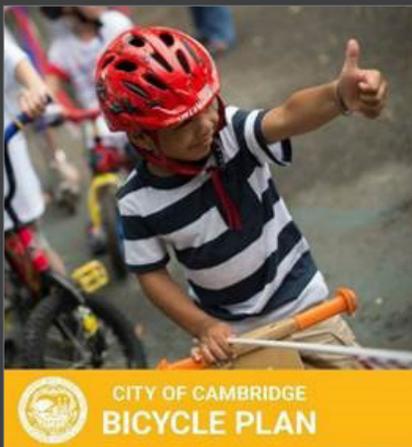


Photo Credit:
Toole Design

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.



CITY OF CAMBRIDGE
BICYCLE PLAN

DESIGN | TRANSIT

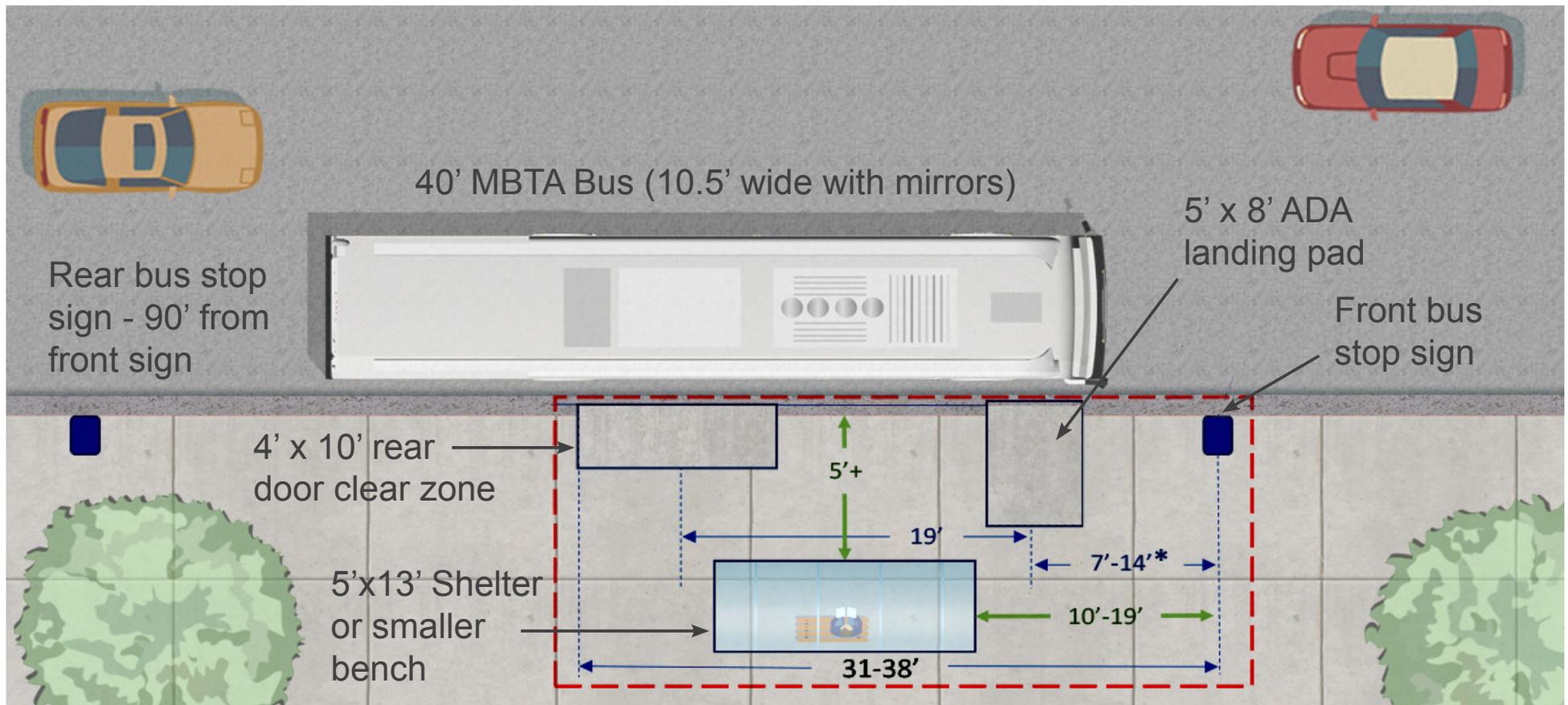
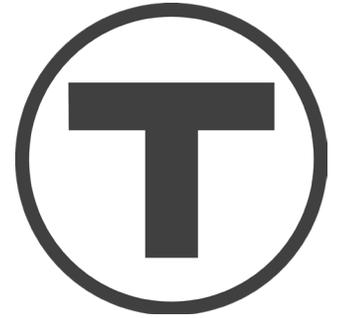
Transit considerations include:

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.

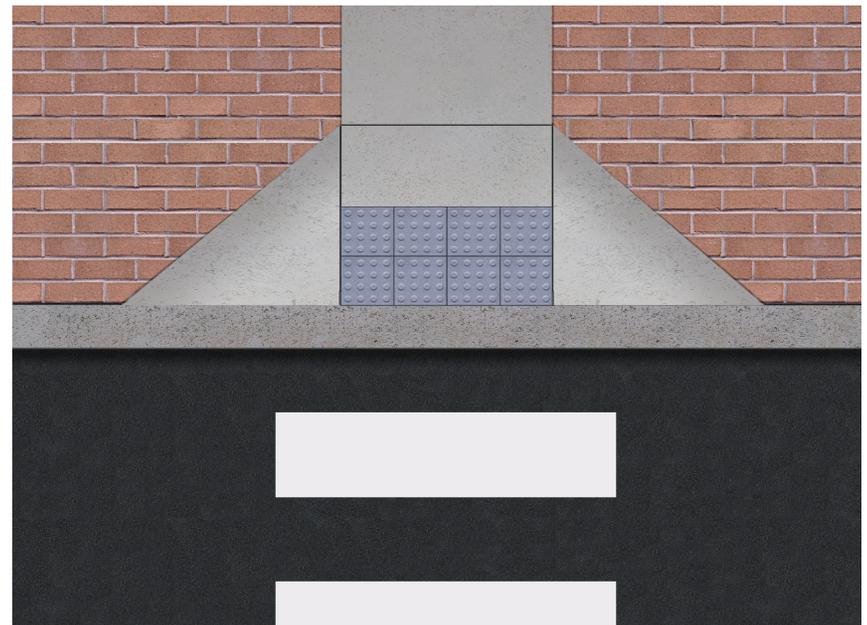


SCOPE | NEW CONSTRUCTION

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.

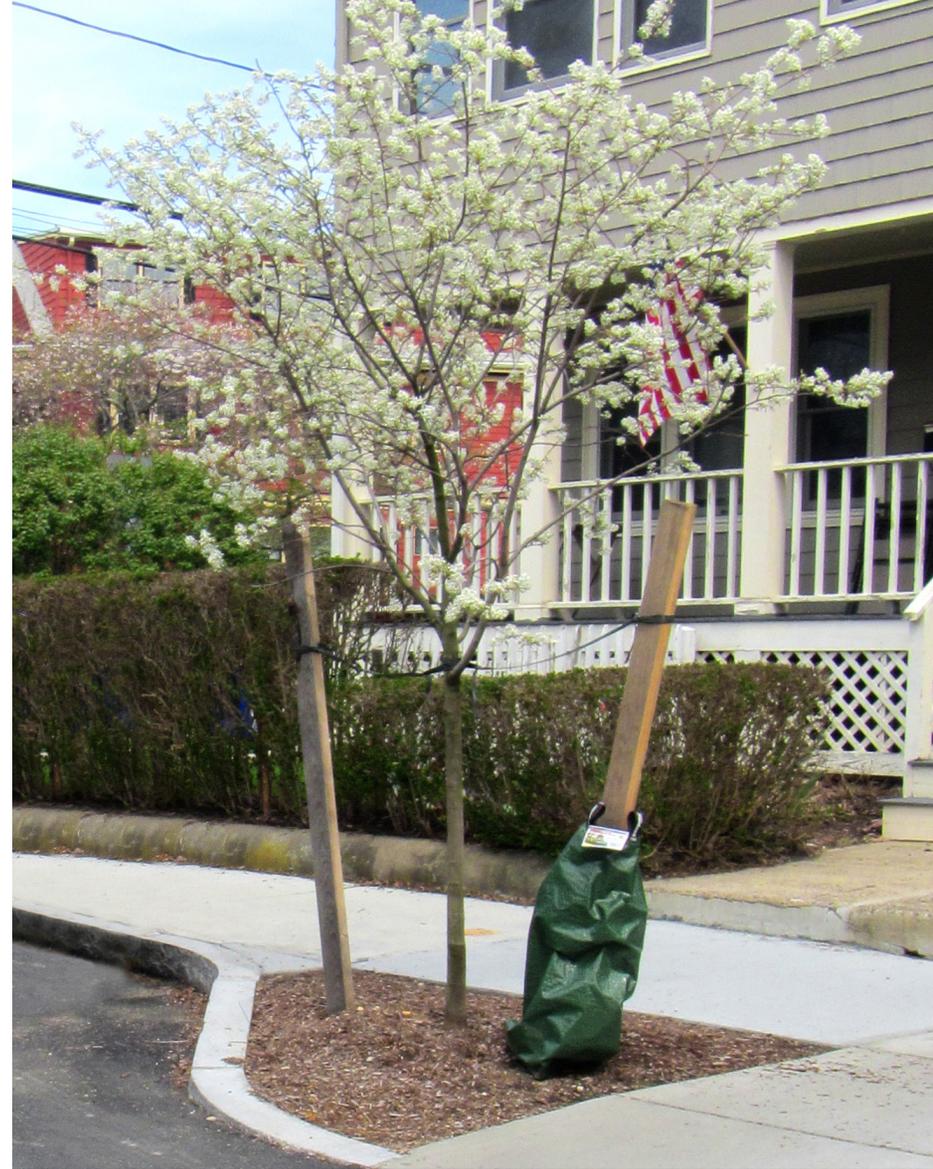
New Tree Plantings

The City Arborist will review each street and sidewalk project to determine tree planting opportunities, with a goal of 30-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

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

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

UNIVERSITY

Doble Campus

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:
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www.cambridgema.gov/theworks/fiveyearplan

Photos & Graphics by Kleinfelder

