May 25, 2021
Planning Board
Utility Infrastructure Planning

Public Works

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City Resources:

www.cambridgema.gov/fiveyearplan
www.cambridgema.gov/tenyearplan

www.cambridgema.gov/Departments/waterdepartment

UTILITY INFRASTRUCTURE PLANNING

1st annual meeting with the Planning Board.

Goal is to have a discussion that supports and provides context for infrastructure planning and provides context for development.

Provide context, answer questions and looking for feedback on information / process.

CAMBRIDGE DEPARTMENT OF PUBLIC THE WORKS

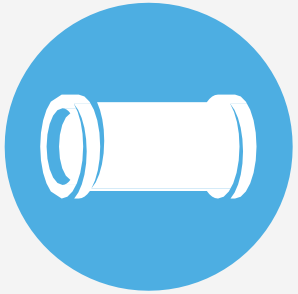
Ten Year Sewer and Drain Infrastructure Plan

April 2019

City of Cambridge
Department of Public Works

INFRASTRUCTURE | PRIORITIES

Our approach requires the effort of both the public and private sectors to achieve the regulatory, infrastructure, and water quality improvements to make Cambridge a **clean** and **healthy community**.

	REGULATORY	INFRASTRUCTURE	WATER QUALITY
PUBLIC	 Reduce CSOs and SSOs, Pollutants of Concern, and Total Suspended Solids (TSS) to surface waters	 Address at risk or high risk infrastructure in high priority areas through rehabilitation or replacement	 Use green infrastructure solutions where possible
PRIVATE	 Comply with Stormwater Regulations to reduce erosion, nonpoint source pollution, and flooding	 Design and build to the 2070 10-year and recover to the 2070 100-year storm climate projection	 Implement Best Management Practices (BMPs)

INFRASTRUCTURE | ENVIRONMENTAL FOCUS

Photo courtesy of Stantec

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.

PROGRAMS | REGULATIONS & REQUIREMENTS

The City must ensure that the Infrastructure Plan meets or exceeds federal and state regulations, including:

Infrastructure Improvements and Maintenance:

- MassDEP (inflow and infiltration)
- EPA

Untreated discharges regulated through the NPDES Program:

- Municipal Separate Storm Sewer System (MS4)
- Combined Sewer Overflow (CSO)
- Total Maximum Daily Load (TMDL)

Activities related to floodplain areas:

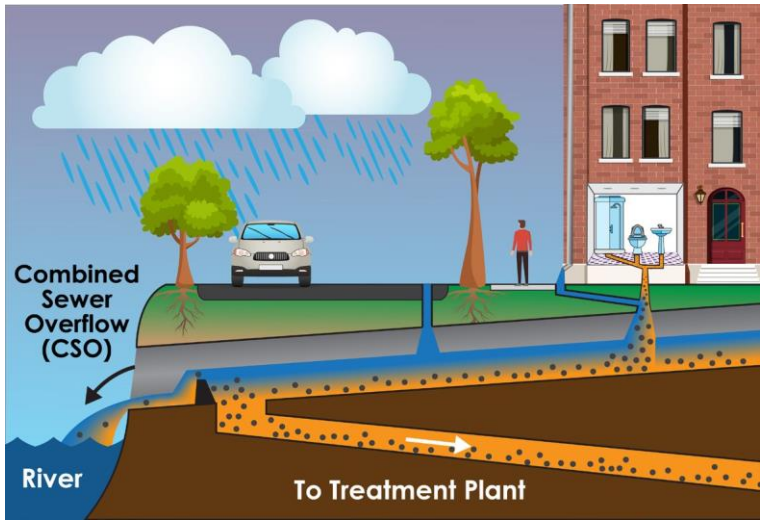
- Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP)
- Wetlands Protection Act
- Zoning Flood Plane Overlay

SEWERS | COMBINED VS SEPARATED

Cambridge's sewer system is approximately 55% separated, where sewage goes to the MWRA for treatment and the stormwater discharges directly to Alewife Brook or the Charles River.

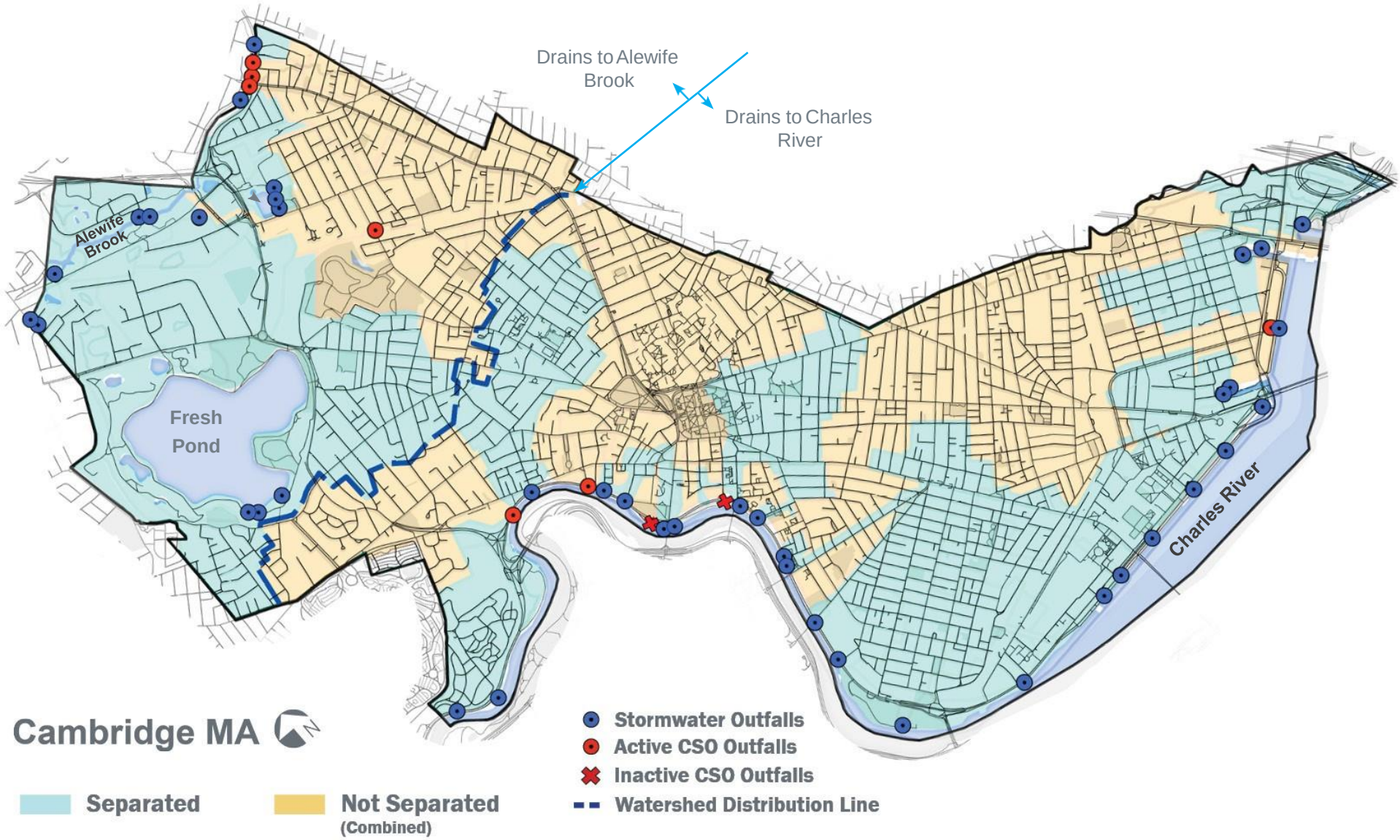
The remaining system is combined sewer, where the sewer and stormwater share a common pipe and can be directed to the MWRA for treatment during dry and wet weather, and to the Alewife Brook or the Charles River during wet weather CSOs.

Combined



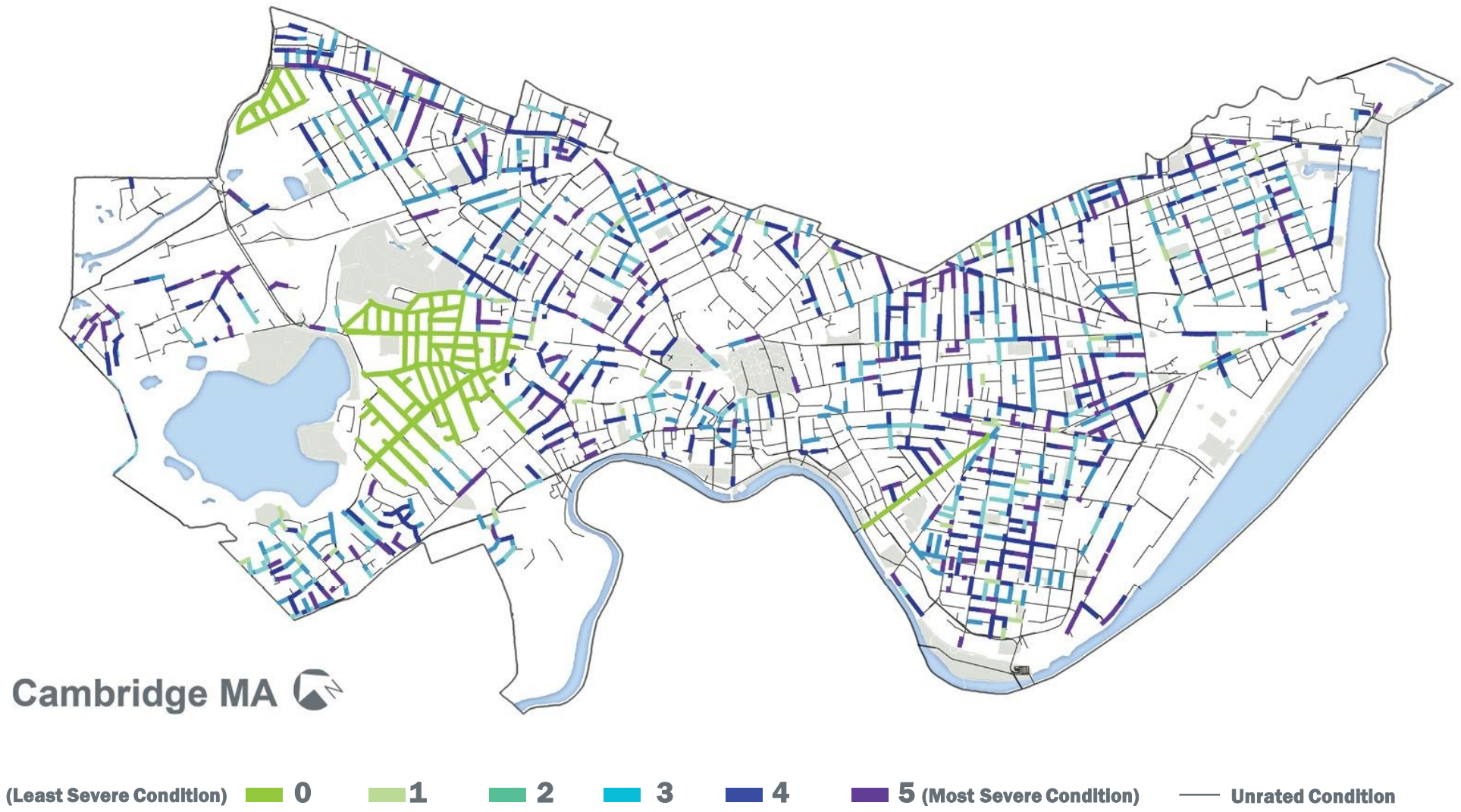
Separated

SEWERS | COMBINED VS SEPARATED



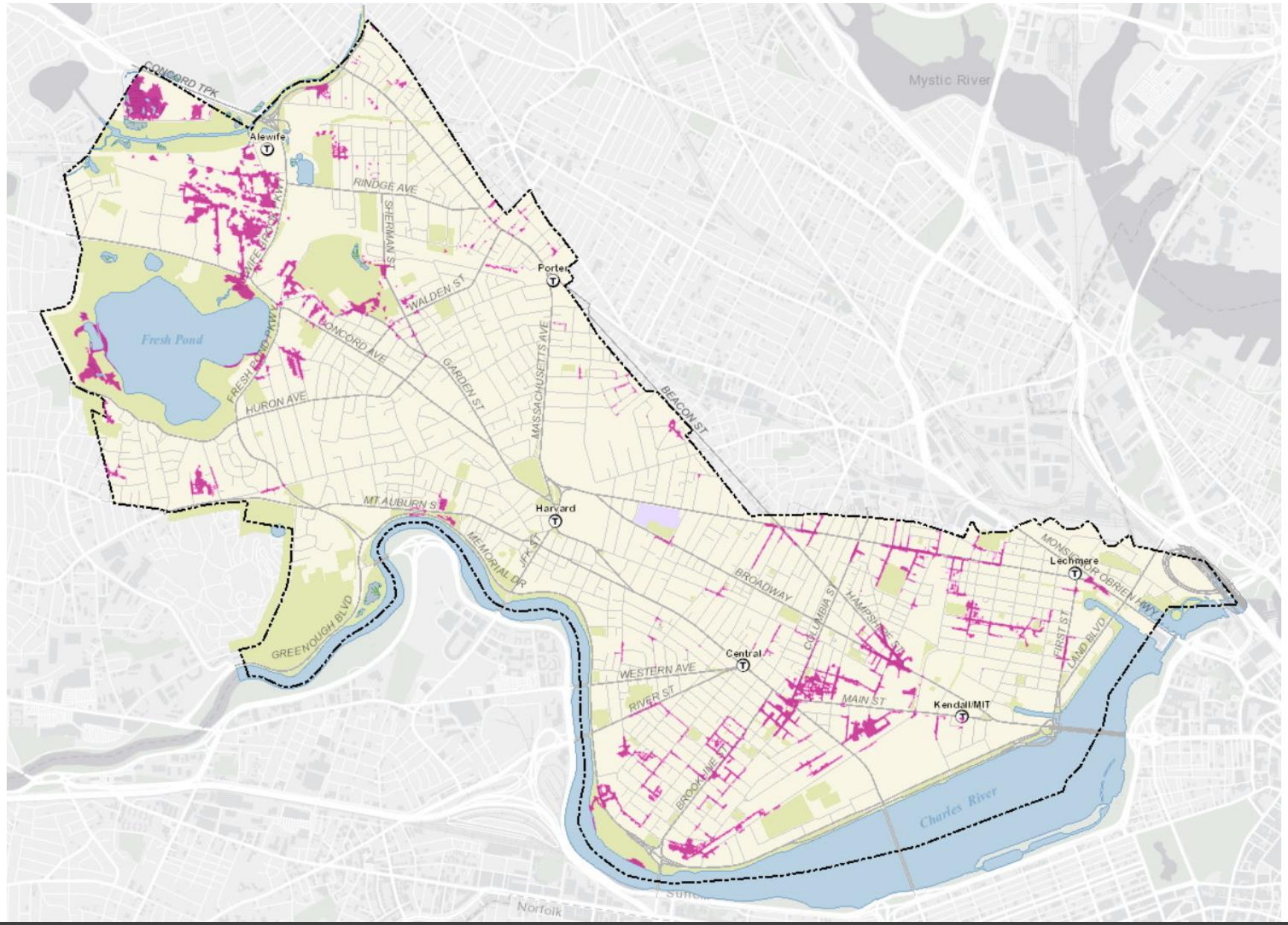
This map shows the areas of Cambridge's sewer system that are separated and are not separated and the active city-owned outfall locations. The City is 55% separated and 45% not yet separated.

PRIORITIES | SEWER CONDITION



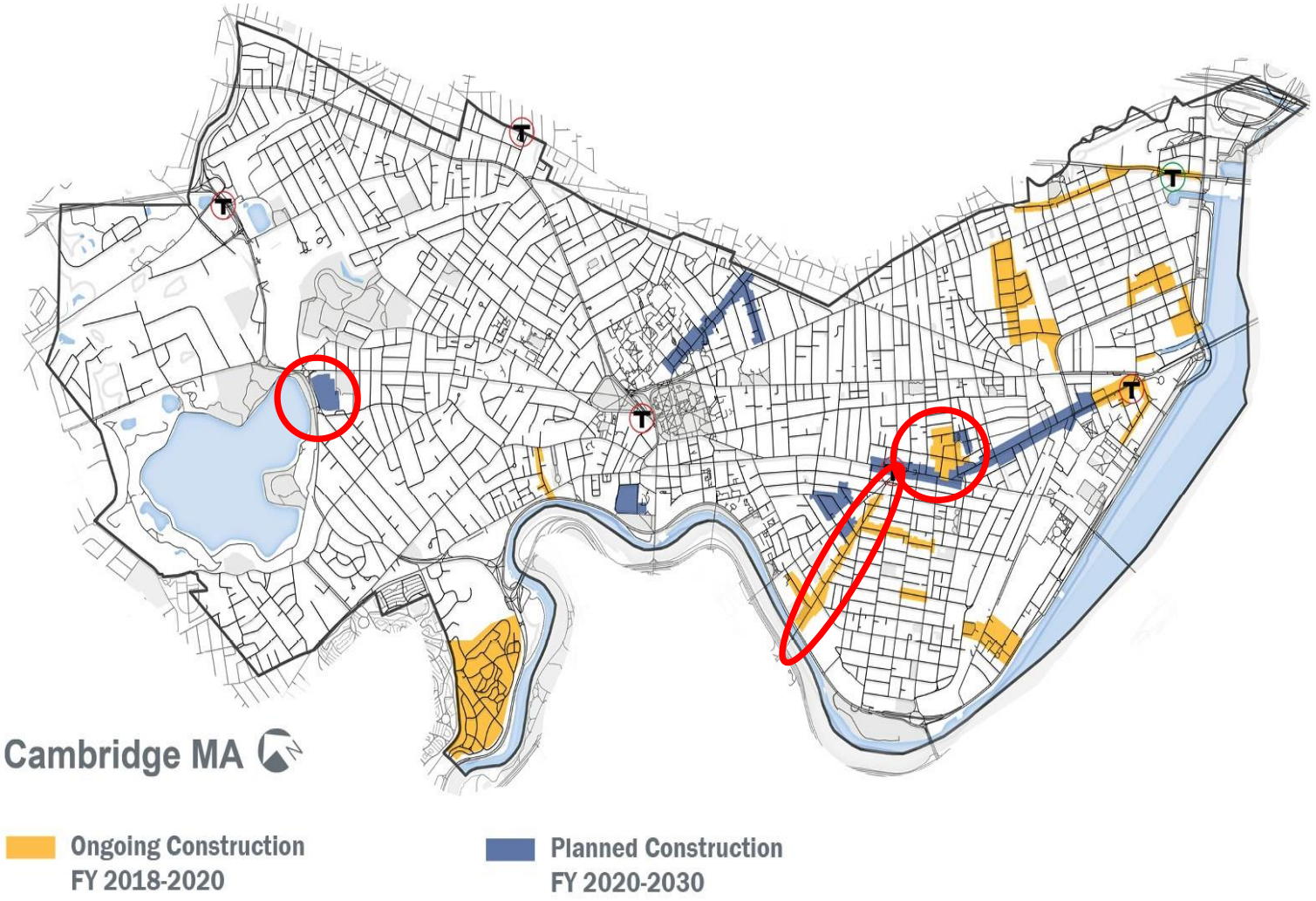
These maps on pages 6 and 7 show areas of major pipe replacement or rehabilitation (0 rating), the condition (1-5 rating) of pipes inspected since 2005, and pipes that have not yet been inspected (unrated). The City continues to inspect its infrastructure through a dedicated program and as part of public and private projects.

PRIORITIES | LEVEL OF SERVICE – FLOODING



2070 10% Probability of Flooding from Precipitation
Cambridge FloodViewer, www.cambridgema.gov/Services/floodmap

10 YEAR PLAN | PLANNED CONSTRUCTION



Utility Projects are identified and prioritized through the 10 Year Plan and then provide a basis for the 5 Year Street and Sidewalk Plan.

CAMBRIDGE DEPARTMENT OF PUBLIC THE WORKS

City of Cambridge
Department of Public Works

Five Year Sidewalk and Street Reconstruction Plan

April 2021

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.

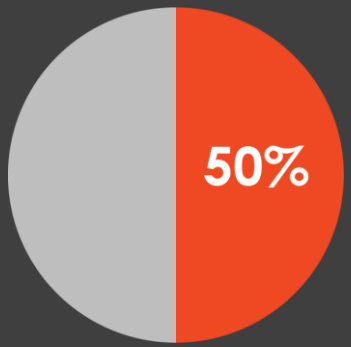
More sidewalks and bicycle facilities are included in Complete Streets, which provide **increased accessibility for pedestrians and cyclists**.

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.

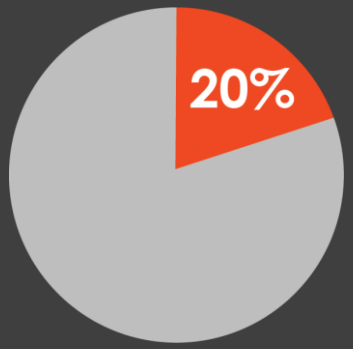
PRIORITIES | HIGH PRIORITY AREAS

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.

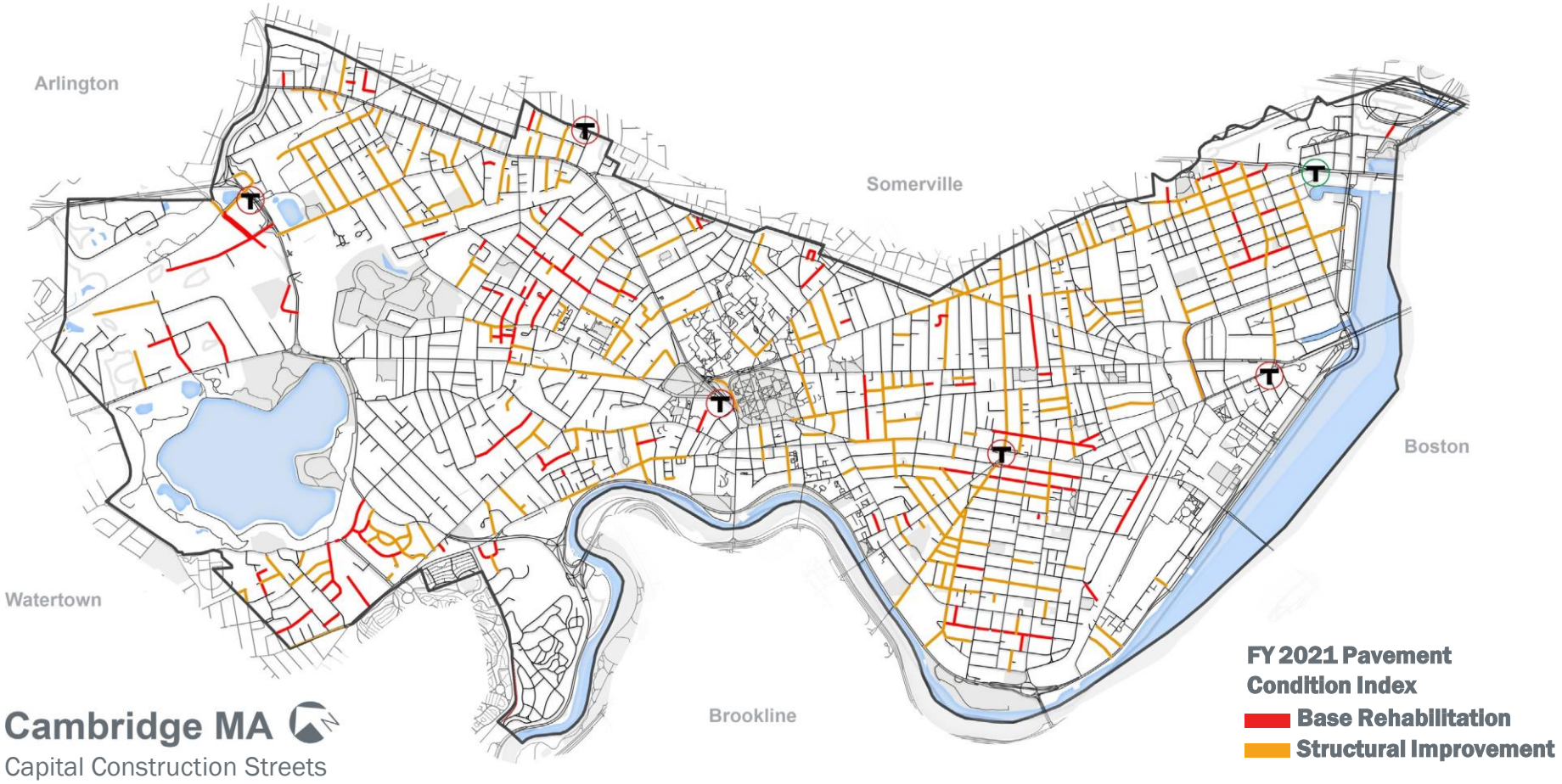


Just over 50% of City sidewalks and streets are located outside High Priority Areas. These corridors serve residential connections and need to be maintained to the extent that funding allows.



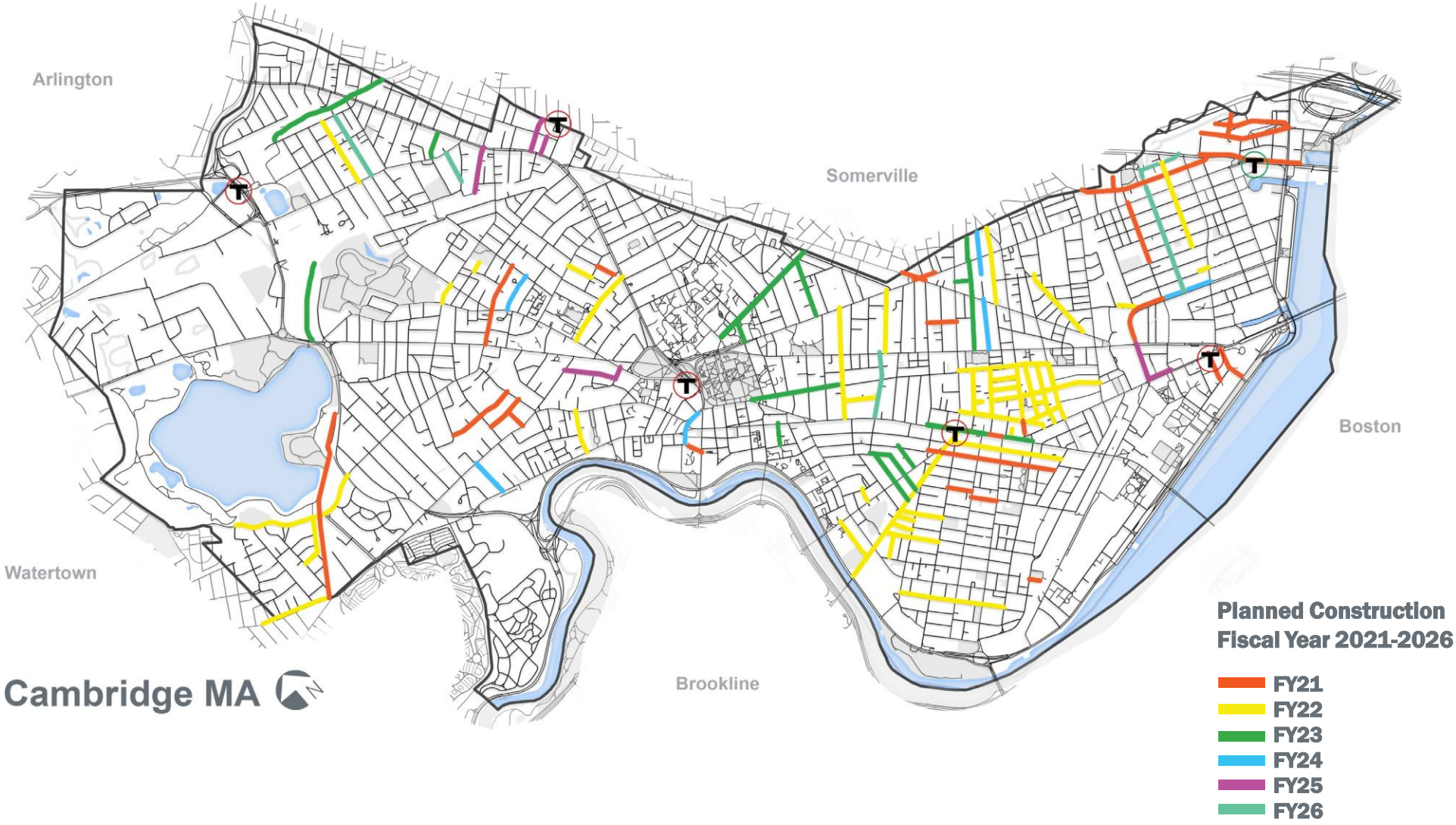
Approximately 20% of street and sidewalk funding will be reserved for areas located outside High Priority Areas.

PRIORITIES | PAVEMENT CONDITIONS



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

5 YEAR PLAN | PLANNED CONSTRUCTION



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

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

PROGRAMS | CLIMATE CHANGE

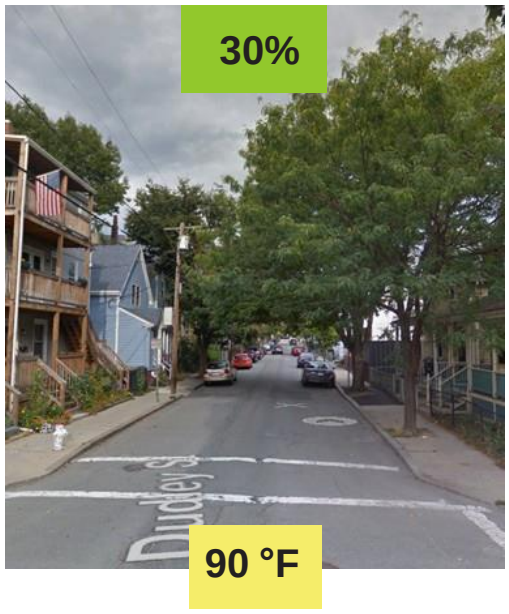
Our climate is changing, bringing more severe storms, more extreme floods, and more intense heat waves. Through projects in the Five Year Plan, we have opportunities to implement resiliency strategies, ranging from green infrastructure to improved drainage to additional tree plantings.

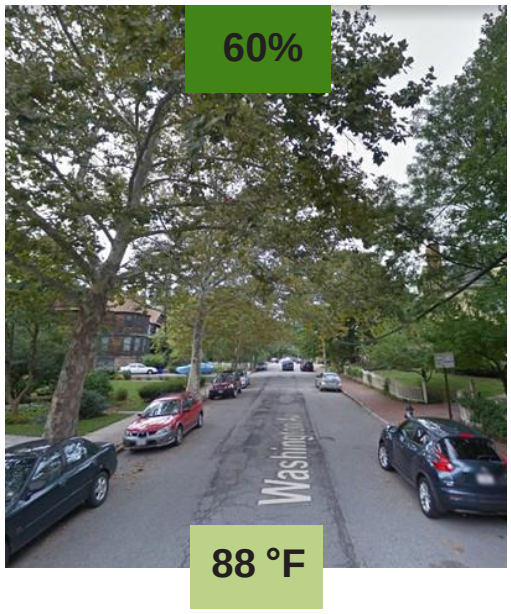
Courtesy photo: Chicago Heat Wave of 1995

PROGRAMS | 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.

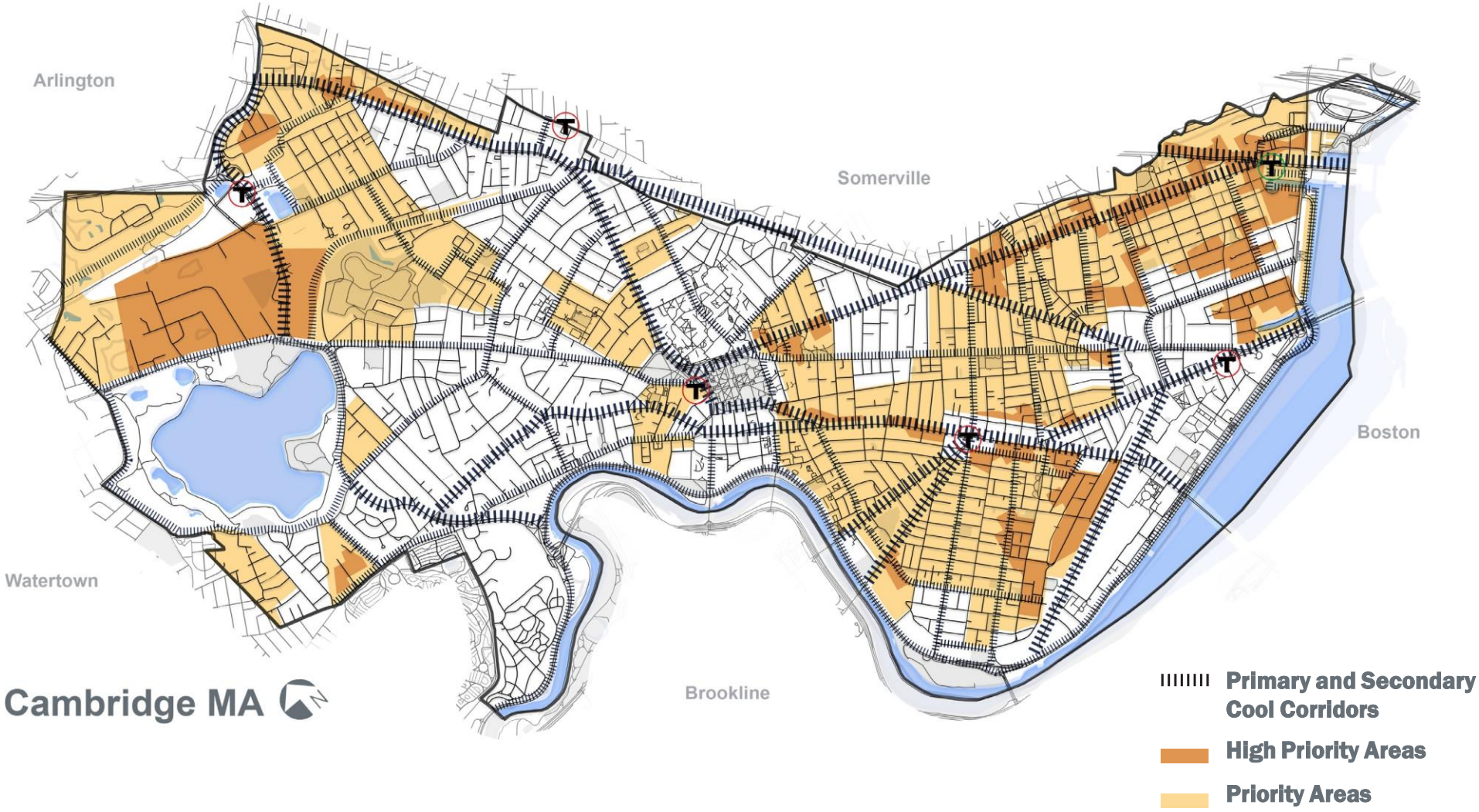
The City maintains over 19,000 trees and has developed an Urban Forest Master Plan to guide the development of the urban forest into the future. The goals are: increase canopy cover where lacking; enhance canopy cover in the public realm to create “cool corridors”; and incentivize each landowner to increase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

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.

5 YEAR PLAN | FUNDING

$65 million allocated for the Complete Streets Program.

In addition, 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

SCOPE | PRIVATE DEVELOPMENT

Private Development

Street, Sidewalk, Bike and Pedestrian improvements

Opportunity to improve tree canopy

Sewer – Capacity and DEP Inflow and Infiltration requirements – 4:1 offset

Stormwater Management – quantity and quality (phosphorous), 2070 Projections

Water – condition of adjacent water mains, fire protection

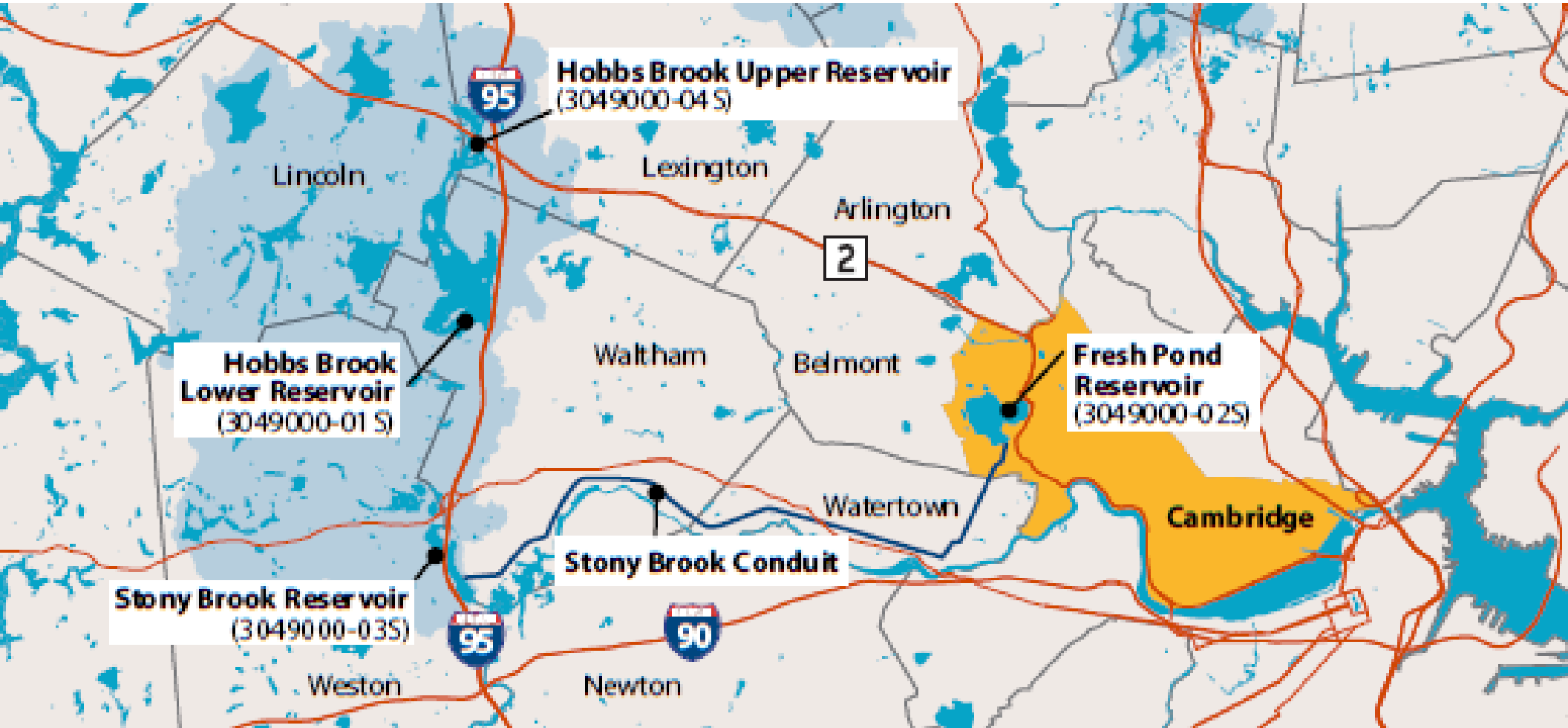
Building Designs – 2070 10% and 1% Projections

WATER | SUPPLY, DEMAND & DISTRIBUTION

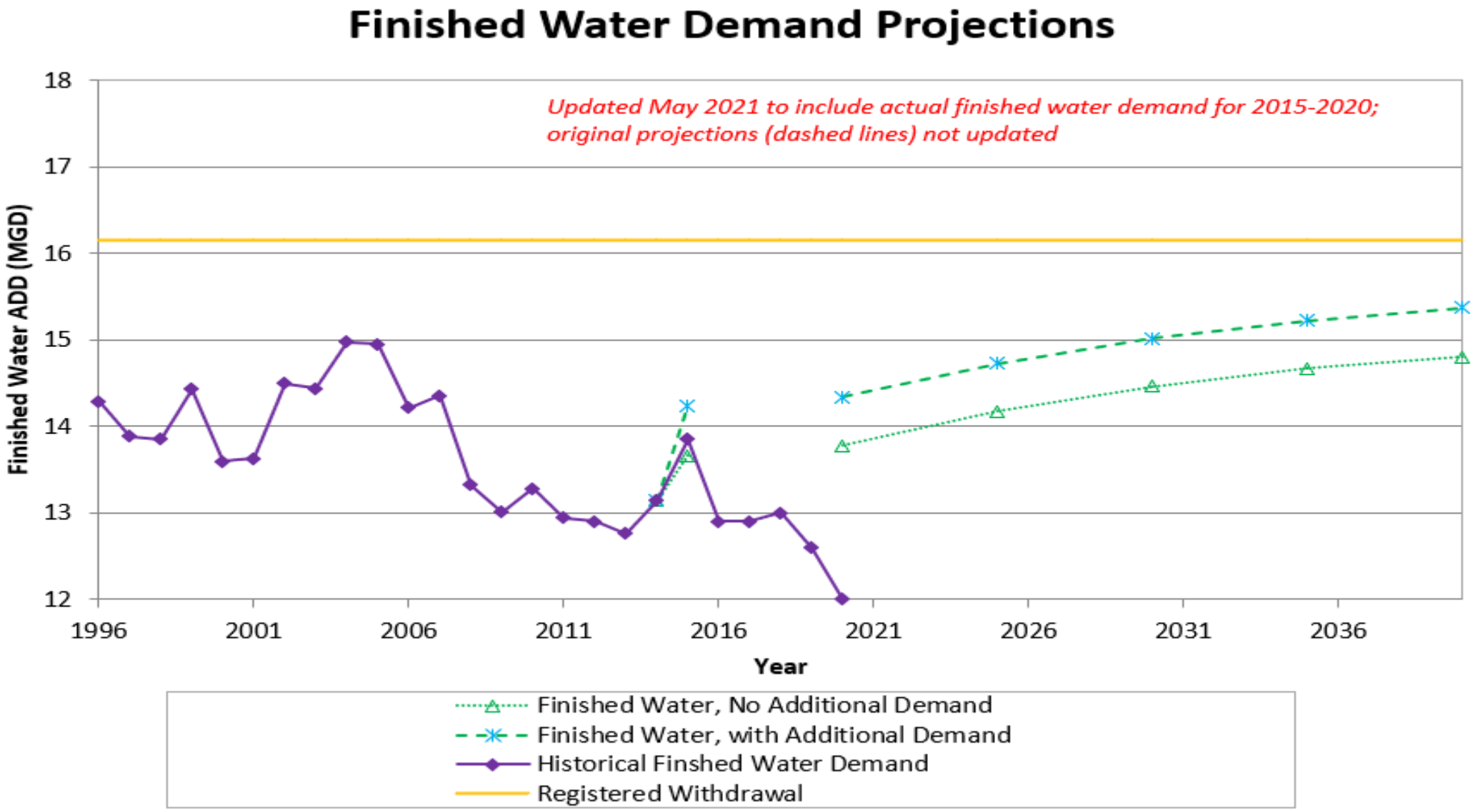
WATER | SUPPLY

Stony Brook Watershed, nested within the Charles River Basin, in the towns of Lincoln, Lexington, Weston, and the City of Waltham.

Water makes its way through tributaries and a series of reservoirs to its final destination in Fresh Pond and the Water Treatment Facility.



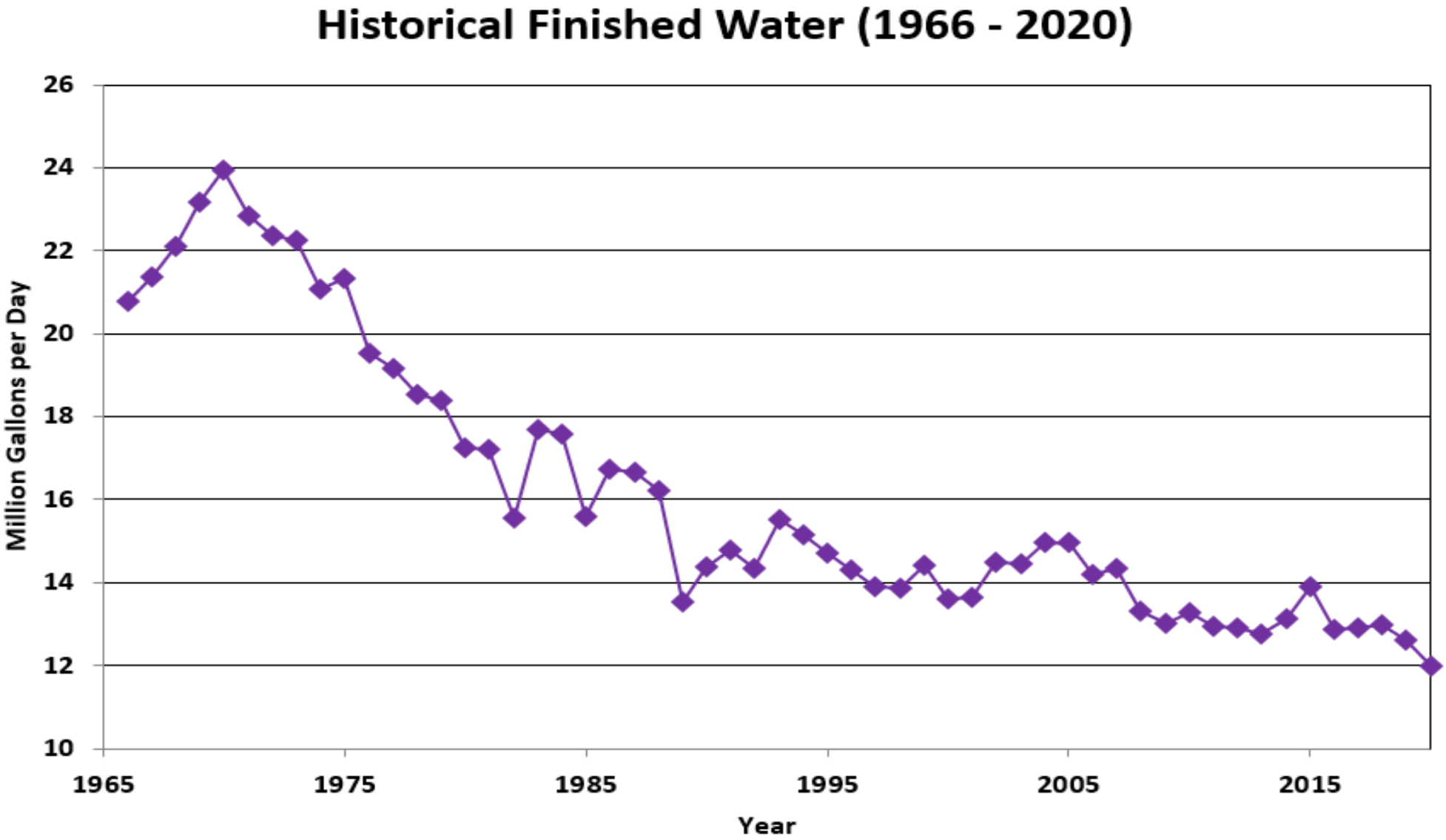
WATER | DEMAND



Registered Withdrawal – just over 16MGD

Pre-COVID Projections with additional demand, remained under the 16MGD.

WATER | DEMAND



46% Reduction in water (1970 to 2019)

$100M+ investment since 1995 to replace 50 miles of water mains; reducing leaks and breaks. Increased water efficiency in new and existing buildings.

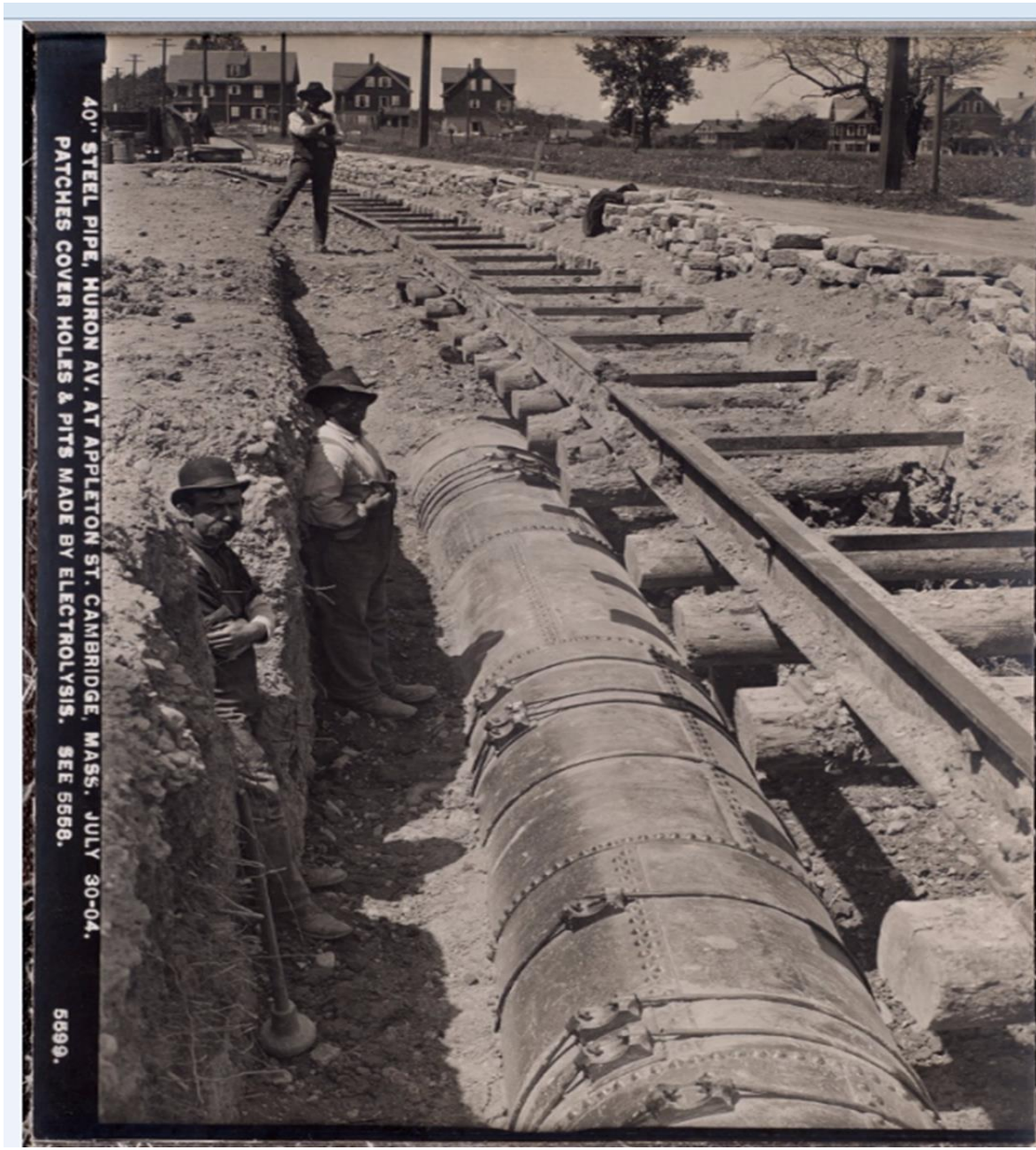
WATER | TRANSMISSION & DISTRIBUTION

Approximately 210 miles of pipe ranging from 4” – 63”

24 miles of Transmission Mains

186 miles of Distribution Mains

Pipe Install dates range from 1864-Present



WATER | DISTRIBUTION

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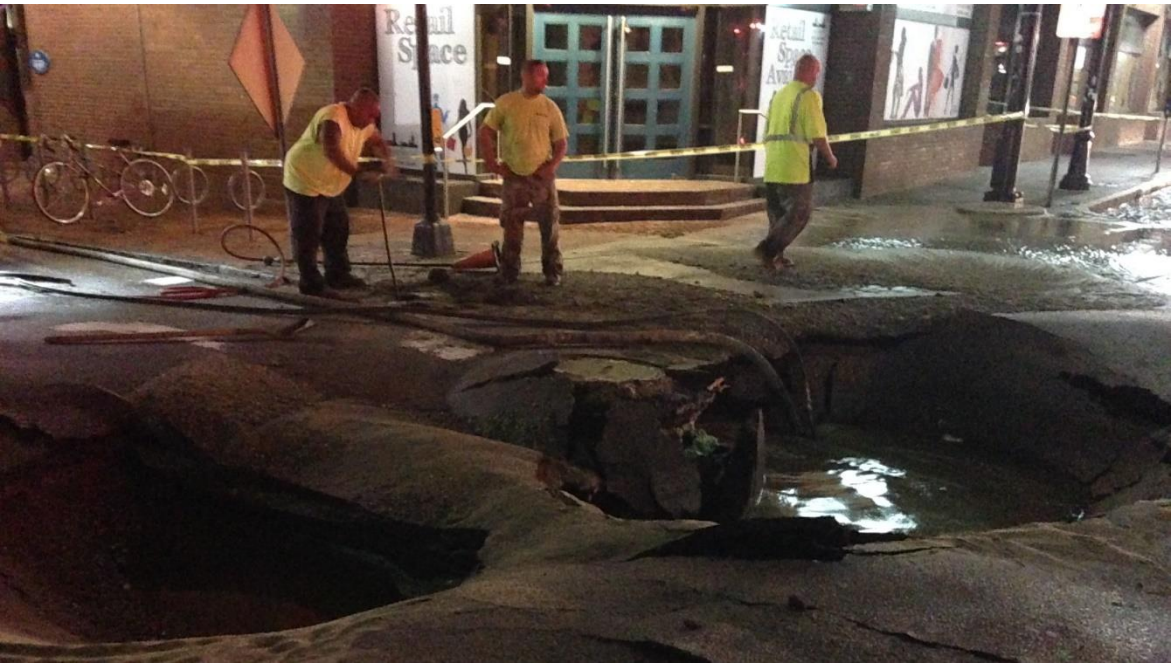
1 leak on JFK Street = $80,000 repair



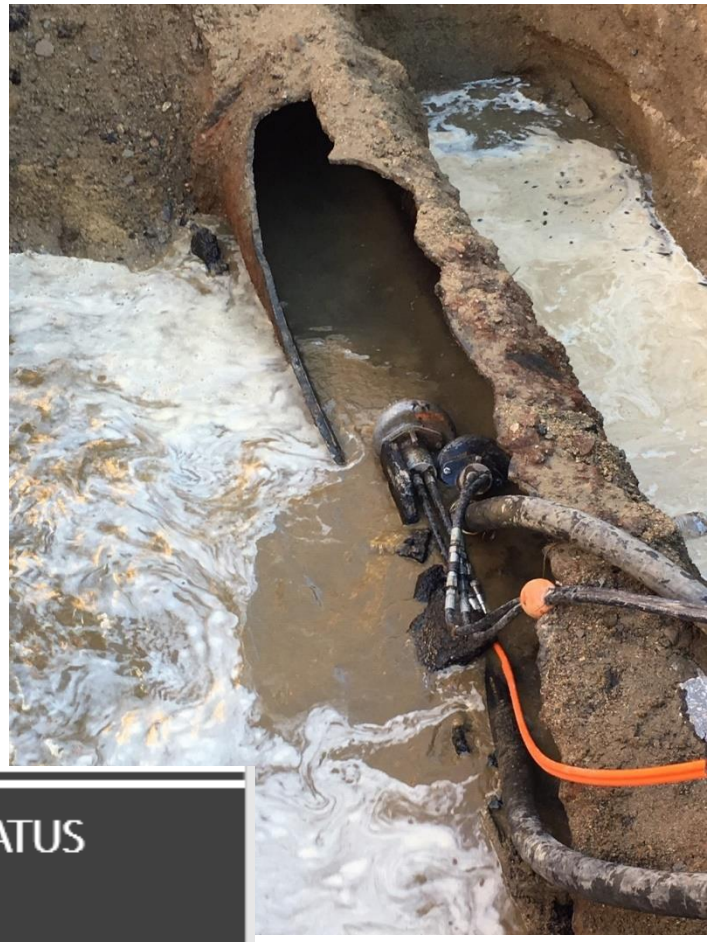
WATER | DISTRIBUTION

Proactive approach

In 1992 CDM completed assessment of the Transmission and Distribution system to identify areas of vulnerability and make recommendations for repair, replacement and preventative maintenance.

75% of all leaks and fire flow issues were found on old 6” unlined cast iron mains.

WATER | DISTRIBUTION



Proactive approach

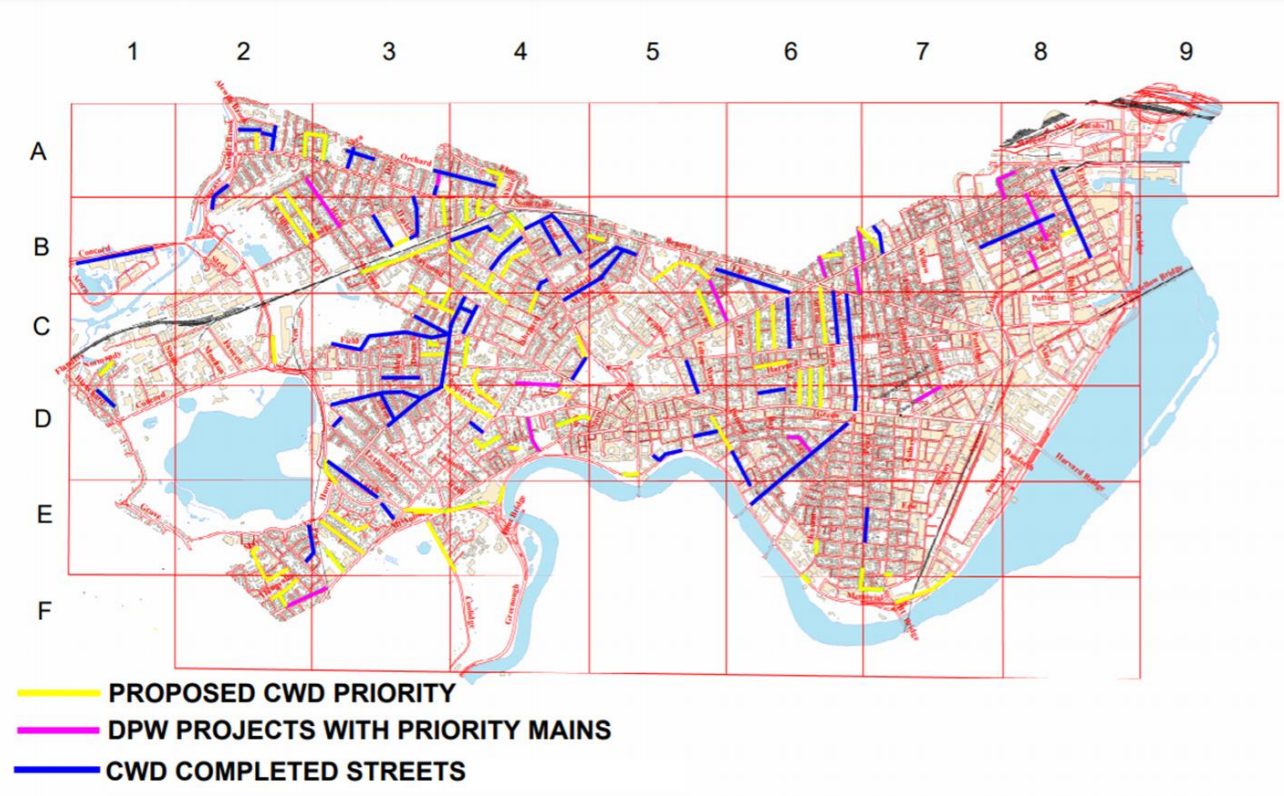
CDM 1992 assessment prioritized 50 miles of small diameter water main.

SMALL DIAMETER WATER MAIN PRIORITY REPLACEMENT STATUS FROM 1992 DISTRIBUTION STUDY

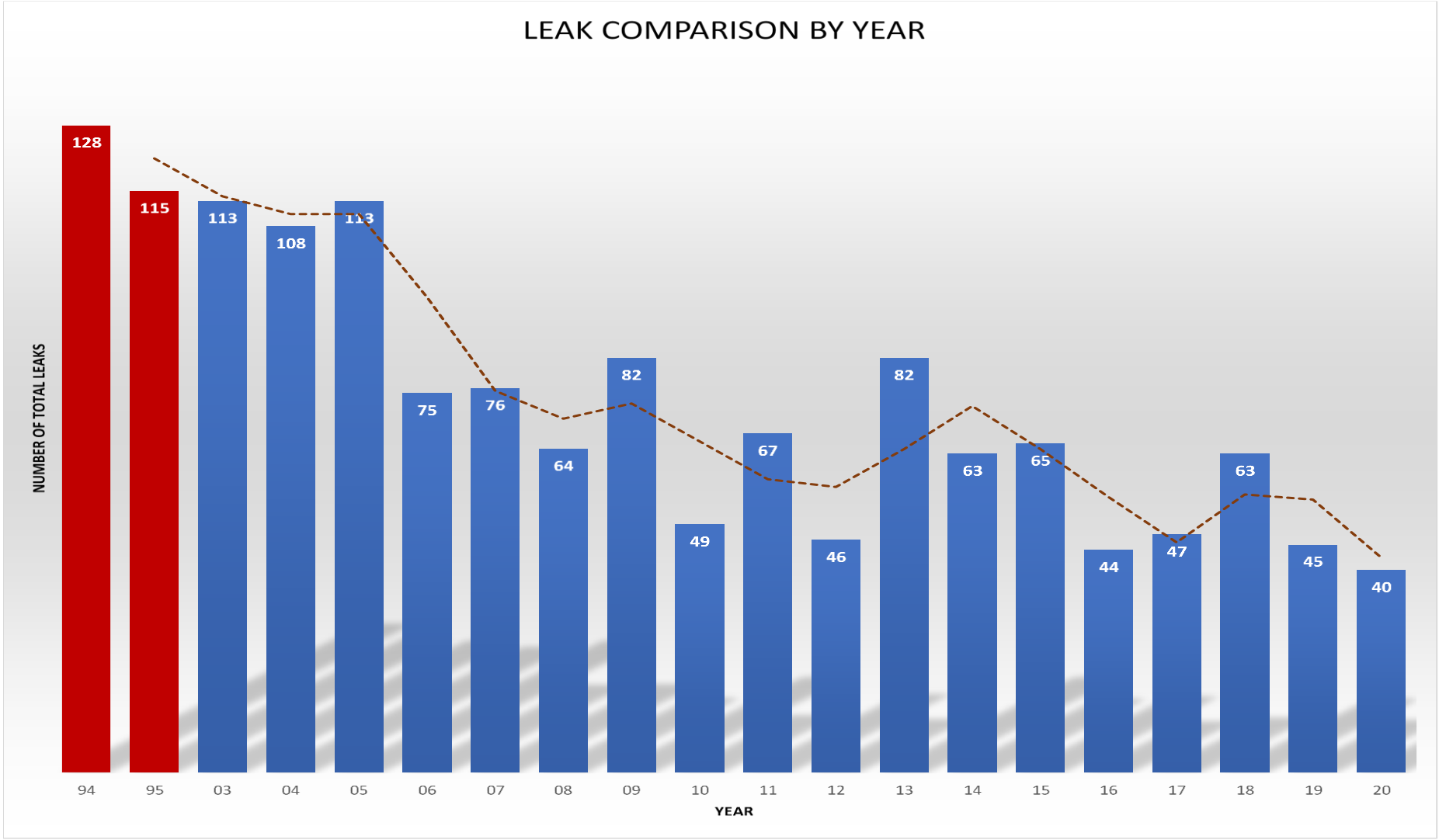
	ORIGINAL LENGTH (Miles)	LENGTH REPLACED (Miles)	PERCENT COMPLETE
PRIORITY 1	8.27	5.37	65
PRIORITY 2	6.85	3.59	52.4
PRIORITY 3	11.34	4.89	43.2
TOTAL	**26.46**	**13.85**	**52.4**

WATER | TRANSMISSION & DISTRIBUTION

Opportunistic – coordinate water infrastructure improvements with DPW projects.



WATER | LEAKS



69% Reduction in Leaks (1994 to 2020)

$100M+ investment since 1995 to replace 50 miles of water mains

WATER | SUPPLY, DEMAND & DISTRIBUTION

Continued sustained investment in infrastructure

- high quality, reliable drinking water
- reliable fire protection
- reduced leaks and breaks