





# 6

## Implementation

Roadway and sidewalk design projects in Boston are informed by the constraints and opportunities of working in a city with a mix of historic and modern construction, multiple and overlapping jurisdictions, and a commitment to meaningful community engagement. In recent years, the City has focused on sustainability and maintainability in all new construction. Efforts to efficiently maintain Boston's vast network of streets, foster community-initiated projects, and create effective partnerships with all stakeholders have been critical to the success of recent street redesign projects in Boston. This chapter identifies the fiduciary responsibilities of City departments, followed by a step-by-step description of the project development process.



# Implementation Principles

The Boston Complete Street Guidelines inform the planning, design, construction, and maintenance requirements for all public right-of-way improvements. The design and implementation of projects must remain flexible to the unique circumstances of each site, creating the most sustainable and innovative solutions. Below are the principles that inform implementation practices in Boston:

**Project initiation is focused on revitalizing streets that improve access to major destinations and the city's neighborhoods.**

**Community supported projects are encouraged.**

**Goals are identified at project initiation to foster multimodal designs and context-sensitive solutions.**

**Designs are informed by an all-inclusive and transparent public process from planning through design and construction.**

**Designs are developed with a focus on matching available resources with expected outcomes.**

**Interagency review is coordinated and efficient with a commitment toward taking responsibility and action.**

**Key constraints are recognized early in the process, including right-of-way ownership, major utility and areaway conflicts, and long-term maintainability.**

**Multimodal access for motor vehicles, transit, bicycles, and pedestrians, particularly for persons with disabilities, is provided during construction.**

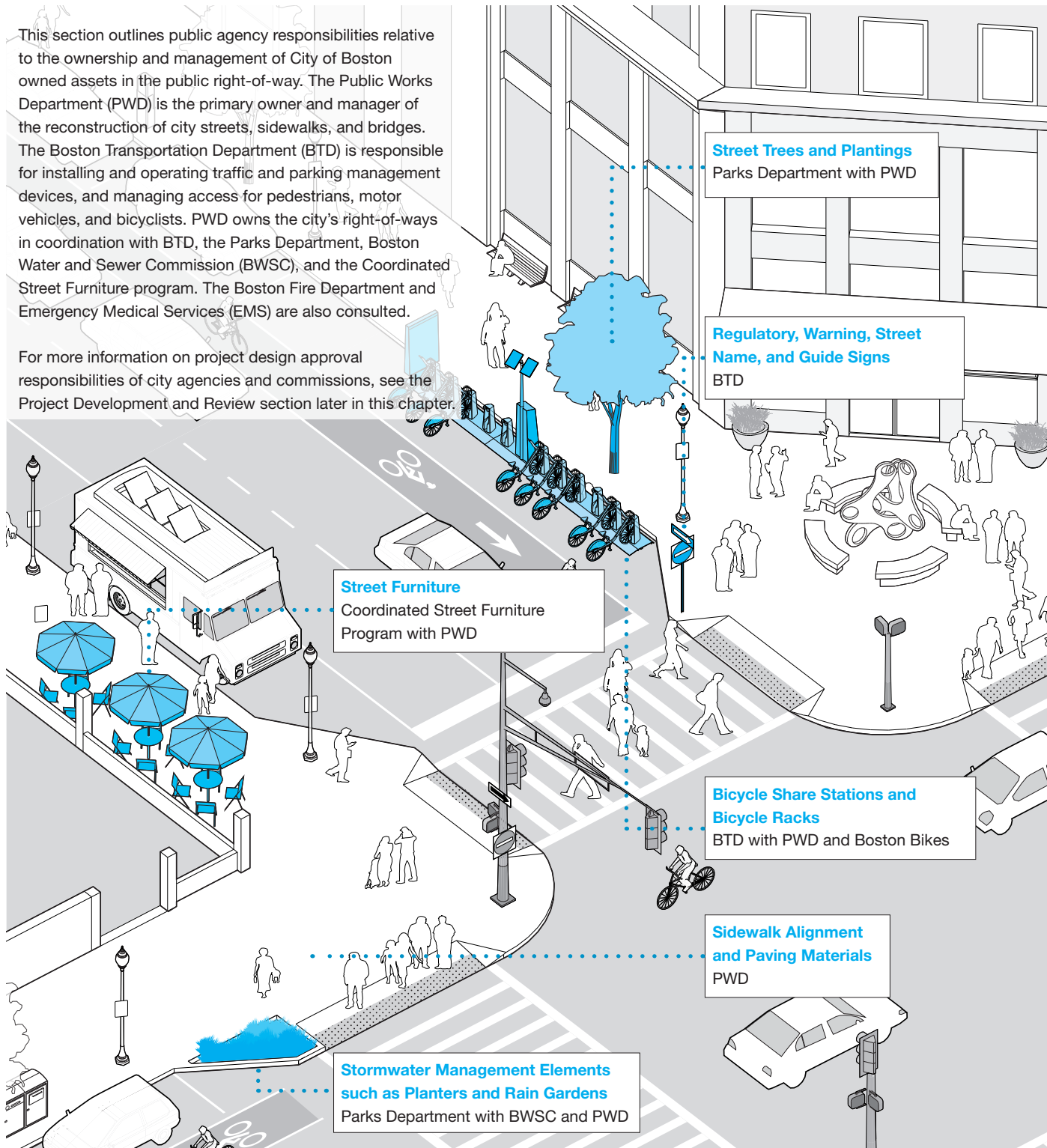
**Implementation practices seek to protect and preserve Boston's valuable environmental and historical resources.**

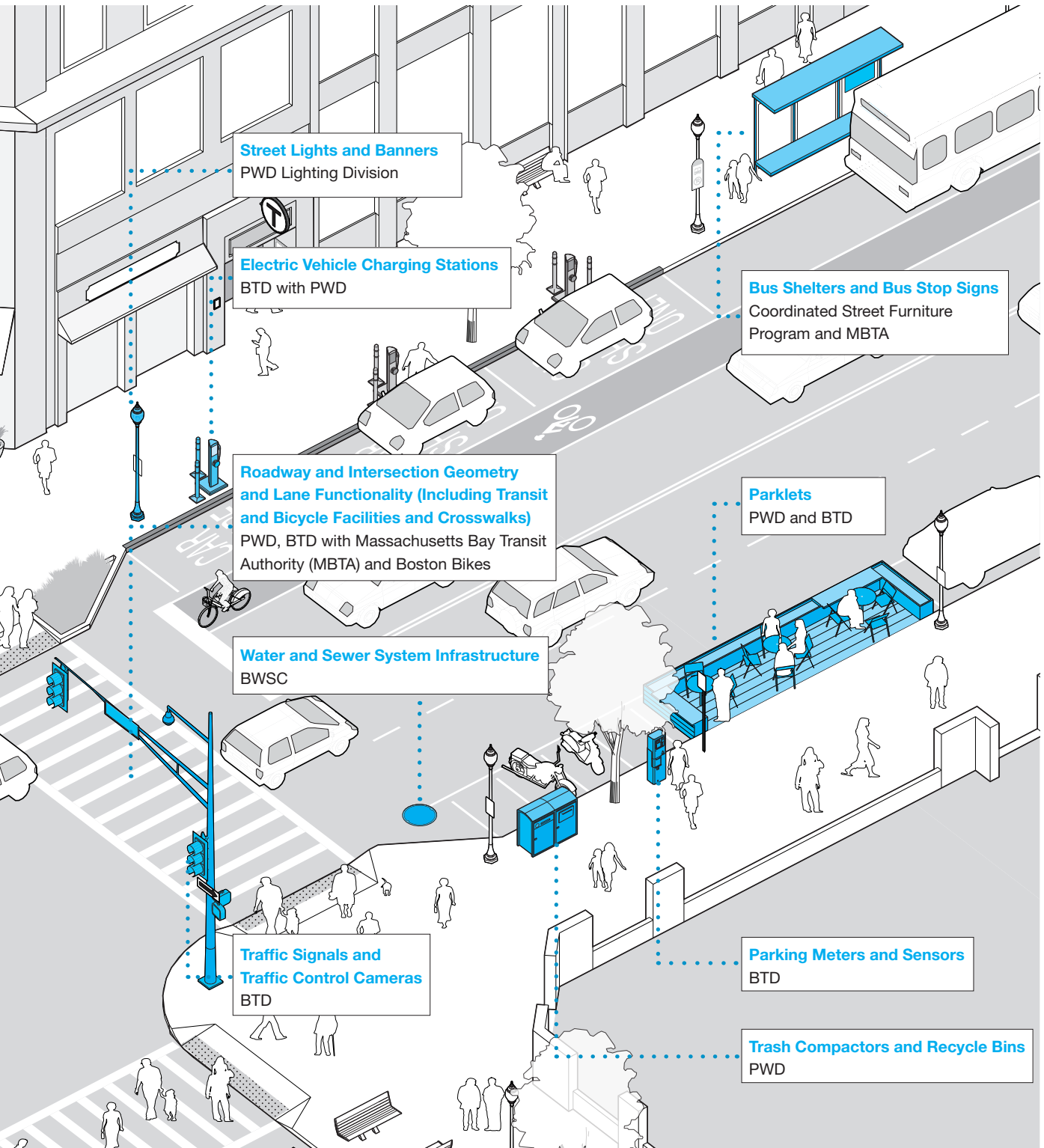
**During all phases of implementation, stormwater management and environmental mitigation practices are considered.**

# Public Agency Fiduciary Responsibilities

This section outlines public agency responsibilities relative to the ownership and management of City of Boston owned assets in the public right-of-way. The Public Works Department (PWD) is the primary owner and manager of the reconstruction of city streets, sidewalks, and bridges. The Boston Transportation Department (BTD) is responsible for installing and operating traffic and parking management devices, and managing access for pedestrians, motor vehicles, and bicyclists. PWD owns the city's right-of-ways in coordination with BTD, the Parks Department, Boston Water and Sewer Commission (BWSC), and the Coordinated Street Furniture program. The Boston Fire Department and Emergency Medical Services (EMS) are also consulted.

For more information on project design approval responsibilities of city agencies and commissions, see the Project Development and Review section later in this chapter.





**Street Lights and Banners**  
PWD Lighting Division

**Electric Vehicle Charging Stations**  
BTD with PWD

**Bus Shelters and Bus Stop Signs**  
Coordinated Street Furniture Program and MBTA

**Roadway and Intersection Geometry and Lane Functionality (Including Transit and Bicycle Facilities and Crosswalks)**  
PWD, BTD with Massachusetts Bay Transit Authority (MBTA) and Boston Bikes

**Parklets**  
PWD and BTD

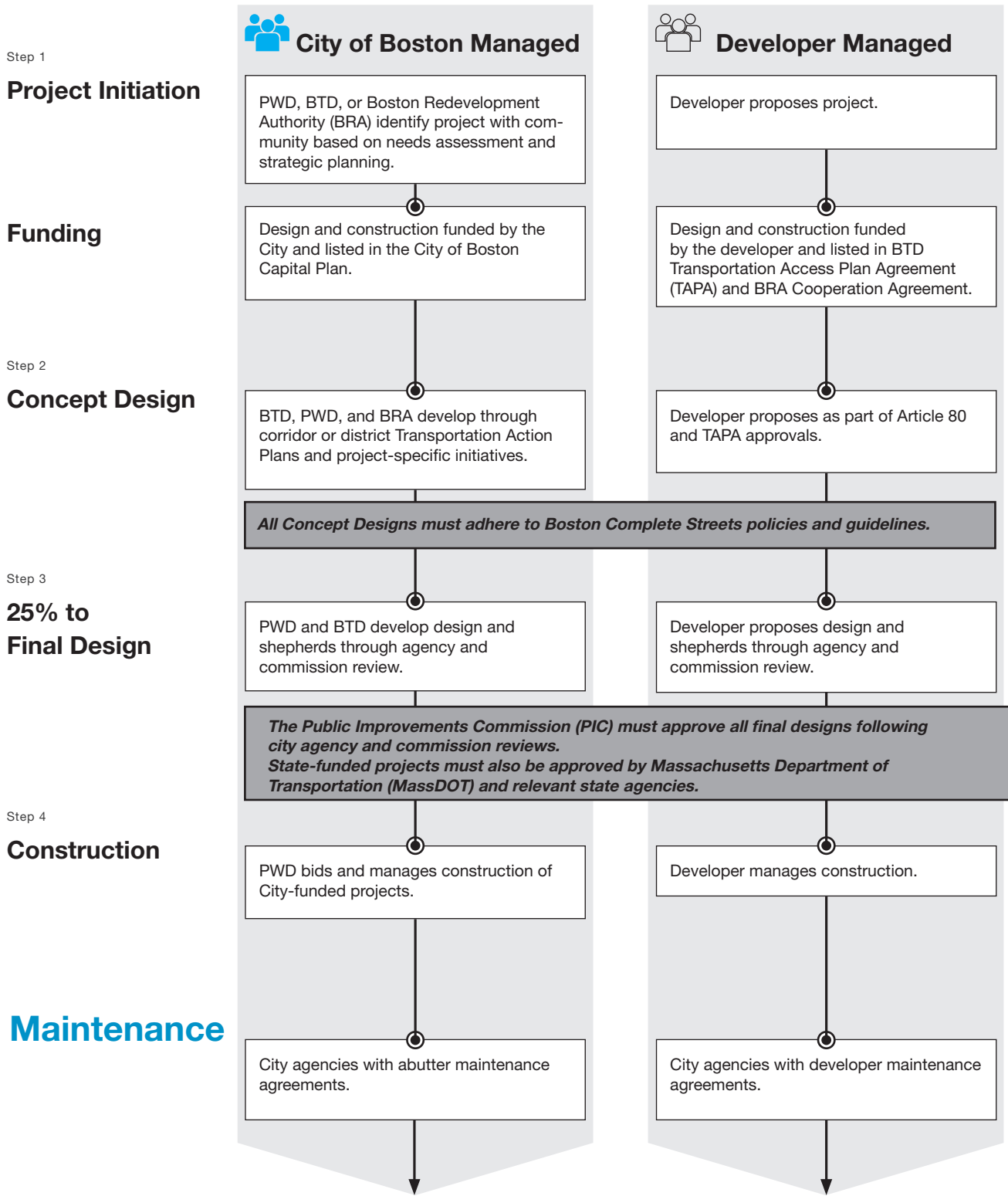
**Water and Sewer System Infrastructure**  
BWSC

**Traffic Signals and Traffic Control Cameras**  
BTD

**Parking Meters and Sensors**  
BTD

**Trash Compactors and Recycle Bins**  
PWD

# Project Development and Review Process



# Public Involvement



## State Managed

MassDOT identifies project in Long Range Transportation Plan (LRTP) and MBTA in Program for Mass Transit (PMT).

Federal and State funded projects are listed in the annual Transportation Improvement Program (TIP).  
  
City-funded design with State construction funding are also listed in the TIP.

State agencies develop a concept design with review by city agencies.

***State-funded projects must comply with MassDOT standards.***

State agencies develop and shepherd through agency and commission review.

State agencies bid and manage construction of State-funded projects including city-designed projects.

State and City agencies based on who controls the right-of-way (ROW) with abutter maintenance agreements.



## Community

Neighborhood, business and advocacy groups propose projects for consideration by the City, developers and State.

Extensive community and citizen advisory group meetings are held to inform the vision and review and select from concept design alternatives.

Community and abutter meetings are held to review design details and ROW impacts at 25% and 75%; MassDOT holds hearings for state-funded projects.

Project proponent appoints community liaison to address construction impacts.

Local residents and businesses participate in maintenance based on abutter agreements.





# Project Development and Review

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Projects vary in scope, complexity, and funding sources. The implementation steps outlined in these guidelines are primarily for the reconstruction of major streets, typically from building face to building face, involving the realignment of curblines and drainage infrastructure; the installation of street furniture and street trees; and the upgrade or installation of new traffic control devices. The implementation process is also significant in the rehabilitation or construction of bridges, which typically involve multiple jurisdictions.

In other projects, such as resurfacing, restriping, minor residential street reconstruction, or spot improvements such as intersection signal retiming and curb ramp construction, the basic Complete Streets principles of multimodal, green, and smart should be applied. All projects will assess the needs of stakeholders, availability of resources, and effectiveness of designs.

The following distinct phases drive project design and construction:

- ▶ Step 1: Project Initiation and Funding
- ▶ Step 2: Concept Design Development
- ▶ Step 3: 25% to Final Design and Bids Documents
- ▶ Step 4: Construction Management

**For City of Boston funded projects, typically PWD and BTD form a project management partnership, with planning staff taking the lead during Project Initiation and Concept Design development, including the organization of the public process; and engineering staff guiding the project from 25% Design through Construction Management.**

# Public Involvement

Boston has a long tradition of community leadership in creating people-oriented streets and public spaces. Neighborhood initiated projects such as the Southwest Corridor, the tree-lined boulevard along the Rose Kennedy Greenway, and the street-to-plaza conversion of Edward Everett and Peabody Squares in Dorchester would never have happened without the sustained commitment of people in the community.

City agencies such as BTD, PWD, and BRA work hand-in-hand with the Mayor's Office of Neighborhood Services to make sure local residents, businesses, Main Streets groups, and community organizations play a meaningful role in the design process. This results in designs that are site specific and sustainable over the long term.

The City also seeks input and guidance from universities and local advocacy groups on new national trends and best practices. Boston routinely partners with its research universities and is fortunate to have some of the most forward thinking advocacy groups in the country, such as WalkBoston (the country's first pedestrian advocacy group), Livable Streets, MassBike, the Boston Cyclists Union, and the Charles River Watershed Association. Many projects have been shaped through their participation.



## New Formats for Public Engagement

As the City explores new types of street and sidewalk configurations, there is also a need to explore new ways of engaging people in the design process. Conventional meeting formats are being supplemented with site walks, guided activities, and, where appropriate, easy-to-implement temporary projects to test new concepts before making a larger investment. The excitement around a community-initiated event can be the best way to bring a more diverse crowd into the conversation.

## Process for Initiating a Project

Neighborhood groups can share ideas for new projects with the City in a number of ways:

- ▶ Participate in neighborhood transportation planning public meetings
- ▶ Contact your neighborhood services coordinator in the Mayor's Office of Neighborhood Services
- ▶ Write a letter to the Commissioner of Public Works or the Commissioner of Transportation

All projects may not be funded immediately, but will be considered for future implementation. Many Complete Streets projects originate from insightful community comments.

## Inclusion in Public Processes


All projects should be guided by an extensive, open to the public, and well-advertised community process. Meetings should be held at each step of the project development process, from concept design through construction. Details of the level of community review and involvement are detailed later in this chapter.

Boston is committed to making public meetings inclusive and accessible, with multilingual translation provided when needed. Public outreach is conducted by mail, email, local news media, and the City's web site. The City also partners with local groups such as neighborhood councils, resident associations, small business groups, and environmental advocacy groups to encourage broad participation. During meetings everyone has a chance to speak, and decisions are made in a transparent fashion.

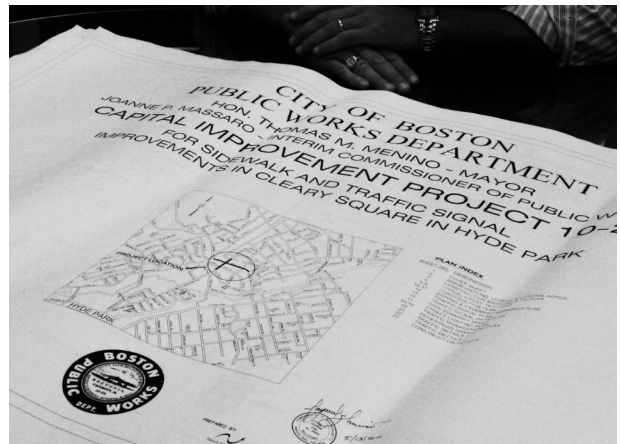
# Public Agency and Commission Approvals

Final design approval of all projects impacting the public right-of-way is made by PWD's PIC. The PIC consists of the Commissioners of PWD, BTM, Property Management, Inspectional Services (ISD), and the Executive Director of the BWSC.

In advance of PIC approval, project designs are reviewed and approved by PWD and BTM staff in coordination with the following City of Boston agencies and commissions:

- ▶ Boston Parks Commission and Parks Department reviews and approves street reconstruction **within**  **100'** of public parks, and proposals for street trees and plantings within all public rights-of-way.
- ▶ Mayor's Commission for Persons with Disabilities reviews projects to ensure that designs adhere to city, state, and federal accessibility policies and regulations.
- ▶ Boston Water and Sewer Commission (BWSC) reviews projects affecting water, sewer, or stormwater drain systems to ensure the optimal operation and safety of its facilities.
- ▶ Boston Redevelopment Authority (BRA) reviews projects for urban design and streetscape features.
- ▶ Boston Civic Design Commission (BCDC) reviews and recommends changes to design proposals that impact the public realm in coordination with BRA staff review.
- ▶ Boston Landmarks Commission (BLC) reviews and approves street reconstruction if it is adjacent to designated landmarks. National Register review may be required. Local Historic District Commissions review projects located within their district boundaries.
- ▶ Boston Art Commission reviews and approves new public art on property owned by the City of Boston. In addition, the Art Commission is responsible for the care and custody of all paintings, murals, statues, bas-reliefs, sculptures, monuments, fountains, arches, and other permanent structures intended for ornament or commemoration on City property.
- ▶ Boston Conservation Commission reviews any work within a wetland resource area or within 100' of a wetland. Permits from state and federal environmental agencies may also be required.

Projects that are funded through the state must also be reviewed by MassDOT and comply with state standards and guidelines.



# Step 1: Project Initiation And Funding

## Project Initiation

Major street reconstruction projects are proposed from various sources including:

- ▶ **City of Boston with local residents, businesses and community groups:** Typically projects are initiated by city agencies such as PWD, BTS, or the BRA based on needs assessments; as part of ongoing district or citywide strategic planning initiatives; and by community groups.
- ▶ **Developers and Institutions:** Developers are required to submit a TAPA with BTS, which includes a site plan detailing improvements associated with their project as well as any off-site mitigation.
- ▶ **State and Federal agencies:** MassDOT, the MBTA, and DCR often propose projects in Boston which need to be reviewed by and coordinated with the community and city agencies. These projects are listed in the Boston MPO's LRTP and the MBTA's PMT 25 year plan.

Key tasks include:

- ▶ Propose the basic design features of the project including the geographical limits of the project site
- ▶ Identify potential funding sources and "sponsoring" agency
- ▶ Identify and initiate coordination with adjacent and overlapping projects
- ▶ Estimate project costs
- ▶ Propose initial design and construction timeline

## Project Funding

Project funding can come from a variety of sources depending on the agency initiating the project. Often design and construction are funded separately by different entities.

- ▶ City of Boston initiated projects are funded through the Capital Plan released annually by Boston's Office of Budget Management. Note that the City's Capital Plan may include funding only for planning and design of a project in anticipation of construction funding from federal and state sources.
- ▶ Developers fund, design, and construct on- and off-site sidewalks, roadways, and intersection improvements based on the limits of the site plan associated with their building and mitigation program. The improvements are listed in TAPA and Cooperation Agreement negotiated with BTS and BRA respectively.
- ▶ State and Federally funded projects located in Boston are listed in the annual TIP of the Boston MPO. Typically, the TIP includes only construction funding with the expectation that design is funded by the City of Boston. The MBTA lists its projects in its own rolling 5 year Capital Investment Program.
- ▶ Federal earmarks and projects in various bond bills are also routed through the Boston MPO.

## Step 2: Concept Design Development

Concepts designs are typically developed through extensive community-based planning processes, either as part of a district Transportation Action Plan or through a project-specific initiative. All designs must adhere to Boston's Complete Streets policies and guidelines.

Key tasks and submittals include:

- ▶ Integrate surrounding land use, environmental, social, and historical context into the design
- ▶ Develop a Complete Streets based vision statement for the project
- ▶ Establish a transparent community involvement and decision making process
- ▶ Tabulate and analyze pedestrian, motor vehicle, bicycle, and transit data
- ▶ Complete multimodal traffic and operations modeling including traffic signal phasing and preliminary timing
- ▶ Develop design alternatives and select a final alternative
- ▶ For the selected design alternative submit roadway and urban design plans with:
  - ▶ Alignment and dimensions of sidewalks and crosswalks
  - ▶ Lane and intersection functionality for bicycles, transit, and motor vehicles
  - ▶ Proactive accommodations for people with disabilities
  - ▶ Street tree plan and "green" features such as rain gardens and pervious surfaces to promote sustainability
  - ▶ Street furniture including Hubway and electric vehicle (EV) stations, and "smart" information infrastructure
- ▶ Flag potential right-of-way issues, easements, areaways and conflicts with major utility lines
- ▶ Enter project in PWD's City of Boston Utility Coordination System (COBUCS) system
- ▶ Develop preliminary cost estimate

### Public Process

Public meetings are held to develop the vision, review design alternatives, and develop the selected alternative. Public involvement is critical during concept design development, as most decisions relative to the major features of project are taken at this stage.

### Agency Review and Approvals

PWD, BTM, and the BRA review concepts designs to ensure physical feasibility within the constraints of the project site and community support. For developer sponsored projects, concept designs included in the TAPA must be approved by BTM.

**All concept designs must adhere to Boston Complete Streets policies and guidelines.**

## Step 3: 25% to Final Design and Bid Documents

Engineering design involves extensive review by City agencies to ensure that all technical standards are being met. Applicable state and federal agency requirements may need to be followed, particularly if they are funding the project. Detailed requirements are customized project-by-project in contract documents.

Key tasks and submittals at each design phase typically include:

### 25% Design

- ▶ Instrument survey of streets and sidewalks including sub-surface investigation
- ▶ Detailing of sidewalk design including the location of street trees, rain gardens, plantings, street and pedestrian-scale light-emitting diode (LED) lights, and all street furniture
- ▶ Plans depicting traffic signal strategy including signal phasing diagrams, traffic control box locations, signage, and pavement markings
- ▶ Project reviewed with BWSC and utility companies for potential advance work
- ▶ Draft maintenance agreement with identified stakeholders
- ▶ Submittal of plans and renderings needed to describe the project, establish curblines, and determine impacts on abutters and existing utility lines
- ▶ Submittal of right-of-way plans
- ▶ Submittal of utilities plans coordinated with utility companies
- ▶ Submittal of 25% cost estimates
- ▶ Submittal to environmental and historic resource protection agencies (if required)

### 75% Design

- ▶ Finalization of maintenance and abutter agreements including construction access
- ▶ Tree hearing (if required)
- ▶ Submittal of plans, details, special provisions, and itemized cost estimates
- ▶ Submittal of detailed traffic signal phasing and timing plans
- ▶ Submittal of Construction Management Plans (CMP)

### 100% Design and Bid Documents

- ▶ Submittal of approved final plans, specifications, and estimates (PS&E)
- ▶ Submittal of quantity sheets for bidding
- ▶ Submittal of signed maintenance and construction easement agreements

### Public Process

Community meetings are held at the 25% and 75% design submission phases to elicit stakeholder comments, including details such as tree species, sidewalk finishes, and selection of street furniture. Individual meetings with abutters are also held to assess and coordinate impacts on the right-of-way.

### Agency Review and Approvals

PIC reviews the project at 75% and provides the final design approval for the project to proceed to construction. In the lead up to PIC approval, formal review is conducted at each design stage by PWD staff including the Lighting Division, BTD, Boston Bikes, the Mayor's Commission for Persons with Disabilities, BRA, BWSC, Boston Parks Department, Boston Fire Department, and EMS. Extensive coordination with and review by utility companies is required during engineering design development. Based on location and design features additional review may be required by the Coordinated Street Furniture Program, MBTA, Boston Groundwater Trust, Boston Conservation Commission, Historic District Commissions, and the Boston Arts Commission.

For state-funded projects, approvals are required from MassDOT at each design stage. Design exceptions may be required from MassDOT if particular features do not meet their guidelines and requirements.

## Step 4: Construction Management

Construction is managed by PWD in coordination with the relevant city agencies. When construction funding is provided through the state, management is undertaken by MassDOT.

Key task and submittals include:

- ▶ Construction bids, contractor selection and award
- ▶ Submittal of CMP
- ▶ Development of a public notification plan and designation of a point of contact for the public
- ▶ Monitoring of construction to ensure quality standards are met, change-orders are reviewed, and community impact mitigation commitments are honored
- ▶ Resolution of “punch-list” items
- ▶ Acceptance of field-checked “as-built” plans.

### Public Process

Project proponent appoints community liaison who is available 24/7 to address community issues during construction, including the monitoring of mitigation commitments such as the halting of night work.

### Agency Review and Approvals

BTD reviews and approves the CMP. PWD in coordination with the relevant agencies “accepts” projects based on field-checked as-built plans.





# Maintenance

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Boston's dense urban fabric has evolved over three centuries and its infrastructure has also correspondingly grown and aged. Add the impacts of the region's harsh rain, snow, and ice; decades-old tree roots; heavy traffic; and the need for regular maintenance becomes clear. Led by PWD, the City of Boston strives to keep its sidewalks and roadways in a state of good repair, design projects with consideration for maintainability, and coordinate construction permitting to reduce redundancies and conflicts between overlapping projects.

These guidelines are designed to be flexible, adapting to innovations in technology and best practices, and take into consideration the life-cycle costs of features such as street lights and sidewalk materials. In general, city agencies that have the fiduciary responsibility of owning and managing city assets in the public right-of-way are also responsible for their maintenance. For more information on fiduciary responsibilities, see the Fiduciary Responsibilities Chart found earlier in this chapter.

In addition to conducting routine preventive maintenance, such as street repaving or the clearing of catch basins, the City of Boston also encourages citizens to report areas in need of repair by contacting the **Mayor's 24 Hour Constituent Service** office by phone or online.

**Citizens Connect**, a smart phone app, enables constituents to quickly submit photos and locations of problems such as graffiti, and reports are automatically routed to the appropriate service department. The app allows residents to follow other problems reported in their area, transforming the experience of reporting an issue to City Hall into an opportunity for community organizing.

**Street Bump** is another smart phone app that helps residents improve their neighborhood streets. As they drive, the app collects data about the smoothness of the ride; that data provides the City with real-time information it uses to fix problems such as filling in pot holes.

# Maintenance Agreements

While the City of Boston is committed to developing and building high quality streetscapes to enhance and instill pride in public spaces, newly constructed streets must also be practical from a maintainability point of view. Long-term operations and maintenance costs must be factored into the design from the outset.

Maintenance needs must be identified and line-itemed early in the design process. Neighborhood groups and abutters who could take on maintenance responsibilities in the future should be engaged so that designs evolve in concert with their abilities and resources.

Draft maintenance agreements with identified signatories must be prepared at the 25% design phase with final maintenance and easement agreements signed at 100% design.

## Standard and Enhanced Maintenance

Throughout these guidelines, specific design elements have been identified as standard, enhanced, or pilot treatments. Treatments within the standard category are usually maintained by City agencies. Those in the enhanced and pilot categories generally require maintenance agreements.

For example, standard sidewalk finishes such as concrete are maintained by PWD. However, non-standard sidewalk materials such as granite pavers or permeable finishes require a maintenance agreement, typically with abutters, developers, or with local businesses or “friends” groups. Typically all specialized greenscape elements such as stormwater planters and rain gardens require maintenance agreements. Maintenance agreements create a public/private partnership to specify what type of and how often maintenance is required. The agreements are legal instruments negotiated on a case-by-case basis to identify responsible parties for payment, maintenance, and/or operations.

# Maintenance Life Cycle of City Roadways and Sidewalks

The City of Boston aims to improve the life and sustainability of roadways and sidewalks in the most cost-effective and efficient way possible. Below is a breakdown of the typical “life cycle” of city roadways and sidewalks with respect to operations and maintenance. During the design of a project, an operations and maintenance plan should be developed to address all aspects of the life of a street, from daily, weekly, and seasonal requirements to routine maintenance. Note that maintenance practices are opportunities to incorporate Complete Streets principles.

The list below is a general guide for when maintenance practices typically occur; however, improvements may be needed at anytime to address safety and access concerns.

## 1. Daily, Weekly, and Seasonal Operations and Maintenance

- ▶ Trash/recycling pickup/removal
- ▶ Street cleaning
- ▶ Pothole repair, sealing of cracks in roadway
- ▶ Sidewalk repair
- ▶ Lighting (bulb replacements)
- ▶ Graffiti removal
- ▶ Tree inspection during warranty
- ▶ Tree pruning
- ▶ Seasonal plantings
- ▶ Cleaning of drainage infrastructure (power washing, silt removal, etc.)

## 2. Restriping (typically every 3 to 5 years)

- ▶ Reconfigure lane markings (reducing lanes widths, removing travel or parking lanes, adding bicycle lanes, etc.)
- ▶ Install bicycle facilities
- ▶ Better realign crosswalk (New curb ramps may be needed)

## 3. Resurfacing (typically every 10 to 20 years)

- ▶ Improve surface smoothness
- ▶ Install accessible curb ramps
- ▶ Install new or realign crosswalks
- ▶ Install bicycle facilities (cycle tracks, bicycle lanes, etc.)

In addition to the short term and routine maintenance needs, long term maintenance of Boston’s streets is required.

Updating centuries old streets is a continuous process, and can be done through small, incremental projects identified at specific locations, or can be accomplished through the complete reconstruction of a street. During reconstruction, determining the cross section of a street is the most critical task, including considering the feasibility of widening sidewalks, providing dedicated bicycle and transit facilities, reconfiguring intersections, and installing traffic calming devices such as curb extensions.

# City of Boston Utility Coordination Software (COBUCS) and Guaranteed Streets Program

Most often, projects on city streets overlap. From capital reconstruction projects to spot improvements, Boston's roadways and sidewalks are continuously changing. PWD issues almost 8,000 construction permits each year to utility companies, private contractors, and other agencies. They typically perform repair and reconstruction for the following reasons:

- ▶ Replacement of deteriorating infrastructure due to age and the effects of Boston's harsh winters
- ▶ Upgrades relative to new developments and the introduction of new technology such as replacing copper with fiber optic lines or increasing the capacity of the sewer system



## Coordinating City Resurfacing and Reconstruction with Non-City Construction

The PWD has developed the City of Boston Utility Coordination Software (COBUCS) as a centralized database to coordinate all construction work on city-owned streets and reduce conflicts amongst ongoing projects. Since August of 2009 the COBUCS program has assisted the City in circumventing over 1,700 conflicting utility projects that may have otherwise caused excavation on a newly paved street.

COBUCS requires all entities, including the City, to register planned excavation work. Companies who perform the majority of excavation work throughout Boston are required to review and officially "clear" streets proposed for resurfacing or reconstruction. Clearing a street indicates that there will be no excavation cuts into the pavement for utilities, drainage, telephone, gas, electric, etc. for a minimum of five years for resurfacing candidates and ten years for reconstruction candidates. The COBUCS reservation system allows for the City to establish long term capital programs that can be successfully coordinated to ensure that newly paved roadways will not be excavated.

Many times when different projects overlap there are also opportunities to "piggy back" projects on top of each other to better utilize funds and resources. For example, the Boston Bikes program analyzes the PWD annual resurfacing program to see if there opportunities to incorporate bicycle facilities from the Bicycle Master Plan on planned corridors.

## Guaranteed Streets

The Construction Management Division of the PWD ensures all completed resurfacing and reconstruction capital projects are free of utility excavation for guaranteed minimum of five years. Utility companies or private contractors are not issued permits on "Guaranteed Streets", except under limited circumstances approved by the City. Approved excavation work on a Guaranteed Streets requires payment to the City equivalent to the cost of full curb-to-curb restoration of the roadway, and an additional  25' beyond the limits of work on both sides of the cut (a total of  50' in addition to the repair).

# Snow Storage and Clearance

## Overview

Inclement weather is a familiar scene in Boston. Snow, slush, and ice impact all modes of transportation; timely clearance is essential to maintaining safe and accessible streets during all seasons. Clear pedestrian paths are necessary for getting around in Boston and are of particular importance as walking is part of all trips, and pedestrians are the most vulnerable users of a transportation network. Street design should proactively incorporate provisions to facilitate snow clearance and storage for all modes, with pedestrians, bicyclists, and transit users given the same attention as motorists. Streets and sidewalks should be accessible for the elderly, young children, the disabled, and people pushing carts and strollers.

**PWD is responsible for fully plowing and deicing approximately 850 miles of roadway in the city, and uses over 500 pieces of equipment at full deployment. Property owners, public and private, are responsible for clearing snow and ice from sidewalks adjacent to their properties.**

## Use

Sidewalks must have a clear unobstructed accessible pathway. Particular attention should be given to clearing curb ramps at crosswalks. Hydrants, catch basins, crossing islands, medians, and building entrances must also be accessible. Sidewalks should be cleared within three hours of snowfall ending (or three hours from sunrise if snow falls overnight). Violators will be subject to fines from the City.

On-street bicycle facilities, including cycle tracks, will be cleared by PWD as part of regular roadway clearing operations. Snow clearance of bicycle racks is the responsibility of the abutting property owner.

On-street transit facilities such as busways and tracks are the responsibility of the MBTA. Snow clearance at bus stops is the responsibility of the MBTA, abutting property owners, or private contractors depending upon the location. A list of bus stop locations and the parties responsible for snow clearance is posted on the MBTA's website.

Designs that make it easier to clear snow and ice, and prevent ponding of water include:

- ▶ Wide Greenscape/Furnishing Zones and curb extensions, which provide space to store snow (both sidewalk and

roadway snow clearance operations can take advantage of this storage area)

- ▶ Vertical elements such as pedestrian signal poles and hydrants located on curb extensions, which provide a visual queue to snow plow operators of the change in the curbline
- ▶ Smooth materials such as concrete, which are easier to shovel compared to bricks or pavers
- ▶ Roadways pitched toward catch basins located on the upstream side of curb ramps, which prevent pooling at the base of the ramp
- ▶ Greenscape elements such as tree pits, stormwater planters, and rain gardens, as well as pervious materials, which assist in accelerating the removal of snow and ice
- ▶ Ensuring street furniture and other physical obstructions are not cluttering the Pedestrian Zone

On-street parking is not permitted on posted snow emergency arteries during a declared emergency. During such events a list of alternative parking lots is posted on the City of Boston's website.

## Considerations

- ▶ Prioritization of streets, sidewalks, and improved strategies for monitoring and enforcing snow clearance should be analyzed and updated annually. Priority should be given to emergency vehicle routes and major arterials, school bus and pedestrian routes, MBTA bus routes, and major bicycle routes.
- ▶ Snow should not be shoveled from sidewalks or parking spaces into the street. Disabled cars blocking the roadway must be removed as soon as possible. Cars parked in driveways must not extend into the sidewalk or street. Space savers will be collected 48 hours after a Snow Emergency has been lifted.
- ▶ Parking restrictions and regulations are strictly enforced during snow emergencies, and violators are subject to ticketing and towing.
- ▶ When treating sidewalks and roadways with chemicals, the City of Boston recommends using CaCl<sub>2</sub> or KCL. Rock salt is not recommended because of environmental concerns. Sand should not be used because it can clog the drainage systems, and is difficult and expensive to clean. Innovative and emerging technology, such as electrically heated sidewalks and roadways, electric rubber mats, and infrared technology to melt snow and ice at targeted areas should be considered on a case-by-case basis.