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5 Smart Curbsides


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Smart Curbsides

Curbside space on Boston's streets is a limited and valuable commodity. Passenger cars, delivery vehicles, and buses compete for limited curb space to access shops, restaurants, housing, offices, and community facilities. And, more competition is on the way. As the City of Boston pursues its ambitious goal of reducing greenhouse gas emissions, it is encouraging the use of environmentally friendly electric vehicles, bicycle and car-share systems, and is accommodating the parking needs of these vehicles on its streets. Smart and efficient management of curbs and the use of web-based, on-the-go information technology can help Boston address this diversity of demand on its curbside space equitably.

Smart Curbside Principles

Curb Space for All

The use of curbside space should be distributed equitably to support the needs of all users, and should encourage alternative modes of transportation such as bicycling, scooters, and electric vehicles.

Clean Energy

Electric grids that power curbsides and vehicle charging should be linked with clean, renewable energy sources, particularly solar and wind.

Variable Pricing

Demand responsive on- and off-street parking pricing should be considered.

Green Space

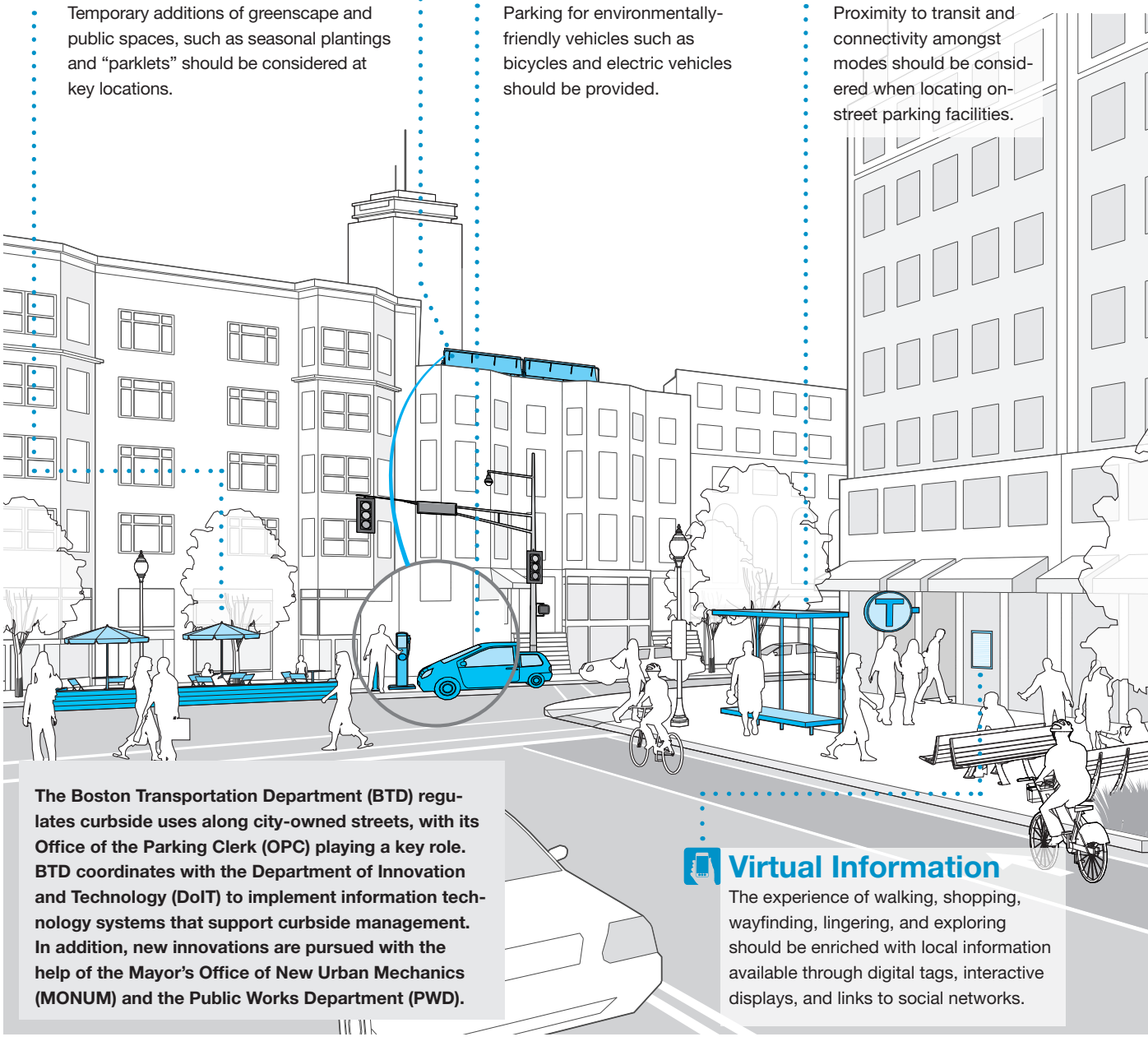
Temporary additions of greenscape and public spaces, such as seasonal plantings and "parklets" should be considered at key locations.

Green Parking

Parking for environmentally-friendly vehicles such as bicycles and electric vehicles should be provided.

Connectivity

Proximity to transit and connectivity amongst modes should be considered when locating on-street parking facilities.



The Boston Transportation Department (BTD) regulates curbside uses along city-owned streets, with its Office of the Parking Clerk (OPC) playing a key role. BTD coordinates with the Department of Innovation and Technology (DoIT) to implement information technology systems that support curbside management. In addition, new innovations are pursued with the help of the Mayor's Office of New Urban Mechanics (MONUM) and the Public Works Department (PWD).

Virtual Information

The experience of walking, shopping, wayfinding, lingering, and exploring should be enriched with local information available through digital tags, interactive displays, and links to social networks.

Air Quality

Web sites, signage, and smart phone applications should inform drivers of available parking spaces in real-time to decrease green house gas (GHG) emissions and congestion caused by vehicles circulating in search of parking.

Balance

Curbside uses should seek to balance parking needs with the demand for other uses such as seating, greenscape, and bicycle parking.

Data Analysis

Data collection and analysis of curbside use should be performed to allow adaptation to changing conditions.

Access for All

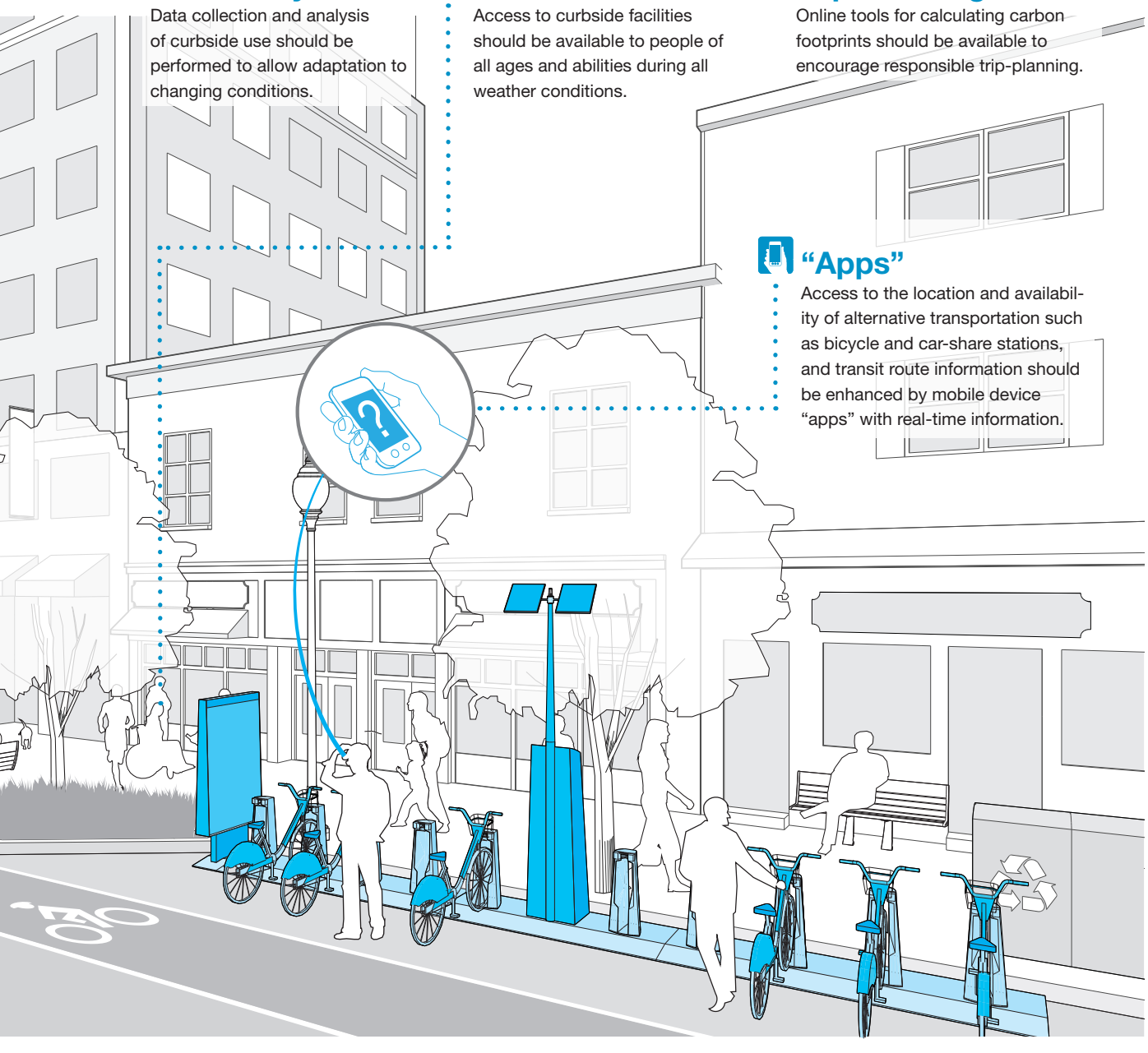
Access to curbside facilities should be available to people of all ages and abilities during all weather conditions.

Trip Planning

Online tools for calculating carbon footprints should be available to encourage responsible trip-planning.

"Apps"

Access to the location and availability of alternative transportation such as bicycle and car-share stations, and transit route information should be enhanced by mobile device "apps" with real-time information.



Mobility Hubs

Mobility Hubs are centers of activity in Boston's neighborhoods that bring together alternative transportation choices, virtual trip-planning, and placemaking at select curbside locations. They are located at prominent destinations where:

❶ **Alternative transportation** choices such as bus and rail transit stops, electric vehicle charging, and bicycle and car share parking are co-located to enable seamless transfers.

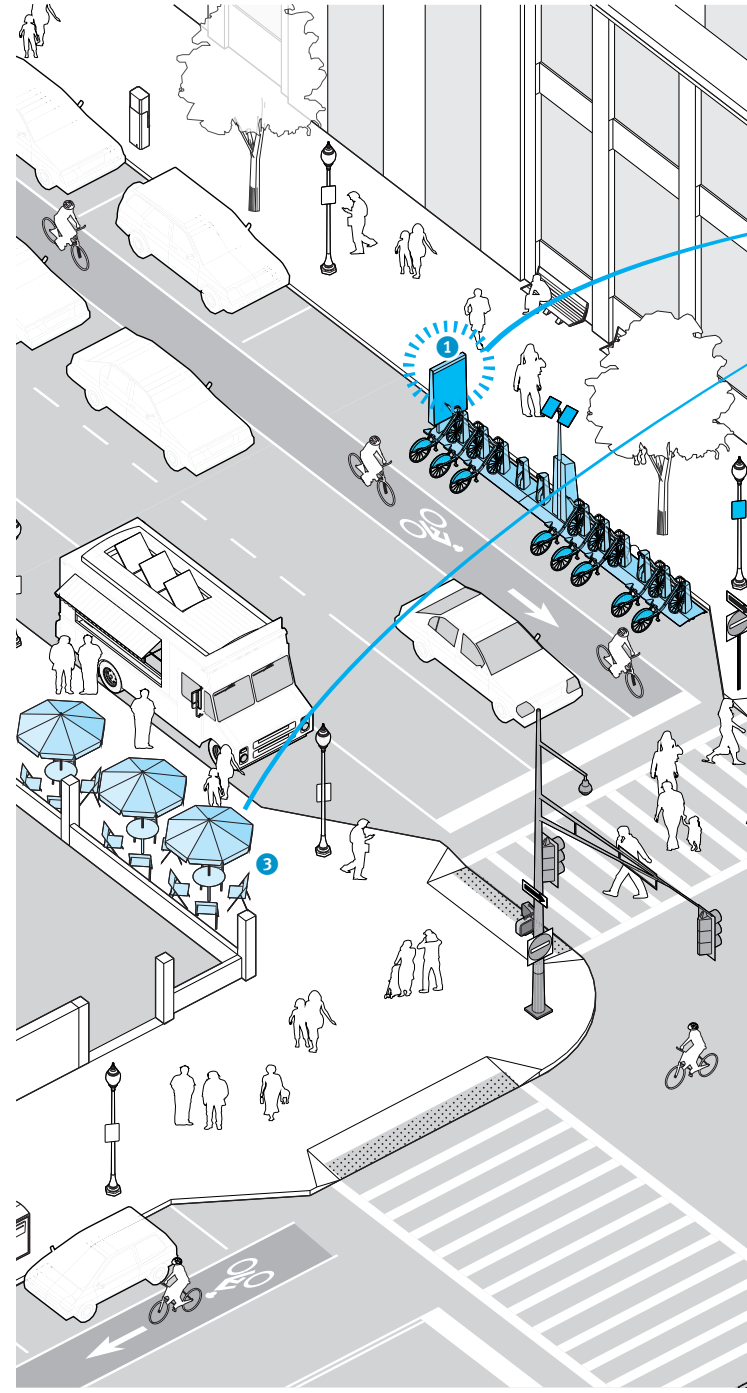
❷ **Trip-planning** is facilitated by providing real-time global positioning system (GPS) information to users to improve access and connectivity to alternative travel modes.

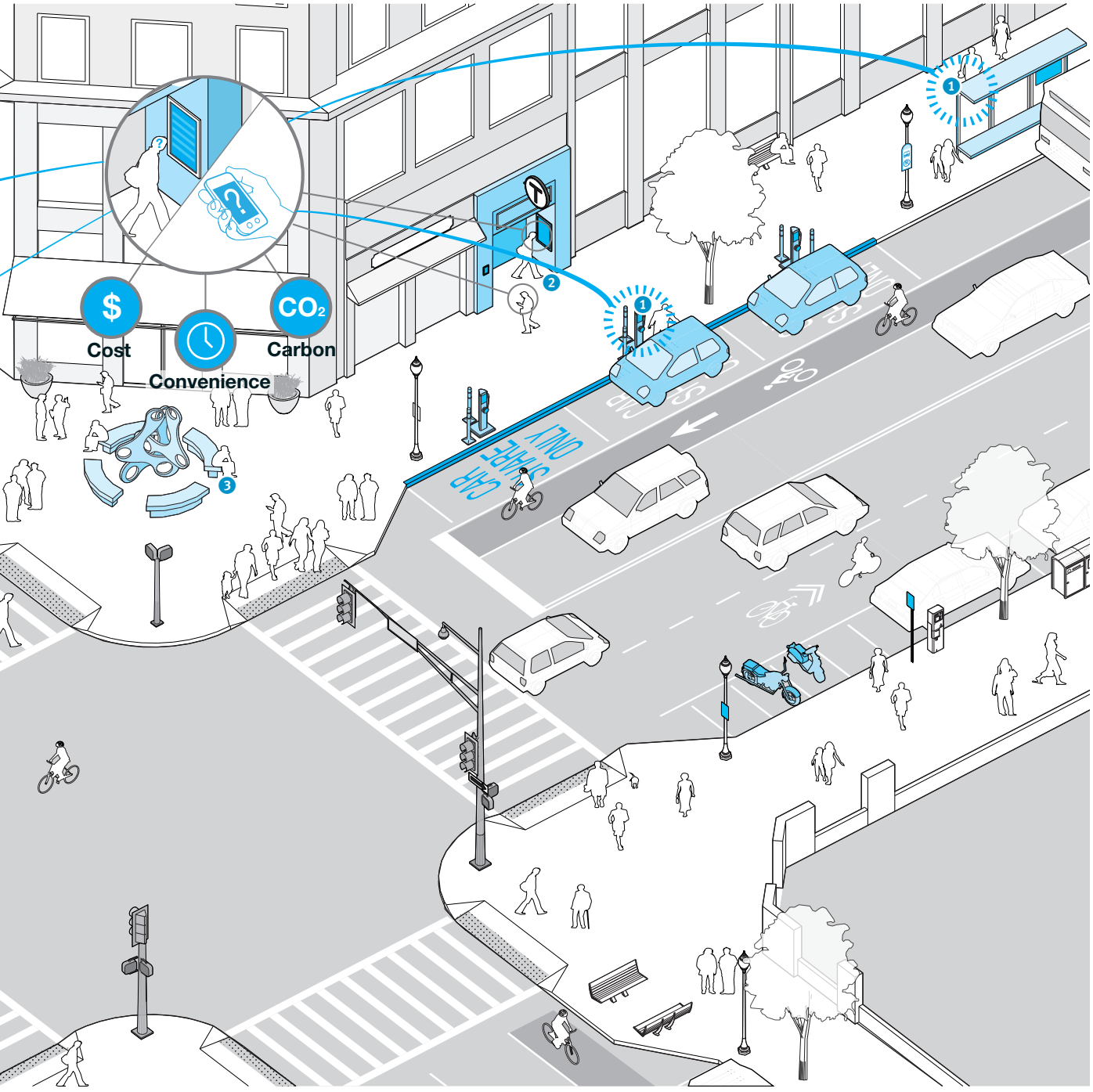
❸ **Placemaking** is enhanced by creating comfortable and desirable streetscapes and supplementing them with interactive digital displays and tags about local community facilities, history, and events.

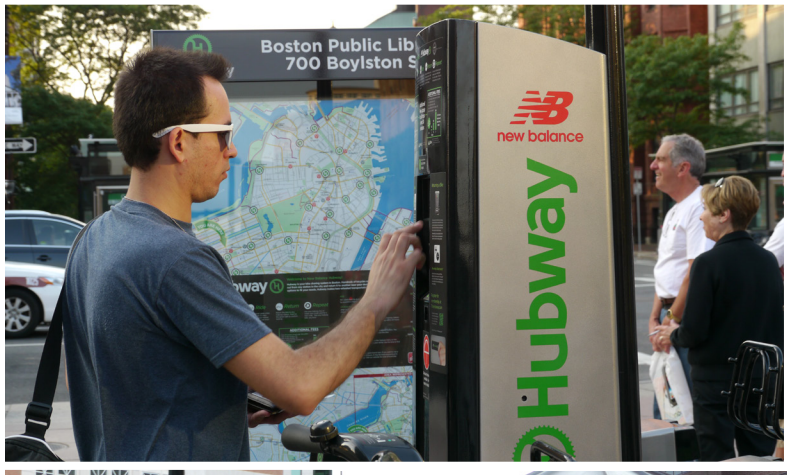
Mobility Hubs provide both the physical and information infrastructure required to assist users in making informed travel choices. For example, using real-time information available on a digital display or mobile app, users would ascertain not only how to select a route to get to their destination, but also the best way to travel. Is it better to grab a bicycle from a Hubway station, hop on a soon-approaching bus or subway train, drive using the electric car-share vehicle located around the corner, or simply walk with the assistance of a smart wayfinding app? Which alternative provides the best balance between convenience, cost, and carbon footprint?

In contrast to Boston's more traditional multimodal centers which bring together regional transportation services at South, North, Back Bay, and other key stations, Mobility Hubs can be distributed at several locations within a neighborhood, typically adjacent to a subway stop, at a key intersection or next to a community center. They complement transit systems by catering to "first and last mile" needs. Mobility Hubs create a finer-grained, more personalized, and environmentally friendly network of transportation options for residents, commuters, and visitors to use on a daily basis.

Finally, Mobility Hubs can enhance the sense of place of a location by linking residents and visitors to new experiences, such as community events, farmers' markets, details about public art and sculptures, or the arrival of a new shop or restaurant in the surrounding neighborhood.







Information Infrastructure

For several years Boston has been "hard-wiring" its use of traffic related systems. For example, BTD's Traffic Management Center controls over 490 traffic signals remotely and has installed close to 200 Closed Circuit Televisions (CCTV). Linked by an extensive fiber optic cable network, this physical infrastructure enables the City to observe video feeds and assess signal functionality to improve traffic flow and pedestrian safety in real-time. Guidelines and technical specifications for this hardware are well established and used extensively.

More recently, new technology—from smart phones to GPS—and a resurgent spirit of civic engagement have increased opportunities for information sharing. Lead by MONUM, Boston has embraced new projects that leverage technology to deliver services that are more personal and citizen-driven. For example, Citizens Connect, a smart phone app, enables residents to upload photographs and request the City to fix potholes and remove graffiti.

The following guidelines discuss the use of infrastructure to provide and collect information that can improve operations and efficiency along Boston's curbsides. Web-based or virtual infrastructure allows for the installation of digital tags and information panels in public spaces to provide real-time information for next bus or train information, or for the availability of parking spaces or bicycles at a Hubway stations. Sensors and smart meters can adjust pricing and parking regulations to respond to changing circumstances. Opportunities to gather, display, and utilize data and technology will continue to grow and improve and will contribute to creating a more cost-effective and efficient management of Boston's curbsides.

Traffic Cameras

Overview

Traffic cameras are CCTVs that play a key role in monitoring Boston's streets to improve traffic flow and pedestrian safety. CCTVs allow Boston's Traffic Management Center (TMC) operators to investigate traffic congestion, locate accidents, disabled vehicles, illegal parking, and roadwork, as well as assist in police and fire emergencies. In addition, CCTVs can be used to observe how pedestrians and bicyclists are traversing intersections. CCTVs are used to determine the efficiency of the traffic signal system, observe the level of service (LOS) of roadways, and evaluate adjustments to signal timing and progression.

Boston has installed over 100 CCTVs at key intersections along major roadways throughout the city. In addition, the TMC is able to share logistics with several CCTVs provided by the Boston Police Department and the Massachusetts Interagency Video Information System (MIVIS).

The location and installation of CCTVs must be approved by BTD and comply with BTD's Video Monitoring System Specifications.

Use

- CCTVs should be installed as part of every street reconstruction or large development project in the city. The system consists of a domed, pendant mounted CCTV with remotely controlled pan, tilt, and zoom capabilities.
- Camera control protocols must be compatible with existing equipment and software at BTD's TMC.
- Communication for remote monitoring at the TMC must be via fiber optic cables or copper wires. All necessary conduit work to connect with the City's fiber optic network should be installed.
- CCTVs should be used to inform traffic advisories posted by BTD in the event of an accident, unusual congestion, or other traffic impeding situations. They are useful to send follow-up traffic alerts as conditions change or the situation ends.

Considerations

- CCTVs and related field equipment should be designed to operate reliably in all weather conditions.
- Traffic signal control boxes should not obstruct the Pedestrian Zone in the sidewalk and be located to minimize visual clutter.
- When mast arm mounted, cameras should be positioned to maximize visibility and should not block, or be blocked by signs, utility wires, or other traffic control devices.

Smart and Multi-Space Meters

Overview

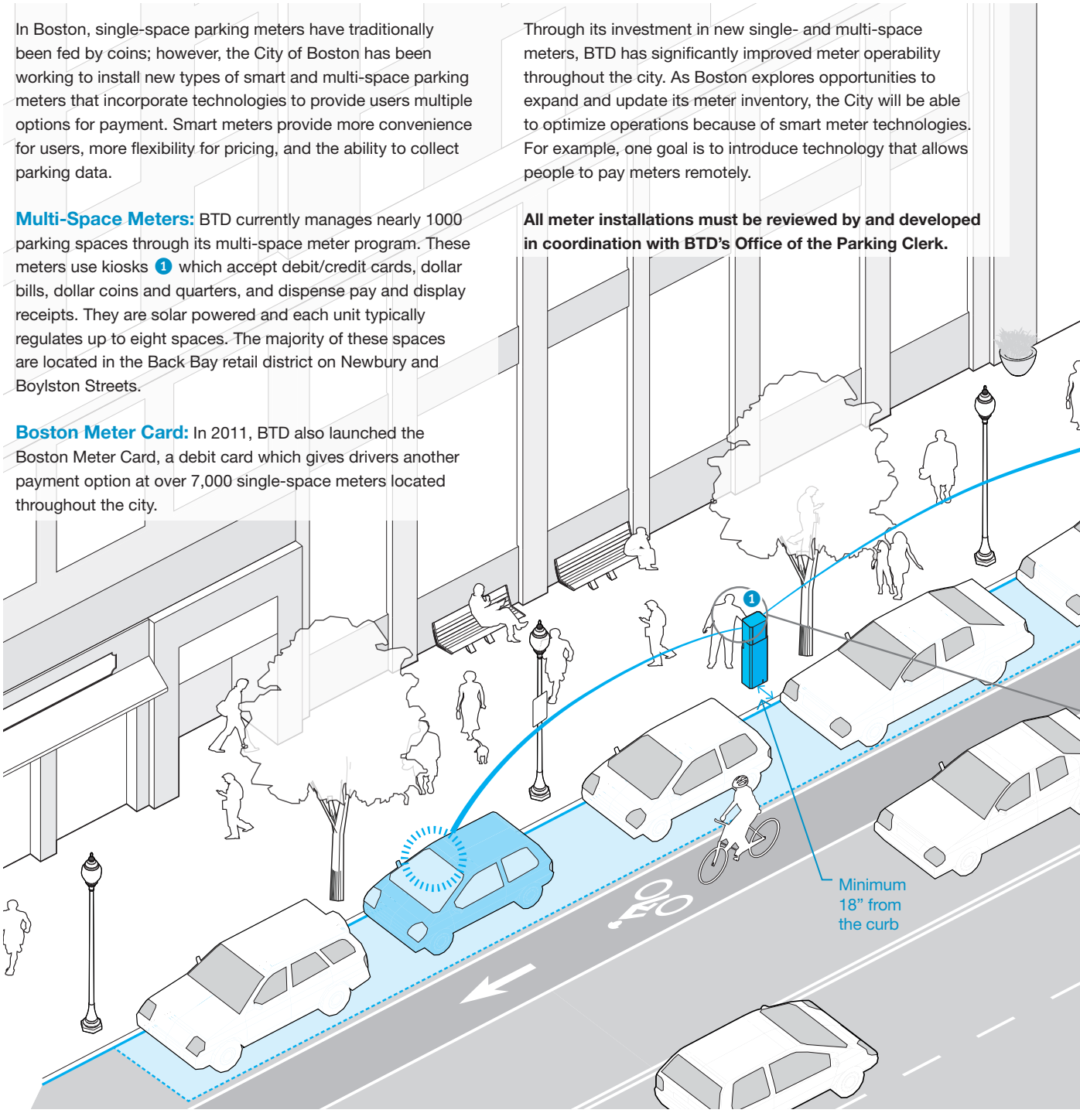
In Boston, single-space parking meters have traditionally been fed by coins; however, the City of Boston has been working to install new types of smart and multi-space parking meters that incorporate technologies to provide users multiple options for payment. Smart meters provide more convenience for users, more flexibility for pricing, and the ability to collect parking data.

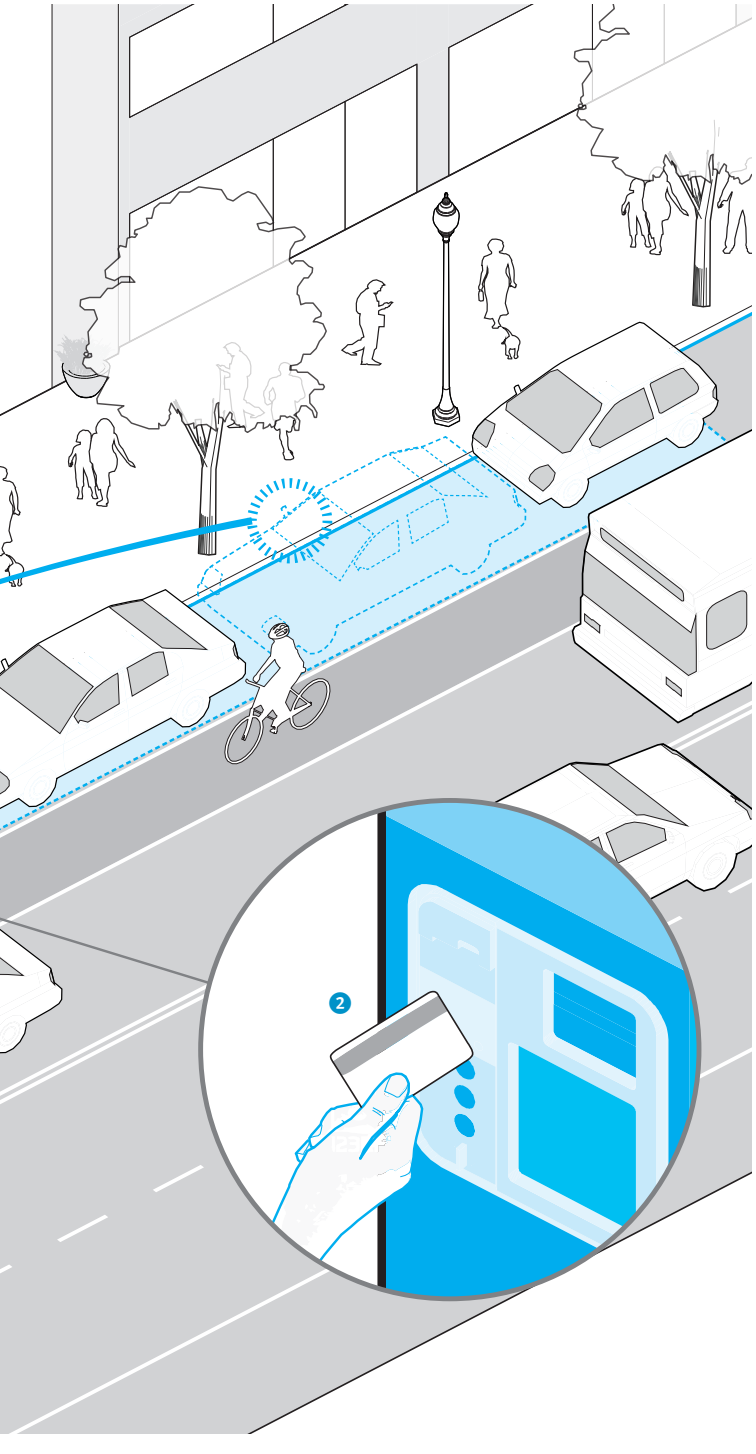
Multi-Space Meters: BTD currently manages nearly 1000 parking spaces through its multi-space meter program. These meters use kiosks (1) which accept debit/credit cards, dollar bills, dollar coins and quarters, and dispense pay and display receipts. They are solar powered and each unit typically regulates up to eight spaces. The majority of these spaces are located in the Back Bay retail district on Newbury and Boylston Streets.

Boston Meter Card: In 2011, BTD also launched the Boston Meter Card, a debit card which gives drivers another payment option at over 7,000 single-space meters located throughout the city.

Through its investment in new single- and multi-space meters, BTD has significantly improved meter operability throughout the city. As Boston explores opportunities to expand and update its meter inventory, the City will be able to optimize operations because of smart meter technologies. For example, one goal is to introduce technology that allows people to pay meters remotely.

All meter installations must be reviewed by and developed in coordination with BTD's Office of the Parking Clerk.





Use

- Smart meters should be configured to allow payment through credit cards or cell phones 2. They should transmit information wirelessly to the Office of the Parking Clerk to facilitate real-time monitoring and maintenance.
- All meters should be located in the Greenscape/Furnishing Zone at a minimum of **18" from the curb**; meters may not be placed in the Pedestrian Zone. A clear path should provide access to and from parked cars to the Pedestrian Zone.
- Parking spaces can be marked or unmarked in the parking lane, depending on the payment method for the multi-space meter.

Considerations

- By providing many payment modes, smart meters make it easier for drivers to avoid parking tickets. At the same time, parking revenues are maintained due to the more efficient utilization of parking spaces by customers.
- Smart meters should be solar powered; however, panels should be strategically placed to reduce visual clutter on the street.
- Compared to single space meters, multi-space meters reduce clutter on the street.
- If individual spaces are striped, information on usage can be collected per space. However, marking parking spaces requires more maintenance, can limit the number of spaces utilized, particularly with the growing popularity of smart cars, and can be impractical during snowy months. If parking spaces are not striped, usage rates may be harder to collect, though some sense of overall demand may be discerned from parking revenue.
- Products are available to retrofit traditional single-head mechanical meters with the capability to make wireless phone payments.
- Smart meter cards increase the efficiency and decrease the cost of collecting payments.
- Meter card use experiences greater retention if money can be added to the card at local kiosks or online.

Parking Sensors and Occupancy Monitoring

Overview

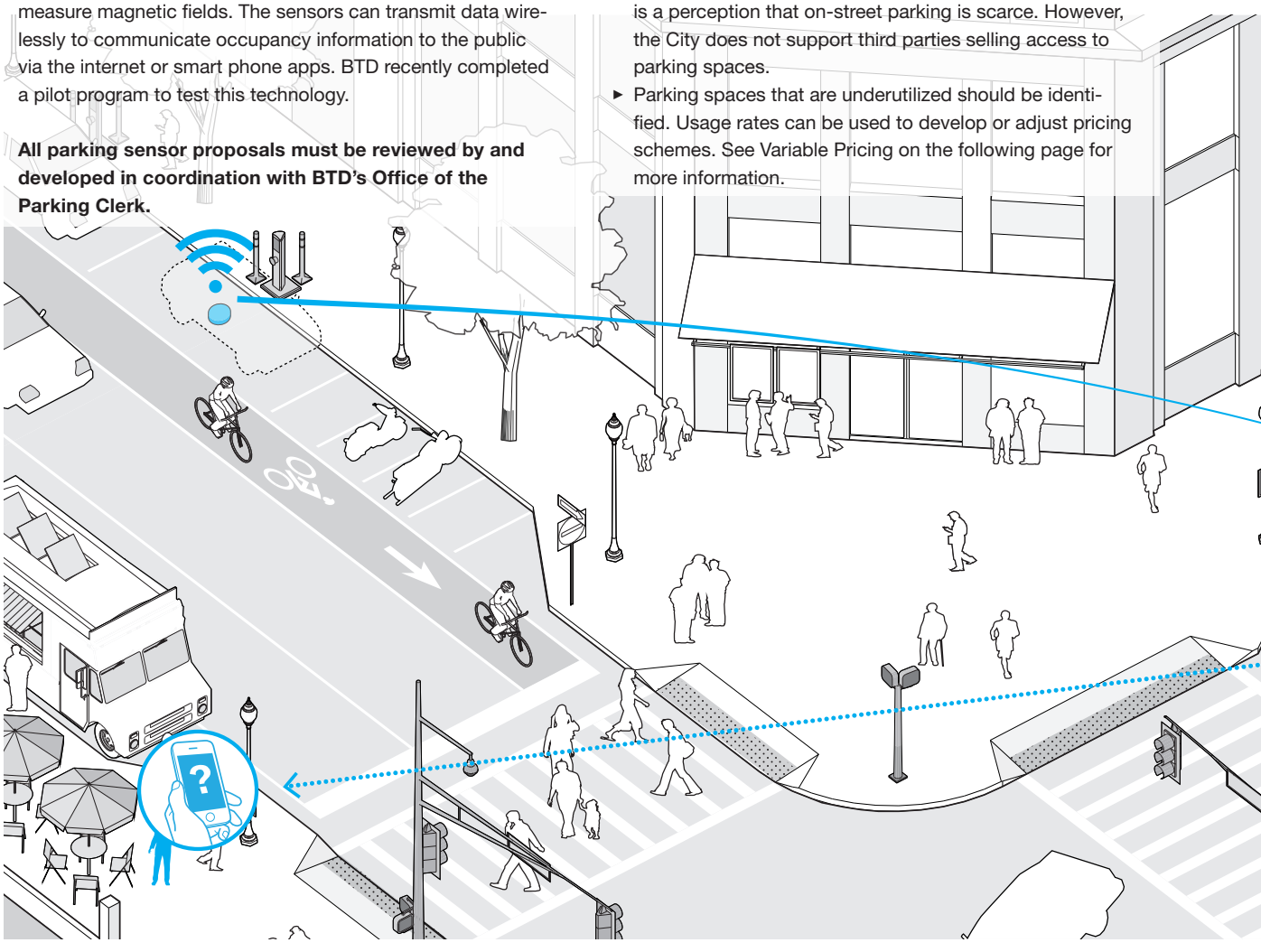
Given Boston's limited on-street parking supply, residents and visitors who choose to drive are spending increasing amounts of time circulating looking for parking; this adds to congestion resulting in an increase in GHG emissions, double parking, and unsafe roadway conditions for all users. Providing information about parking availability, and making it easier to find a place to park, particularly by providing information in real-time (1), is therefore of importance.

Small, battery-powered parking sensors can be installed on or embedded in the roadway to detect when vehicles arrive and depart using a magnetometer, or an instrument used to measure magnetic fields. The sensors can transmit data wirelessly to communicate occupancy information to the public via the internet or smart phone apps. BTD recently completed a pilot program to test this technology.

All parking sensor proposals must be reviewed by and developed in coordination with BTD's Office of the Parking Clerk.

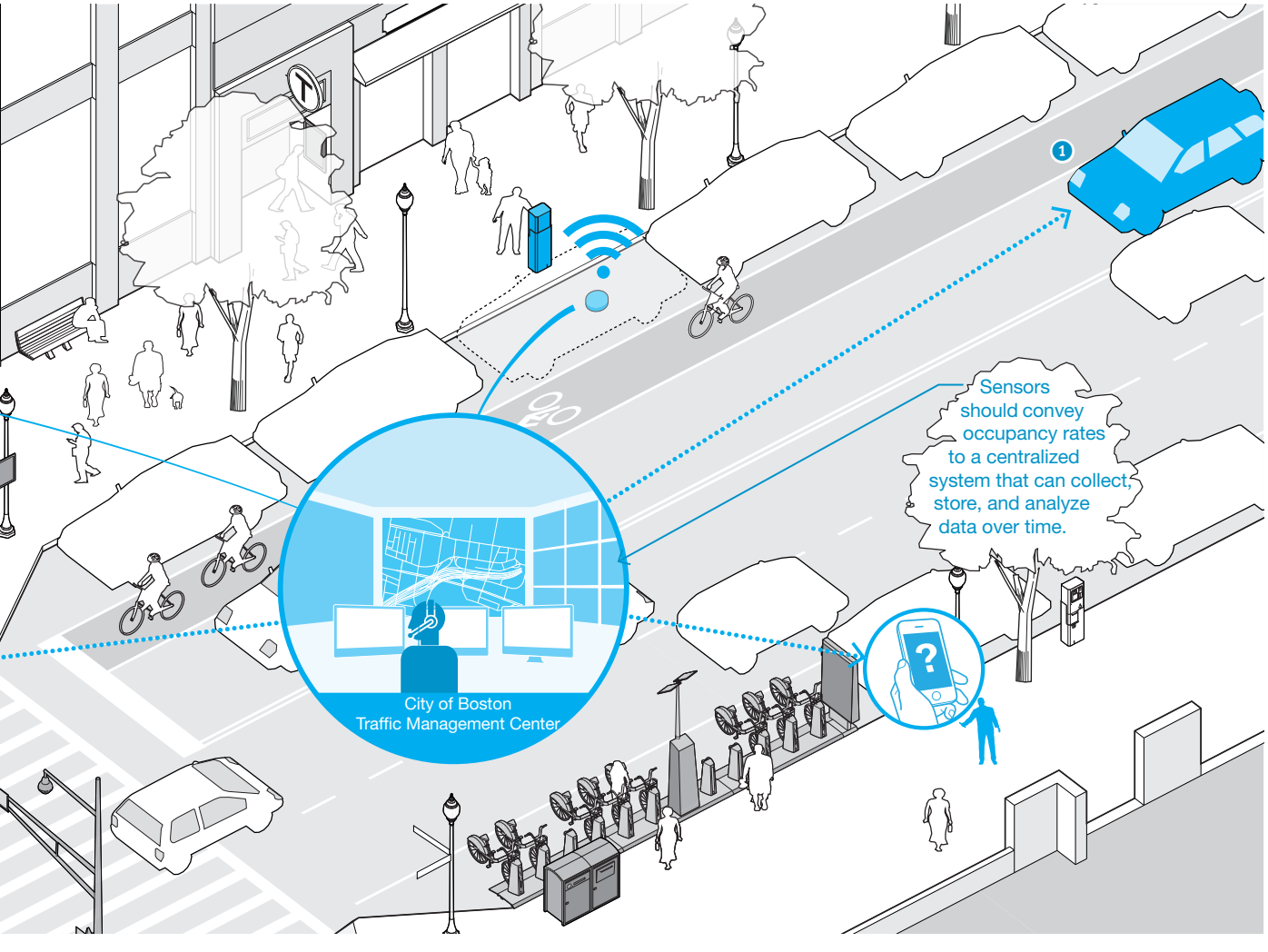
Use

- Sensors should be programmed to convey occupancy rates to a centralized system that can collect, store, and analyze the data over time, making it possible to identify patterns in how parking spaces are utilized and develop new management programs.
- Sensors should monitor motor vehicle parking meters, electric vehicle charging parking, and Hubway stations usage rates to assist in developing strategies to encourage the use of alternative modes of transportation.
- Sensors can be useful for documenting actual real-time usage and availability rates and to share this information with the public, particularly along corridors where there is a perception that on-street parking is scarce. However, the City does not support third parties selling access to parking spaces.
- Parking spaces that are underutilized should be identified. Usage rates can be used to develop or adjust pricing schemes. See Variable Pricing on the following page for more information.



Considerations

- Regular monitoring and analysis of the sensors and system should be conducted. A database of utilization can be built to support analysis over time and/or geography.
- The sensors should be durable and adapt to New England weather, particularly their ability to detect parked vehicles in snowy conditions.
- Sensors can report time violations to parking enforcement officers. This can help enforcement be more efficient and increase citations.
- Sensors can be pole mounted, for example on a meter or on a street light, and combined with instruments that can measure air and noise pollution, ambient light, and motor vehicle, pedestrian, and bicycle volumes.



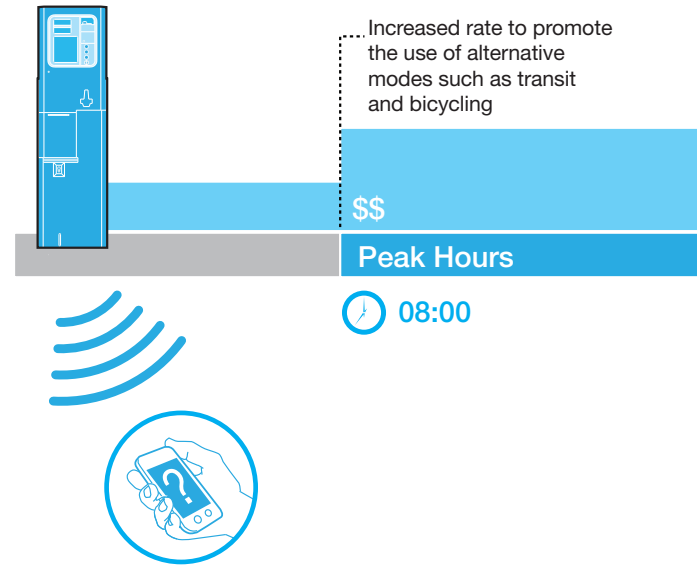
Variable Pricing

Overview

With the introduction of smart and multi-space meters on Boston's streets, parking pricing can be adjusted in response to parking demand. Variable pricing requires rates to be raised when spaces are difficult to find, for example along commercial corridors or during peak hours, and lowered when demand is low, such as in neighborhood business districts at off-peak hours or downtown during weekends. Variable pricing can also be used during special events to encourage people to take transit, walk, or bicycle. The goal of variable parking is to maximize efficiency of Boston's limited parking supply.

When combined with parking sensors, smart meters with variable pricing can provide real-time data as to the location of available parking spaces and their price; smart phone apps may be developed to direct drivers to available on-street parking by price and location. For events, smart meters can adjust pricing as well as time limits in response to the duration of the event.

BTD's Office of the Parking Clerk is investigating the use of variable pricing based on the experience of pilot programs such as SFpark in San Francisco.



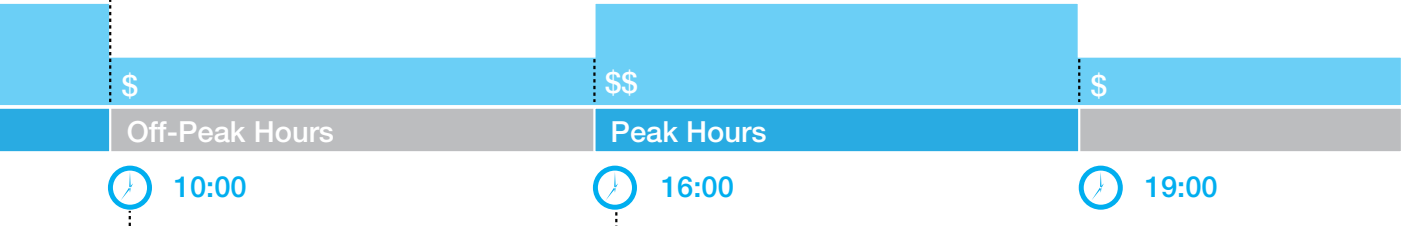
Use

- Variable pricing should be considered when on-street parking rates are substantially lower than garage or off-street parking rates in the area to reduce the incentive for drivers to circulate and find the best deal.
- Meter parking rates should be set to find the right balance between making parking spaces easily accessible while pricing spaces to encourage the use of alternative modes such as transit and bicycling.
- Meter parking rates should not be adjusted too frequently to reduce confusion for the consumer and enforcement officers. For example, SFpark has different rates for off-peak and peak hours but keeps those rates fixed for several months at a time.
- New on-street parking meter rates should be adjusted in coordination with distributing information about the availability and pricing of parking in off-street lots that are permitted by BTD.
- To encourage visitors to stay for dining or entertainment in business districts, allowed parking in some areas should be extended from two hours to four hours after 6pm. Smart meters can be programed to accommodate this change.

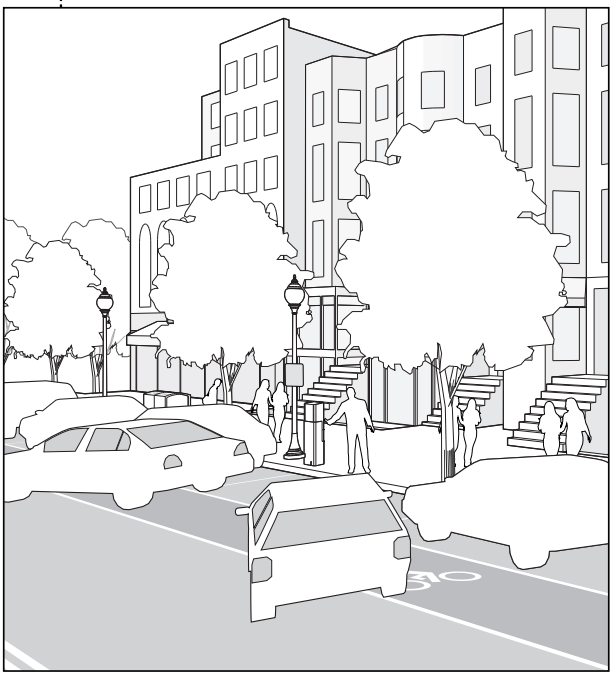
Considerations

- Monitoring is important to verify that the variable pricing is producing the desired results. Regulations should consider how often rates can be adjusted.
- Pricing parking according to location and time of day can create unintended spillover into adjacent neighborhoods or districts if not implemented and managed properly. Parking policies may require coordination amongst adjacent districts to ensure community concerns of overflow parking are addressed.
- Variable pricing at metered spaces can be more effective when coordinated with rates for renting bicycles at Hubway stations and with Massachusetts Bay Transit Authority (MBTA) commuter rail, subway, and bus prices to make it possible for users to weigh alternatives and calculate the cost of an entire trip.
- Citation fines should also be coordinated with the use of variable pricing for parking. Fees when combined with variable pricing should ideally be greater than the price of short-term parking in nearby garages and lots to encourage turnover and for citizens to obey time limits.
- Variable pricing may have impacts on operating costs for BTD's Enforcement and OPC divisions.

Reduced rate in neighborhood business districts or downtown during weekends at off-peak hours



Off-Peak Hours: Low Demand – Reduced Pricing



Peak Hours: High Demand – Increased Pricing

Digital Tags and Information Panels

Overview

A key ingredient of a vibrant street or public space is face-to-face interaction where people shop, eat, or gather for events. Recently, with the rapid rise of mobile internet and the desire for people to share information with one another using social media, new tools have become available to enrich this interaction. These include traditional and digital information panels as well as digital tags known as QR, or Quick Response codes. QR codes are two dimensional bar codes that can be scanned using a smart phone causing the device's browser to launch a selected website.

Digital tags and information panels add value to city streets by providing links to day-to-day practical information such as real-time transit information, walking and bicycling routes with times to nearby destinations, and bicycle and car-share availability. They can also inform people of place-based history and cultural information about nearby landmarks; descriptions and schedules for local community events; and wayfinding information to the nearest library, farmers' market, or subway station. Interactive information panels can also serve as web-based community bulletin boards. These tools together have the potential to transform physical places and streetscapes into communicative and interactive destinations.

Recent examples include the MBTA's installation of an information panel at Ruggles Station. Riders can toggle screens displaying real-time bus and subway schedules to facilitate transfers between modes. My Dot Tour, a collaborative program that empowers youth and community by celebrating Dorchester's multicultural history, uses QR codes to provide links to narratives about the past, present, and future of the neighborhood.

Information panels at Ruggles Station toggle between bus and subway real-time schedule information.

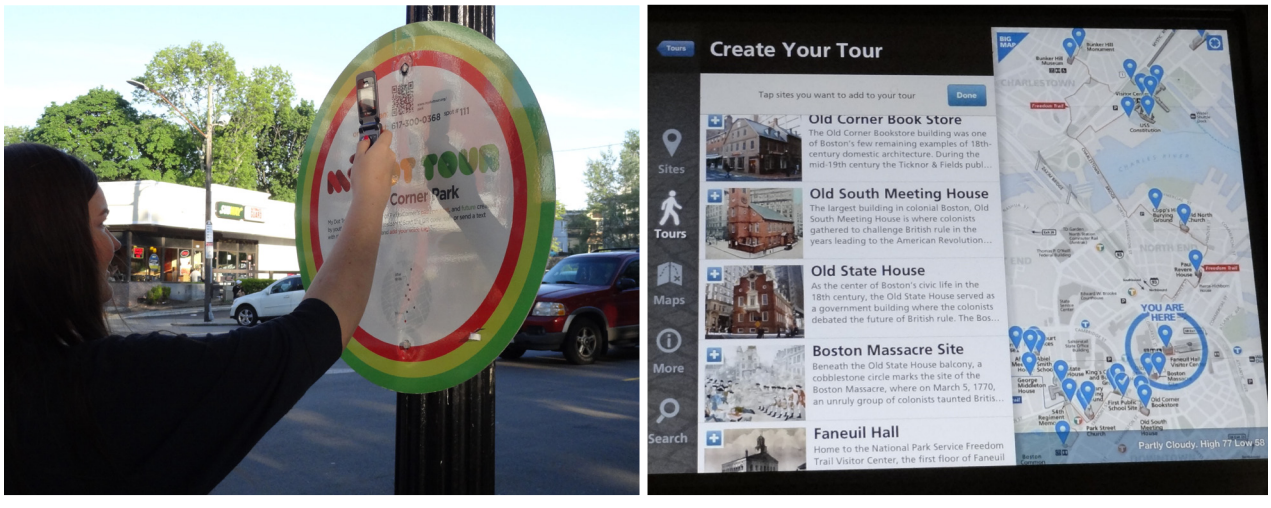
Use

- Digital tags and displays should integrate pedestrian and bicycle wayfinding with real-time information about the availability of Hubway bicycles, electric vehicles (EV) charging spaces, and transit schedules.
- Digital displays are best located in public spaces such as plazas and should be visible from, though not obstructing, the Pedestrian Zone.
- Information panels and tags should be Americans with Disabilities Act (ADA) accessible. People of all ages and abilities should be able to access information posted on display screens or linked through tags. Wayfinding options such as speech messages at kiosks, Braille text on maps and multi-lingual access should be provided as well.
- The information that is linked through digital tags and displayed on panels should encourage participation in community-based initiatives that promote local culture, public health, youth education, and public service announcements.
- Digital tags on a community building should link to the facility's website, services provided, up-to-date hours of operation, as well as information about related facilities in the area.
- Tags should be located so they are easy to find, such as at entrances to transit stops, on EV charging stations, or adjacent to posted bus schedules.

Considerations

- Information panels and displays can add to visual clutter if not located in a sensitive manner; panels should not obstruct the Pedestrian Zone. Protection from inclement weather is often necessary.
- Digital information panels and tags should be integrated into a support network that ensures web links and transportation information is constantly updated.
- Digital panels can be expensive to install and maintain, and may need to be supported by advertising revenue from local shops, restaurants, sports, and entertainment venues.

Boston Complete Streets QR code



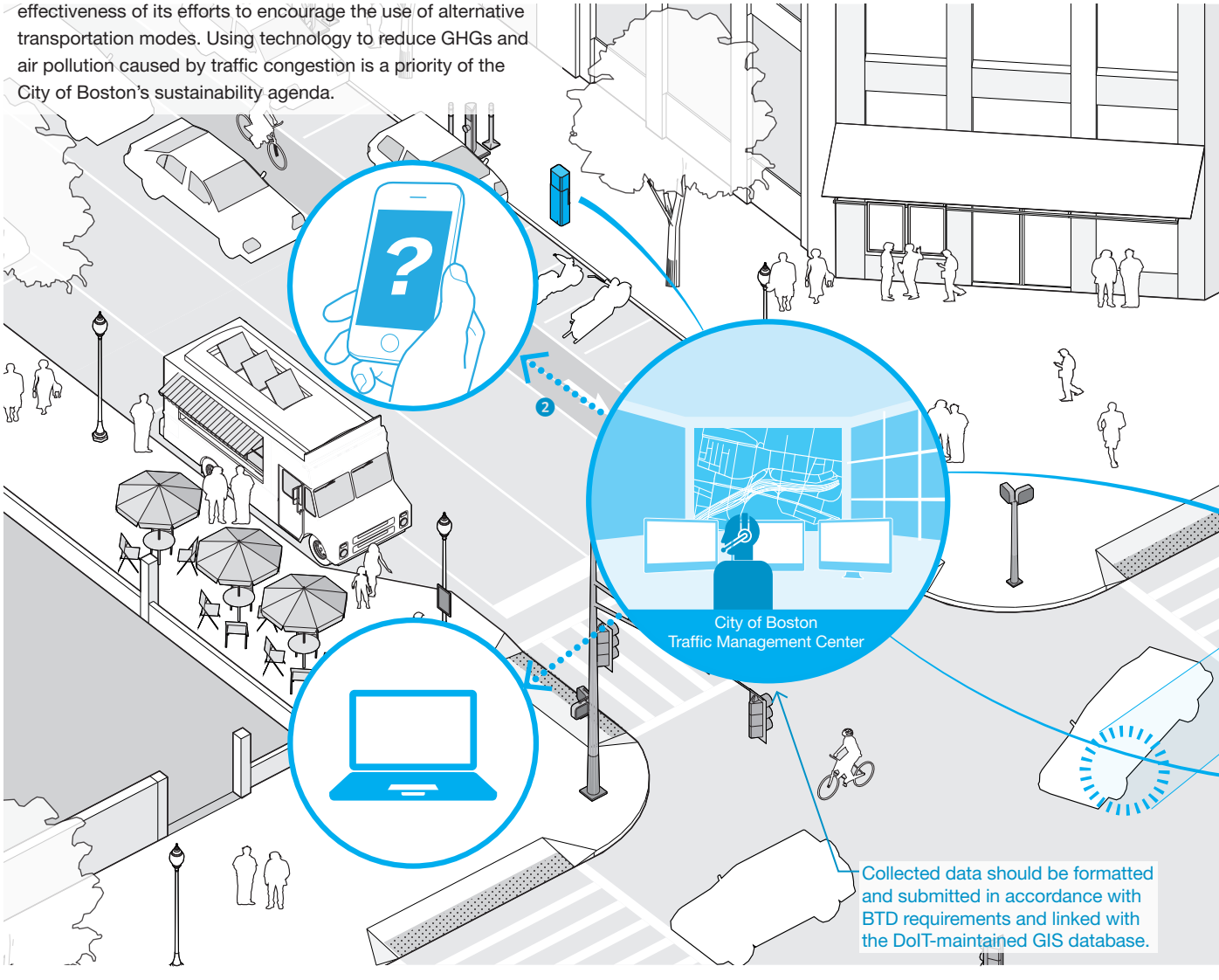
My Dot Tour uses QR codes to provide links to narratives about the neighborhood.

Data Collection Infrastructure

Overview

Timely and accurate data collection of multimodal traffic conditions can significantly enhance the City of Boston's ability to manage traffic flows and its curbsides more efficiently. Data can be collected and analyzed to measure modal usage, vehicle miles traveled (VMTs), identify dangerous intersections, and maximize efficiency and safety on city streets. In addition to providing overall volumes on key corridors, VMTs are a key variable in calculating levels of GHG emissions. Boston's Climate Action Plan aims to reduce VMTs by 7.5% from 2010 to 2020, and requires reliable data to measure the effectiveness of its efforts to encourage the use of alternative transportation modes. Using technology to reduce GHGs and air pollution caused by traffic congestion is a priority of the City of Boston's sustainability agenda.

To meet these needs, BTD, MONUM, and the DoIT is developing data collection, storage, and analysis protocols. A consistent set of standards as to how vehicle, pedestrian, and bicycle data will be documented and integrated into a citywide database are being established. The goal is to create a dedicated public domain website for policy makers, engineers, residents, and commuters to access transportation data at near real-time intervals. Simple online visualizations of this information can reveal patterns and trends.

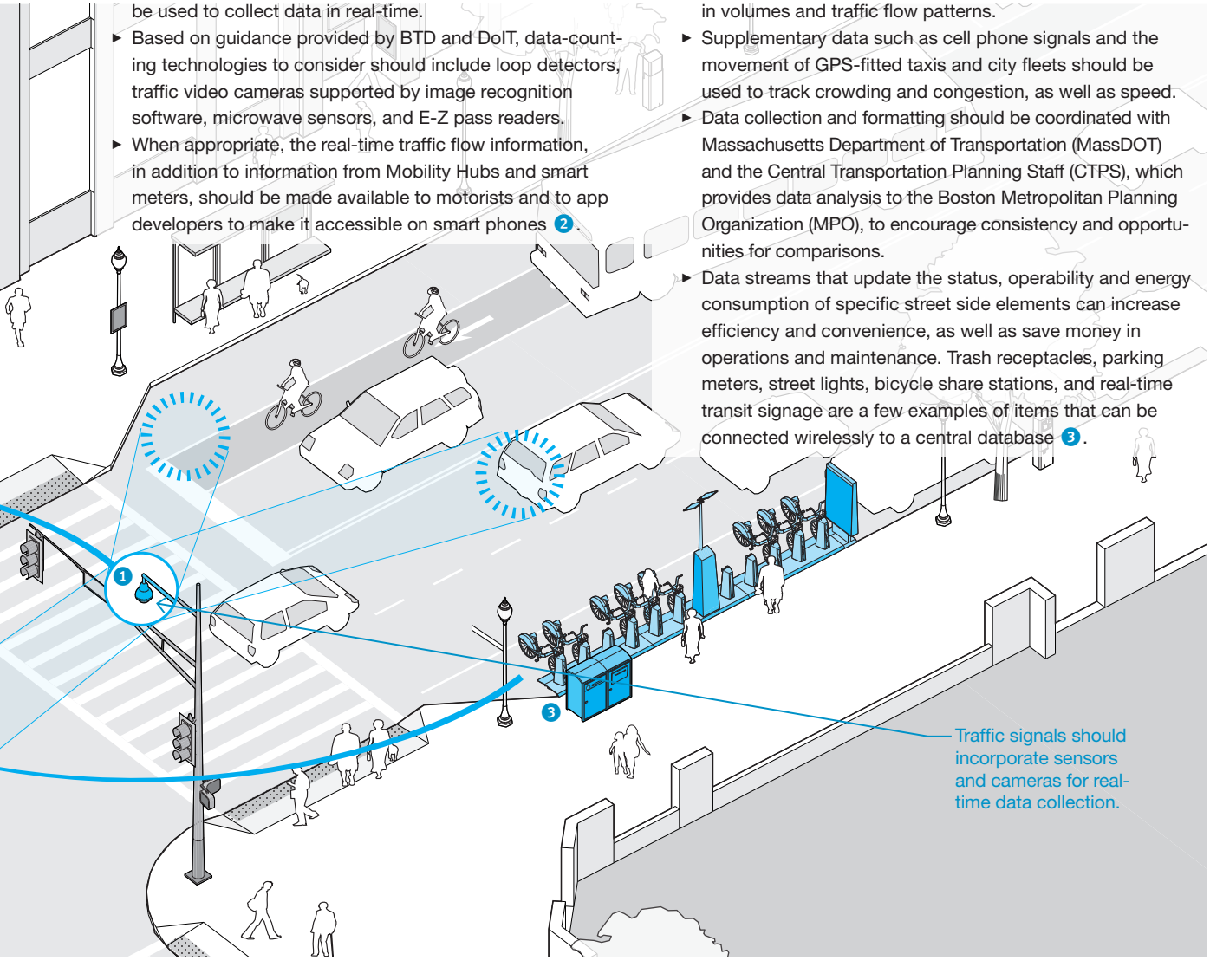


Use

- Traffic data collected as part of development and street reconstruction projects should be formatted and submitted in accordance with BTD requirements. It should be linked with the geographic information system (GIS) database maintained by DoIT.
- Modal counts as well as crash data and infrastructure data should be collected for pedestrians, bicycles, and heavy vehicles in addition to passenger vehicles 1.
- Intersection design, particularly the configuration of traffic signals, should incorporate sensors and cameras that can be used to collect data in real-time.
- Based on guidance provided by BTD and DoIT, data-counting technologies to consider should include loop detectors, traffic video cameras supported by image recognition software, microwave sensors, and E-Z pass readers.
- When appropriate, the real-time traffic flow information, in addition to information from Mobility Hubs and smart meters, should be made available to motorists and to app developers to make it accessible on smart phones 2.

Considerations

- Installation of radio frequency identification (RFID) or other forms of identification should be considered as roadways are constructed or repaired. Tags can be embedded in asphalt patches within the roadway and serve a variety of uses, from maintaining information about the contractor to recording data about pilot materials to assess durability over time.
- Maintenance of data in consistent formats over the long term is a key challenge and goal, particularly as comparisons spanning several years is necessary to identify trends in volumes and traffic flow patterns.
- Supplementary data such as cell phone signals and the movement of GPS-fitted taxis and city fleets should be used to track crowding and congestion, as well as speed.
- Data collection and formatting should be coordinated with Massachusetts Department of Transportation (MassDOT) and the Central Transportation Planning Staff (CTPS), which provides data analysis to the Boston Metropolitan Planning Organization (MPO), to encourage consistency and opportunities for comparisons.
- Data streams that update the status, operability and energy consumption of specific street side elements can increase efficiency and convenience, as well as save money in operations and maintenance. Trash receptacles, parking meters, street lights, bicycle share stations, and real-time transit signage are a few examples of items that can be connected wirelessly to a central database 3.



Alternative Curbside Uses

The transportation sector accounts for about one quarter of Boston's GHG emissions. The City of Boston's Climate Action Plan goal is to reduce GHGs by 28% by 2020. While a majority of these reductions will come from adherence to Federal and State standards that increase vehicle efficiency and the carbon intensity of fuel, to meet this goal Boston must also reduce its reliance on motor vehicles.

The City of Boston has formulated and implemented long term policies to encourage walking, riding transit, bicycling, the use of alternative vehicles such as scooters, motorcycles, and electric vehicles EVs. In support of these policies, the City has replaced valuable curbside parking spaces, traditionally reserved for motor vehicles and delivery trucks, to serve more environmentally friendly modes of travel, such as Hubway bicycle share and EV charging stations. One motor vehicle parking space can provide about 10 to 14 bicycle parking spaces and four to five motorcycle or scooter spaces, resulting in a more inclusive use of the space. When combined with online access, these alternative modes of travel can have the personalization, flexibility, and convenience of car-ownership; and the cost-efficiency, environmental awareness, and health benefits of public transportation.

Boston is known as a vibrant walking city. Curbside space can also be used as extensions of the sidewalk environment to accommodate facilities that support sidewalk activity. The City designates seasonal Food Truck parking spaces and has established guidelines to install parklets, or temporary platforms installed over a parking space for public seating.

BTD regulates curbside uses along city-owned streets. New innovations are pursued with the help of MONUM, Boston Bikes, and PWD.

Accessible Parking

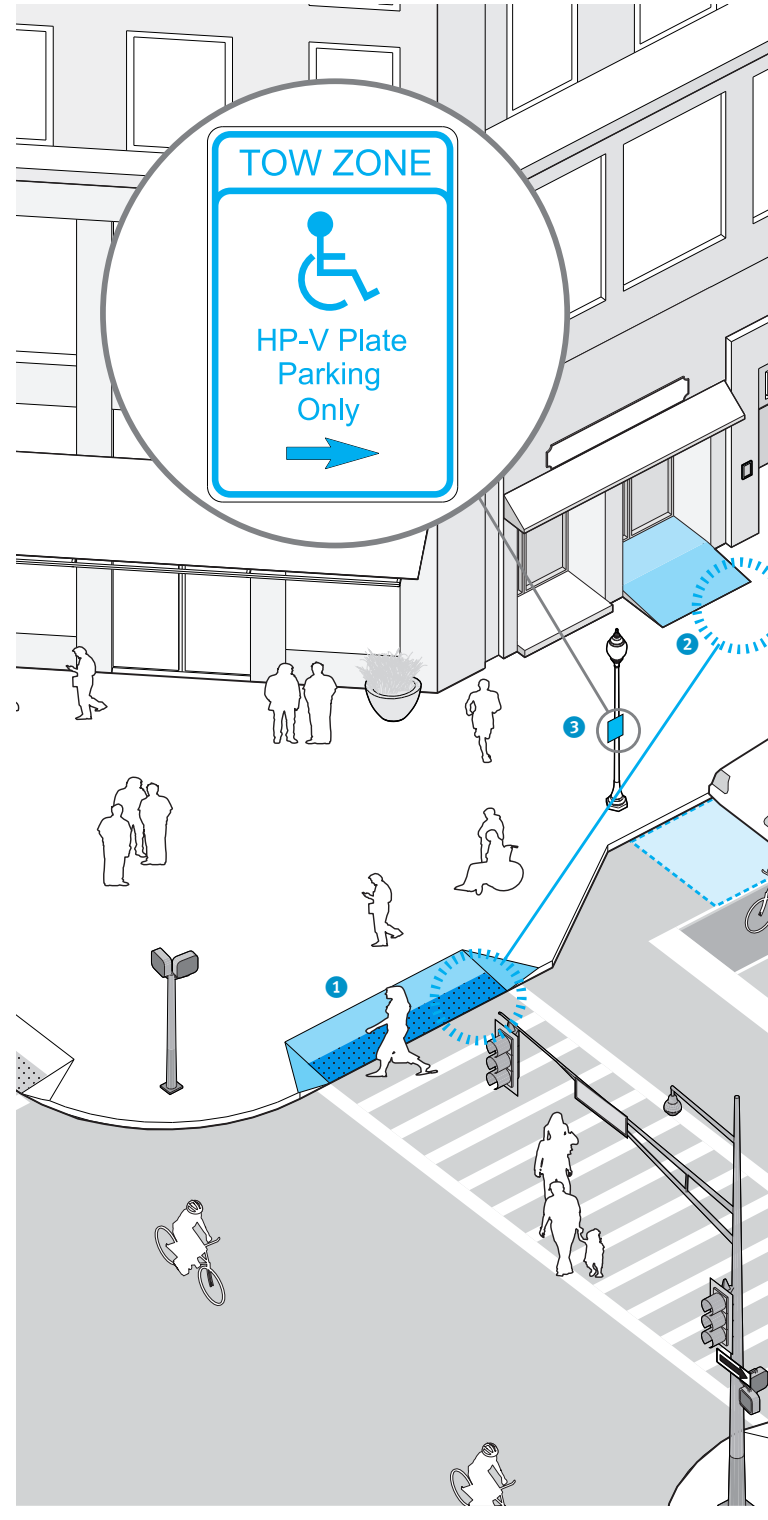
Overview

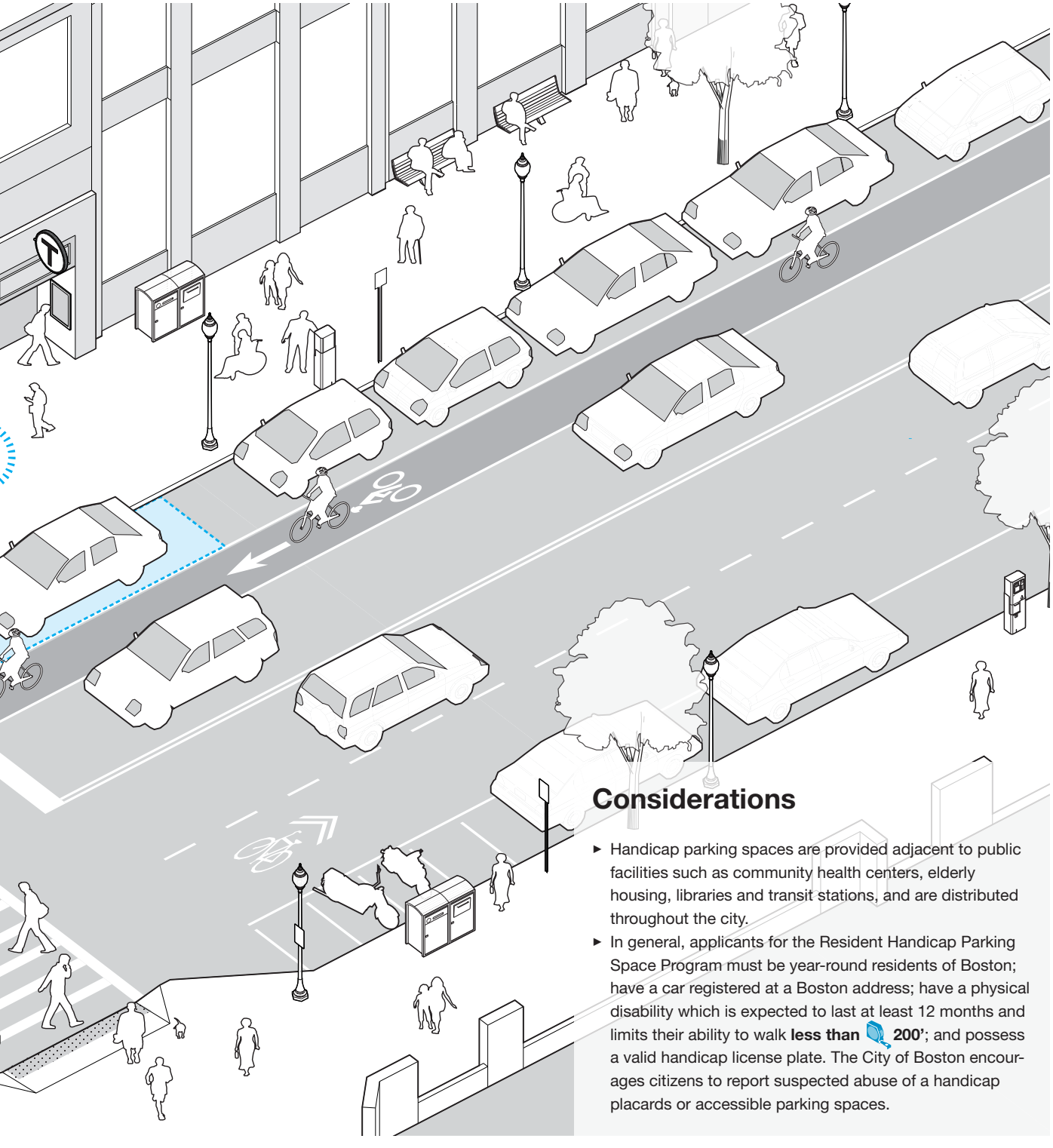
The City of Boston proactively facilitates full and equal participation in all aspects of life by persons with disabilities on city streets, including the provision of accessible parking, also known as handicap parking. Accessible spaces are distributed throughout the city and installed by request. Any resident of Boston who meets the requirements of the program is entitled to apply. Standards are established by the Commission and adhere to ADA and the Massachusetts Architectural Access Board guidelines.

Boston has established a Handicap Parking Space Program which is administered jointly by the Mayor's Commission for Persons with Disabilities and OPC.

Use

- All accessible parking space surfaces must be smooth, stable, and slip resistant, and not exceed a 2% slope in any direction. Accessible curbside spaces require accessible curb ramps at the head or foot of the space 1.
- Accessible parking should be located as close as possible to an accessible entrance 2.
- Accessible parking spaces should be marked by signs 3 using the international symbol for accessibility.
- Signs should be located at the head of each parking space or **no more than**  **10' away**.
- Massachusetts's law exempts vehicles with proper accessible parking permits from all public meter fees.





Considerations

- Handicap parking spaces are provided adjacent to public facilities such as community health centers, elderly housing, libraries and transit stations, and are distributed throughout the city.
- In general, applicants for the Resident Handicap Parking Space Program must be year-round residents of Boston; have a car registered at a Boston address; have a physical disability which is expected to last at least 12 months and limits their ability to walk **less than 200'**; and possess a valid handicap license plate. The City of Boston encourages citizens to report suspected abuse of a handicap placards or accessible parking spaces.

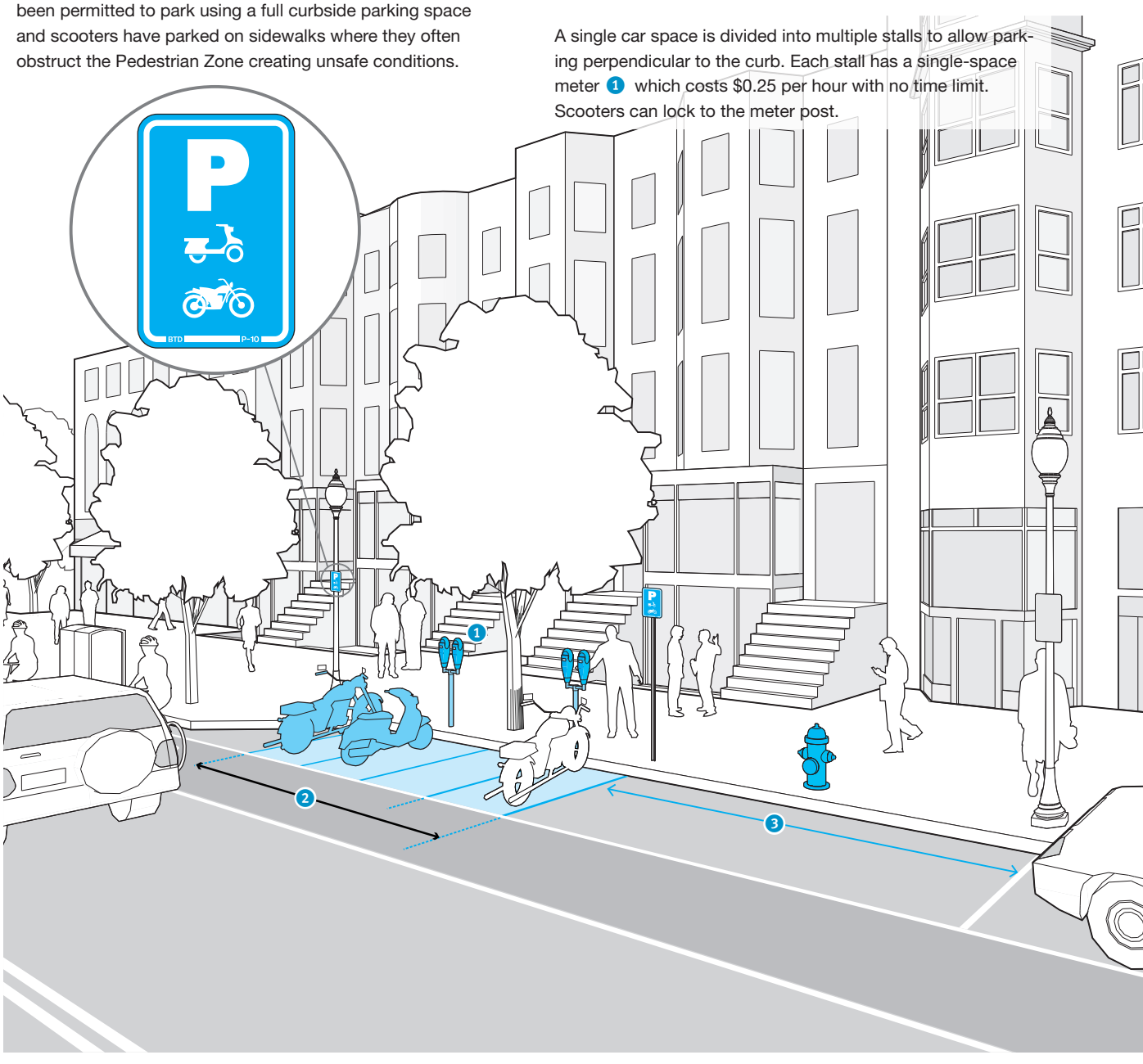
Scooter and Motorcycle Parking

Overview

Motorcycles and scooters have become increasingly popular in Boston. BTD promotes their use as a greener alternative to motor vehicles and is providing all-day parking as an incentive for people to use them. Traditionally, motorcycles have been permitted to park using a full curbside parking space and scooters have parked on sidewalks where they often obstruct the Pedestrian Zone creating unsafe conditions.

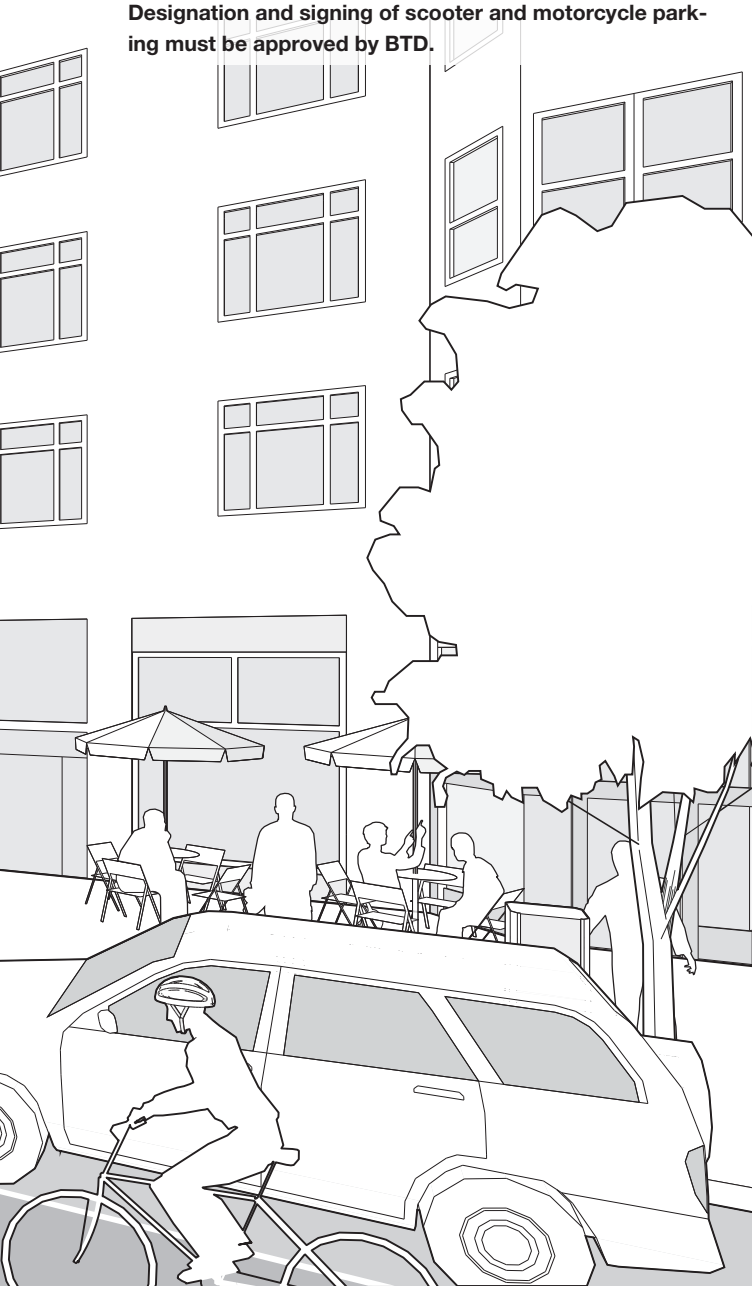
In April 2010, Boston began instituting a pilot program of metered parking for motorcycles and scooters in the Back Bay. As an incentive to increase use, motorcycle and scooter parking is currently provided without time restrictions.

A single car space is divided into multiple stalls to allow parking perpendicular to the curb. Each stall has a single-space meter (1) which costs $0.25 per hour with no time limit. Scooters can lock to the meter post.



BTD plans to monitor the success of motorcycle and scooter program and make adjustments as necessary, with plans to expand the program to other parts of the Boston.

Designation and signing of scooter and motorcycle parking must be approved by BTD.



Use

- The average **20' long parking space should be divided into four 5' spaces** (2) to create stalls for scooters and motorcycles. Users prefer spaces grouped at the end of a block or close to corners rather than in between two cars.
- Stalls can also be installed in pairs.
- Preferred locations include parking spaces that allow cars to maneuver easily without damaging motorcycles or scooters parked perpendicular to the curb, next to crosswalks and curb extensions, or adjacent to the unoccupied, usable space in front of a fire hydrant (3). Note hydrants require 10' of clearance.
- Based on neighborhood demand, it is estimated that two to four stalls should be provided for every 50 to 75 regular parking spaces.
- Uniform, easily identifiable signage provided by BTD, should be used to designate spaces.

Considerations

- Scooters parked on sidewalks also take up space that could be used for bicycle racks.
- Where not enforced, people using motorcycles or scooters are liable to park on the sidewalk or plazas where sufficient space exists because it is free. Additionally, pay and display multi-space meters are an issue for these types of vehicles since the receipt cannot be displayed securely and may be stolen.
- Consideration should be given to install hitches or rings installed in the asphalt or curb edge to make it easier to lock scooters and motorcycles.

Bicycle Share Stations

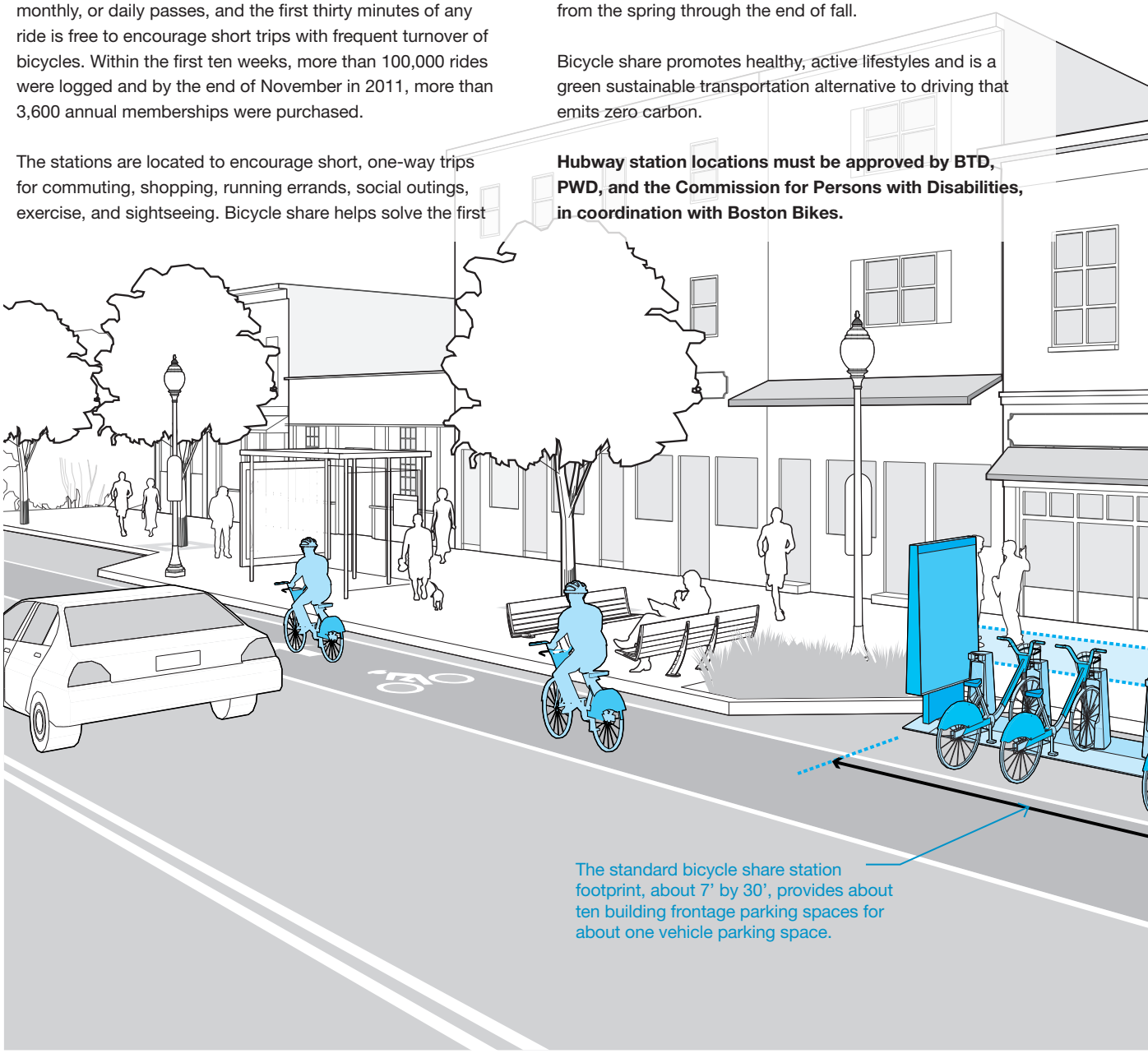
Overview

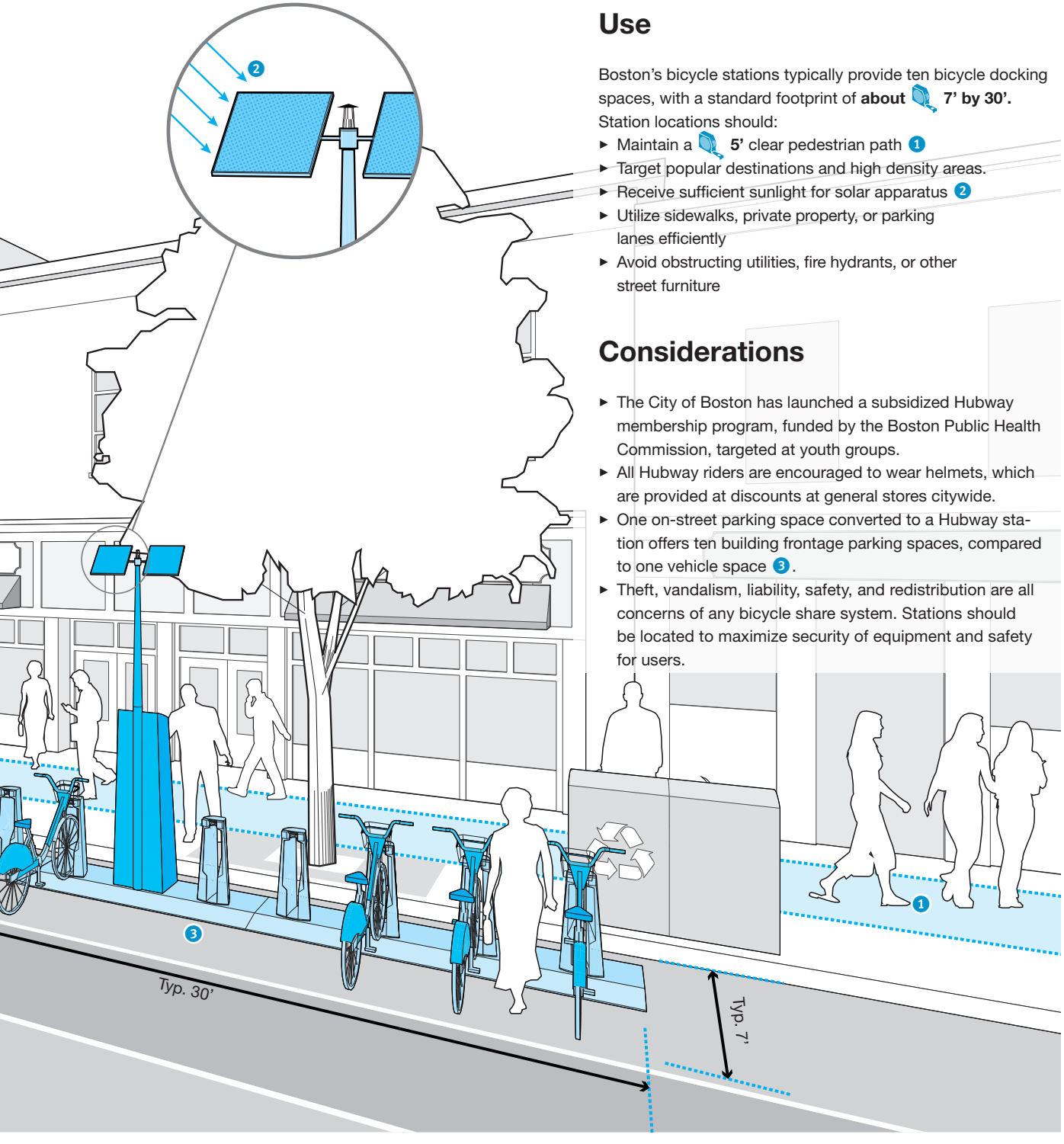
The City of Boston launched the Hubway bicycle share program in the summer of 2011. Participants access a bicycle with the swipe of a card, and can return bicycles to any station in the network. Users are able to purchase yearly, monthly, or daily passes, and the first thirty minutes of any ride is free to encourage short trips with frequent turnover of bicycles. Within the first ten weeks, more than 100,000 rides were logged and by the end of November in 2011, more than 3,600 annual memberships were purchased.

The stations are located to encourage short, one-way trips for commuting, shopping, running errands, social outings, exercise, and sightseeing. Bicycle share helps solve the first and last mile many transit riders face when reaching a final destination. Bicycle sharing is particularly suited for Boston's student and tourist populations, as well as its generally flat topography. Fleet access is 24 hours, and currently operates from the spring through the end of fall.

Bicycle share promotes healthy, active lifestyles and is a green sustainable transportation alternative to driving that emits zero carbon.

Hubway station locations must be approved by BTD, PWD, and the Commission for Persons with Disabilities, in coordination with Boston Bikes.





Use

Boston's bicycle stations typically provide ten bicycle docking spaces, with a standard footprint of **about 7' by 30'.** Station locations should:

- Maintain a **5'** clear pedestrian path 1
- Target popular destinations and high density areas.
- Receive sufficient sunlight for solar apparatus 2
- Utilize sidewalks, private property, or parking lanes efficiently
- Avoid obstructing utilities, fire hydrants, or other street furniture

Considerations

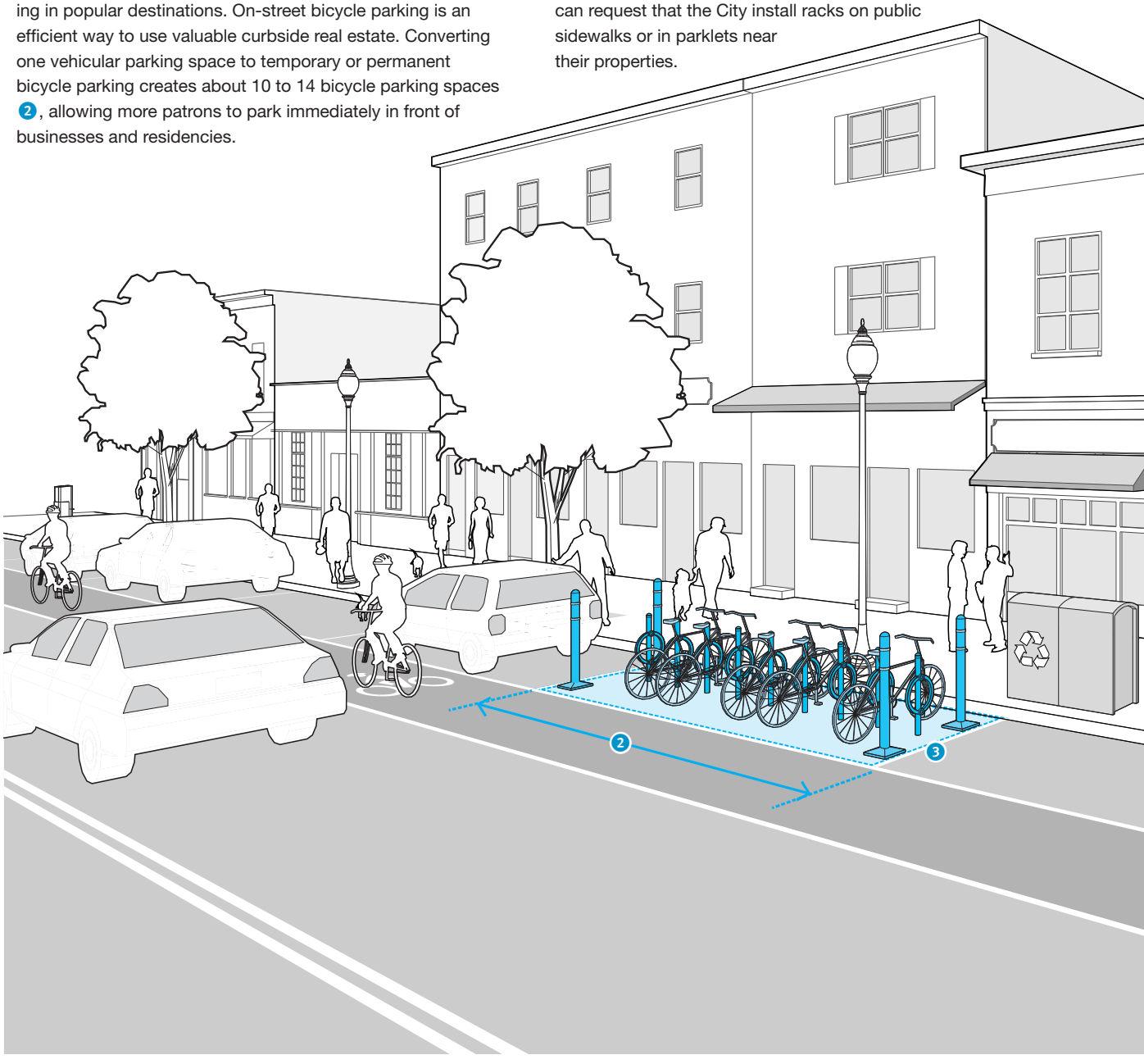
- The City of Boston has launched a subsidized Hubway membership program, funded by the Boston Public Health Commission, targeted at youth groups.
- All Hubway riders are encouraged to wear helmets, which are provided at discounts at general stores citywide.
- One on-street parking space converted to a Hubway station offers ten building frontage parking spaces, compared to one vehicle space 3.
- Theft, vandalism, liability, safety, and redistribution are all concerns of any bicycle share system. Stations should be located to maximize security of equipment and safety for users.

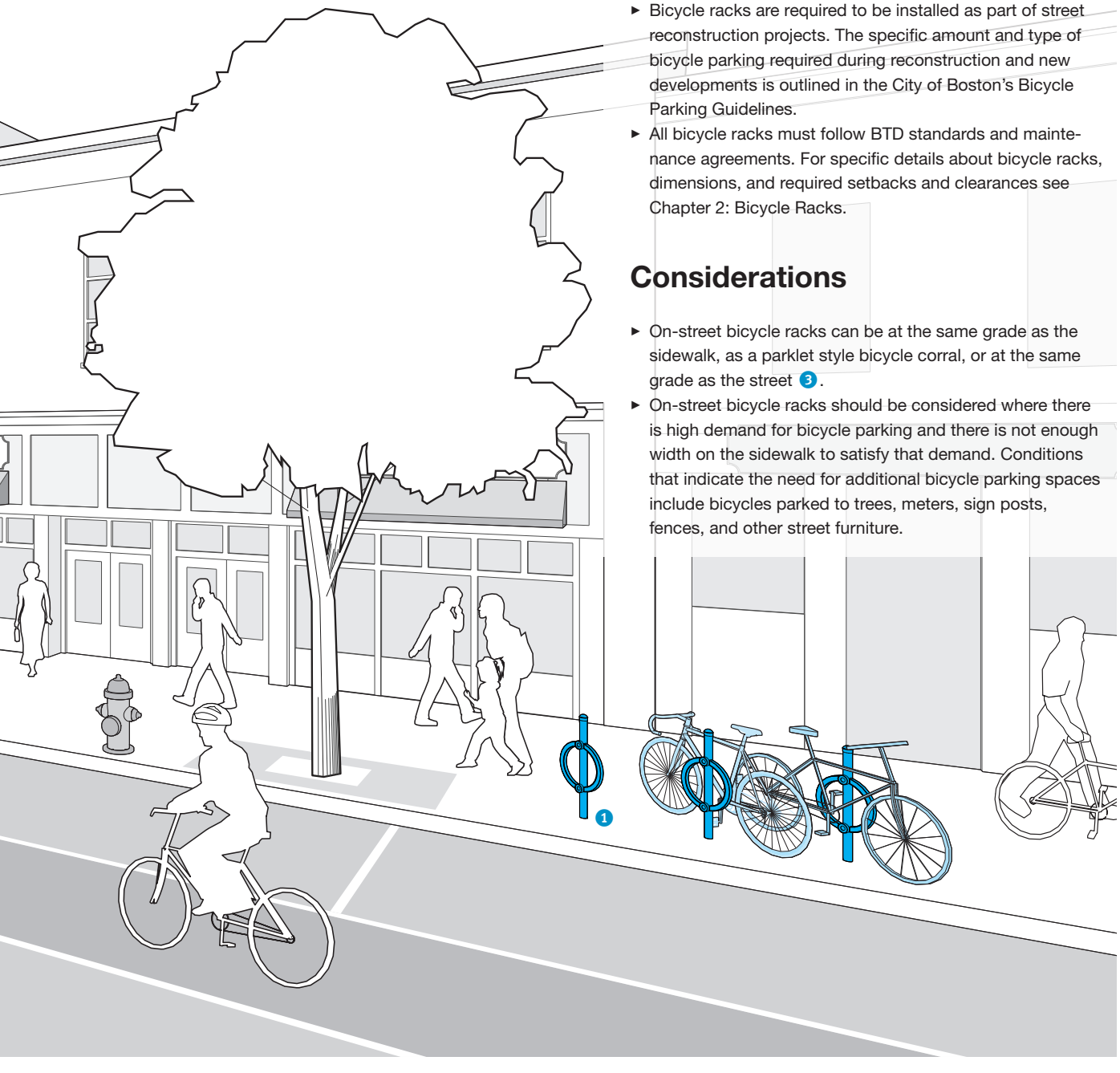
On-Street Bicycle Parking

Overview

Convenient, secure, and ample bicycle parking is a necessity for encouraging bicycling in Boston. Bicycle parking is typically found on sidewalks 1; however the sidewalk may not be wide enough to support the high demand of bicycle parking in popular destinations. On-street bicycle parking is an efficient way to use valuable curbside real estate. Converting one vehicular parking space to temporary or permanent bicycle parking creates about 10 to 14 bicycle parking spaces 2, allowing more patrons to park immediately in front of businesses and residencies.

Bicycle parking is installed through Boston Bikes, the City's comprehensive program to encourage bicycling. Over 1,500 racks have been installed since 2008, and while most racks were installed based on surveys, residents and businesses can request that the City install racks on public sidewalks or in parklets near their properties.





Use

- Bicycle racks should be permanently affixed to a paved surface; movable bicycle racks are only appropriate for temporary use.
- Bicycle racks are required to be installed as part of street reconstruction projects. The specific amount and type of bicycle parking required during reconstruction and new developments is outlined in the City of Boston's Bicycle Parking Guidelines.
- All bicycle racks must follow BTD standards and maintenance agreements. For specific details about bicycle racks, dimensions, and required setbacks and clearances see Chapter 2: Bicycle Racks.

Considerations

- On-street bicycle racks can be at the same grade as the sidewalk, as a parklet style bicycle corral, or at the same grade as the street 3.
- On-street bicycle racks should be considered where there is high demand for bicycle parking and there is not enough width on the sidewalk to satisfy that demand. Conditions that indicate the need for additional bicycle parking spaces include bicycles parked to trees, meters, sign posts, fences, and other street furniture.

Electric Vehicle Charging Stations

Overview

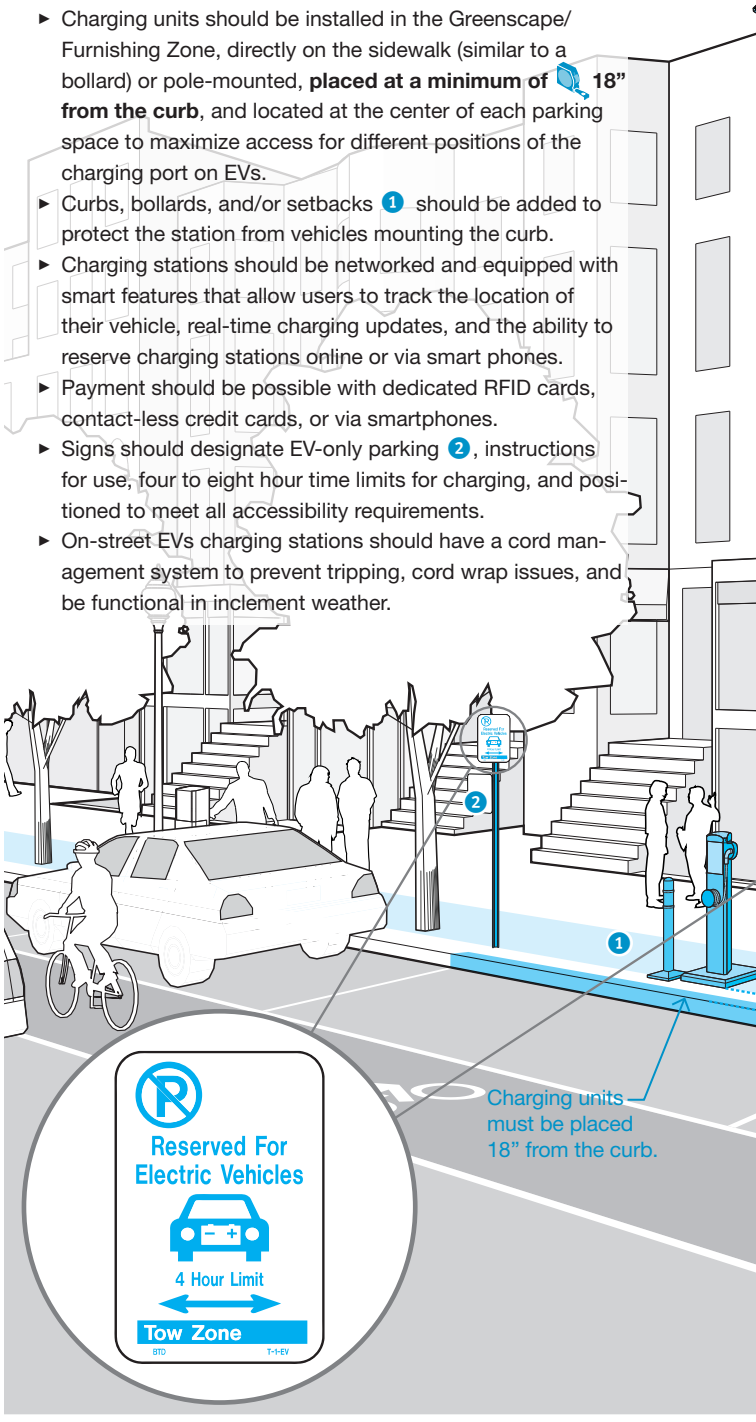
Electric and other low emissions vehicles (EVs) are smart, clean, and more sustainable modes of transportation that are re-emerging in efforts to reduce GHG emissions and combat climate change.

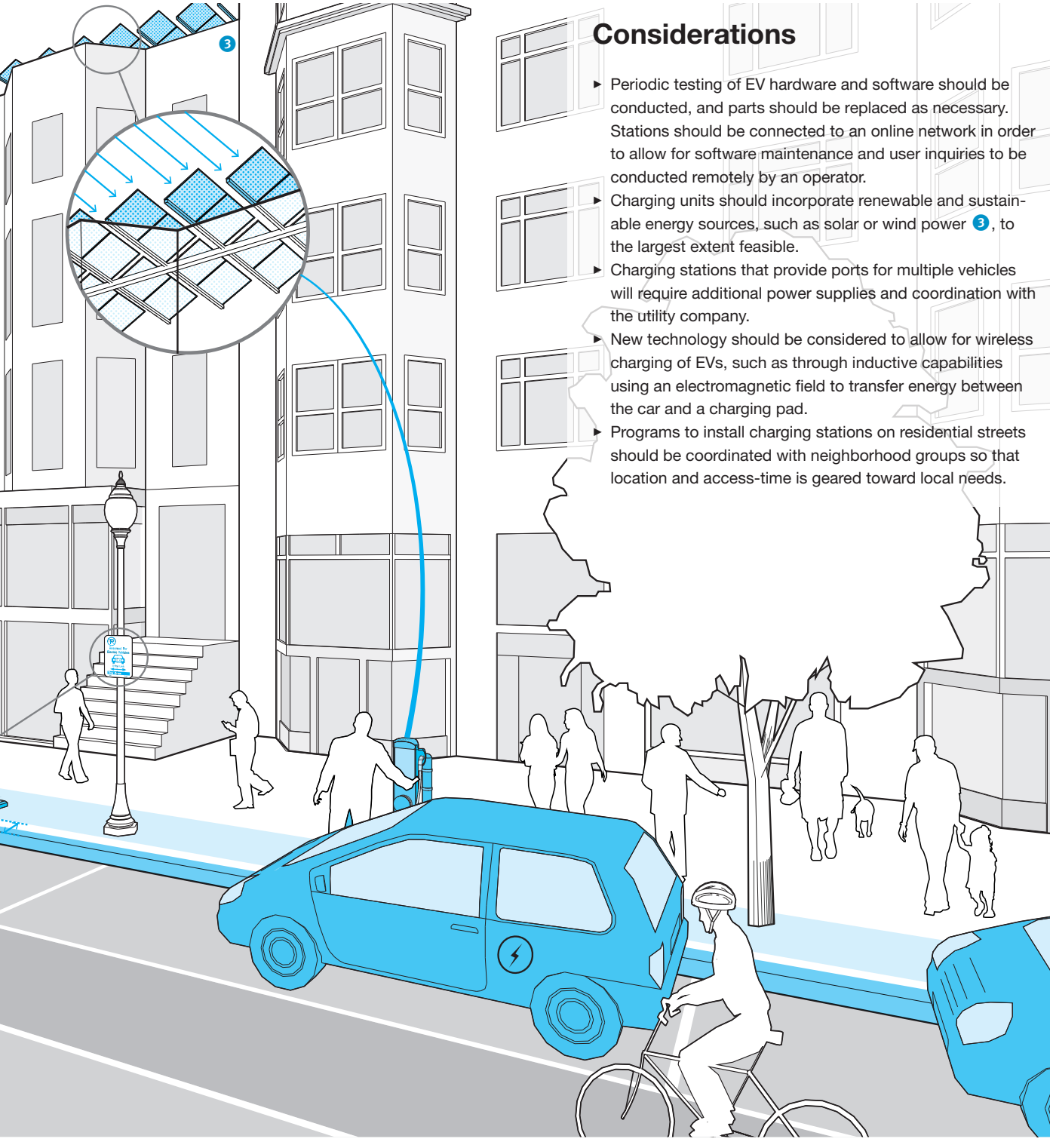
Providing incentives to encourage the use of EVs is a key component of the City of Boston's efforts to reach its Climate Action Plan goal of reducing carbon emissions by 25% by 2025 citywide. The City launched its EVboston initiative in 2011 with the installation of three free public curbside charging stations in front of City Hall. EVboston aims to encourage the use of EVs through education, public-private partnerships, and providing public access to EV charging stations. The City recently received 21 dual-charging stations through a State "Green Communities" grant as part of the Chargepoint America Federal program, which have now been installed in garages, at public institutions, hotels, and other locations throughout the city.

Proposals to locate EV charging stations must be approved by BTD and PWD.

Use

- All curbside charging stations should use Level 2 chargers, which operate at 220V to 240V. Using a Level 2 charger, a vehicle could receive a complete charge in as few as four hours from a 240V system. This would be ideal for people living in apartments or at locations that cannot accommodate private garage charging. EVs should use the industry-wide standard plug, the J1772 connector, which allows for faster battery charging times.
- Level 1 chargers, or typical wall plugs, and direct current (DC) charging stations, which can recharge fully depleted batteries in as little as 15 minutes, may also be considered for off-street charging.
- EV stations should be placed near utility feeder lines, clear from traffic, and away from flood zones.
- Where feasible, charging units should be incorporated in smart grids that use renewal sources such as solar or wind power.
- Charging units should be installed in the Greenscape/ Furnishing Zone, directly on the sidewalk (similar to a bollard) or pole-mounted, **placed at a minimum of 18" from the curb**, and located at the center of each parking space to maximize access for different positions of the charging port on EVs.
- Curbs, bollards, and/or setbacks 1 should be added to protect the station from vehicles mounting the curb.
- Charging stations should be networked and equipped with smart features that allow users to track the location of their vehicle, real-time charging updates, and the ability to reserve charging stations online or via smart phones.
- Payment should be possible with dedicated RFID cards, contact-less credit cards, or via smartphones.
- Signs should designate EV-only parking 2, instructions for use, four to eight hour time limits for charging, and positioned to meet all accessibility requirements.
- On-street EVs charging stations should have a cord management system to prevent tripping, cord wrap issues, and be functional in inclement weather.





Considerations

- Periodic testing of EV hardware and software should be conducted, and parts should be replaced as necessary. Stations should be connected to an online network in order to allow for software maintenance and user inquiries to be conducted remotely by an operator.
- Charging units should incorporate renewable and sustainable energy sources, such as solar or wind power (3), to the largest extent feasible.
- Charging stations that provide ports for multiple vehicles will require additional power supplies and coordination with the utility company.
- New technology should be considered to allow for wireless charging of EVs, such as through inductive capabilities using an electromagnetic field to transfer energy between the car and a charging pad.
- Programs to install charging stations on residential streets should be coordinated with neighborhood groups so that location and access-time is geared toward local needs.

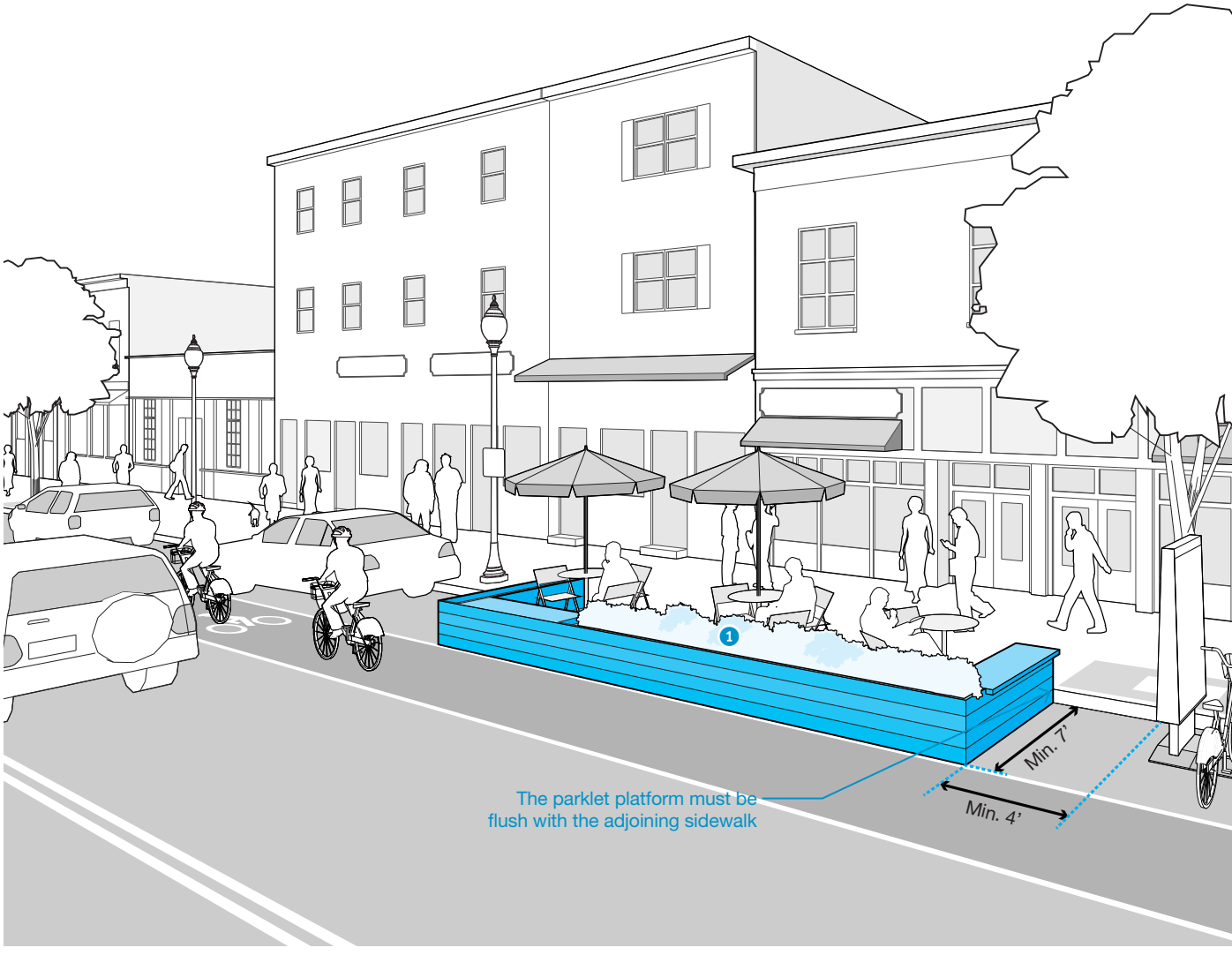
Parklets

Overview

A parklet is the conversion of one or more on-street parking spaces into a temporary or permanent extension of the sidewalk; parklets are installed typically where existing sidewalk widths are too narrow to accommodate street activity. Parklet features can include benches, tables, chairs greenscape, bicycle parking, and art (1) that should reflect the character of the location.

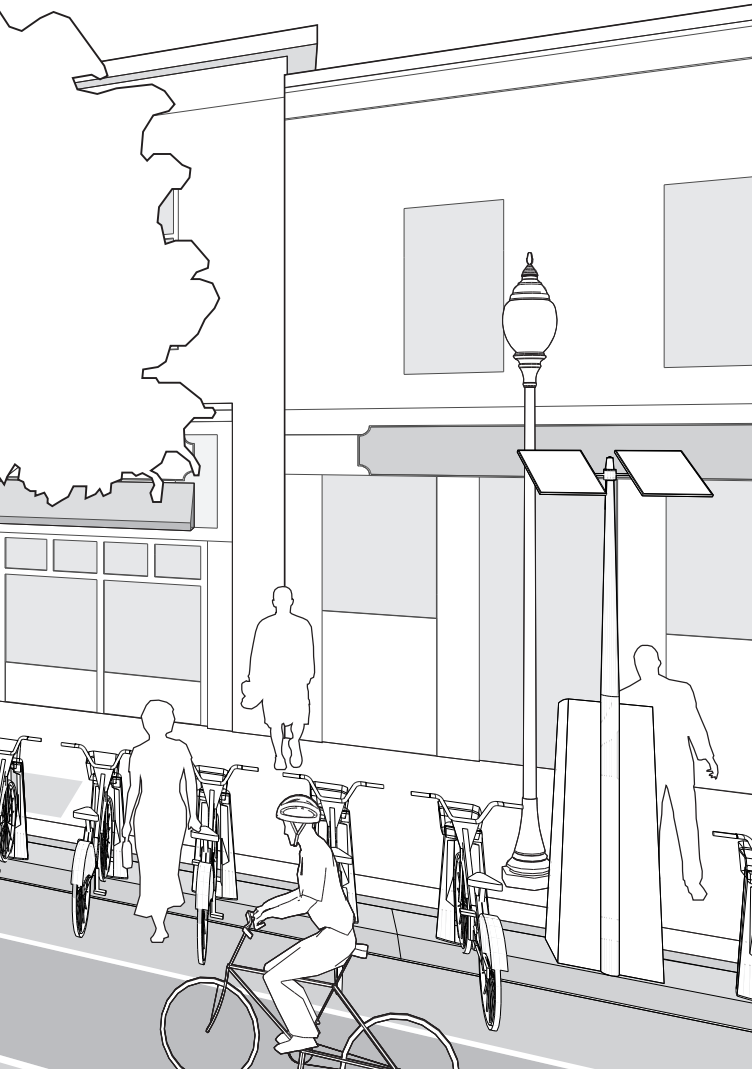
These retrofitted pedestrian spaces are open to the public but are typically maintained by adjacent businesses. The reclaimed space can be used seasonally and converted back into parking or used for snow storage in the winter. Parklets are considered public space and must be signed as such—table service and advertising are not permitted in parklets.

Parklets proposals must be approved by PWD and BTD.



Use

- Parklet platforms should be safe, practical, and flush with the adjoining sidewalk. They must also be accessible and meet all ADA requirements.
- Parklets cannot occupy space beyond the dimensions of the existing parking space(s). Parklet designs should not extend beyond the width of the adjacent parking lane, which is **a minimum of 7'. Also, designs must provide a 4' wide buffer on either end of the parklet** from the adjacent parked cars; buffers may include planters, wheel-stops, barricades, or temporary bollards.



- Parklets must not be located in front of fire hydrants, over manholes, or over utility access points.
- Parklets are not appropriate for every street. Examples of unsuitable locations include Parkways, streets with peak-time restricted parking lanes, fire lanes, authorized vehicle parking areas, no stopping zones, and within bus stops.
- Parklet platforms are installed in coordination with neighborhood groups and adjacent businesses. The City will consider applications from business owners and local community organizations. The selected applicant is typically responsible for deconstructing and storing materials in the off-season.

Considerations

- Parklets should be located where the street has minimal slopes, platforms are not obstructing curbside drainage, and access to below ground utilities is maintained.
- Parklets are well-suited on Neighborhood Main Streets, Downtown Commercial, and Downtown Mixed-Use Street Types. Parklets should be considered in areas with moderate to high pedestrian traffic and where existing sidewalk widths do not provide space for amenities such as seating, bicycle parking, or sidewalk cafés. Suggested locations include retail districts and restaurants with takeout food service.
- Maintenance agreements with area businesses and community groups are key to the long-term viability of parklets.
- When sidewalk cafés are considered for parklets, designs must adhere to the guidelines found in Chapter 2: Sidewalks, Sidewalk Cafés. Note that serving food and alcohol is not permitted across public sidewalks; however seating and tables are encouraged in parklets to allow patrons to enjoy take-out service.

Food Trucks

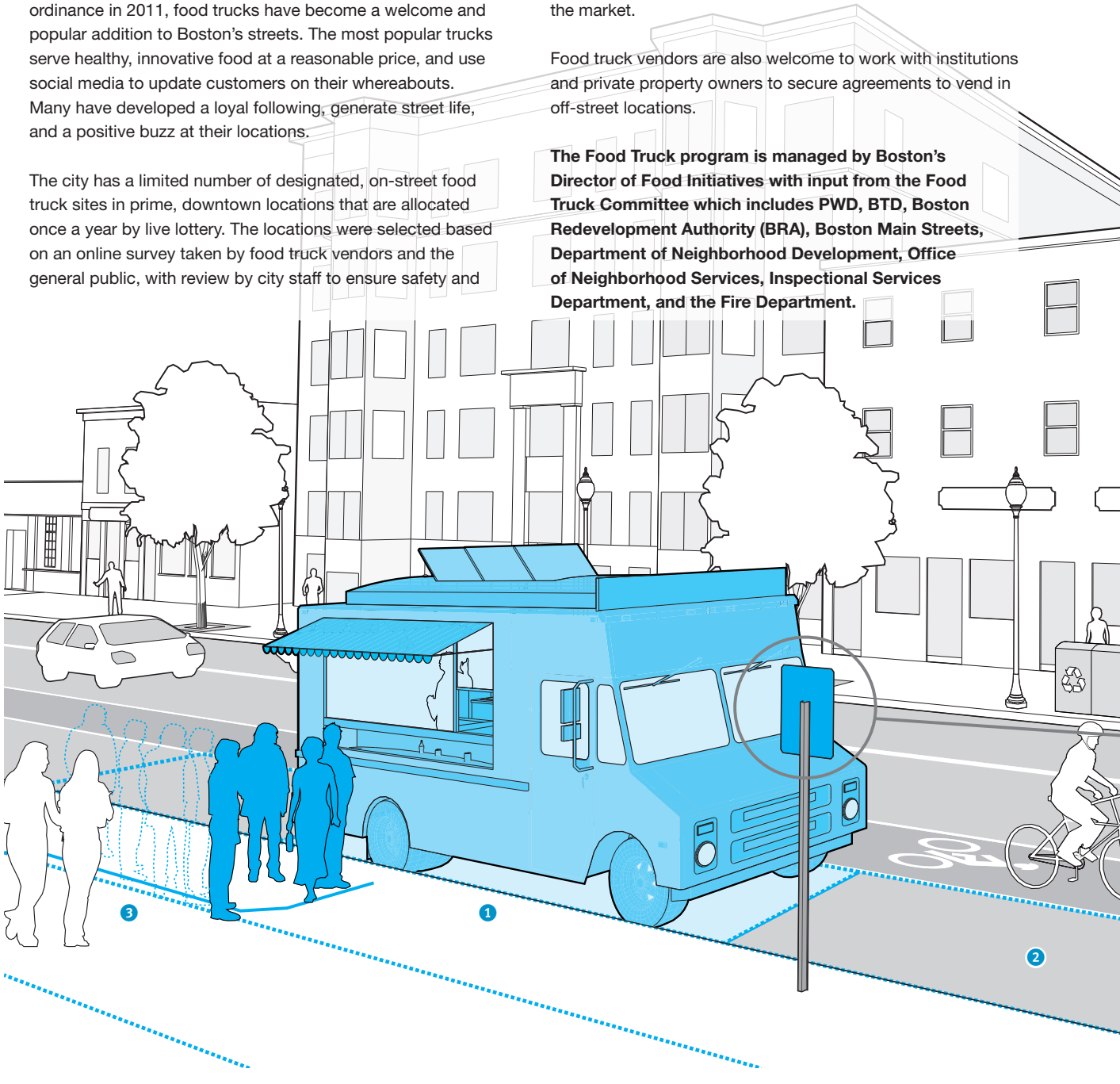
Overview

Providing opportunities for outdoor eating is a key way to activate public spaces. Since the City passed a food truck ordinance in 2011, food trucks have become a welcome and popular addition to Boston's streets. The most popular trucks serve healthy, innovative food at a reasonable price, and use social media to update customers on their whereabouts. Many have developed a loyal following, generate street life, and a positive buzz at their locations.

The city has a limited number of designated, on-street food truck sites in prime, downtown locations that are allocated once a year by live lottery. The locations were selected based on an online survey taken by food truck vendors and the general public, with review by city staff to ensure safety and suitability. The annual lottery ensures that food truck offerings remain dynamic and that new vendors have a way to enter the market.

Food truck vendors are also welcome to work with institutions and private property owners to secure agreements to vend in off-street locations.

The Food Truck program is managed by Boston's Director of Food Initiatives with input from the Food Truck Committee which includes PWD, BTD, Boston Redevelopment Authority (BRA), Boston Main Streets, Department of Neighborhood Development, Office of Neighborhood Services, Inspectional Services Department, and the Fire Department.



Use

In Boston, a "Mobile Food Truck" is a retail food establishment located on a vehicle, where food is cooked, prepared, and served for individual portion service. Food trucks contain full-service, commercial kitchens, and are usually large, up to **24' long by 8' wide** (1). Food is typically cooked and served from inside the truck.

Food trucks on city streets must park in the center of the designated space, leaving one vacant space in front and one space behind the truck (2) for fire safety. Vendors are required to have a plan for queuing that ensures an accessible route for passing pedestrians (3). They must collect and remove all food-related trash and leave the site clean at the end of the shift.

Food trucks are encouraged to be energy efficient, generate minimal waste, offer affordable food choices, and provide access to underserved neighborhoods. They are required to offer a healthier meal item and to participate in the city's "Rethink Your Drink" campaign. Once a year they are asked report on how they are employing local residents, using a local fabricator, purchasing local products, etc.

Considerations

- Food truck location should take into account factors such as existing bricks and mortar restaurants, pedestrian and vehicular traffic, and emergency vehicle access.
- The City of Boston will continue to identify locations where food trucks may work well to help activate an area.
- Other types of mobile vending in Boston include food push carts, canteen trucks, and ice cream trucks. Permitting for these vendors is independent of the permitting for food trucks.
- The City is committed to providing a fair, equitable, and transparent method for scheduling the use of public vending sites.