



Bike Share

Station Siting Guide

The NACTO Bike Share Station Siting Guide provides high-level guidance on physical bike share station siting types and principles. Selecting good individual station locations while maintaining walkable distances between stations throughout the system can maximize ridership and increase safety.

The NACTO Bike Share Siting Guide is part of a collection of resources created in collaboration with the Better Bike Share Partnership (www.betterbikeshare.org). It is made possible with a grant from The JPB Foundation to further the conversation around equity in bike share.

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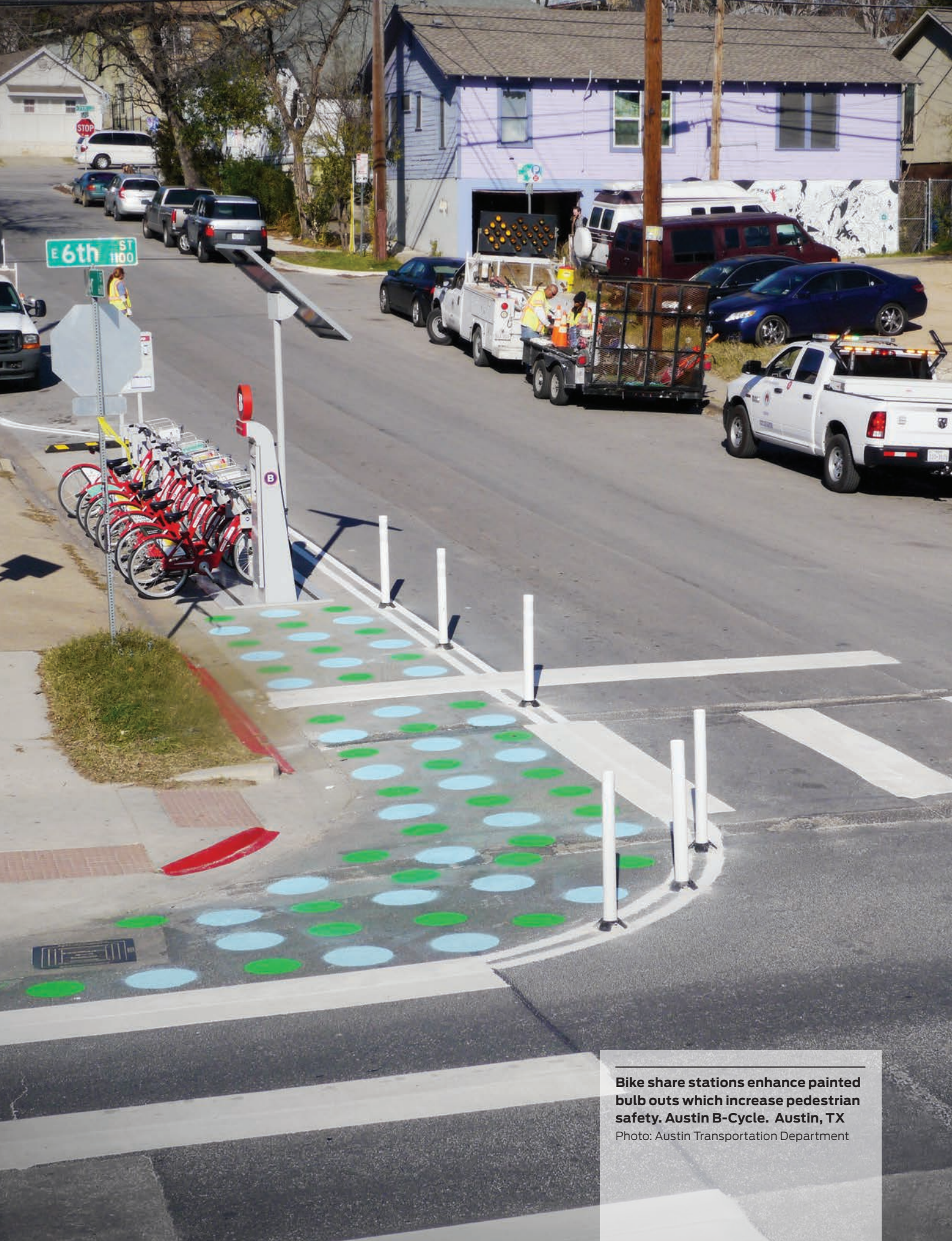
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Introduction



Bike share stations enhance painted bulb outs which increase pedestrian safety. Austin B-Cycle. Austin, TX
Photo: Austin Transportation Department



1.1

About This Guide

As bike share systems continue to grow and expand throughout North America, station siting is a critical issue for cities and operators. While each city experiences its own challenges and opportunities, a careful look across cities can offer valuable lessons for station siting, opening up new location types for placement and contributing to citywide traffic safety enhancements.

In some places, necessary station densification will require practitioners to look beyond the “low hanging fruit” for station locations. In other cities, expansion into residential neighborhoods will require additional consideration of a wider range of station locations.

NACTO’s *Bike Share Station Siting Guide* highlights best practices in station siting from around the United States and provides guidance on bike share station typologies and principles. It offers examples of a variety of siting types, providing photos and technical drawings to show how bike share stations can be situated in the streetscape. In addition, the Guide offers examples of street treatments that are commonly used to demarcate and protect on-street stations and provides guidance for surfaces, wayfinding and ad/sponsor panels, and siting around utilities. The Guide is a valuable resource for

Bike share stations can define center medians and create pedestrian refuges on overly-wide streets. Citi Bike. New York, NY

Photo: NACTO

planners and operators alike who are striving to create successful, sustainable bike share systems.

The NACTO *Bike Share Station Siting Guide* was developed in response to frequent requests from cities for siting guidance and for examples of stations in various configurations. It was created in collaboration with bike share experts, system operators, and planners from a variety of North American cities. It focuses on modular bike share stations typically used in the United States and Canada and is intended for practitioners involved in site selection for bike share stations. The examples and recommendations are intended to empower practitioners by providing real-world examples that can expand options for station siting. In addition, these examples can be used to guide discussions around certain location types and to help maximize the usefulness of each station for riders.

Decisions about station density and strategies for community engagement play key roles in determining not only where bike share stations can go but whether a bike share system will succeed or fail overall. Extensive research by NACTO and others shows that ensuring that bike share stations are placed within an easy, 3-5 minute walking distance of one another throughout a contiguous program area is paramount to successful, sustainable, equitable bike share. Meaningful participation by residents, community and civic groups, businesses, and elected officials plays a significant role in the public acceptance of a bike share program. This Guide supports these efforts by providing practitioners with real-world examples of a wide range of possible locations, enabling practitioners to more easily respond to community desires while maintaining effective network design. The Guide is a robust station siting toolkit that can be used by practitioners in cities of all scales to introduce bike share stations into the streetscape while advancing larger transportation goals of safety and increasing cycling.



STATION TYPOLOGIES COVERED IN THIS GUIDE:

Stations in the Street

- Curbside
- Curbside flipped
- In the median
- Stations offset/In floating parking lanes

Stations on the Sidewalk

Stations in Open Spaces

- Parks
- Plazas
- Parking lots



1.2

General Principles

Every city has its own conditions, culture, and constraints. In some places, bike share stations can be comfortably placed on sidewalks; in others, stations are better suited to placement in the street.

Decisions about station placement take into account technical criteria—such as sidewalk widths, pedestrian volumes, location of fire hydrants, bus stops, and utilities—as well as political considerations and community desires. Guidelines for siting bike share stations that apply in all cities and all contexts are often difficult to construct.

However, some station placement principles are universal. In particular, easy access and good visibility are paramount to success. No one wants to use a bike share station in a poorly-lit location or where they feel personally unsafe. Potential riders may be discouraged if stations are hard to find or hidden behind walls, buildings, or trees. Similarly, it may be difficult to attract and retain sponsors and advertisers if stations are hard to see.

Station locations must be operationally feasible—for example, adequate sun exposure if solar power is used, or close to access

Ensuring that stations are accessible and convenient is essential to a well-functioning bike share system. Citi Bike. New York, NY

Photo: NYC DOT

points for maintenance and rebalancing vehicles. Locations that impede pedestrians or create conflicts with other major streetscape elements—e.g. bus stops, hydrants, loading bays—should also be avoided. Adherence to these guidelines ensures that bike share stations are situated in the streetscape in safe and desirable ways and that stations are easy to find and use.

BIKE SHARE SITING GOALS



Accessible and Convenient

Stations should be conveniently located and easy for pedestrians and cyclists to find and use, at any time, in any season.



Designed for Safety

Stations should be considered as part of a city's traffic calming toolkit and located in areas with relatively high volumes of pedestrian traffic and good lighting.



Operationally Feasible

Station locations should be easy to reach and service. They should have adequate sun exposure, if using solar power, and be accessible to rebalancing and maintenance vehicles.



Enhance the Pedestrian Realm

Stations should be placed in ways that enhance the quality of the surrounding pedestrian environment.



Part of the Streetscape Hierarchy

Stations share space in a crowded streetscape. Stations should take precedence over moveable objects such as drive rails and standard bike racks. Stations should not impede major, permanent streetscape elements such as hydrants, bus/transit stops, and loading docks. While the station plate should not cover utility access points, bikes can overlap utility points.



1.3

Bike Share Stations in Context

Bike share stations share space in a complex streetscape. Divvy, Chicago, Illinois

Photo: Ann Fisher

Bike share stations are the most visible components of a bike share system. As a result, station placement is one of the most public and challenging aspects of the bike share planning process.

Good station placement can attract riders, serve as a permanent promotion for the system itself, create value for sponsors, contribute to larger road safety designs, and add activity to the pedestrian realm. Poor placement can make stations hard to find or difficult to get to, reduce ridership, interfere with pedestrian, cyclist or vehicular motion, and can contribute to community complaints.

Bike share exists within the larger frame of a city's safety and cycling policies and can play a key role in a city's traffic safety and sustainability vision. The station siting strategies presented in this Guide also advance other planning efforts, such as Complete Streets and Vision Zero-style policies. Like bike lanes, bike share stations can be tools to improve safety. Smart station placement can be part of road safety redesigns and help reduce traffic fatalities and injuries by increasing pedestrian visibility at intersections, narrowing streets, and providing pedestrian refuge areas. On-street bike share stations can protect bike lanes and help to define pedestrian space.

As cities around the country grapple with issues of safety and income inequality, the role of design cannot be understated. Low-income people have a disproportionate risk of death or injury caused by drivers and poor road design.¹ At the same time, new research shows that low-income people and people of color are the fastest growing cycling populations, more likely to ride bikes regularly for transportation, and most likely to say that introducing protected bike lanes would make them ride more.² Cities can make their scarce financial resources do double duty by selecting bike share station sites that make streets safer and increase ridership.

All across the world, data shows that proximity to a network of high quality bike lanes increases bike ridership. Good bike share station siting can encourage new cyclists and increase the use of bike lanes, further justifying municipal investment in growing cycling. Bike share systems often bring in less experienced riders who will not ride without high comfort, protected bike lanes. Ensuring that investments in bike share are matched by investments in high comfort bike lanes is necessary. Systems that are implemented or expand without considering where people will ride and the real and perceived safety of those routes will not succeed. While not all stations can or should be directly on or adjacent to a bike lane, planners should ensure that bike share program areas are well served by a strong bike lane network.

Bike share and transit are complementary modes and bike share can play an important role in expanding a city's overall transportation options. In cities with high transit use and bike share, more than 50% of bike share users report frequently linking bike share and transit trips.³ Placing bike share stations in close, visual proximity



A bike share station forms a clear border for a painted curb extension on a busy street. Citi Bike. New York, NY

Photo: Kate Fillin-Yeh/NACTO

Bike share stations work in tandem with protected bike lanes to create a welcoming cycling environment. GREENbike. Salt Lake City, UT

Photo: GREENbike



to bus and train stops can broaden the reach of transit, solving some first/last mile problems.

Whether on sidewalks or in the street, bike share stations are places for people, creating valuable public space and generating economic activity. In New York, Citi Bike stations have been used to anchor pedestrian plazas and create new places for people to sit, mingle, and relax. In Minneapolis and New York City, researchers have found that having a bike share station nearby increases the spending and economic activity at stores, especially restaurants.⁴ A New York survey found that a bike share station in the curb lane, replacing metered parking, increased total commercial spending by 52%, due to the increased turnover (one parking space can accommodate approximately ten bikes) and the fact that people walking or biking spend more money at local businesses than drivers.⁵

As bike share systems continue to proliferate and expand, good station siting and network planning is essential. System expansion and densification offer opportunities to push forward with initiatives to increase road safety and create more livable, vibrant urban spaces. Similarly, there is room in Vision Zero-style and Complete Streets policies and transit and economic development projects to move forward with bold bike share expansions. For cities to reap the benefits of these symbiotic policies and projects, they must grapple with the physical reality of bike share stations in the street and on the sidewalk. It all comes down to where the rubber (bike tire) meets the road.



1.4

Basic Station Configurations

In contrast to their European and Asian counterparts, North American cities have largely opted for modular bike share equipment that can typically be deployed without trenching, excavation, or other preparatory work. Most modular bike share systems are solar powered, although some systems offer options to wire individual stations into the existing electrical grid. Solar, modular systems allow for faster station installation, lower installation costs, greater ability to adjust station designs and sizes after deployment, and the ability to move stations, if necessary, to accommodate changing conditions such as construction or extreme weather. At the same time, solar power often puts limits on power availability and can limit station configuration options as all the docks in the station must be connected at surface level.

In the past two years, hub-based bike share systems and systems with “dumb” docks (where the docks do not require electrical power) have been introduced in some U.S. cities. These systems may make it harder for users to intuitively know where to find a bike but have significantly lower capital costs. Because electricity is not a concern, systems that use dumb docks have greater station configuration options. However, the same basic planning principles—selecting locations that are convenient, easily accessible, feel safe, fit into the pedestrian context, and are operationally feasible—still apply.

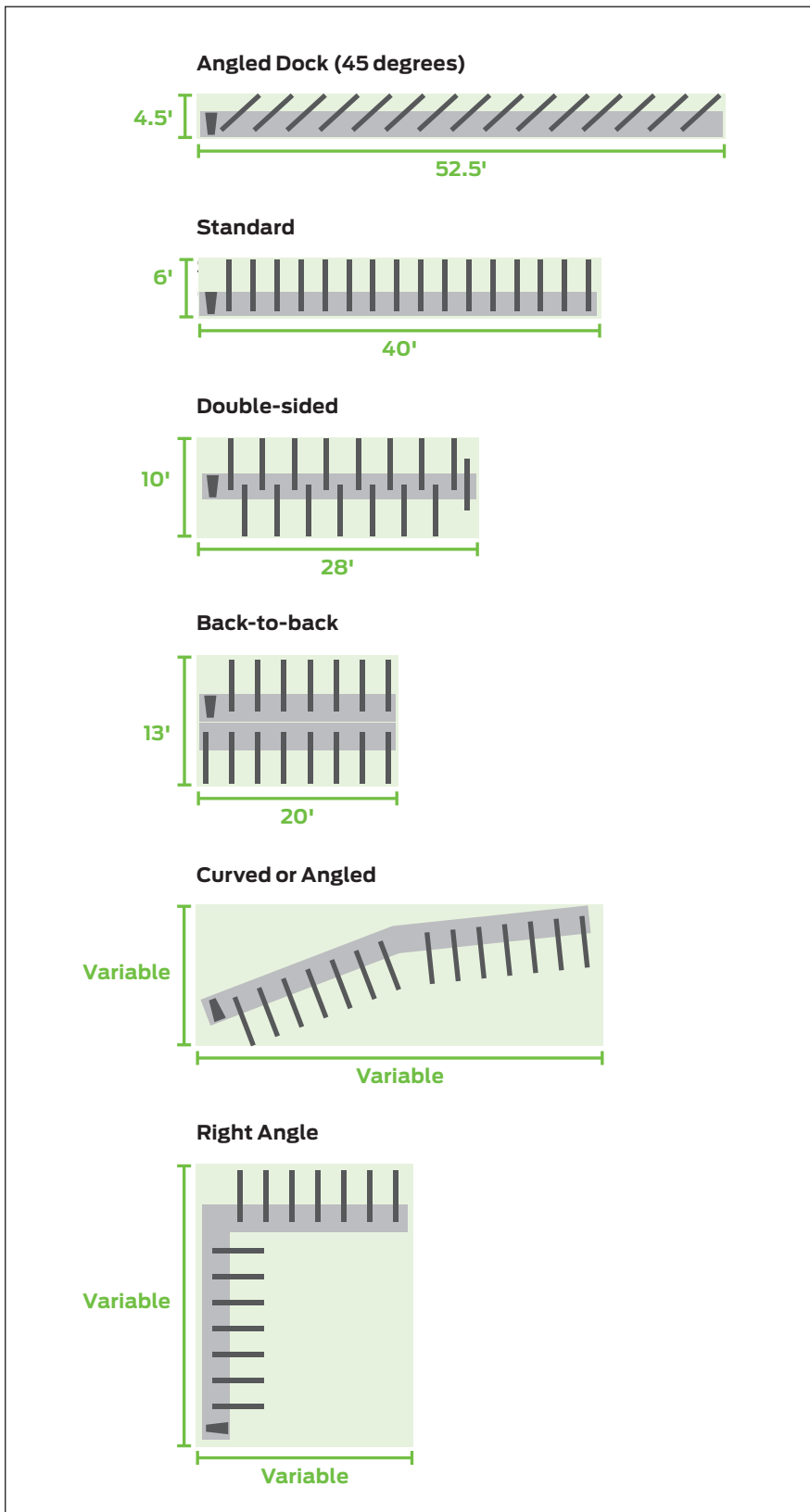
A Capital Bikeshare station protects a bike lane. Arlington, VA

Photo: Paul DeMaio

How much room do you need? A 15 dock example *

Bike share stations can be configured to fit in a variety of spaces. For example, a station that uses angled docks is only 4.5' wide, ideal for narrow sidewalks. However, the angled plate configuration requires more length for the same number of docks than a standard plate. In contrast, a back-to-back station layout requires significantly more width – 13' wide – but almost half as much length.

* Approximate measurements for systems using B-Cycle and Motivate systems.





EXAMPLES



Standard

The most common station configuration. Ideal for linear spaces like streets and sidewalks.

Capital Bikeshare. Washington, DC
Photo: Mario Durán Ortiz



Angled Docks

A good option on narrow sidewalks or where there is limited width.

Indego. Philadelphia, PA
Photo: City of Philadelphia



Double-sided

Opposite facing docks on the same plate. Good for wider spaces.

Indego. Philadelphia, PA
Photo: Ilana Wurman



Back-to-back

Double-wide or standard plates placed back-to-back. Good for wider spaces.

Capital Bikeshare. Washington, DC
Photo: Eric Gilliland



Curved or Angled

Allows stations to fit into non-linear spaces or wrap around corners and objects.

Indego. Philadelphia, PA
Photo: B-Cycle



Right Angle

Allows stations to fit into non-linear spaces or wrap around corners and objects.

B-Cycle. McAllen, TX
Photo: B-Cycle

2.0

Station
Typologies



A bike share station defines the edge of a pedestrian plaza. Citi Bike. New York, NY

Photo: Stephen Mallon, with permission from NYC DOT



2.1

Stations in the Street

In this Section

- Stations Next to the Curb
- Stations Next to the Curb: Flipped
- Stations in the Median
- Stations Offset/In Floating Parking Lanes
- Case Study:
Bike Share Protected Bike Lanes,
Austin, TX

A bike share station protects a bike lane. Citi Bike. New York, NY

Photo: NYC DOT

Placing stations in the roadbed, at the same level as vehicle traffic, is a common siting choice. On-street stations are most frequently used where sidewalks are narrow or pedestrian space is at a premium. Much like linear “parklets” or bike parking corrals, bike share stations are routinely placed in standard (8’ or 9’) parking lanes, in offset/floating parking lanes, and in painted and concrete medians.

As a general rule, an on-street bike share station can be placed anywhere where parked cars would go. The typical bike share station—with bikes at a 90 degree angle—is narrower than a parked car; riders pull bikes out into the “door zone” just as a driver would open a car door. Street stations can also be “flipped” so that the bikes pull out toward the sidewalk, provided that there is sufficient room (more than 3’) to pull bikes out of the dock without hitting the curb. The “flipped” configuration is ideal in places where planners look to take additional width out of the roadway to calm traffic and increase safety.

Smart, creative station placement allows on-street stations to play a role in larger traffic calming and street safety efforts. Stations placed in parking lanes provide opportunities to also

introduce additional traditional bike parking or create parklets and seating. Stations that are placed in painted or striped medians help to clearly demarcate the space as off-limits to cars and create additional pedestrian refuges. Stations placed in offset/floating parking lanes create a permanent barrier between bike lanes and vehicular moving lanes, creating high-comfort bike areas that are particularly valuable for newer riders.

Because they have a lower physical profile than parked cars, bike share stations can also serve as part of a city's strategy to enhance visibility and pedestrian safety at crosswalks and intersections. In New York, bike share stations are approved as a form of intersection "daylighting" to increase visibility of and by pedestrians who are about to enter the crosswalk. In systems that use free standing map panels, designers should pay extra attention to maintain sightlines, especially at intersections.

Most cities avoid placing on-street bike share stations on streets with excessively high traffic volumes but this standard varies from city to city depending on a variety of other conditions including presence/absence of bike lanes and surrounding land uses. Service entrances and loading bays can be accommodated by adding blank plates (standard plates without docks attached) to create pass-through gaps in stations. Since stations are porous, people can walk between docks—even large stations do not impede sidewalk access.



A street station in Seattle. Pronto. Seattle, WA

Photo: Alex Engel/NACTO



CASE STUDY

Bike Share Protected Bike Lanes, Austin, TX

Bike share station placement can augment bike lane design in powerful ways and can encourage people to ride. As seen here in Austin, “bike share protected bike lanes” use the bike share station itself to build safer bike lanes. The station forms a physical barrier between the bike lane and moving traffic lanes and provides a safe place for people to begin and end their bike share trips. Such buffer space is particularly important for less experienced riders.

The “bike share protected bike lane” design helps strengthen the link between bike share and the city’s bike network. In Austin, planners report that people have become “very conscious” of the bike lane and are less likely to walk in it since the B-Cycle station was added to the design.⁶ In New York, planners found less resistance to stations placed adjacent to bike lanes because the public assumed that bike share users would want to use the bike lanes and thus placing a station nearby was a good use of public land.

In addition to Austin, “bike share protected bike lanes” are found in New York City as part of the Citi Bike system and Arlington, VA as part of Capital Bikeshare.

Austin B-Cycle. Austin, TX

Photo: Kate Fillin-Yeh/NACTO



GENERAL CONSIDERATIONS

On-street bike share stations can be placed anywhere where parked cars would go. Standard station plates (i.e. not angled) can be used in parking lanes that are 8' wide or greater.

Most cities allow on-street bike share stations in no parking and no standing zones (“red zones”) when they do not conflict with moving travel lanes or pose other, location-specific issues.

Because the stations have a lower profile than parked cars, stations do not create sight obstructions. They can be used at intersections to increase pedestrian visibility and safety. Extra care should be used in systems that feature map panels.

Typically, the payment kiosk should be oriented to face the curb so that users can access the kiosk from the sidewalk.

On-street stations can create space for other amenities such as private bike parking and seating.

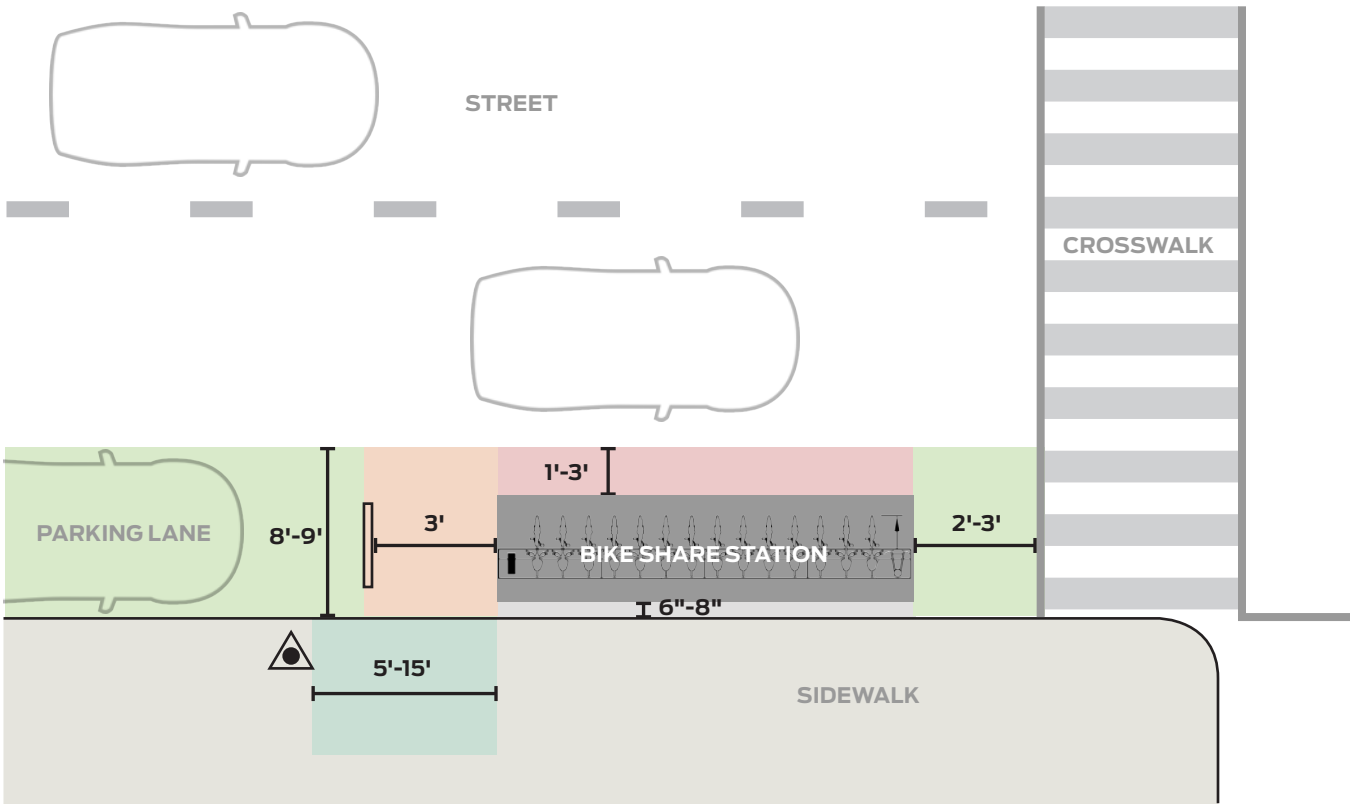
On-street stations can be key features in larger traffic calming projects and can be placed in medians and floating parking lanes to demarcate and protect pedestrian and cyclist space.

Wheelstops, stone blocks, flexible delineators, and/or painted buffers are all commonly used to protect on-street stations from moving vehicles. Stone blocks or planters can replace wheelstops on cobble surfaces or other places where wheelstops cannot be installed.

Station plates should not cover utility access points. However, the bikes can sit on utility points and drainage covers. Bridging and blank plates can create gaps to provide pedestrian access, accommodate loading or avoid obstructions and utilities (see Materials and Design Elements).

When using angled station plates, the station should be angled so that riders back the bike out into the travel lane and are facing in the direction of traffic (similar to front-angle-parking for cars).

Bay Area Bike Share.
San Francisco, CA
 Photo: David Weinzimmer



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TYPICAL CLEARANCES

Street Placement

Standard bike share stations can be placed in parking lanes that are 8' wide or greater. Angled station plates can be used if the parking lane width is less than 8'.

Planners typically leave small clearances (2'-3') between the station and curb cuts and crosswalks.

Docking

People need room to pull bikes out of the station—typically 1'-3' from the back of the bike to the curb or extent of the station area. Stations where bikes are pulled out toward a raised curb typically need more clearance (at least 3') than stations where bikes are pulled out toward the street.

Fire Hydrants

Clearances for fire hydrants vary from city to city. They typically range from 5'-15'.

Drainage

Operators often request about 6"-8" behind curbside stations to allow for drainage.

Wheel Stops

Wheel stops or blocks are generally placed 3' from the end of the station. A wheel stop need not be installed on the side of a station adjacent to a non-parked area. Wheelstops should be used in conjunction with vertical delineators to increase visibility.



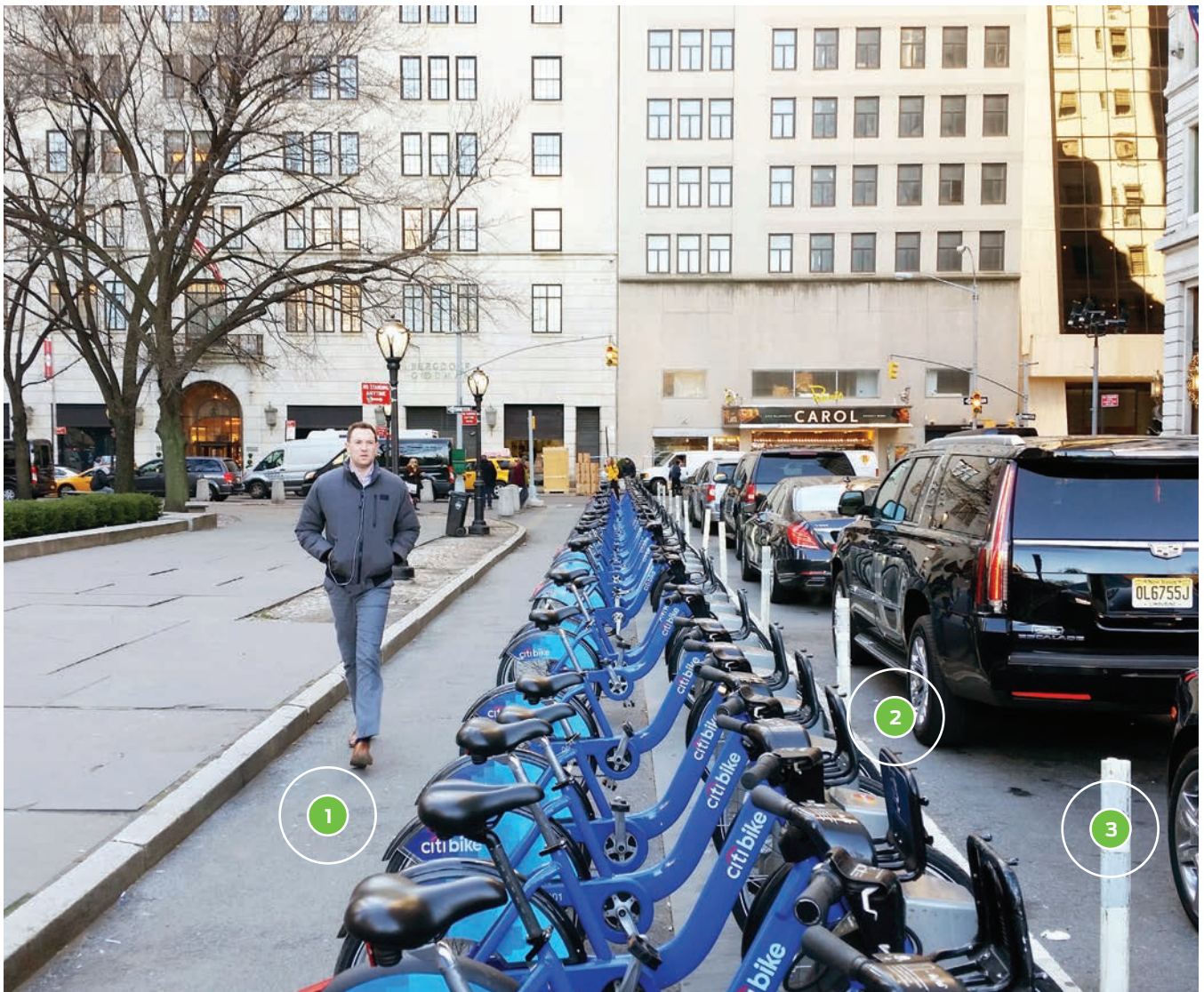
STATIONS NEXT TO THE CURB

- 1 Station fits within the existing parking lane.
- 2 Bikes can be pulled out away from the curb (in the “door zone”) or pulled out toward the curb provided there is sufficient space – typically a minimum of 3’ from the back of the bike to the curb or extent of the station area.

- 3 Station creates opportunities for other amenities such as private bike parking and seating.

- 4 Wheelstops, blocks, flexible delineators, and painted buffers can be used to protect the station from moving vehicles.

Capital Bikeshare. Washington, DC
Photo: Mario Durán Ortiz

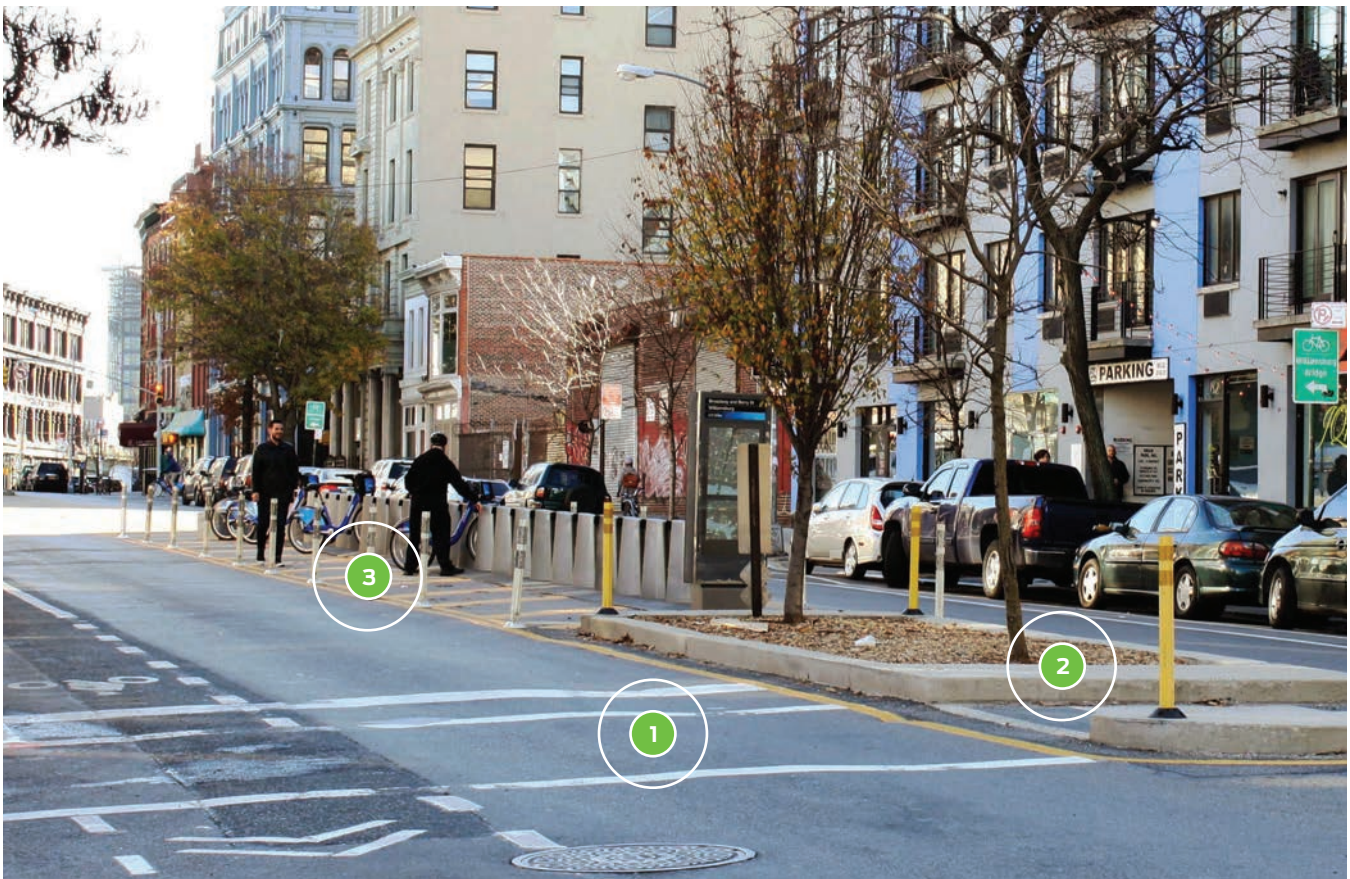


STATIONS NEXT TO THE CURB: FLIPPED

- 1 Station fits in a wide parking lane (typically greater than 10'). Planners should leave at least 3' of clearance between the back tire and the curb to allow riders to dock and undock bikes.
- 2 The station area can be used to fill excess road space or narrow vehicular moving lanes as a road safety or traffic calming measure.

- 3 Wheelstops, blocks, flexible delineators, and painted buffers can be used to protect the station from moving vehicles.

Citi Bike. New York, NY
Photo: Kate Fillin-Yeh/NACTO



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STATIONS IN THE MEDIAN

- 1** Crosswalks connect the station area to the sidewalk.
- 2** Station creates new pedestrian space and narrows overall road width to reduce speeding.
- 3** Blocks, flexible delineators, and paint can be used to protect the station from moving vehicles.

Citi Bike. New York, NY
Photo: Ted Graves/NACTO



STATIONS OFFSET/IN FLOATING PARKING LANES

- 1 Station fits within the existing parking lane.
- 2 Station demarcates and protects the bike lane and creates a high-comfort zone for starting and ending bike trips.
- 3 Bikes should be pulled out toward the curb.
- 4 Wheelstops, blocks, flexible delineators, and painted buffers can be used to protect the station from moving vehicles.

Citi Bike. New York City, NY

Photo: Kate Fillin-Yeh/NACTO



2.2

Stations on the Sidewalk

In this Section

- Case Study:
Bike Share Bulb Out, Bethesda, MD

Sidewalks are another common location for bike share stations. Sidewalk placement is often chosen where road space is unavailable, where high traffic volumes make on-street locations untenable, or where there is resistance to removing parking. Stations can only be placed on the sidewalk in places where the sidewalk is wide enough to accommodate a station without impacting people walking. Most cities require a minimum of 6' clear from the back of a docked bike in order to provide room for pedestrians and meet ADA requirements. Cities may opt for larger clearances depending on pedestrian volumes.

Depending on sidewalk width, a variety of configurations are possible for sidewalk stations. Stations can be placed along the curb, back up against a building face or property line, or sit elsewhere on the sidewalk. Stations placed at the curb next to curbside parking should be offset slightly to accommodate people getting out of cars. Back-to-back stations can easily be installed on particularly wide sidewalks, minimizing the overall station length. Angled stations can reduce station width—maximizing pedestrian clearpath—but require additional length.

Charlotte B-Cycle. Charlotte, NC

Photo: Charlotte B-Cycle



An 18" setback from the curb allows people to open their car doors next to the station. Divvy. Chicago, IL

Photo: Steve Vance

Unless there is ample sidewalk width, stations should not be placed directly in front of the main entrance to high-volume buildings to avoid conflicts with people walking. Similarly, system operators caution against configurations where operations crews can only reach bikes via the sidewalk as they can be difficult to rebalance or service if the pedestrian volumes are high.

Bike share and conventional transit are complementary modes, thus planners should make every effort to site bike share stations near transit stops. However, since transit stops are likely to have heavier than average pedestrian volumes, planners should pay extra attention to ensure that stations are placed in ways that do not impede pedestrian access to bus or transit stops. Many cities have addressed this issue by increasing the number of stations at high volume transit stops or at regional rail stations. In New York, for example, system planners tried to place Citi Bike stations at all the exits to major subway stations such as Union Square.



Planners ensure that sufficient sidewalk space remains for people walking. Divvy. Chicago, IL

Photo: Esther Dyson



CASE STUDY

Bike Share Bulb Out, Bethesda, MD

In places with narrow sidewalks and significant limits on taking street space, some cities have poured concrete or used other materials to expand sidewalk widths to accommodate bike share stations. Planners can take advantage of this commitment of resources to make streets and intersections safer. In Bethesda, MD, planners built a concrete bulb-out for a bike share station. The bulb-out makes the intersection safer by providing a shorter, safer crossing distance for pedestrians while also creating a place for the bike share station. Rather than fully reconstruct the street and subterranean drainage systems, a costly proposition, the bulb-out is separated from the existing curb by a surface level drainage channel which is covered by metal plates. The station partially overlaps these plates and the City reports no issues with debris in the drainage channel or maintenance access.⁷

A bike share station on a bulb out.
Capital Bikeshare. Bethesda, MD
 Photo: Google



GENERAL CONSIDERATIONS

Sidewalk stations should not impede pedestrian flow. Keeping stations in the same line as street furniture and other sidewalk features may help to maintain a pedestrian clear path.

The payment kiosk should be oriented so that users can access the kiosk while standing on the sidewalk.

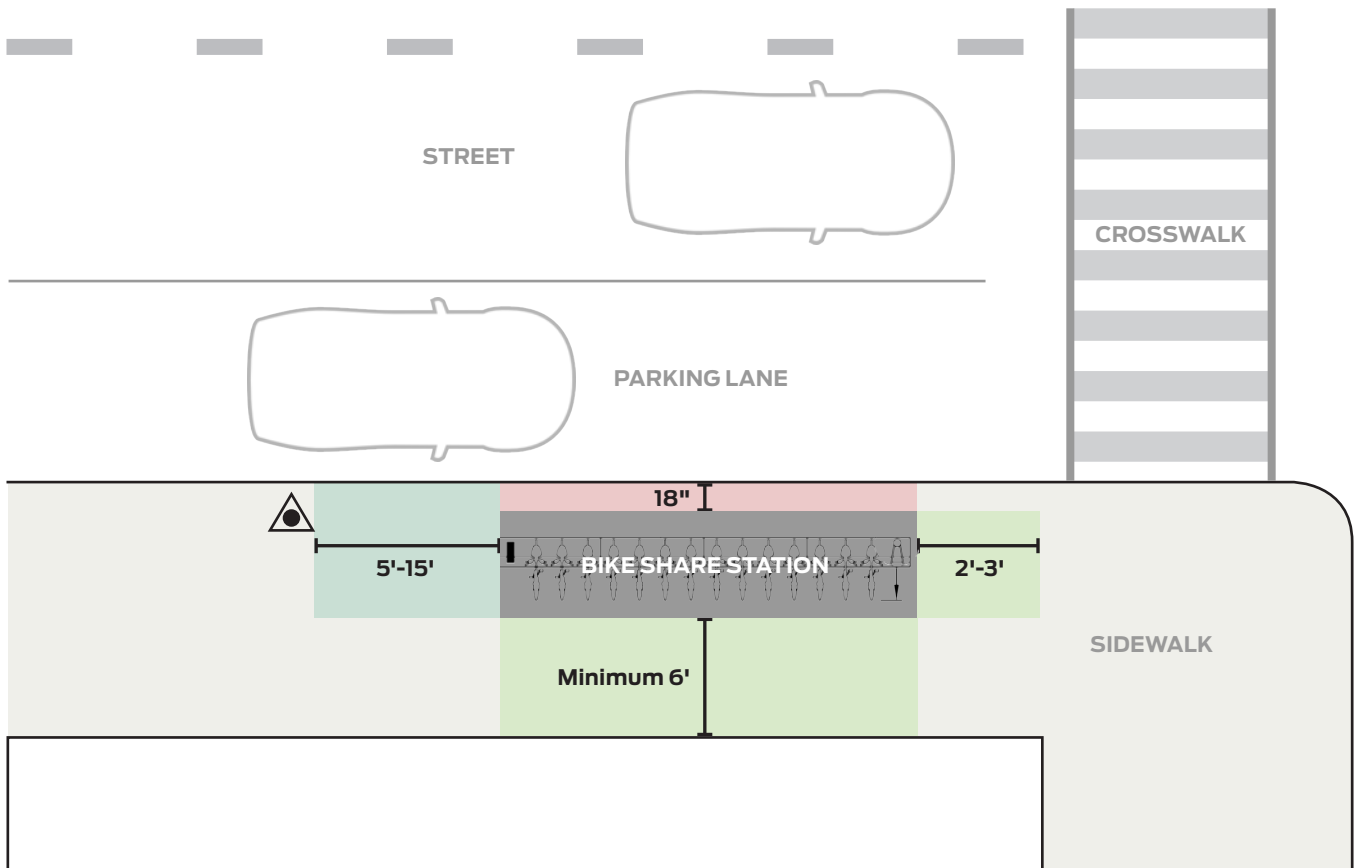
Planners may want to consider adding other amenities such as private bike parking and seating into sidewalk station plans.

Station plates should not cover utility access points, but the bikes can sit on utility points and drainage covers. Bridging and blank plates can create gaps to provide pedestrian access, accommodate loading, or avoid obstructions and utilities (see Materials and Design Elements).

Other streetscape features, such as traditional bike racks, can be moved to accommodate bike share stations. However, bike racks should always be relocated nearby, rather than eliminated, so that they will continue to serve the location.

Capital Bikeshare. Arlington, VA

Photo: Mobility Lab



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TYPICAL CLEARANCES

Sidewalk Placement

Most cities require a minimum of 6' clear from the back of a docked bike in order to provide room for pedestrians and meet ADA requirements.

Planners typically leave small clearances (2'-3') between the station and curb cuts and crosswalks.

Fire Hydrants

Clearances for fire hydrants vary from city to city. They typically range from 5'-15'.

Vehicle Clearance

If vehicle parking is allowed adjacent to a sidewalk station, the station is typically placed at least 18" off the curb to allow for car doors to open.



2.3

Open Spaces

In this Section

- Parks
- Plazas
- Parking Lots
- Case Study:
Bike Share Plazas, New York, NY

A bike share station in a newly created public plaza. Indego. Philadelphia, PA

Photo: Cara Ferrentino/City of Philadelphia

Open spaces, such as plazas and parks, provide great opportunities for bike share stations. Stations can complement or provide access to public spaces, as well as leverage underutilized space. Similarly, in some cities, surface area parking lots may also offer good locations for bike share stations. The non-linear nature of many of these spaces often encourages unique station configurations.

Parks

Parks offer excellent locations for bike share stations because they can enliven public space and typically do not use on-street parking space or valuable pedestrian areas. At the same time, however, park locations also present unique challenges especially regarding late night access and ensuring user safety in off-hours. When placing stations in parks, it is important to consider the type and size of the park and the intensity of its uses and attractions.

The Divvy system in Chicago offers a number of examples of good station placements within parks. Divvy stations inside Grant Park are located immediately adjacent to the main entrances to the park or next to main attractions such as the Adler Planetarium, the Field

Museum, and Shedd Aquarium. The combination of high-volume attractions and good station placement make these stations some of the most used stations in the system. The Shedd Aquarium station, for example, ranks third in terms of average trips per day.⁸

In contrast, in parks without large-scale attractions, bike share stations may be better placed along the periphery where they can be easily reached by park-goers and non-park-goers alike, regardless of time of day. For example, in New York City, planners have not placed stations inside Central Park, Riverside Park, or East River Park, opting instead to keep stations along the park edges where they are more visible and accessible at all times of day. Data collected in Capital Bikeshare's user survey shows that the overwhelming majority of annual members will not walk more than 3-5 blocks (a little less than a ¼ mile) to get to a bike share station.⁹ Stations that are isolated inside large parks may go unused, unless they are placed near to a high-volume attraction such as a museum or zoo.

A Hubway station on the periphery of a pocket park. Hubway. Somerville, MA

Photo: Ted Graves/NACTO





Above: Planners closed a slip street for a bike share station and public art plaza. Below: Before bike share. Citi Bike. New York, NY

Photo: Google

Plazas

Public plazas present excellent opportunities for bike share stations. Because they are modular, bike share stations can be configured in a variety of ways, a particular asset in open or unprogrammed plaza spaces. Stations can provide programming for large open areas and break up underutilized space, including in front of office buildings and transit stations. Because bike share stations are activity generators, they can also help bring in additional customers, especially to cafes and restaurants.¹⁰ Designers should take care to consider pedestrian travel patterns when placing bike share stations in open spaces. Stations in plazas at sidewalk level typically do not need additional markers or protection. Stations in roadbed level plazas are typically protected from moving vehicles by flexible delineators, planters, blocks, or other street treatments (see Street Treatment Options).



CASE STUDY

Bike Share Plazas, New York, NY

Bike share stations can provide the impetus to create new pedestrian plazas, repurposing underutilized street space and creating safe places for cyclists and pedestrians alike. In New York, NYC DOT worked closely with the Grand Central Partnership Business Improvement District to close one block of Park Avenue just south of Grand Central Terminal and turn it into a bike share station and pedestrian plaza. The newly formed plaza eliminated a high-conflict turn in a largely pedestrian area and provides additional public space at the main entrance to Grand Central Terminal. The Pershing Square station is one of the most heavily used station in the Citi Bike system with over 1,000 trips per day. Similar bike share plazas were created at the off-angle intersections of streets in Brooklyn and Manhattan, including Franklin/Varick/West Broadway, Stagg/Union/Hewes and Roebling/N. 4th/Metropolitan. These bike share plazas increase pedestrian safety by simplifying vehicular turning movements at those locations and are a part of New York City's Vision Zero and public space policies.

Bike share station plazas also afford the opportunity for unique kinds of community engagement including public art and mural projects. As part of NYC DOT's Asphalt Art Activation program, the Franklin Street bike share station features a mural painted by a local artist with the assistance of volunteers.

One block of Park Ave was closed to cars to create a bike share plaza at the entrance to Grand Central Terminal. Citi Bike. New York, NY

Photo: Kate Fillin-Yeh/NACTO



Parking Lots

In areas with limited sidewalk space, surface parking lots may offer good options for bike share stations. Especially in less dense urban contexts, surface lots often have available space and provide access to multiple destinations. Similar to plaza locations, the flexibility of modular bike share equipment makes it relatively easy to site bike share stations in parking lots. Unlike sidewalk or plaza space, however, attention must be paid to make sure that cars do not park or hit station equipment. In San Jose, for example, surface parking lot locations are specially marked with paint and signage. Ensuring high station visibility from and providing additional signage to direct people to the bike share station is also key.

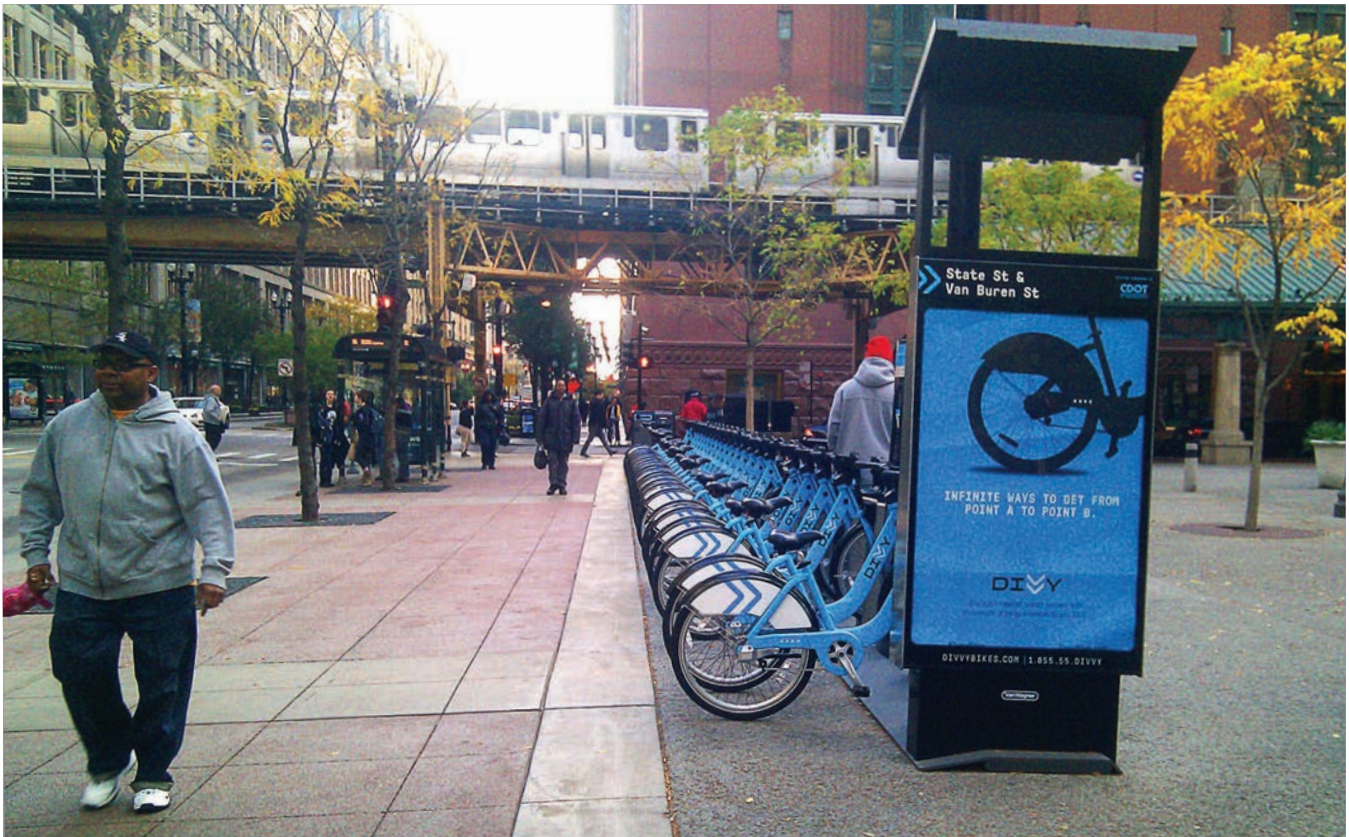
A bike share station in a parking lot. Bay Area Bike Share. San Jose, CA

Photo: City of San Jose



"Bicycle Parking Only" signage marks a bike share station. Austin B-Cycle. Austin, TX

Photo: Don Mason



GENERAL CONSIDERATIONS

Stations should not impede pedestrian flow. Keeping stations in the same line as street furniture and other raised amenities may help to maintain a pedestrian clear path.

When selecting locations within parks, avoid locations that are isolated, especially in off-peak hours. Special attention should be paid to park uses and pedestrian volumes to ensure that stations will be used and useable at all times.

Attention should be paid to existing pedestrian desire lines. Stations should not impede pedestrian flow.

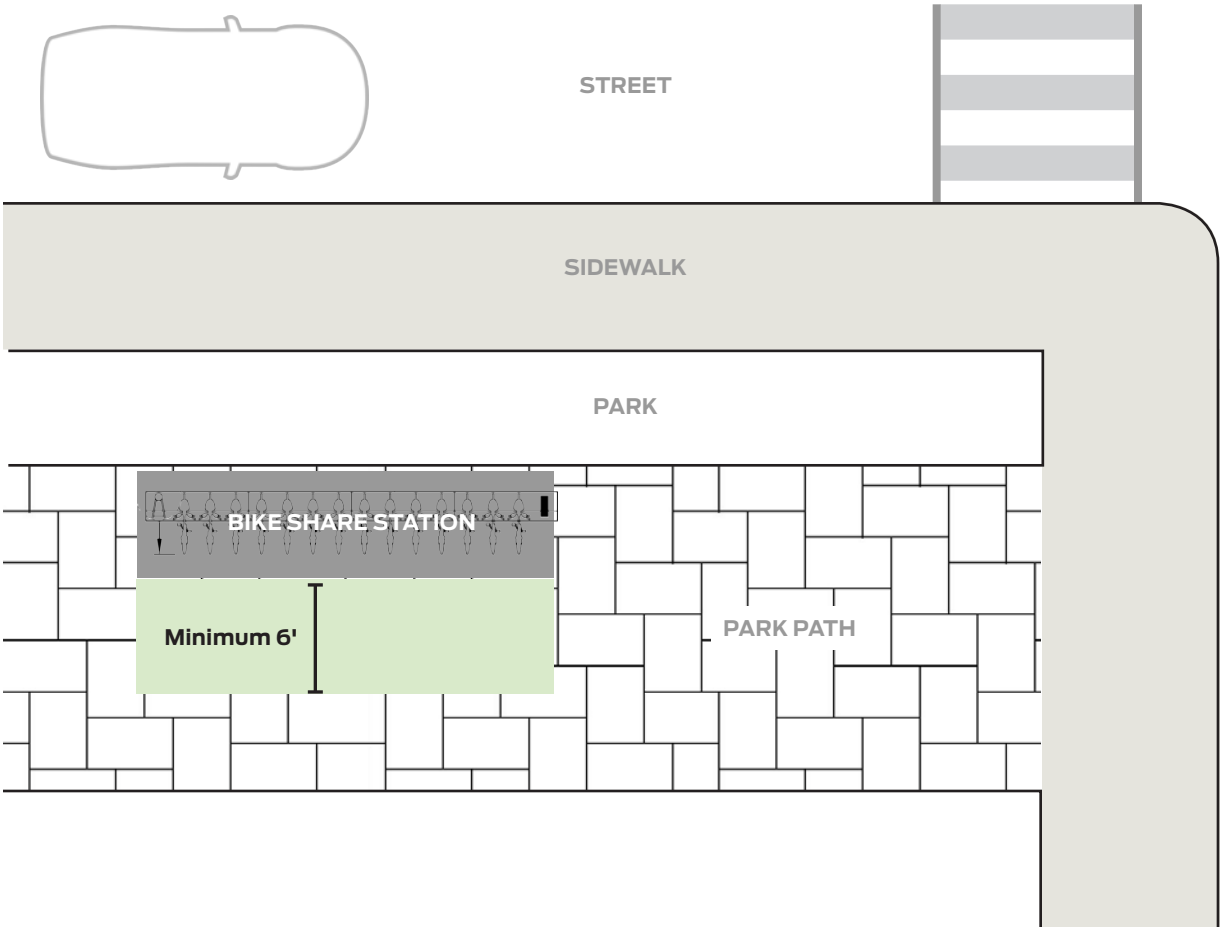
In most cases, plaza stations should also be marked by flexible delineators, planters, blocks, or other street treatments (see Street Treatment Options).

Bike share station plazas can be built into traffic calming projects and can be used to separate pedestrian space from moving traffic.

Station plates should not cover utility access points, but the bikes can sit on utility points and drainage covers. Bridging and blank plates can create gaps to provide pedestrian access, accommodate loading, or avoid obstructions and utilities (see Materials and Design Elements).

Designers should pay additional attention to ensuring that stations are accessible by operations vehicles (rebalancing and maintenance), especially in parks or places with unpaved paths and free flowing pedestrian activity.

Divvy. Chicago, IL
Photo: City of Chicago



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TYPICAL CLEARANCES

For stations on park paths, most cities require a minimum of 6' clear from the back of a docked bike in order to provide room for pedestrians and meet ADA requirements.

In parking lot locations, if wheelstops are used, they should be used in conjunction with vertical delineators to increase visibility.



3.0

Materials
and Design
Elements



Wheelstops are often used to protect stations from being hit when people are parking their cars. Austin B-Cycle. Austin, TX

Photo: Kate Fillin-Yeh/NACTO



3.1

Street Treatment Options

On-street stations are typically protected from moving vehicles by a variety of traffic control treatments including parking regulations, paint and striping, reflective delineators, wheelstops, and other physical barriers.

These treatments are meant to protect station equipment, keep drivers from parking in stations or blocking docks, and delineate the extent of the station area to provide riders with a safe place to mount and dismount the bikes. Cities often combine treatments depending on surrounding conditions and constraints. The following summarizes the treatments most commonly used around on-street bike share stations.

**Bay Area Bike Share.
San Francisco, CA**
Photo: David Weinzimmer

Without street treatments, stations are at risk of being blocked or damaged by cars. Citi Bike. New York, NY
Photo: Kate Fillin-Yeh/NACTO



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FLEXIBLE DELINEATORS

Used to mark the extent of the station area. Delineators are typically placed no more than 20' apart and are retro-reflective. Planners should make sure to leave room between the back of the bikes and the delineators so that riders have room to mount and dismount. Most cities use delineators that are between 28"-48" tall. Removable.

GREENbike. Salt Lake City, UT

Photo: GREENbike



//////
THERMOPLASTIC STRIPING AND PAINT

Used to mark the extent of the station area. Typically a white bounding box is drawn around the station, leaving room behind the back tires of the bike for riders to mount and dismount. Areas within the station box can be painted for aesthetic reasons. Removable.

Citi Bike. New York, NY

Photo: Kate Fillin-Yeh/NACTO





WHEEL STOPS

Used when there is parking adjacent to the station to protect the station from vehicles. Planners typically leave about 3' from station to wheelstop to accommodate vehicle overhang. Wheelstops should be used in conjunction with vertical, flexible delineators to increase visibility. Wheelstop color varies by city. Removable.

Divvy. Chicago, IL

Photo: City of Chicago



BLOCKS

Used to protect the station from moving vehicles. Used on cobble stone streets or other places where wheelstops cannot be drilled into the roadbed. Also used to mark the extent of median stations or to prevent vehicles from parking in station gaps. Can double as seating. Removable.

Citi Bike. New York, NY

Photo: Kate Fillin-Yeh/NACTO

PLANTERS

Used to mark the borders of bike share plazas, in lieu of wheelstops, or as part of larger placemaking efforts. Can be used in places where wheelstops cannot be drilled into the roadbed. Also used to mark the extent of median stations or to prevent vehicles from parking in station gaps. Removable.

Hudson Bike Share. Hoboken, NJ
Photo: Hudson Reporter



BOLLARDS

Used to protect the station from moving vehicles. Bollards are dug into the ground as part of station installation. Permanent.

Santander Cycle Hire (Formerly Barclay's) London, England
Photo: Transport for London





CONCRETE CURBS

Used to protect the station from moving vehicles. Concrete curbs are poured as part of station installation. Concrete curbs should be used in conjunction with vertical delineators to increase visibility. Permanent.

Vélib'. Paris, France

Photo: Kate Fillin-Yeh/NACTO



FENCING

Used to protect the station from moving vehicles. Fencing is dug into the ground as part of station installation. Permanent.

MOL Bubi. Budapest, Hungary

Photo: Peter Dalos



Bike share stations can be placed on a variety of surfaces. Bay Area Bike Share. San Francisco, CA

Photo: David Weinzimmer



3.2

Surfaces

From asphalt to cobblestones to permeable pavers, bike share stations can be installed on a wide variety of surfaces. In general, planners and operators look to site stations on hard surfaces that will not sink under the weight of the station or degrade or erode with heavy use. Ensuring that rebalancing and maintenance vehicles can reach the station without damaging lawns or getting stuck in mud is also essential.

Ensuring a generally flat surface is important for station operations as the station plates must be level in order to connect properly. Most operators caution against placing stations in locations that can only be reached by stairs or locations that have a steep gradient as stairs and steep slopes are disruptive both to potential users and maintenance and rebalancing teams.

//////
ASPHALT

Stations can be placed directly on asphalt.

Bubl Bikes. Milwaukee, WI
Photo: Bublr



//////
CONCRETE

Stations can be placed directly on concrete.

Hudson Bike Share. Hoboken, NJ
Photo: Hudson Reporter





COBBLESTONE

Stations can be placed directly on cobblestone. However, some street treatment options, especially thermoplastic striping, and flexible delineators and wheelstops which are bolted into the ground, cannot be installed on cobblestone. In New York, large granite blocks were used in lieu of other street treatments to protect stations on historic cobblestone streets. It may be difficult to place stations that must be bolted down on cobble stone streets.

Citi Bike. New York, NY

Photo: Kate Fillin-Yeh/NACTO



GRASS

Stations can be placed on grass with limited success. Most operators report issues with mud, dirt and station plates sinking over time. Snow removal is also more difficult on grass. If a location on grass is the best option, a pad should be placed under the station plates to prevent sinking; good materials for the pad include asphalt, pavers and concrete. In Boston, operators have had success using $\frac{3}{4}$ " pressure treated plywood. Stations that must be bolted to the ground typically cannot be placed on grass.

Hubway. Boston, MA

Photo: City of Boston

////////////////////////////////////
GRAVEL

Stations can be placed on gravel with varying degrees of success. Some cities have created an enclosed gravel bed for the station in lieu of putting the station directly on grass. This treatment addresses most issues with mud and sinking plates. Stations that must be bolted to the ground typically cannot be placed on gravel.

NiceRide. Minneapolis, MN
Photo: Kaitlin O'Shea



////////////////////////////////////
BRICK

Stations can be placed on brick without any issues.

Indego. Philadelphia, PA
Photo: Cara Ferrentino/City of Philadelphia





PERMEABLE PAVERS AND POROUS PAVEMENT

Stations can be placed on permeable pavers without interfering with drainage. In Maryland, Capital Bikeshare planners have created station pads with FlexiPave, a porous pavement product, in lieu of placing stations directly on grass.

Capital Bikeshare. Arlington, VA

Photo: Mario Durán Ortiz



WOOD/RAISED PLATFORMS

In the Bay Area, stations have been placed on raised wooden platforms (parklets) with no reported issues or concerns.

Bay Area Bike Share. Palo Alto, CA

Photo: Jason Tester/Guerrilla Future



3.3

Utility Points and Loading Access

Siting bike share stations around utility access points is a particularly challenging issue, especially where space is limited. In general, bike share station plates should not cover utility access points.

However, it is common industry practice to allow the bikes to sit on utility points, drainage covers, and tree grates. Most cities leave a small amount of room—ranging from a few inches to about a foot between station plates and utility access points. Stations may need to be temporarily deactivated or relocated to accommodate major utility projects.

In New York, the Citi Bike system uses “bridging,” short sections of specially designed conduit, to go around utility points in places where a station plate is too wide. The bridging provides an additional degree of design flexibility, allowing stations to flow around objects such as utility covers, trees, and poles. Bridging should be marked with reflective tape or paint.

Bike tires sit on tree grating. Austin B-Cycle. Austin, TX

Photo: Kate Fillin-Yeh/NACTO



Bridging allows the station to fit around a utility cover and provides additional flexibility in station design. Citi Bike. New York, NY
Photo: Kate Fillin-Yeh/NACTO

Conflict areas, such as loading zones or service entrances, can also be addressed by adding blank plates (standard plates without docks attached) to create gaps in stations in front of loading bay doors.

Right: Blank plates in the middle of the station allow for loading access. Citi Bike. New York, NY
Photo: Kate Fillin-Yeh/NACTO



Below: Detail of blank plates. Citi Bike. New York, NY
Photo: Kate Fillin-Yeh/NACTO





3.4

Wayfinding and Sponsor/Ad Panels

Wayfinding and ad/sponsor panels are an important part of marketing and funding bike share systems. They can be stand-alone panels or integrated into the kiosk and are typically placed at the ends of stations to maximize visibility.

Planners should pay additional attention to pedestrian sight lines when placing large, tall panels near intersections. Narrower wayfinding panels, such as those employed in many smart bike/dumb dock systems or those integrated into narrow-design kiosks like New York, Philadelphia, and Seattle, may avoid this issue. Most cities place some content guidelines, typically around alcohol and tobacco, on ad/sponsor panels. Wayfinding panels should include clear maps showing the immediate area, other nearby bike share stations, and bike lanes.

More than just a map, wayfinding panels may in fact help encourage bike share use. In 2011, an intercept survey in New York City found that 24% of visitors were lost at any point in time and that 13% of locals admitted to being unfamiliar with the neighborhood they

Breeze Bikes. Santa Monica, CA

Photo: Jason Islas/Santa Monica Next

Citi Bike. New York, NY

Photo: NYC DOT



were in.¹¹ The city concluded that being lost, fear of being lost, and lack of knowledge of their surroundings deterred people from biking or walking. As a result, many people took taxis, buses, or subways for short trips that could have easily been made by bike or on foot. In addition, including wayfinding panels in bike share stations is a good way to consolidate street furniture elements and limit sidewalk clutter.



FARGO BANK

5689
PHOTO PASTORIS VEHICLE

GO AHEAD, DRIP HOT FLUIDS ON THE HOT PLUMES

480.BIKE
bybikeshare
areabikeshare

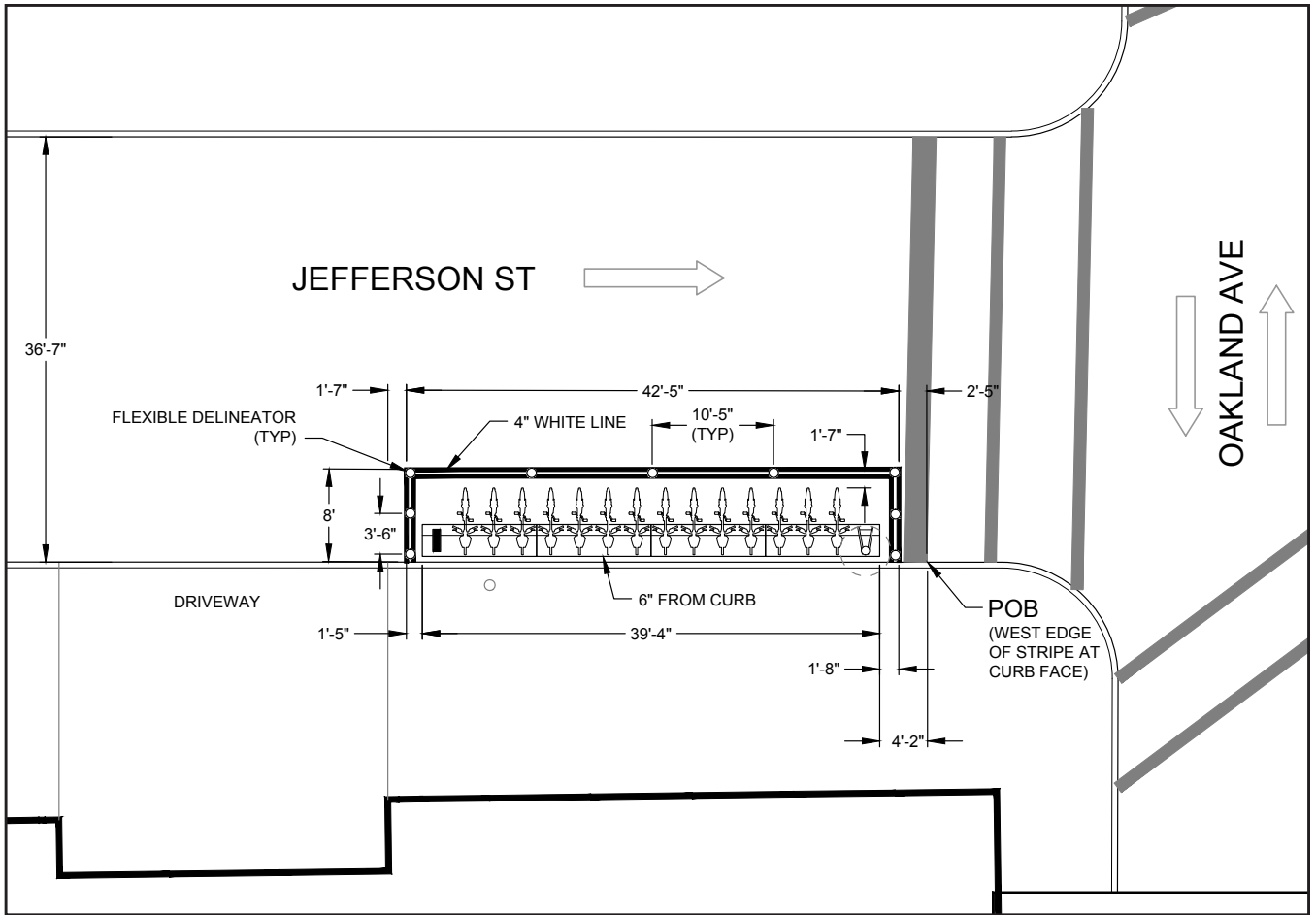
4.0

Site Drawings

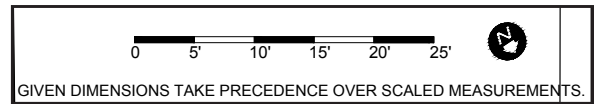


4.1

Site Drawings: Stations in the Street

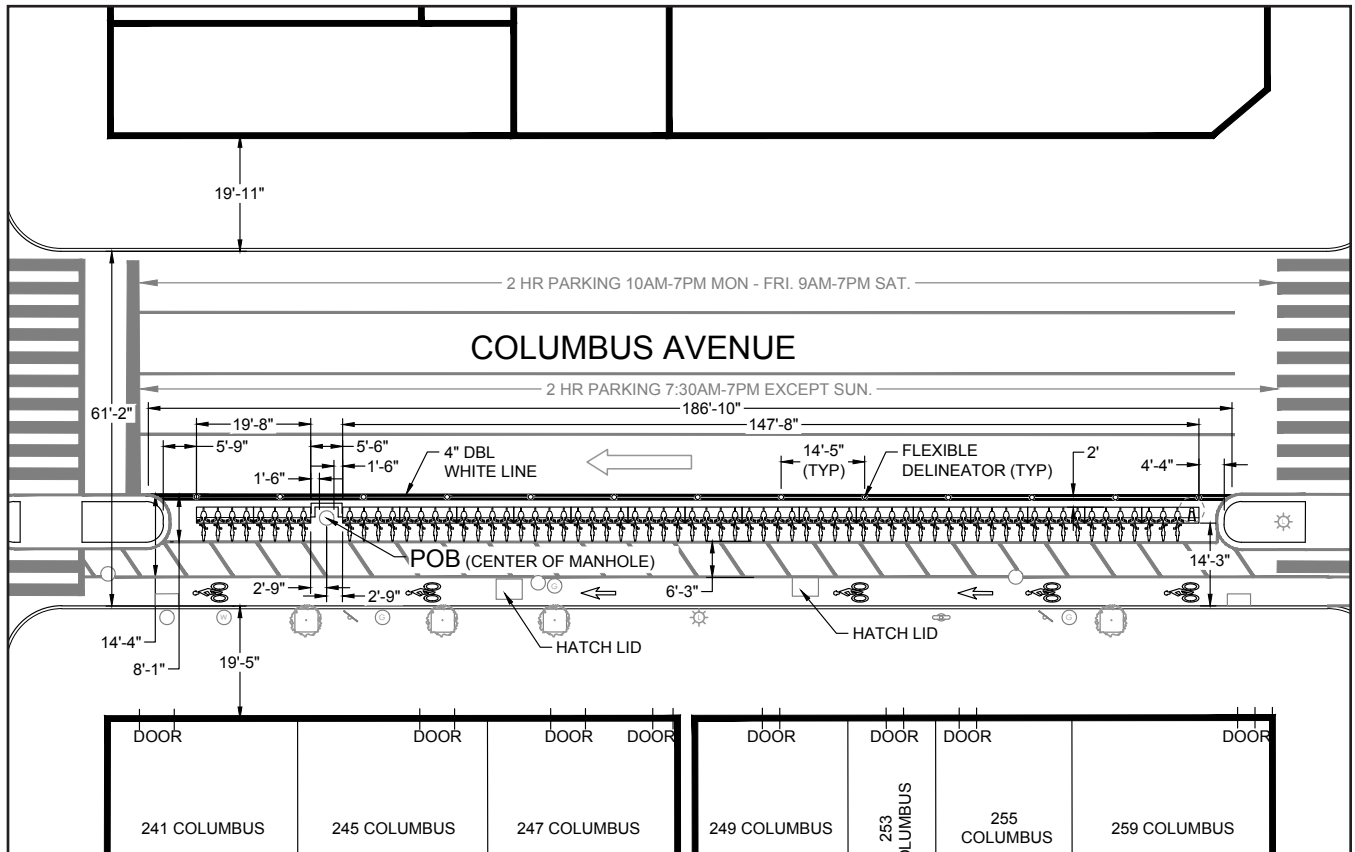


LEGEND	
POB	POINT OF BEGINNING
	CURB
	SIGN
	FENCE
	FLEXIBLE DELINEATOR
	AD PANEL
	KIOSK WITH SOLAR PANEL (OVERHEAD)
	PANEL LIMITS





STATIONS IN THE STREET



LEGEND

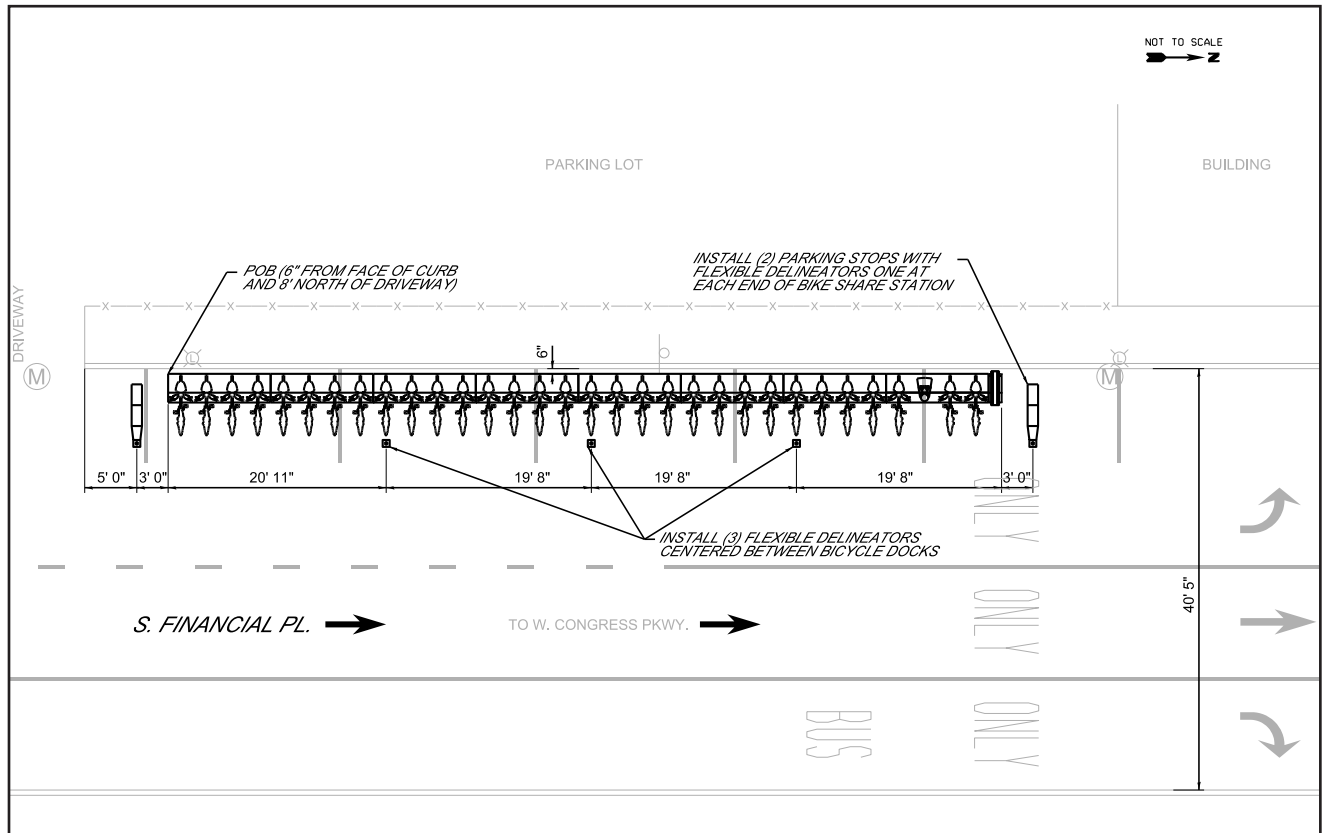
- CURB CUT
- NO PARKING
- STREET REGS
- SIGN/POLE
- CURB
- TREE PIT
- POB
- MANHOLE
- MANHOLE (WATER)
- MANHOLE (GAS)
- LIGHT POLE
- PARKING METER (SMART)

0 10' 20' 30' 40' 50'

GIVEN DIMENSIONS TAKE PRECEDENCE OVER SCALED MEASUREMENTS.

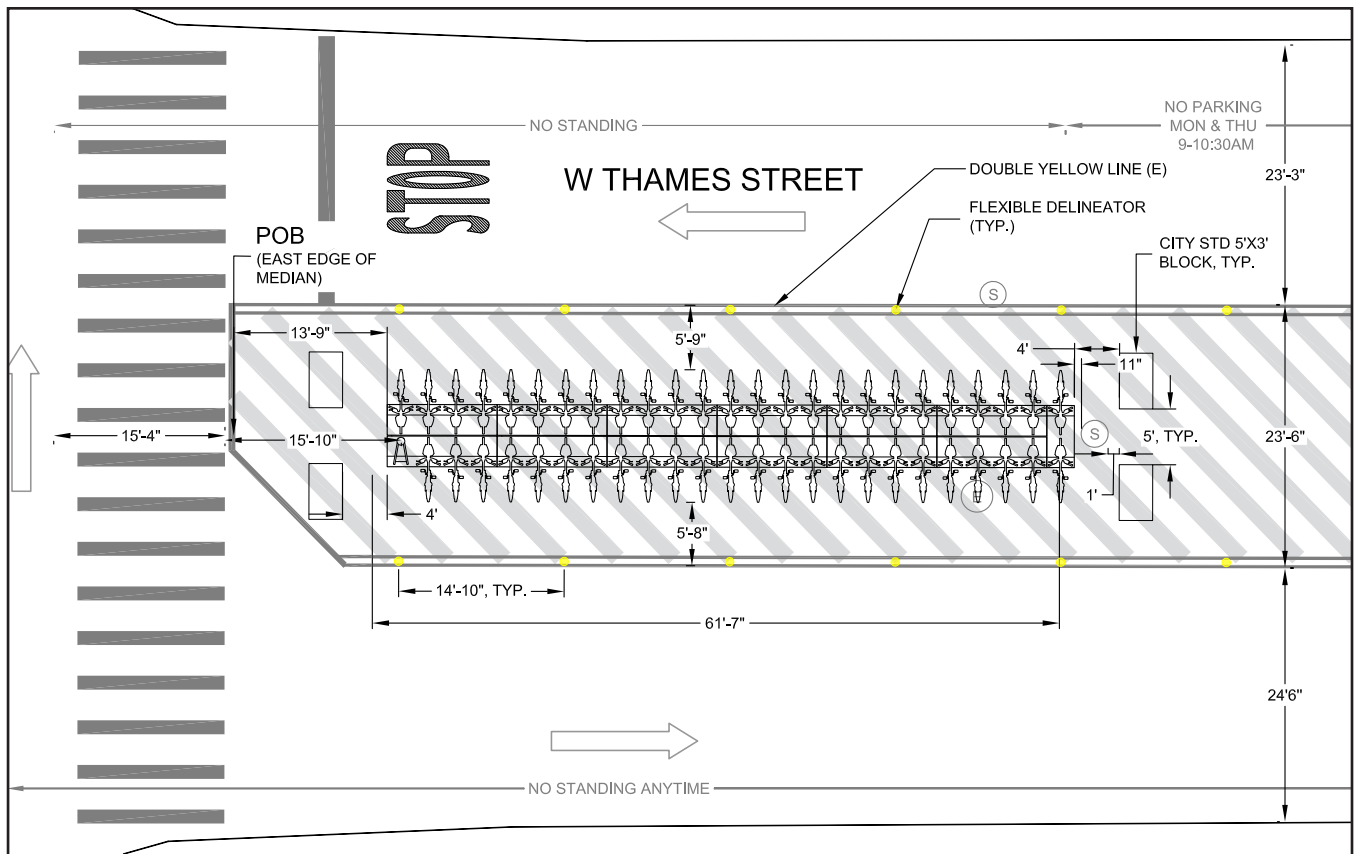


STATIONS IN THE STREET

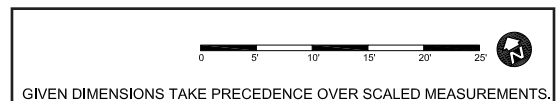


LEGEND	
	EXIST. MANHOLE
	EXIST. LIGHT POLE
	EXIST. SIGN POLE
	EXIST. FENCE
POB	POINT OF BEGINNING

STATIONS IN THE STREET



LEGEND	
<u>NO PARKING</u> STREET REGS	
(E)	MANHOLE-ELECTRIC
(S)	MANHOLE-SEWER
==	CURB
POB	POINT OF BEGINNING





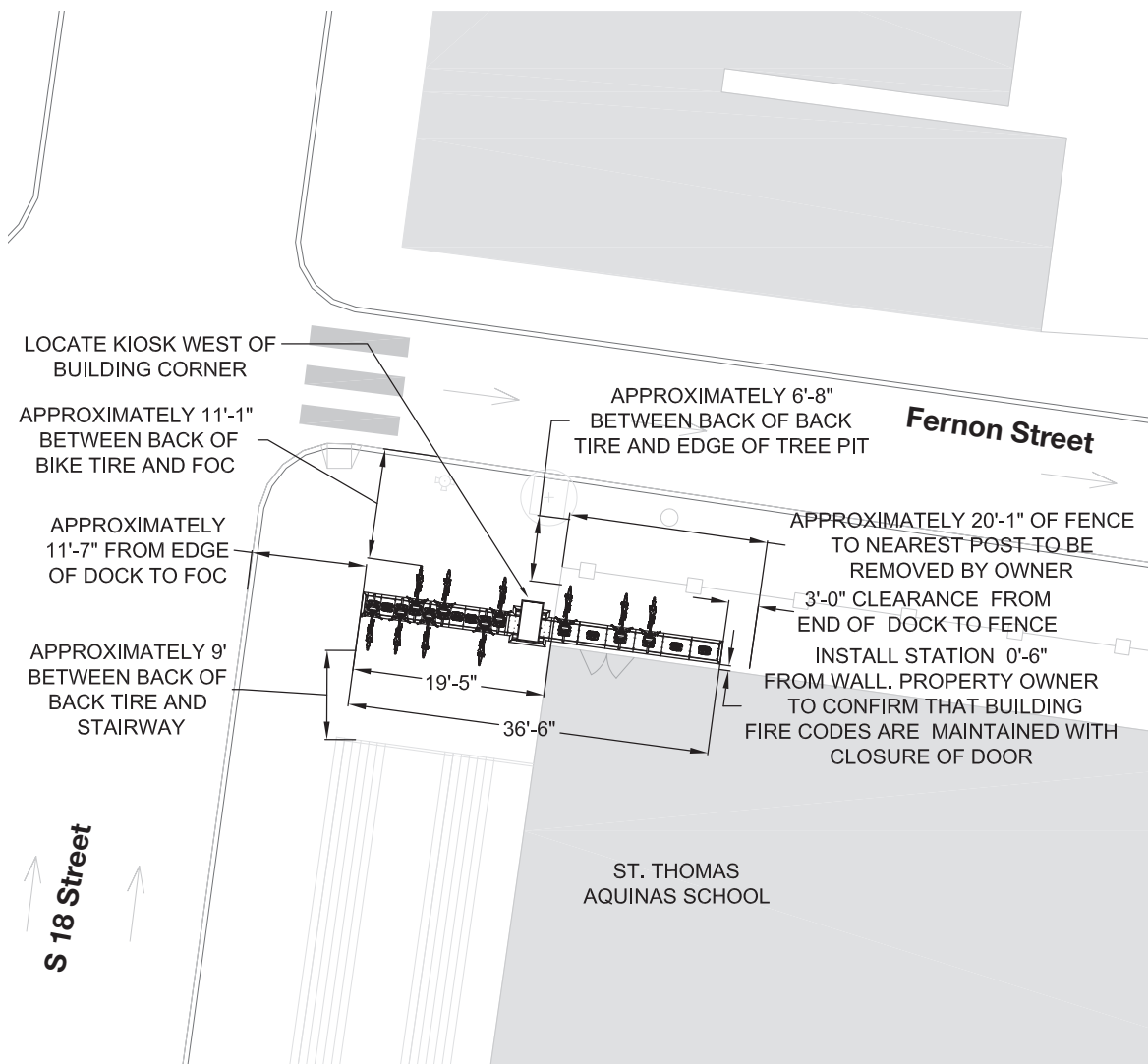
4.2

Site Drawings: Stations on the Sidewalk

STATIONS ON THE SIDEWALK

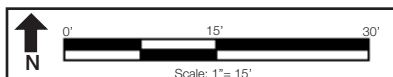
Site Plan

Name: Fernon Street and S 18th Street
 Station Number: 0305
 Location: South side of Fernon Street, east of S 18th Street
 Address: 1798 Fernon Street, Philadelphia, PA 19145
 Site Coordinates: Latitude: 39.9308243 & Longitude: -75.1746216
 Maintenance Hours: All hours
 Power Source: Solar
 Dock Configuration: 16 docks, flatback and dual-sided with 90-degree docks
 Property Owner: St. Thomas Aquinas School
 Additional Installation Notes: Property owner to remove fence. Door to be confirmed as inactive and that all fire codes are maintained with this door closure prior to installation.



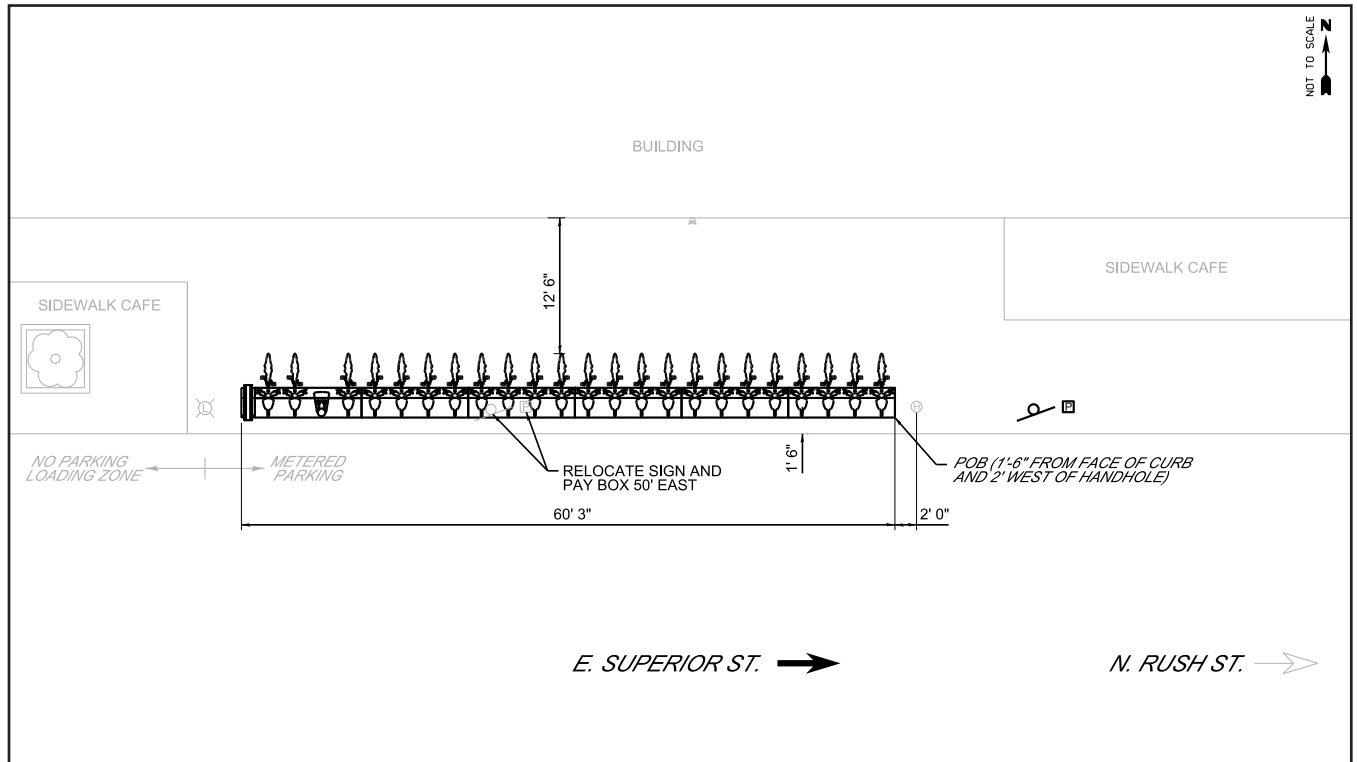
- Notes:
1. Dimensions to existing features are approximate as measured in the field by Rodriguez Consulting
 2. Street markings are representative

DRAFT - NOT FOR CONSTRUCTION



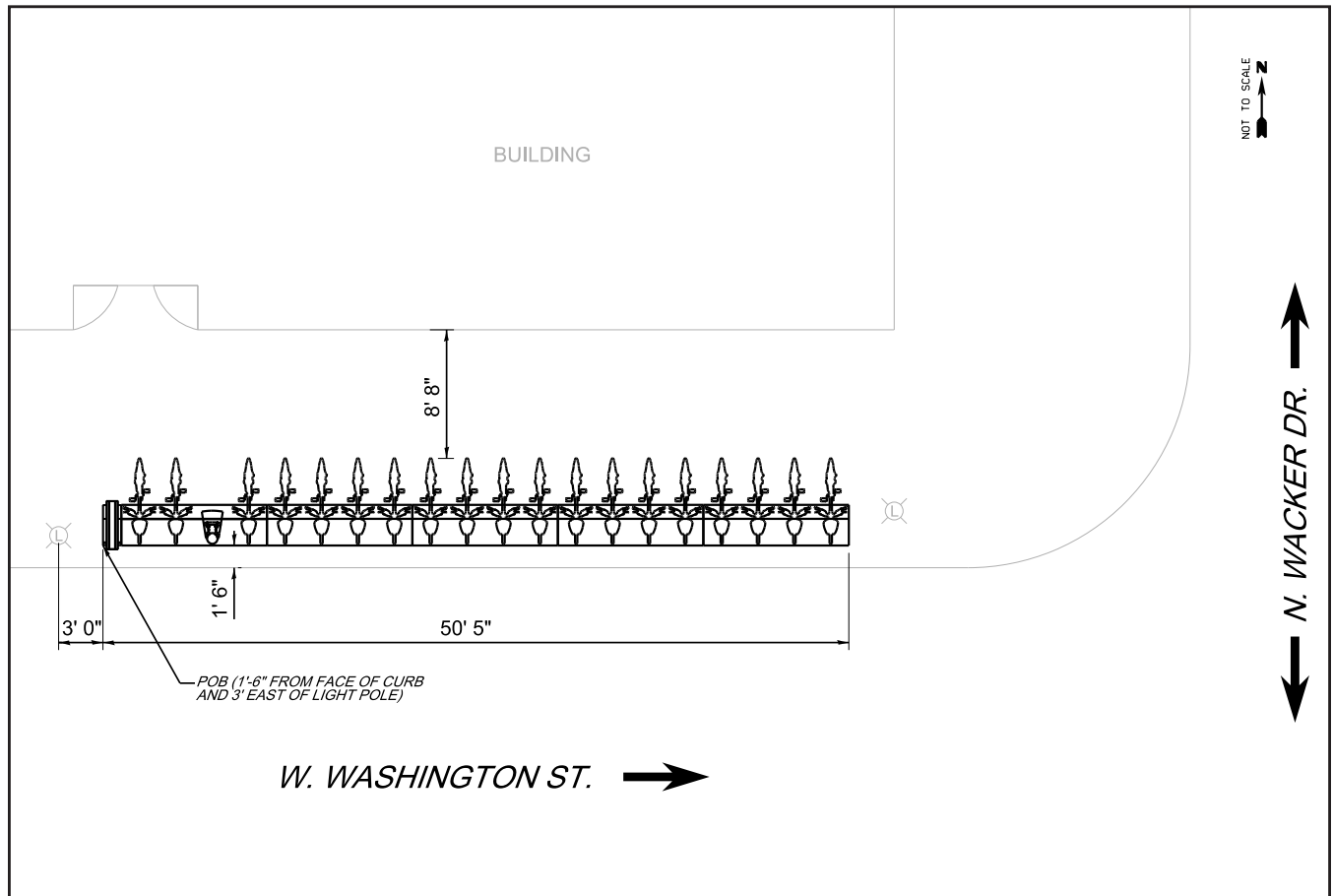


STATIONS ON THE SIDEWALK






LEGEND	
	EXIST. UTILITY HANDHOLE
	EXIST. STAND PIPE
	EXIST. LIGHT POLE
	EXIST. SIGN POLE
	EXIST. PARKING PAY BOX
	EXIST. TREE PIT
	POB POINT OF BEGINNING

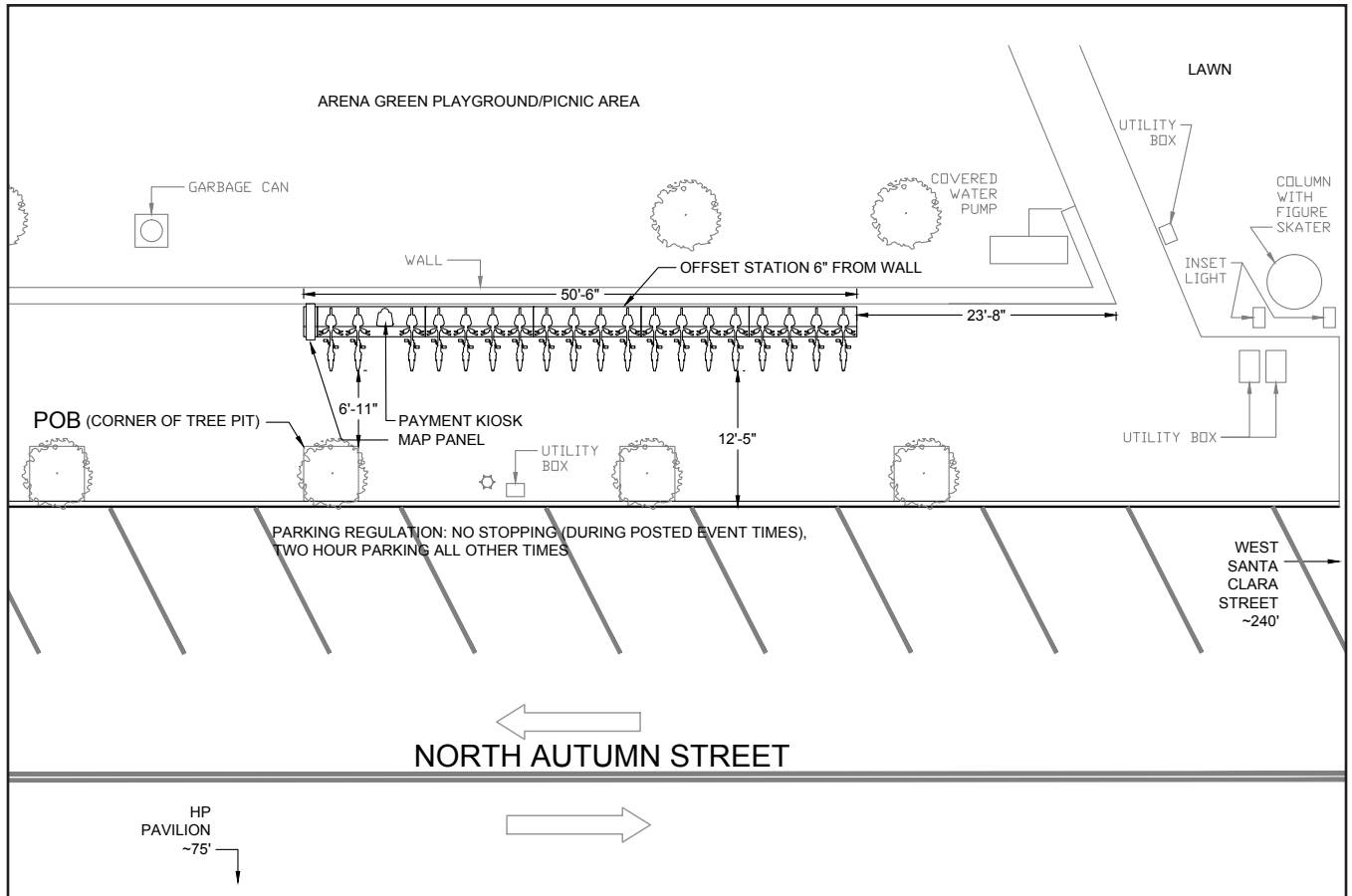
STATIONS ON THE SIDEWALK



LEGEND

-  EXIST. LIGHT POLE
-  EXIST. DOOR
-  POINT OF BEGINNING

STATIONS ON THE SIDEWALK



LEGEND	
	LIGHT POST
POB	POINT OF BEGINNING
	TREE PIT
	PARCEL LINE
	CURB

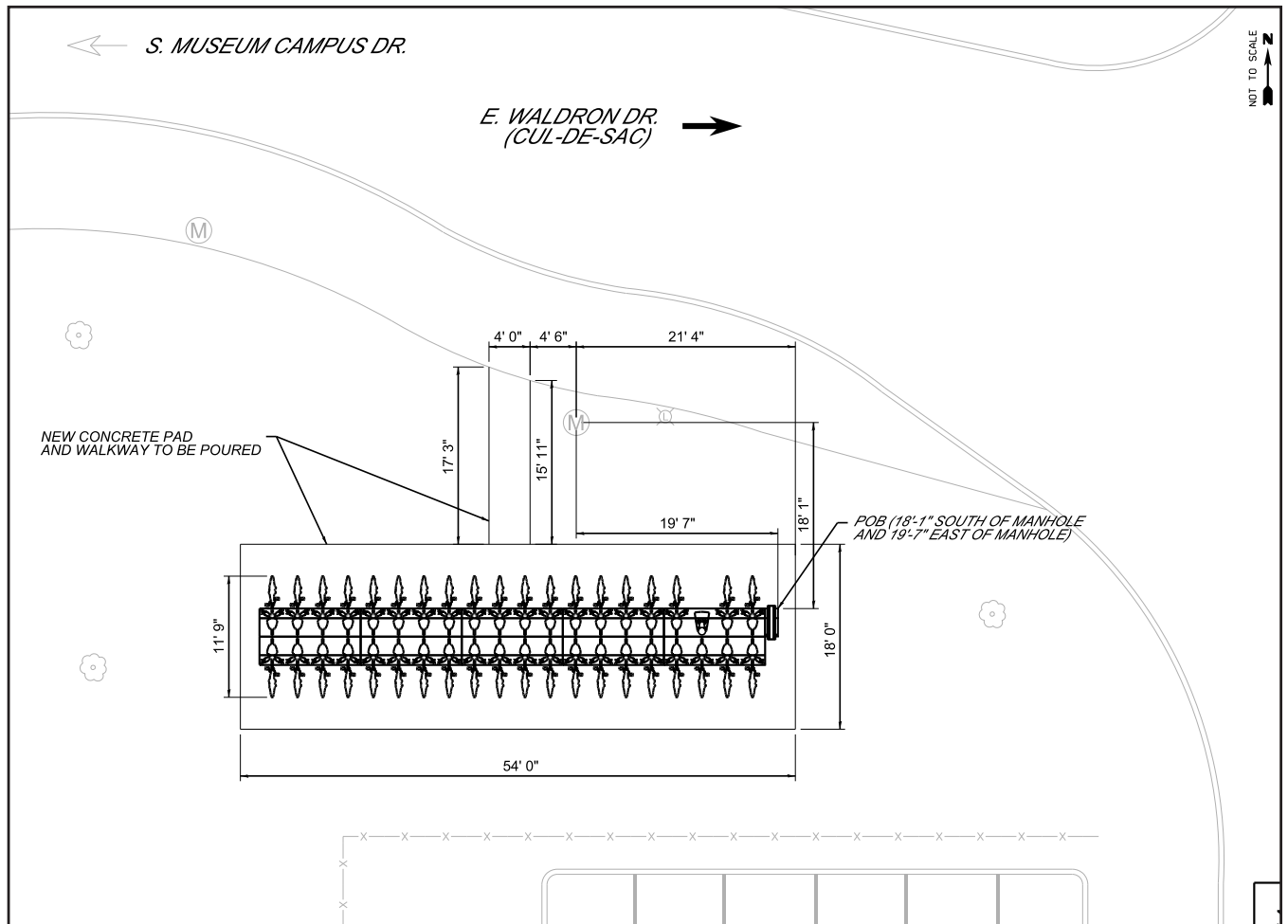
GIVEN DIMENSIONS TAKE PRECEDENCE OVER SCALED MEASUREMENTS.



4.3

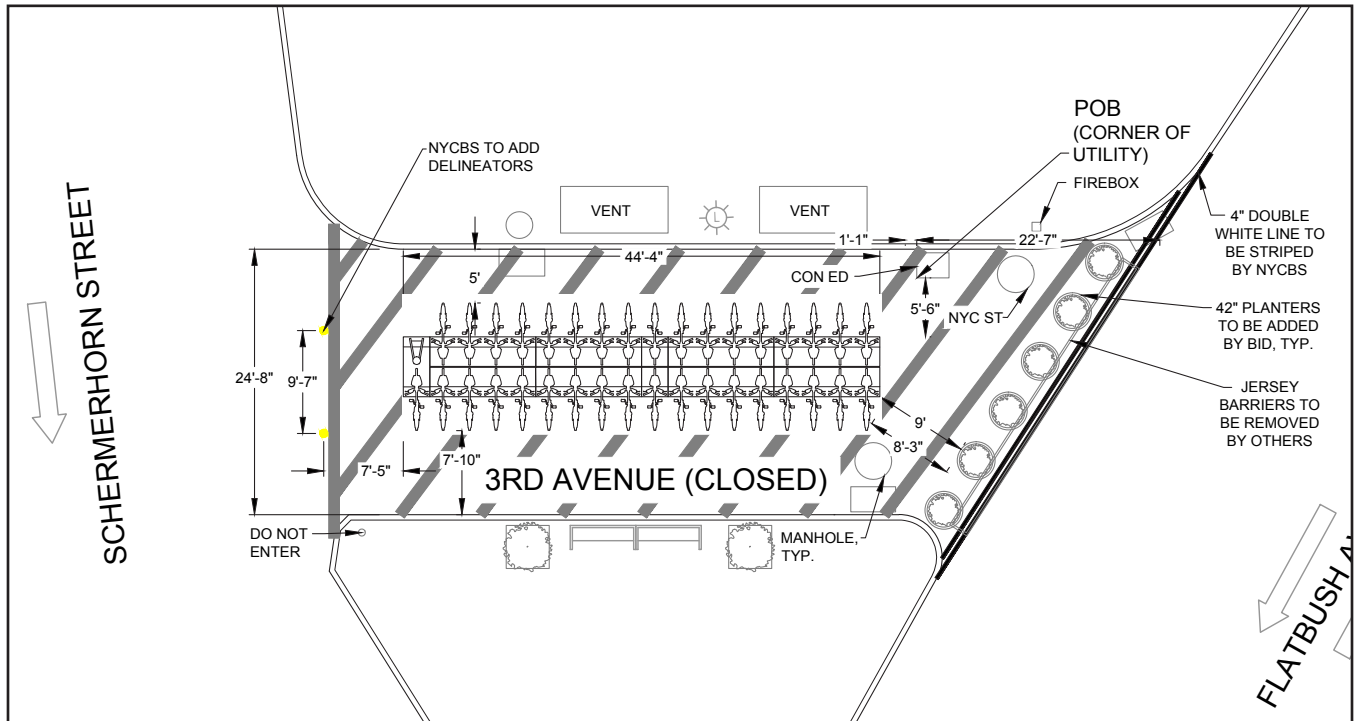
Site Drawings:
Stations in Open Space

STATIONS IN OPEN SPACE

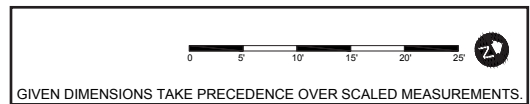


LEGEND	
(M)	EXIST. MANHOLE
(L)	EXIST. LIGHT POLE
X-X	EXIST. FENCE
(C)	EXIST. TREE
POB	POINT OF BEGINNING

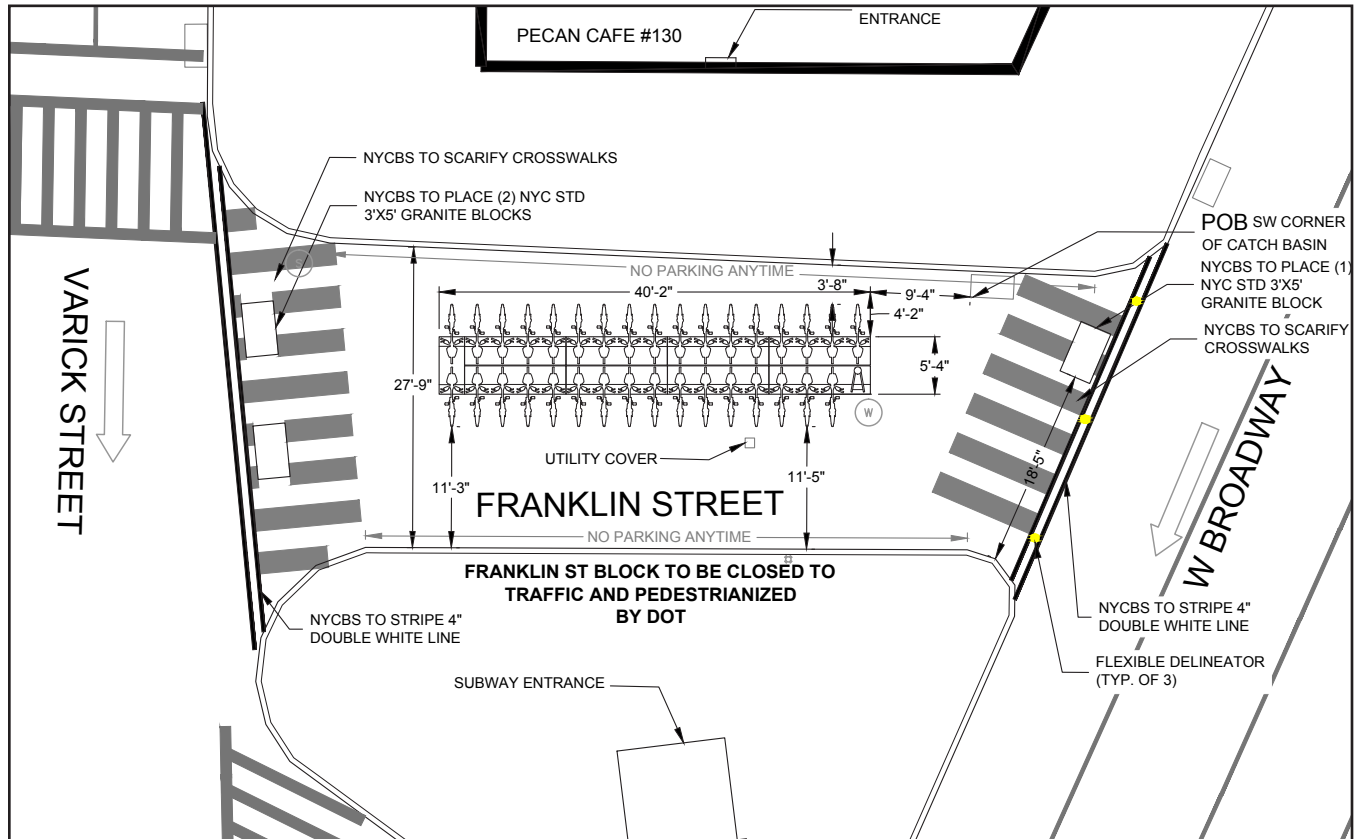
STATIONS IN OPEN SPACE



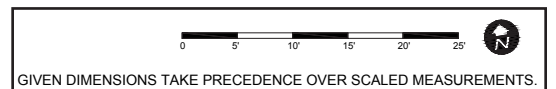
LEGEND	
	BENCH
	STREET LAMP
	CATCH BASIN
	TREE PIT
	SIGN/POLE
	CURB
	POINT OF BEGINNING



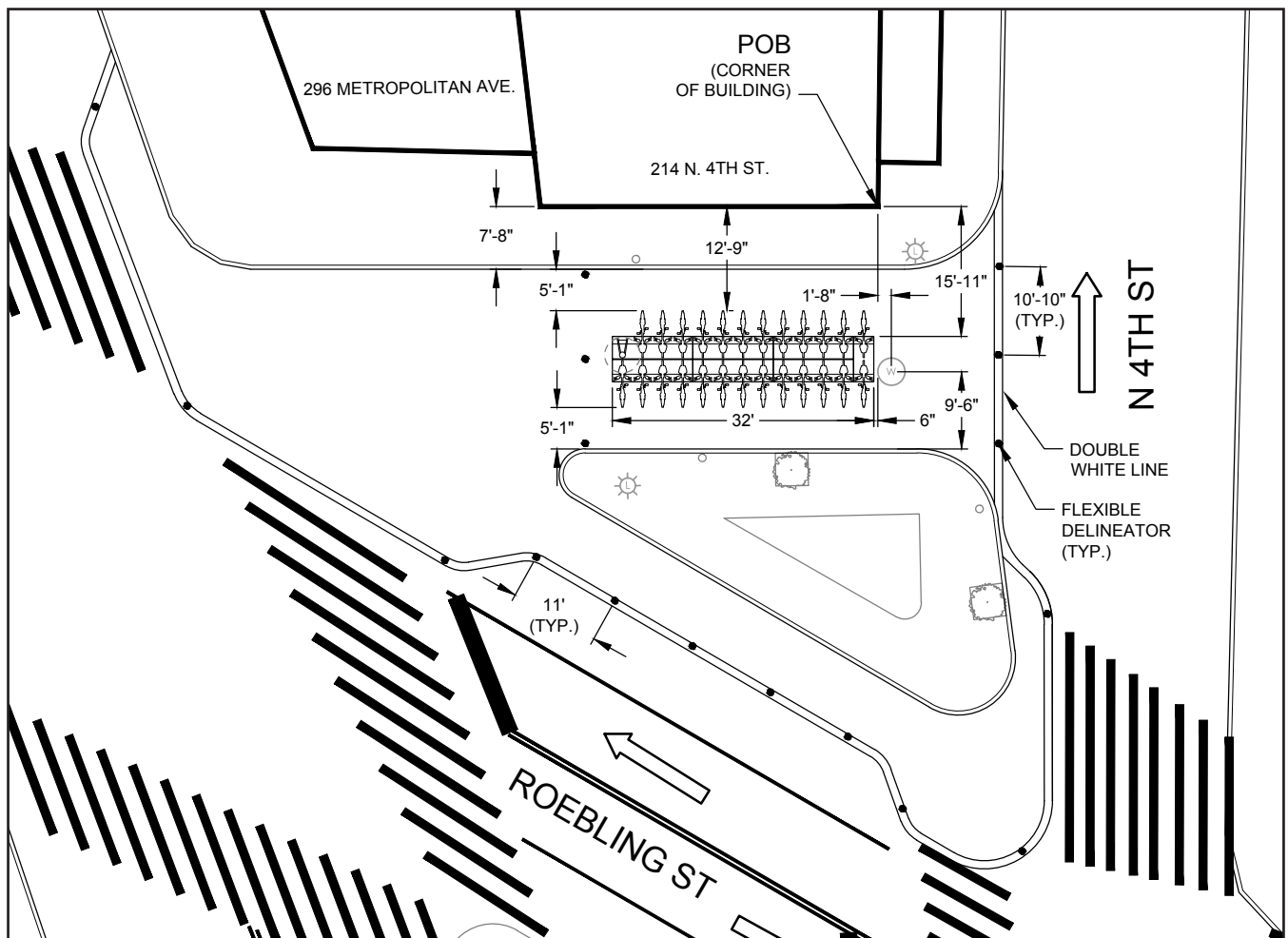
STATIONS IN OPEN SPACE



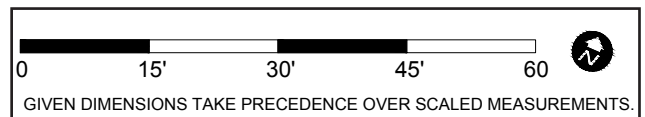
LEGEND	
	CATCH BASIN
	CURB
	FIRE HYDRANT
	MANHOLE-WATER
	MANHOLE-SEWER
POB	POINT OF BEGINNING



STATIONS IN OPEN SPACE



LEGEND	
	STREET REGS
	TREE PIT
	CATCH BASIN
	CURB
POB	POINT OF BEGINNING
	POLE-DRIVE RAIL
	MANHOLE - WATER



Notes

- 1 Maciag, Mike, "Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods." *Governing Magazine*, August 2014. Accessed via: <http://www.governing.com/topics/public-justice-safety/gov-pedestrian-deaths-analysis.html>
- 2 Anderson, Michael, "Assumption Busters: 12 Facts About Race, Ethnicity, Income & Bicycling," *People For Bikes*, March 9, 2015. Accessed via: <http://www.peopleforbikes.org/blog/entry/assumption-busters-surprising-facts-about-ethnicity-race-income-bicycles>
- 3 Wang, Xize & Greg Lindsey et al, "Modeling Bike Share Station Activity: The Effects of Nearby Businesses and Jobs on Trips To and From Stations." 2012. Accessed via: http://nacto.org/wp-content/uploads/2015/12/2013_Wang-Lindsey-Schoner-and-Harrison_Modeling-Bike-Share-Station-Activity.pdf & Peters, Jonathan & Adam Davidson, Nora Santiago, "Don't Curb Your Enthusiasm: The Economic Impacts of Transferring Curb Space from Car Parking to Bike Share Docks," *CUNY/Transportation Alternatives*, November 2013. Accessed via: http://nacto.org/wp-content/uploads/2015/12/2013_Peters-Davidson-and-Santiago_Economic-Impact-of-Transferring-Curba-Space-form-Car-Parking-to-Bike-Share-Docks.pdf
- 4 Peters, Jonathan & Adam Davidson, Nora Santiago, "Don't Curb Your Enthusiasm: The Economic Impacts of Transferring Curb Space from Car Parking to Bike Share Docks," *CUNY/Transportation Alternatives*, November 2013. Accessed via: http://nacto.org/wp-content/uploads/2015/12/2013_Peters-Davidson-and-Santiago_Economic-Impact-of-Transferring-Curba-Space-form-Car-Parking-to-Bike-Share-Docks.pdf & Clifton, Kelly & Sara Morrissey, Chloe Ritter, "Business Cycles: Catering to the Bicycling Market," *TR News 280*, May-June 2012, pp. 26-32. Accessed via: http://kellyclifton.com/Research/EconImpactsofBicycling/TRN_280_CliftonMorrissey&Ritter_pp26-32.pdf
- 5 Approximate measurements for systems using B-Cycle, BIXI & 8D/Motivate equipment.
- 6 Adrian Lipscombe, former Bicycle Coordinator, City of Austin, TX
- 7 Paul DeMaio, MetroBike, 10/12/15
- 8 Data provided by Divvy
- 9 Capital Bikeshare Annual Member Survey, 2014
- 10 Peters, Jonathan & Adam Davidson, Nora Santiago, "Don't Curb Your Enthusiasm: The Economic Impacts of Transferring Curb Space from Car Parking to Bike Share Docks," *CUNY/Transportation Alternatives*, November 2013. Accessed via: http://nacto.org/wp-content/uploads/2015/12/2013_Peters-Davidson-and-Santiago_Economic-Impact-of-Transferring-Curba-Space-form-Car-Parking-to-Bike-Share-Docks.pdf
- 11 NYC DOT, "Sustainable Streets: 2013 and Beyond." p. 101. Accessed via: <http://www.nyc.gov/html/dot/downloads/pdf/2013-dot-sustainable-streets-lowres.pdf>.

Photos

Cover: Darren Burton
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 Page 58: Kate Fillin-Yeh/NACTO
 Page 63: Kate Fillin-Yeh/NACTO
 Page 68: Kate Fillin-Yeh/NACTO

Report design: Carly Clark



**National Association of
City Transportation Officials**