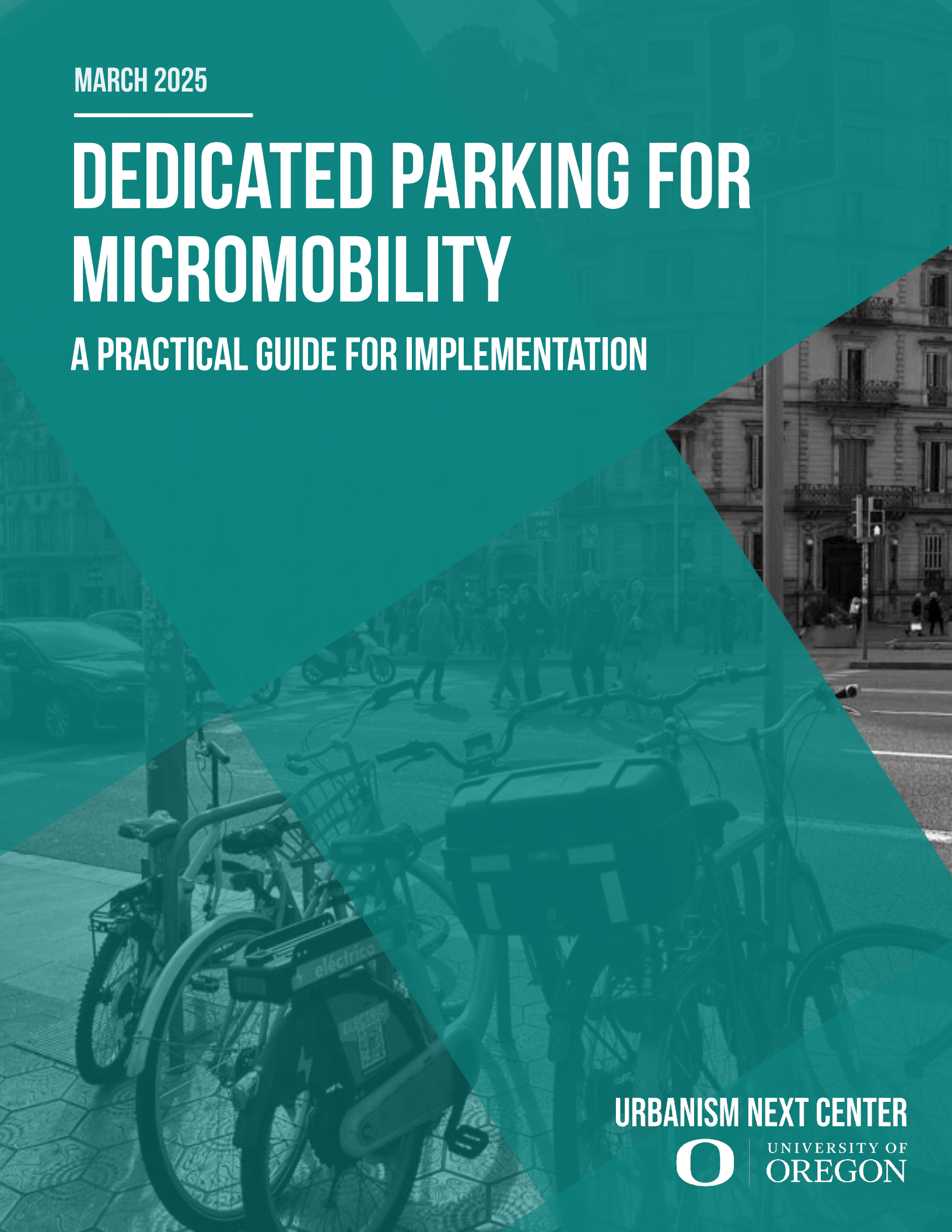
MARCH 2025

DEDICATED PARKING FOR MICROMOBILITY

A PRACTICAL GUIDE FOR IMPLEMENTATION



URBANISM NEXT CENTER
UNIVERSITY OF OREGON

ACKNOWLEDGMENTS

This report was written by:

Anne Brown	Urbanism Next/UO
Calvin Thigpen	Lime
Nicholas J. Klein	Cornell University

Graphic Design by:

Nicole Stout	Urbanism Next/UO

URBANISM NEXT CENTER

The Urbanism Next Center at the University of Oregon conducts research and convenes partners from around the world to understand the impacts of new mobility, e-commerce, urban delivery, and autonomous vehicles on the built environment. Going beyond these emerging technologies, we explore the possible implications on equity, health, safety, the economy, and the environment to inform decision-making that supports community goals. Urbanism Next brings together experts from a wide range of disciplines including planning, design, development, business, and law and works with the public, private, and academic sectors to help create positive outcomes from the impending changes and challenges confronting our cities.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

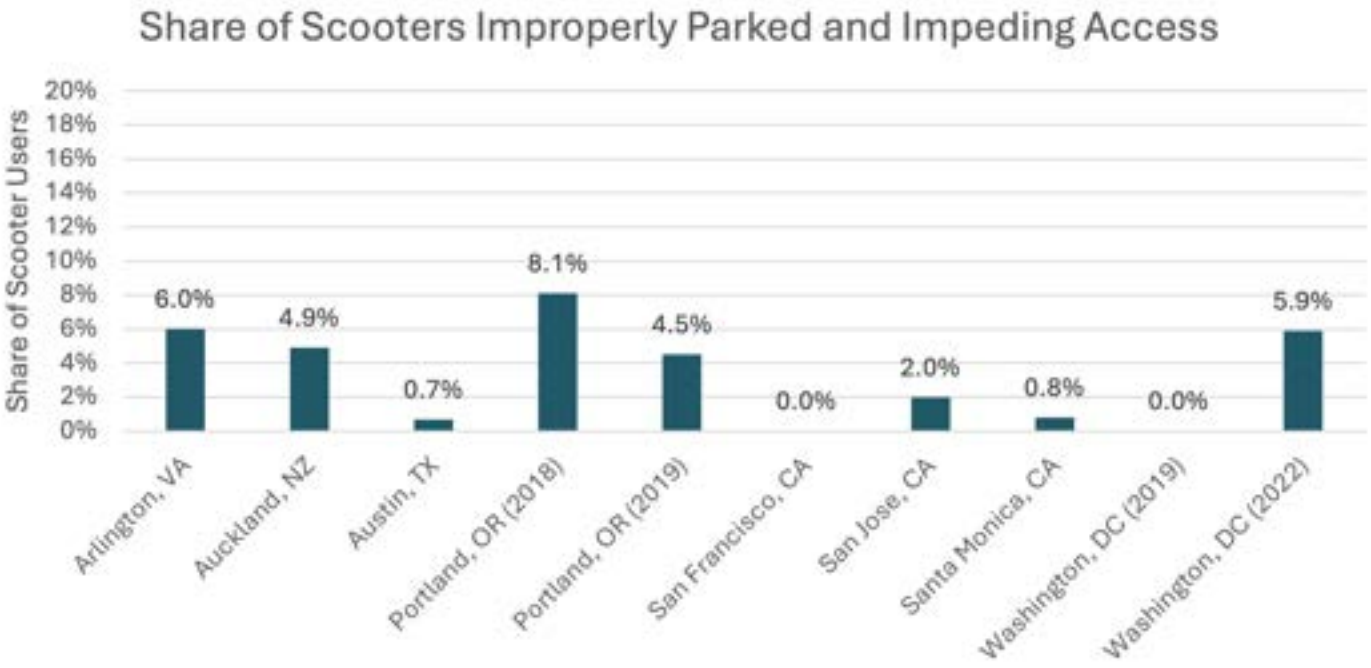
So you want to fix shared micromobility parking challenges?

This report is for you.

Previous research has addressed some of the fundamental questions swirling around parking:

How much misparking is there?

Studies find that a small fraction of shared scooters are misparked (10-15%) and even fewer impede access (<5%). Findings vary by location, with many regulations prioritizing parking that ensures accessible sidewalks for all users.



Note: *Graph measures improper parking as vehicles that impede pedestrian access.[i] It does not capture compliance with all city regulations (e.g., parked within 5 feet of public art of a bike rack). Previous research finds higher shares of scooters are noncompliant with at least one city regulation.[ii]*

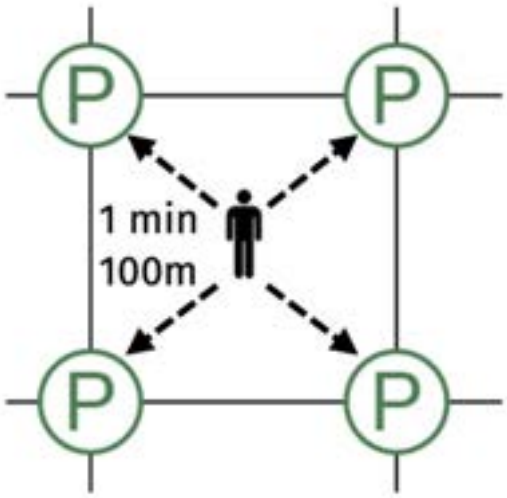
Why does misparking happen?

For the most part, riders try to park considerately and compliant with city rules, but are confused about the rules or don't know the rules in the first place.

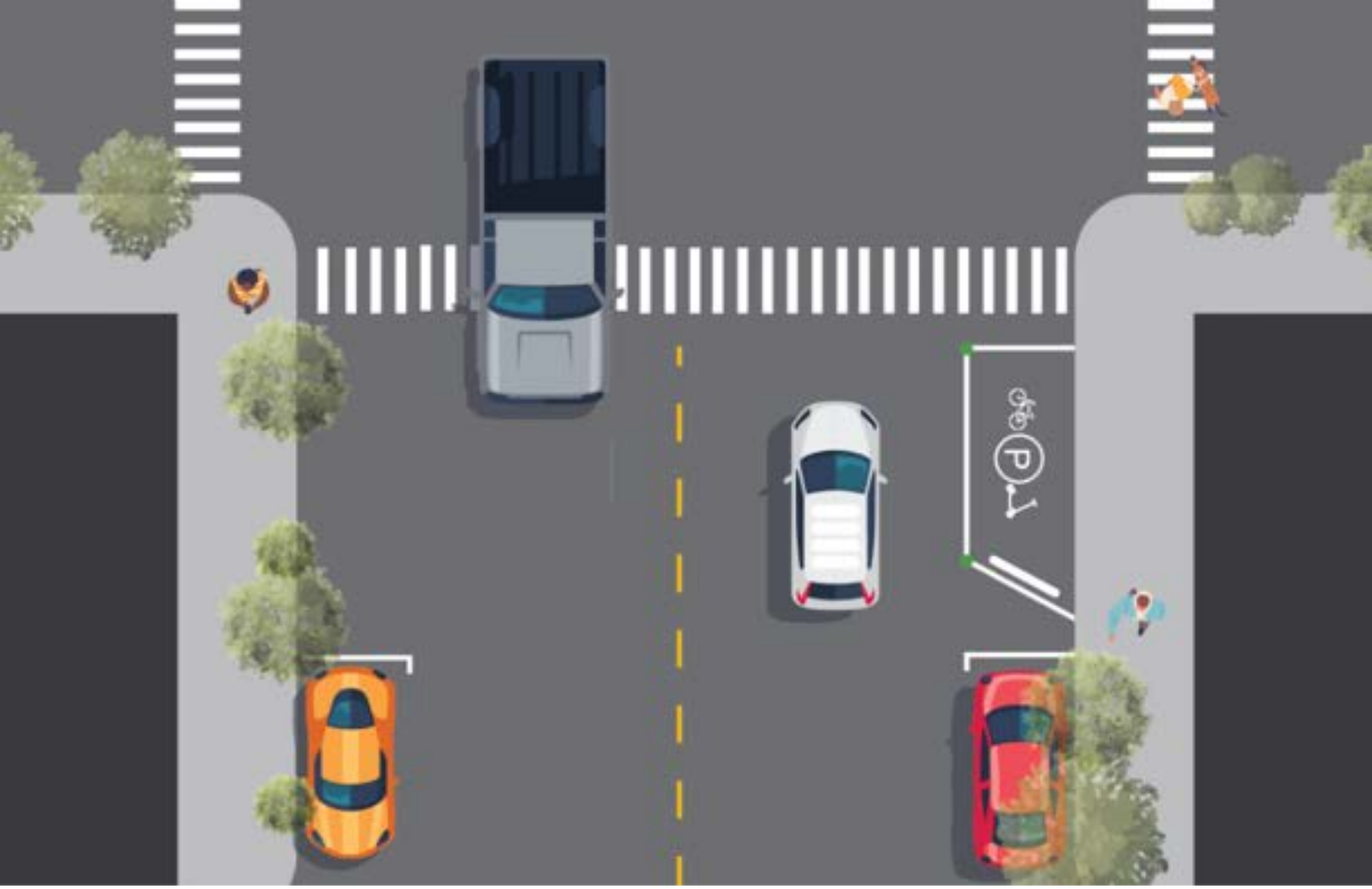
Source: Brown, A., Klein, N. J., & Thigpen, C. (2021). "Can you park your scooter there? Why scooter riders mispark and what to do about it." *Findings*.

Why does misparking happen?

Research shows that cities with parking rules like "mandatory parking zones" or physical "lock-to" requirements should provide at least 25 parking locations per square kilometer (or 65 parking locations per square mile), which translates to parking locations every 200 meters so riders are always within a 1-minute walk of parking. Without frequent parking opportunities, parking compliance falls.



Source: Meng, S., Brown, A., Klein, N., Thigpen, C., Haydu, B. (2024). "Shared scooter parking: The role of parking density and land use in compliance and demand." Urbanism Next Center.



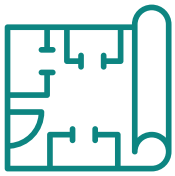
This report picks up where previous research leaves off. If plentiful parking can address parking compliance and tidiness concerns, then the next questions are:

01 How can cities provide the necessary parking locations?

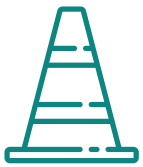
02 How can cities build parking in a way that addresses other considerations, such as cost-effectiveness and traffic safety?

As cities seek to provide dedicated micromobility parking, they can learn from the experiences of other cities. Specifically, we interviewed practitioners in **12 cities from 5 countries** to learn from their experience and expertise. From these interviews, we provide practical guidance for parking implementation and design considerations around four topics:

Plan for parking located in areas of high trip demand and spaced no more than 200 meters apart. Increasing parking density further, and strategically siting parking in high-visibility locations, could provide additional compliance benefits through improved wayfinding. A dense network of dedicated parking can help to balance the flexibility of micromobility travel alongside compliant and tidy parking. In-street, at-grade parking can daylight (increase visibility at) intersections, enhance safety, and deter sidewalk riding. Using parking to daylight intersections also mitigates conflict with competing uses like goods delivery, reduces motor vehicle misparking, and generates new revenue from previously unused space.



Parking design that strategically employs bollards, angled striping, and/or curb stops can effectively designate space while also limiting installation costs. Using u-racks positioned close to the curb within dedicated spaces can provide space for personal and shared vehicles.



Maintenance considerations including snow or leaf removal may impact design considerations or operator contracts. Modular rather than custom elements (e.g., u-racks rather than custom racks) and simple parking designs can reduce both installation and replacement costs.

Implementation nuts and bolts preview the costs cities can expect to install different types of parking infrastructure and overviews considerations for both how to fund and maintain parking infrastructure.

Cities can adopt a variety of different parking "regimes" such as free-floating, mandatory parking zone, hybrid, or lock-to. This report does not advocate for a single parking regime. Rather, it offers best practices and practical guidance based on city experiences installing and maintaining effective parking approaches across the different parking approaches.

Barcelona, photo credit: Calvin Thigpen

HOW TO USE THIS REPORT

This report is intended for city staff interested in adding, expanding, or rethinking dedicated micromobility parking spaces. We offer concrete recommendations related to macro decision-making (where to locate parking in the city and on the street) down to micro details (snow removal, how many bollards to use, best practices for striping). We pair recommendations with quotes from city staff experienced with planning for, installing, maintaining, and iterating dedicated micromobility parking to illustrate experiences and lessons learned from the professionals who engage with these topics on the ground.

We include design diagrams and infrastructure cost estimates to offer practical guidance for cities seeking best practices learned from those who have already implemented and experimented with micromobility parking. Appendix B includes engineering schematics from micromobility parking corrals already on city streets.

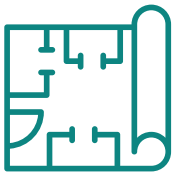
In other words, this report aims to help cities bypass the guesswork that may go into micromobility parking and instead offer guidance grounded in real experiences and experimentation by cities to date.

INTRODUCTION

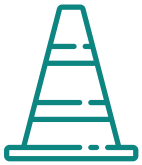
The public—particularly non-riders—often hold pessimistic views about micromobility parking.[iii] An exception is designated parking for micromobility, which most people view as both tidy and compliant with parking regulations.[iv] This report provides practical guidance to cities seeking to provide dedicated micromobility parking.

Specifically, this report examines four topics:

1. Planning for Parking
Land use, intersection placement, align with broader city goals



2. Parking Design
Size, materials, location in the right-of-way



3. Maintenance Considerations
Consider weather, use modular materials, keep it simple

4. Implementation Nuts and Bolts
Align with concurrent city efforts; streamline approvals, costs; seek funding

METHODS: GATHERING GLOBAL EXPERTISE

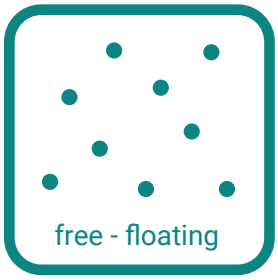
The report is informed by micromobility research and interviews with practitioners from the United States, Europe, and Australia with deep experience implementing and managing micromobility parking. Appendix A includes additional detail about the interview methodology used to collect the information presented in this report.

Figure 1: Practitioner Interview Cities.

Portland, Oregon | Grand Junction, Colorado | Boulder, Colorado | Denver, Colorado | Chicago, Illinois | Grand Rapids, Michigan | Washington, DC | London, UK | Lille, France | Dusseldorf, Germany | Berlin, Germany | Brisbane, Australia

MICROMOBILITY PARKING 101: APPROACHES TO REGULATING PARKING

Cities adopt a range of micromobility parking regimes. While this report does not advocate for a single parking regime, the different approaches are important to consider as parking needs vary based on program structure. In general, four broad parking regimes each create unique parking considerations:

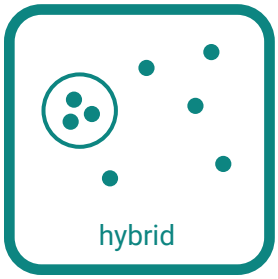


Free-floating parking models allow e-scooters to park anywhere within the operation area (provided they do not block sidewalks and follow other parking rules). Free floating systems may or may not provide any dedicated parking for shared bikes and e-scooters.

Examples: Austin, TX, USA; Los Angeles, CA, USA; Boulder, CO, USA; Seattle, WA, USA; Denver, CO, USA; Salt Lake City, UT, USA; Oklahoma City, OK, USA.

Mandatory parking zones, also known as dedicated parking zones, require that scooters or bikes be parked in defined, typically geofenced, zones within the operating area. Ensuring dedicated parking at least every 200 meters is critical to ensuring compliant parking.[v]

Examples: Grand Rapids, MI, USA; Hackney, England; Paris, France; Copenhagen, Denmark; Lille, France.



Hybrid parking presents a mix of free-floating and mandatory parking zones, typically across varied land uses and intensities. Grand Junction, CO, USA for example, mandates that e-scooters park in dedicated corrals in their dense downtown core, but allows scooters to park freely in less dense residential areas. Others such as Wandsworth, England allow free floating parking except for areas with high concentrations of trip ends such as outside of train stations.

Examples: Grand Junction, CO, USA; Brisbane, Australia; Wandsworth, England; Berlin, Germany; Dusseldorf, Germany.

Lock-to requires that all bikes or scooters be locked to a stationary object–typically a bike rack or city signpost–at the end of a trip. Cities vary in what they permit scooters to be locked to. Chicago, IL, USA for example, requires scooters to lock to "a fixed physical object, such as a bike rack, retired meter, street sign or light pole."[vi] Portland, OR, USA requires "a public bike rack or to a city signpost if no bike racks are available".[vii] Lock-to presents acute infrastructure needs and cities often need to add substantial parking infrastructure to accommodate the additional demand for dedicated parking created by shared micromobility vehicles. For example, Washington, D.C. implemented a lock-to requirement alongside a mandate to add 1,000 new bike racks per year for three years.

Examples: Chicago, IL, USA; Minneapolis, MN, USA; Portland, OR, USA; San Francisco, CA, USA; Washington, DC, USA.

Paris, photo credit: Nicholas J. Klein

Within and across each parking regime, considerable variation exists between how cities regulate micromobility parking. Sixty percent of American cities, for example, allow shared e-scooters to park against signs, while the other 40% prohibit it.[vi] Such varied parking regulations can confuse riders, who say they mispark because they do not know the parking rules, cannot find a spot or are in a hurry.[vii]

While many people may not be aware of the local parking regulations, riders share an intuitive sense of proper parking including not blocking doors, curb cuts, or the middle of the sidewalk, and ensuring that the scooter is parked upright.[viii]

Cities typically deploy a range of tools to encourage compliant parking, including rider education efforts (in-person as well as through the smartphone apps), in-app reminders, wayfinding, discounts for parking in designated spaces, geofencing, and dedicated parking spaces.

To maximize parking compliance, previous research from 12 cities around the world suggest that cities need to construct designated micromobility parking every 200 meters within the service area.[ix] Best practices on dedicated parking placement and design from a city management perspective remain murky, with many planners relying on trip data, intuition, and trial and error to design a system of dedicated micromobility parking.[xii]

PLANNING FOR PARKING

Cities weigh a host of considerations when identifying parking locations. First, many cities partner with data aggregators or operators to use a data-based approach to look at "where trips are ending" or balance community input alongside data of "high ridership area[s]". After identifying parking demand broadly, cities must consider how much parking to build and where to locate it.

Recommendation #1: Provide Dense Parking Supply

Providing dedicated micromobility parking every 200 meters or less (meaning people are never more than 100 meters or about a one-minute walk away from the nearest parking) can maximize parking compliance.[xi] Dedicated spaces may also help to reduce operator costs and vehicle miles traveled associated with locating and charging more widely dispersed free-floating vehicles.[xii]

Cities can then take the data on high-demand locations alongside the context-specific insights to more granularly identify precise locations where parking should be installed, within the general vicinity of the recommended area. For example, some cities seek to either co-locate micromobility parking near transit to facilitate first-last mile access, or else deliberately locate stations to fill in gaps in the transit network. Increased parking density may be necessary in select locations, such as locations adjacent to no parking zone boundaries to accommodate larger shares of vehicle trip ends.

> *"[dedicated street parking is] a win-win that we get to make the public space more orderly, we get to soak up this unused road space and preserve sightlines by daylighting intersections, making this safer for everybody."*
>
> - city with lock-to parking

> *"In the beginning, we started with sidewalks because it was easier and faster for the approval process…[but dedicated on-street parking] creates more cleanliness, no [improperly] parked scooters or bicycles on sidewalks to provide barrier-free access on sidewalks with for people, for with disabilities, or with people with kids."*
>
> - city with hybrid parking

Recommendation #2:
Build Parking At-Grade, on the Near Side of Intersections

Dedicated micromobility corrals are ideally located **at-grade on the near side of intersections.** Doing so realizes a number of complementary goals and benefits, including:

Daylighting intersections to increase visibility may improve safety for pedestrians and micromobility riders. Safety benefits are maximized when physical infrastructure rather than just signs are installed.[xiii] Intersection locations may also **enhance safety** by reducing mid-block pedestrian crossing of people traveling to/from a corral.

Typically **does not conflict with competing uses** like metered parking or loading spaces as mode city code prohibits parking within about 20 feet (6 meters) of the intersection. Lack of competing uses also streamlines processes including reducing need to coordinate with other agencies or engage in public comment.

Previously-unused space may **generate new revenue** through fees paid by micromobility operators.

Locating at the near side of the intersection, just before a vehicle would enter an intersection, **reduces conflict with vehicles** that either may reverse into the corral without looking, or that may hit it when making a poor turn or rushing through a yellow light.

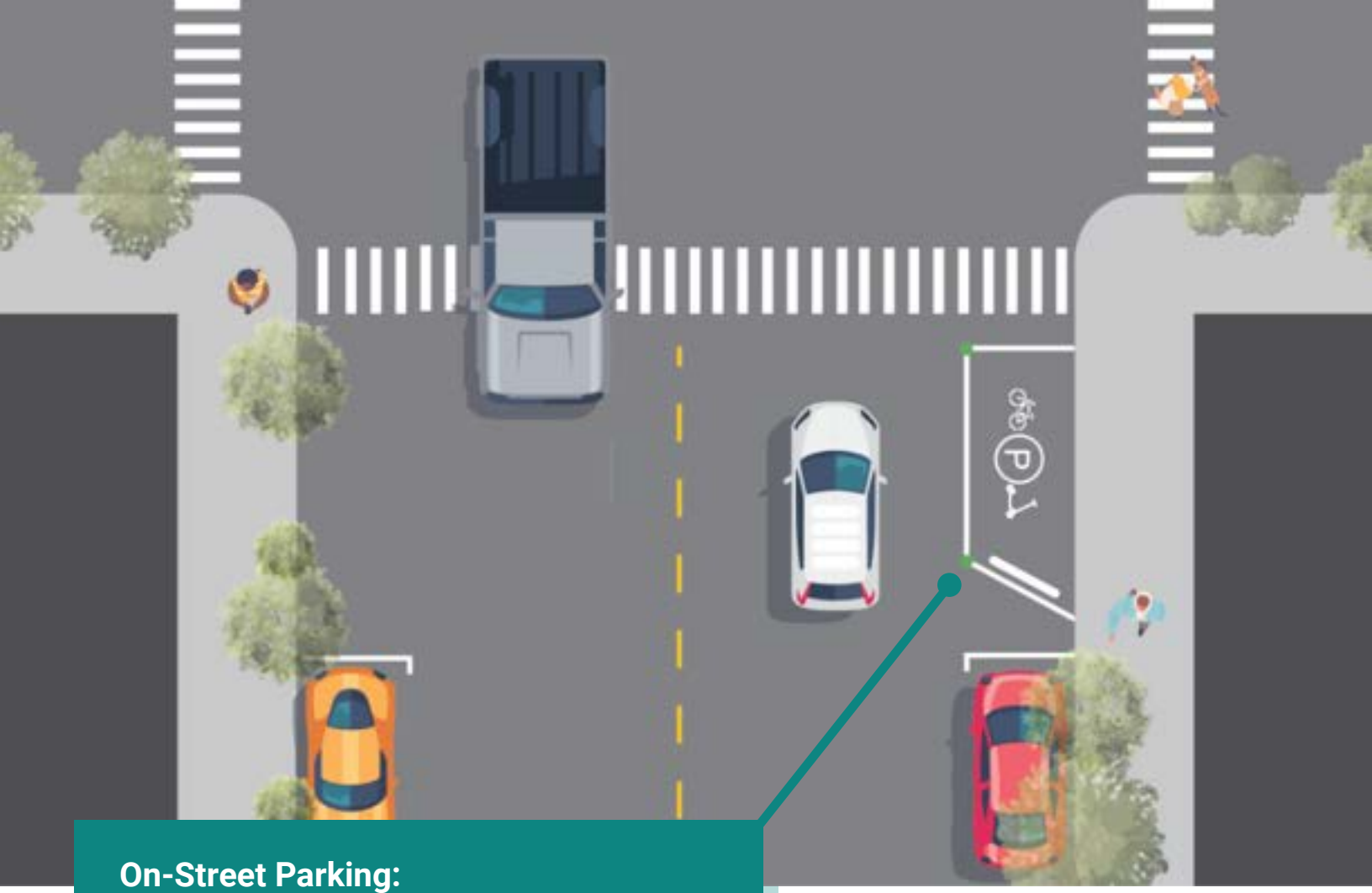
Reduces vehicle misparking by dedicating space to micromobility parking.

Paris, photo credit: Emmanuel Marin.

Recommendation #3:
Account for GPS Drift

Some cities caution, however, that GPS inaccuracies may introduce additional challenges for ensuring that crosswalks remain clear. Inaccurate GPS readings could, for example, mean that a scooter parked in a crosswalk registers as parked correctly in a corral 20 meters away. Cities may validate GPS drift using field observations, as inaccuracies vary by location and with conditions such as nearby building heights. Cities with ample drift have opted to shift dedicated corrals further towards mid-block (about 2 car spaces in) although this limits the potential synergies of locating dedicated parking at an intersection.

> *"Because of the inaccuracy of GPS…the risk would be too high that a user can drop off [a] micromobility vehicle in the middle of a street crossing when the micromobility hub is 20 meters away. So [dedicated parking] needs to be close to [a crosswalk], but not that close that it's directly edge to edge."*
>
> - city with hybrid parking



On-Street Parking:
Parking should be in-street, at-grade, and on the near-side of intersections, taking into account local context.

Recommendation #4:
Consider Local Context When Siting Parking

While locating dedicated parking on the far-side of intersections may reduce the likelihood of conflicts with vehicles and therefore long-term maintenance or replacement costs, specific intersection dynamics may also influence site selection. Location decisions are swayed by financial considerations, local land uses or destinations, land ownership, topography, other on-site conditions, and local traffic infrastructure may also influence parking location decisions.[xiv]

For example, some cities seek to locate micromobility parking near high-activity generating vland uses such as restaurants rather than adjacent to an auto-oriented land use at the same intersection such as a gas station. Cities may also seek to integrate micromobility parking with bike/shared mobility lanes to encourage seamless trip starts and ends.

Florence, photo credit: Calvin Thigpen

PARKING DESIGN

A general rule of thumb is to provide **3 parking spaces per micromobility vehicle.**[xvii] This means that cities with larger fleets of shared bikes and scooters will likely have more total micromobility parking spaces to accommodate greater demand. Dedicated parking located in areas with many leisure, tourism, and mixed land uses should offer greater capacity for micromobility vehicles relative to parking areas located in residential areas.[xvi] Cities may need to expand corrals if they become overcrowded in high-demand areas. Local conditions such as available right-of-way may also shape parking design.

On-street dedicated micromobility parking can facilitate seamless trip starts and ends and **keeps all trips below the curb** rather than on the sidewalk.

> *"We're really cognizant about sidewalk riding, because we heard a lot of complaints...So we have an interest of keeping our parking at street grade to try to have a cohesive message about not riding on the sidewalk."*
>
> - city with hybrid parking

> *"If you locate them all above curb, then every trip will start and end on the sidewalk, which we do get a lot of complaints about."*
>
> - city with free-floating parking

Additional design elements can lower installation and maintenance costs:

Recommendation #5: Use Bollards Strategically to Mark Parking Corrals

Corrals should use **two bollards on the side of the corral nearest traffic** to clearly demarcate the corral. Bollards should not be used on sidewalk corrals as they may prove trip hazards or impede accessibility particularly for travelers with disabilities.

Berlin, photo credit: Calvin Thigpen

> *Bollards should "highlight [the corral] for drivers…[that] this isn't a parking space for you. So we do our best to use those delineators to kind of physically block.*
>
> - city with hybrid parking

> *Not having [bollards] on the sidewalk side, but just the outer corners. And it's those things right, where you multiply them across hundreds or thousands of these in a city, it can really add up to have half as many posts and half as many curb stops. So I think we're always start a little over-engineered, and then back into what makes sense.*
>
> - city with free-floating parking

> *So for some of our sidewalk grade ones, for example, at the library, we don't do any vertical treatments. So it's only this spray paint on the ground.*
>
> - city with hybrid parking

Recommendation #6: Angled corral striping can reduce conflicts and maintenance

Using angled rather than perpendicular border striping on the side of the corral nearest to parked cars can make it easier for cars to pull into/out of parking spaces and reduces the potential conflict between cars parking and corral bollards and therefore the need to replace bollards as frequently.

> *"The little flex post there is less likely to get, you know, run over and it makes it a little easier for people to pull in and out of the parking space."*
>
> - city with lock-to parking

Recommendation #7: Use Curb Stops to Protect Parking Corrals

A **single curb stop** nearest to parked vehicles may deter vehicles from rolling through the corral. This is more advantageous when placed adjacent to parallel parking compared to other contexts. While some cities appreciate the additional physical barrier, others observe limited benefits alongside added installation costs and maintenance issues if debris such as leaves become trapped.

San Francisco, photo credit: Calvin Thigpen

> *"We had anticipated using a lot of curb stops, which are more expensive than just vertical delineators."*
>
> - city with lock-to parking

> *"We realized maybe we just need one [curb stop], and that'll reduce the cost...it also wasn't really needed on the intersection side, because you don't have vehicles parking on the intersection side."*
>
> - city with lock-to parking

> *"Curb stops "[prevent] drivers from running over [the corral]. We would ring the corral with [curb stops]. And we found that that...it didn't really add much in terms of physical protection or separation, [and] we were seeing that [corrals] are still getting hit. But [curb stops also] added the complexity of stormwater in that it didn't drain very well."*
>
> - city with lock-to parking

Washington DC, photo credit: DDOT

Recommendation #8: Bike Racks Can Provide Locking Infrastructure and Visual Cues for Parking

Consider **including u-racks** in lock-to systems or if looking to offer parking for personal vehicles.

Position any bike racks closer to the curb to provide more buffer space between parked bikes and scooters and moving vehicles.

> *"Putting bike racks close to the curb provides "a little more buffer space between parked cars and the back of the bike rack… So instead of having four feet [1.2 meters] on either side, you'll have maybe…six feet [1.8 meters] on the side [and] five and three [1.5 and 0.9 meters]" on the other sides."*
>
> - city with lock-to parking

> *"You have the bike rack for bikes and any personal devices…the scooter box has the benefit of being able to take other types of unique bike configurations like cargo bikes, trikes."*
>
> - city with free-floating parking

Grand Junction, photo credit: City of Grand Junction

Denver, photo credit: Calvin Thigpen

Recommendation #9: Consider Internal Striping to Encourage Tidy Parking

Internal corral striping may provide visual cues for people to park vehicles tidily, but it's not clear that they affect parking behaviors. [xvii]

Recommendation #10: Install Vertical Signage for Wayfinding and Credibility

Vertical signage may increase corral visibility, although small scale design experiments show limited effects on parking behaviors. [xviii] Other cities rely on parked bikes and scooters rather than signage to cue riders to the presence of corrals.

> *"When scooters [are] in a given stall, I think it looks a lot less cluttersome… I imagine that some of our frequent complainers might not hate it as much if that were more comprehensive, even if it doesn't actually help get people to park in those... and maybe that little just visual reminder would be enough to get them to straighten it up."*
>
> - city with lock-to parking

Barcelona, photo credit: Calvin Thigpen

Florence, photo credit: Calvin Thigpen

While these designs represent best practices gleaned from city experiences across the world, other cities may opt for different approaches to meet specific city standards or objectives. A number of cities, for example, intentionally limit physical parking infrastructure to either curb installation costs or because "policies around decluttering streets and rationalizing signage" mean that they "try to avoid putting any extra things on the street unless it's really needed."

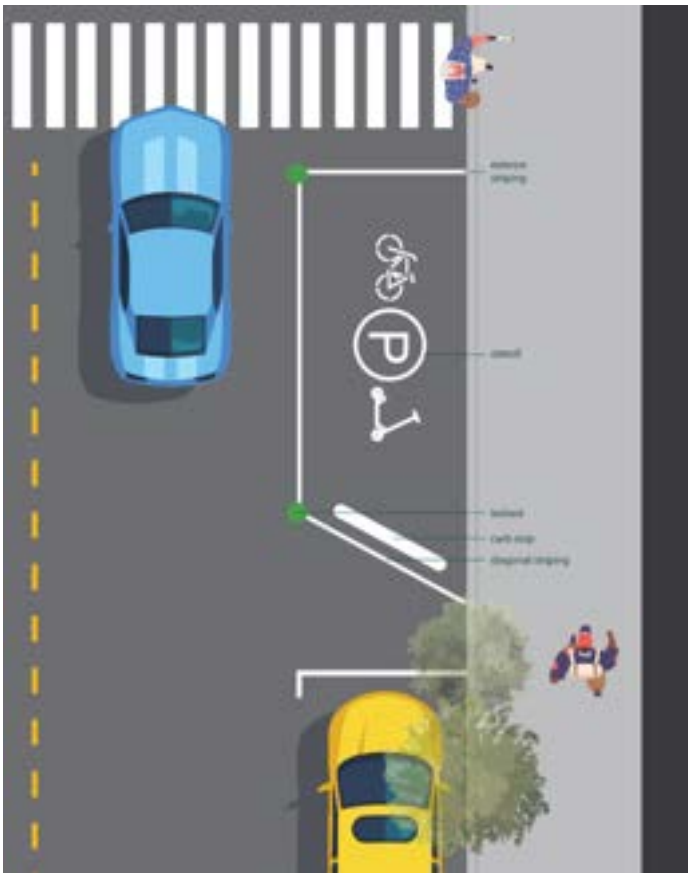


Figure 2: Recommended on-street micromobility parking corral design

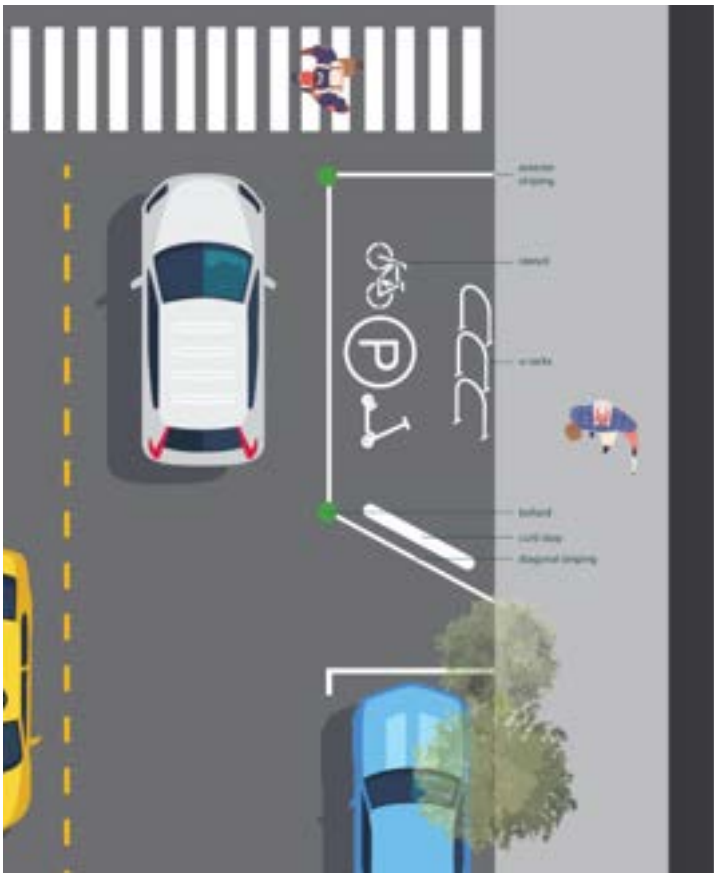


Figure 3: Recommended on-street micromobility parking corral design with U-Racks

On-Street Corral

Pro

- Sends consistent message to riders to begin, end, and travel in the street
- Repurposes space that cannot be used for other purposes
- Helps to daylight (increase visibility) of intersections
- Reduce vehicle misparking by dedicating rather than leaving open curb space

Con

- May create maintenance challenges (e.g., clearing leaves and snow)
- Prone to damage by passing or parking vehicles

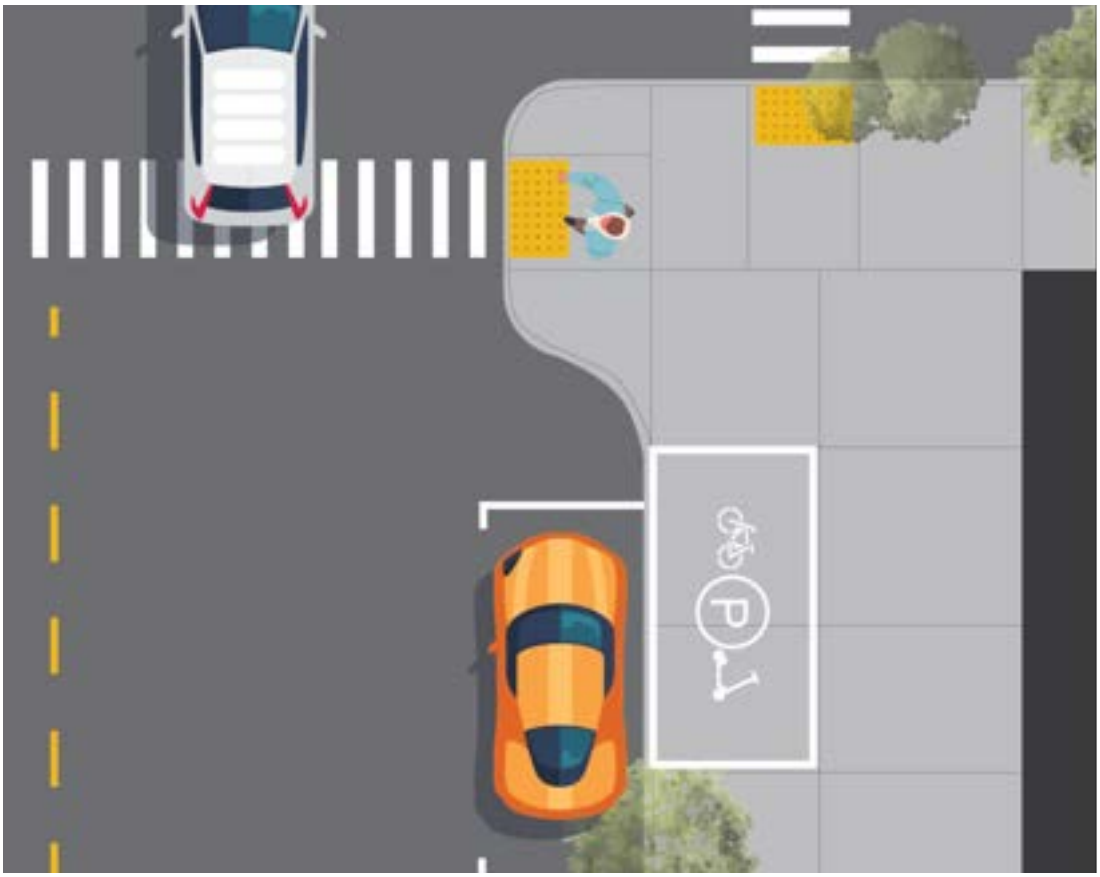


Figure 4: Example of sidewalk-grade micromobility parking corral design

Sidewalk Corral

Pro	Con
• Fewer maintenance issue with snow or leaf clearance • Unlikely to be damaged by a moving vehicle • Low cost installation	• May support sidewalk riding by beginning and ending trips on the sidewalk • Compete with other sidewalk activities or uses such as street furniture • May create additional obstacles for people who are blind or low-vision navigating the sidewalks • May not be sufficient space on all sidewalks

Barcelona, photo credit: Calvin Thigpen

MAINTENANCE CONSIDERATIONS

Recommendation #11: Consider Seasonal Impacts for Parking Design

Cities should **consider how weather like snow or fallen leaves may impact operations** and who will be responsible for keeping corrals clear. Boulder, CO for example requires operators to clear snow from on-street corrals. Grand Rapids, MI positioned their corrals on sidewalks to enable snow removal.

> *"We're taking into consideration winter...but with snow clearing...on-street DPZ is just going to be a nightmare for clearance. It's not really feasible for us to have these on street, getting them cleared without destroying those bollards all the time is really not going to happen. So we find that the sidewalk [corrals are] a much more feasible way for us to keep them clean and maintained and have them accessible."*
>
> - city with mandatory parking zones

> *"We worked with our maintenance team and they said...with our current snow removal equipment, we can't [maintain the corrals]. So the provider would need to be responsible for [snow removal]."*
>
> - city with free-floating parking

Grand Rapids, photo credit: City of Grand Rapids.

Recommendation #12: Consider the Advantages of Modular Design Elements

Corrals may become damaged over time. Installing modular racks (e.g., u-rack) or elements rather than customized or prefabricated racks can lower maintenance costs by allowing cities to replace single pieces easily and cost-effectively rather than having to remove or replace costly custom or large-scale racks.

> *"We think- for a maintenance perspective- it's probably better to have these individual elements that you can just swap out if they get damaged or destroyed."*
>
> - city with lock-to parking

Recommendation #13: Reduce Maintenance Costs through Simple, Minimal Designs

Keeping corral design simple reduces installation costs, and also cuts down on long-term maintenance as fewer elements can be damaged or need to be replaced. NACTO offers additional guidelines on how different materials and delineators vary in maintenance frequency and intensity.[xix]

> *"This has allowed us to roll it out on a much on a much bigger scale for a very, very low cost because then a lot of places cost paint, you know and printing the sign for $10-15 and that was it. Other ones were pour concrete you know, it's a 5 by 10 concrete pad...it's very minimal."*
>
> - city with mandatory parking zones

Denver, photo credit: City & County of Denver

IMPLEMENTATION NUTS & BOLTS

Recommendation #14: Package Parking as Part of Broader Infrastructure and Grant Efforts

Micromobility parking can be incorporated into existing city efforts to expand micromobility infrastructure, such as dedicated travel lanes. Denver, CO, USA, for example, now integrates shared micromobility parking into designs for protected bike lanes. Cities should also consider bundling the parking infrastructure needs of the shared micromobility program into broader grant applications for active transportation infrastructure.

> *"We're piloting…to integrate the bike parking and the shared micromobility parking into the design of a new protected bike lane."*
>
> - city with free-floating parking

> *"We've been having a lot of success at putting them below curb, particularly in the daylighting areas, alongside our parking protected bike lanes, they fit in perfectly right there when the geometry allows."*
>
> - city with free-floating parking

Recommendation #15: Seek Opportunities to Streamline Permitting and Ease Implementation

Implementation often requires coordination across city departments or teams including maintenance, police, fire, or parks and recreation. Choosing unused curb spaces may streamline (or eliminate the need for) internal approvals or public-facing processes. For example, Washington, DC, USA requires a 30-day comment period anytime a residential parking space is repurposed. Locating dedicated micromobility parking at intersections not only contributes to the city's daylighting and safety objectives, but also greatly speeds the implementation timeline as no comment period is required.

City staff observed that residents' reception to new micromobility parking often varied by neighborhood. Some, particularly those where biking is common or shared micromobility is already present, often welcome it. When new bikes and scooters arrive at the same times as dedicated parking infrastructure, practitioners observed greater pushback from residents. They also observed, however, that opposition typically waned within a few weeks as residents became accustomed to the new mode and infrastructure.

Photo credit: Seattle Department of Transportation. 2020. Seattle Bicycle Parking Guidelines. https://www.seattle.gov/dpd/codes/dr/DR2020-6.pdf

Recommendation #16: Installing Parking is Relatively Affordable

Costs for dedicated micromobility parking can range greatly based on types and quantity of materials. Considering the aggregate costs of installing a dense network of dedicated parking offers an important point in weighing infrastructure design and investment. Table 1 includes a range of estimated costs for different infrastructure components that can be combined into different corral styles.

For example, two American cities estimated that material costs for a single corral would total:

- **4-rack on-street corral:** $1,035 including 4 racks, 1 rail set, and 5 flexposts.
- **Dedicated parking zone (no existing concrete):** $3,000 including concrete, signage, signpost, and paint/decals.
- **Dedicated parking zone (existing concrete):** $150-$300 including signage, signpost, and paint/decals.

Corral costs should also consider labor hours, which again vary based on parking style and materials. Cities estimated 1-2 hours of time needed per corral installation.

Table 1. Estimated Costs for Micromobility Parking Infrastructure

Material	Cost Estimate
U-rack[1]	$90-$140
Flexpost / bollard[2]	$45-$100
Rails	$180-250 per pair
Curb Stop	$200
Paint / striping	Minimal for test paint (e.g., spray paint)
Signpost, signage, decals	$300
Labor	1-2 hours

Cost estimates sourced from both publications[ii] and conversations with city staff with hybrid, mandatory, and lock-to parking regimes.

1 Custom, larger, or ornamental racks may cost far more; Bushell et al., 2013 estimate that median racks cost $540 with minimum of $64 and a maximum of $3,610.[xxi]

2 Simple flexposts represent both the most common and lowest cost option for shared micromobility parking, but bollards range in style and price. Bushell et al. 2013 estimate bollards costing between $62 to $4,130 with some bollards having mechanical, security, or decorative functions.[xxii]

Recommendation #17: Identify Parking Funding Streams

Cities fund dedicated parking infrastructure through both general and programmatic fees.[xxiii] Some cities earmark funding streams specifically for infrastructure. For example, Grand Junction, CO charged high up-front permit fees from each provider, which it used to construct infrastructure to support pilot operations. Other program fees, including per-trip fees, cover ongoing operational costs such as staff time and management software.

Cities should consider who is responsible for building and maintaining corrals. To date, cities have taken different approaches. Many use permit fees to build dedicated parking infrastructure for micromobility. Others like Boulder and Denver, CO, however, mandate that operators pay to construct corrals. Denver charges operators with constructing corrals and building out the micromobility parking network in lieu of device or per-trip fees.

Cities should also consider bundling shared micromobility parking infrastructure needs into broader grant applications for active transportation infrastructure. For example, in 2024 the Atlanta Department of Transportation was awarded a grant from the AARP to build parking corrals in the city.[xxiv] In the United States, bicycle parking is eligible for funding under a number of Federal funding programs.

CONCLUSION

This report outlines key recommendations for implementing dense networks of shared micromobility parking locations, based on the experiences of practitioners from around the globe. In a way, the evolution of shared micromobility parking, from docked systems, to free-floating, and now back again toward more physically-constrained parking requirements, might feel as though the industry has simply come full circle. But instead, the new era of parking requirements offers a synthesis of the two previous eras, bringing together the advantages of each while jettisoning the primary disadvantages. Docking stations are expensive to construct and maintain at the density and scale that is both useful to riders and that encourages tidy and compliance parking. At certain times and locations, docked systems can also suffer from capacity issues - with either no parking or no vehicles available. While free-floating systems offer advantages of parking near your destination and do not face capacity constraints, they may be more prone to clutter and to impeding sidewalk access. By using more cost-effective modular bike racks and dedicated corrals instead of expensive docks, the latest evolutions of shared micromobility parking approaches can provide a more convenient, lower-cost, and dense network of parking locations open to both shared and personally-owned micromobility vehicles to yield benefits for all.

ACKNOWLEDGEMENTS

We thank the fourteen professionals who provided helpful perspectives and expertise in micromobility parking practices.

APPENDIX A:
RESEARCH METHODOLOGY

Findings documented in this report were informed by interviews with professionals from 12 international cities that varied by geography, population, and micromobility parking regimes. Interviewed professionals had substantial experience in setting and iterating micromobility parking approaches. Most had direct oversight or knowledge about micromobility parking, although staff ranged in tenure.

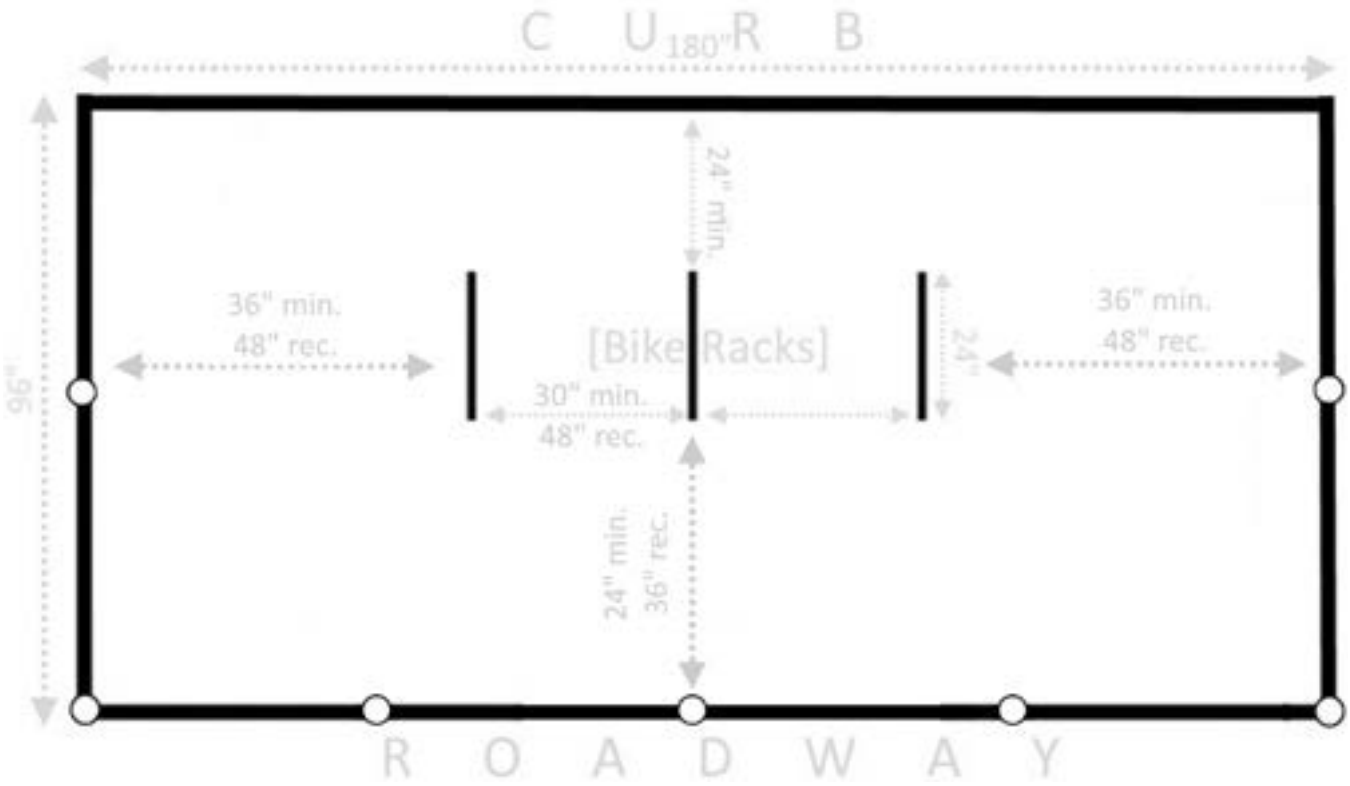
City	Population	Micromobility Fleet	Program Start Date	Dockless Parking Regime
Berlin, Germany	3,576,870	Dockless bikes and e-scooters; docked bikeshare	2019 dockless e-scooters; 2004 docked bikeshare	Hybrid
Boulder, CO, USA	105,898	Dockless e-scooters; docked bikeshare	2021 dockless e-scooters; 2011 docked bikeshare	Free-floating
Brisbane, Australia	1,323,162	Dockless bikes and e-scooters	2018 dockless e-scooters; 2011 docked bikeshare	Hybrid
Chicago, IL, USA	2,746,388	Dockless bikes and e-scooters; docked bikeshare	2019 dockless e-scooters; 2013 docked bikeshare	Free floating, lock-to requirement
Denver, CO, USA	710,800	Dockless bikes and e-scooters	2018	Free floating
Düsseldorf, Germany	629,047	Dockless bikes, e-scooters, mopeds, and cargo bikes	2021	Hybrid
Grand Junction, CO, USA	65,560	Dockless e-scooters	2023	Hybrid
Grand Rapids, MI, USA	196,608	Dockless bikes and e-scooters	2020	Mandatory parking zone
Lille Metropolitan Area, France	1,515,061	Dockless e-scooters	2021	Mandatory parking zone
Portland, OR, USA	630,498	Dockless e-scooters; docked bikeshare	2018 dockless e-scooters; 2016 docked bikeshare	Free floating, lock-to requirement
London Borough of Wandsworth, England	329,035	Dockless bikes	2022	Hybrid
Washington, DC, USA	689,545	Dockless e-scooters e-bikes; docked bikeshare	2017 dockless e-scooters and e-bikes; 2010 docked bikeshare	Free floating, lock-to requirement

Interview Script

- Can you tell me about your overall experiences with scooter parking in your city?
- Can you tell me about how scooter parking has evolved in your city over time?
- What is your overall approach to creating dedicated parking for scooters? What factors do you consider? (e.g., collocating with bike lanes, areas of high demand, daylighting, land use, local complaints/perceptions)
    - Prompt: potential approaches such as identifying most high-use areas, carving out unused street space, replacing car parking, etc.
- What challenges have you encountered trying to build micromobility parking?
    - Have you experienced any issue of overcrowding?
- Do you follow any implementation guides (e.g., NACTO, Oslo, etc.)
- Where does funding typically come from to construct dedicated parking?
- Who do you collaborate with—internally and perhaps externally—to both decide on where parking goes, its design, and to actually install it?
- What are your recommendations for how to get parking built?
    - Prompt: Do you feel like you've uncovered any "tricks" or "secrets" to getting micromobility parking implemented?
- What do you recommend for parking design?
    - Prompt: Any particular materials / elements? Locations in the ROW (sidewalk vs street), along a street (e.g. midblock vs endblock)?
- Have you noticed improvements in parking?
    - Prompt: Is this a result of city investments in infrastructure? Fines? Companies designing better scooters, investing in "tidiness" patrols, etc.?
- What is your perspective on different technological solutions to parking compliance (lock-to, parking corrals, virtual corrals / geofencing, etc.)? Do they work? Do they have any drawbacks?
- Are there any cities you look to as strong examples when it comes to positive parking outcomes?

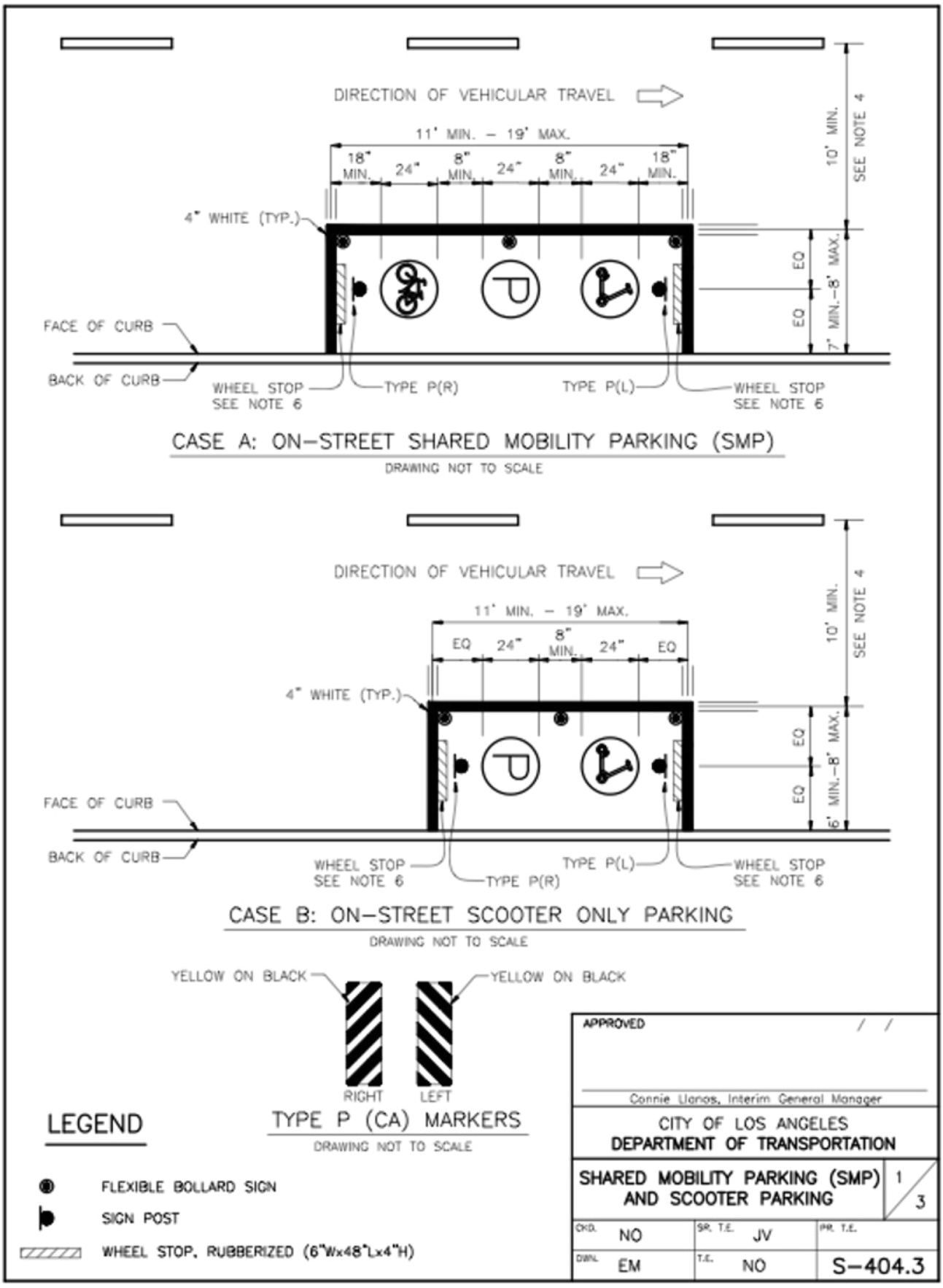
APPENDIX B:
CITY ENGINEERING DRAWINGS FOR CORRALS

Dockless Corral with Racks, Washington, DC



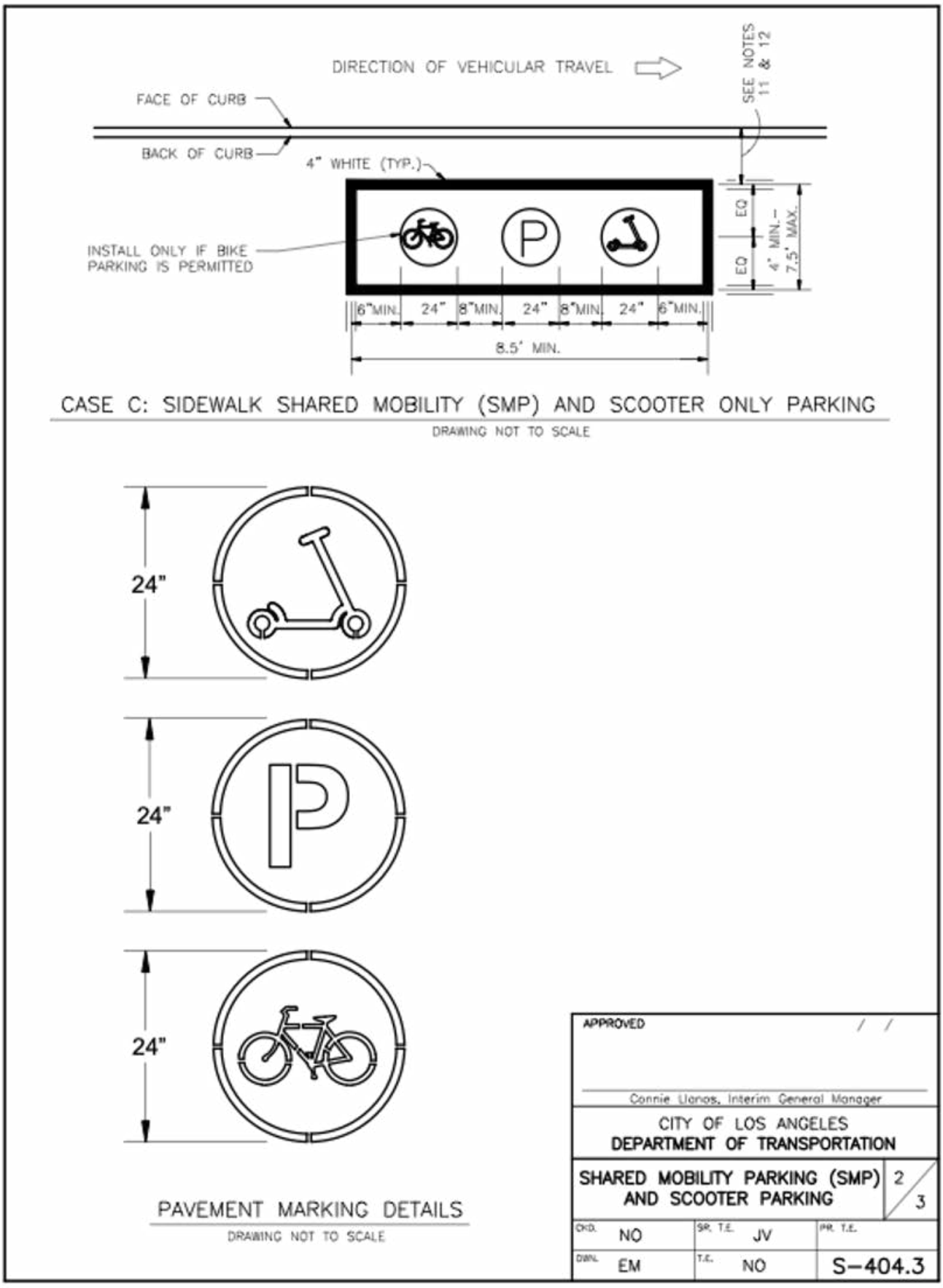
Source: DDOT

Dockless Corral, Los Angeles, CA



Source: City of Los Angeles

Dockless Corral, Los Angeles, CA (cont.)



Source: City of Los Angeles

Dockless Corral, Los Angeles, CA (cont.)

NOTES:

1. MINIMUM CLEARANCE FROM A FIRE HYDRANT SHALL BE 15'.
2. MINIMUM CLEARANCE FROM THE TOP OF THE DRIVEWAY SHALL BE 5'.
3. ALL PAVEMENT MARKINGS SHALL BE SKID–RESISTANT.

CASE A & B (ON–STREET)

4. TRAVEL LANES ADJACENT TO THE SMP OR SCOOTER ONLY PARKING (ON–STREET) SHOULD BE MINIMUM 10' WIDE.
5. SMP OR SCOOTER ONLY PARKING PROPOSED WITHIN PARKING METER ZONES SHALL BE COORDINATED WITH LADOT PARKING METERS DIVISION (PMD) FOR THE INSTALLATION AND REMOVAL OF PARKING METER HEADS, POSTS AND SIGNS.
6. RUBBERIZED WHEEL STOPS SHALL BE USED AT THE ENDS OF THE SMP OR SCOOTER ONLY PARKING ZONES IF LOCATED NEXT TO ON–STREET PARKING.
7. SMP OR SCOOTER ONLY PARKING SHALL REMAIN CLEAR OF BUS ZONES.
8. MINIMUM CLEARANCE FROM TWO OR MORE CONSECUTIVE PARKING SPACES SHALL BE 5'.
9. SMP OR SCOOTER ONLY PARKING SHALL NOT BE INSTALLED IN PEAK HOUR LANES ON PARKING RESTRICTED AREAS (i.e. TOW–AWAY NO STOPPING ANY TIME "T.A.N.S.A.T.", NO PARKING ANY TIME "N.P.A.T.", ETC.)
10. SMP OR SCOOTER ONLY PARKING IN RED CURB ZONES:
    - A. SHOULD NOT BE INSTALLED ON NON–CONTROLLED ARTERIAL APPROACHES TO INTERSECTIONS, BEGINNING FROM A POINT AT LEAST 50 FEET UPSTREAM OF THE CURB LINE PROJECTION OF THE CROSS STREET AND EXTENDING TO THE PROPERTY LINE PROJECTION OF THE CROSS STREET.
    - B. SHOULD NOT BE INSTALLED ON ARTERIAL STREET DEPARTURES FROM INTERSECTIONS, BEGINNING FROM THE PROPERTY LINE PROJECTION OF THE CROSS STREET AND EXTENDING TO A POINT AT LEAST 30 FEET DOWNSTREAM FROM THE CURB LINE PROJECTION OF THE CROSS STREET.
    - C. SHOULD NOT BE INSTALLED BEGINNING FROM A POINT AT LEAST 30 FEET IN ADVANCE OF THE STOP LINE OR CROSSWALK LINE OF A TRAFFIC SIGNAL CONTROLLED INTERSECTION AND EXTENDING TO THE PROPERTY LINE PROJECTION OF THE CROSS STREET, UNLESS PROPOSED ON THE APPROACH OF A ONE–WAY STREET WHERE THERE ARE NO VEHICLE TURNING OR SIGHT DISTANCE CONFLICTS.
    - D. SHOULD NOT BE INSTALLED BEGINNING FROM A POINT AT LEAST 25 FEET IN ADVANCE OF A "STOP" SIGN OR "YIELD" SIGN AND EXTENDING TO THE PROPERTY LINE PROJECTION OF THE CROSS STREET, UNLESS PROPOSED ON THE APPROACH OF A ONE–WAY STREET WHERE THERE ARE NO VEHICLE TURNING OR SIGHT DISTANCE CONFLICTS.
    - E. SHOULD NOT BE INSTALLED IN ADVANCE OF A NON–CONTROLLED APPROACH TO A MARKED CROSSWALK, AS PER S–481.0 IN SECTION 531 OF THE MPP AND EXTENDING TO THE PROPERTY LINE PROJECTION OF THE CROSS STREET.
    - F. SHOULD NOT BE INSTALLED AT LOCATIONS WHERE CURB STOPPING IS PROHIBITED AND THERE IS LESS THAN 35 FEET FOR SMP OR 34 FEET FOR SCOOTER ONLY PARKING MEASURED FROM THE LEFT EDGE OF THE LANE FROM WHICH THE "U" TURN WOULD BE INITIATED TO THE LEFT CURB, UNLESS "U" TURN RESTRICTIONS ARE PROPOSED. SEE MPP 334 FOR MORE INFORMATION.
    - G. ENGINEERING JUDGEMENT SHOULD BE USED AT ALL OTHER RED CURB ZONES. SEE MPP 334, MPP 342, AND LADOT STANDARD S–405 FOR ADDITIONAL CONSIDERATIONS.

CASE C (SIDEWALK)

11. A MINIMUM OF 5' OF UNOBSTRUCTED SIDEWALK SHOULD BE MAINTAINED FOR A PEDESTRIAN PATHWAY.
12. WHERE THERE IS NO PARKING ON THE ADJACENT STREET, PROVIDE:
    - A. MINIMUM CLEARANCE OF 1'–6" FROM THE FACE OF CURB TO THE EDGE OF THE SMP ZONE.
13. WHERE THERE IS PARKING ON THE ADJACENT STREET, PROVIDE:
    - A. MINIMUM CLEARANCE OF 3' FROM THE FACE OF CURB TO THE EDGE OF THE SMP ZONE.
    - B. MINIMUM CLEARANCE OF 4' FROM THE FACE OF CURB TO THE EDGE OF THE SMP ZONE IF THE ADJACENT PARKING IS A LOADING ZONE, IN FRONT OF TRAFFIC SIGNAL CABINETS OR DISABLED PARKING SPACE.
    - C. MINIMUM CLEARANCE OF 4' OF UNOBSTRUCTED PATHWAY AT THE ENDS OF THE SMP ZONE.
14. MINIMUM CLEARANCE OF 5' FROM THE MARKED CROSSWALK LINE OR TOP OF CURB RAMP.
15. SMP ZONES AND SCOOTER ONLY PARKING SHALL REMAIN CLEAR OF BUS LOADING AND UNLOADING ZONES.
16. SMP ZONES AND SCOOTER ONLY PARKING SHALL NOT:
    - A. BLOCK ACCESS TO BUILDING ENTRANCES OR EXITS.
    - B. OBSTRUCT UTILITY ACCESSES SUCH AS MANHOLES, PULLBOXES, STREET LIGHT POLES, POWER POLES, ETC.
    - C. OBSTRUCT THE USE OF SIDEWALK FURNITURE SUCH AS BENCHES, NEWSSTANDS, MAILBOXES, BUS SHELTERS, ETC.

APPROVED / /

Connie Llanos, Interim General Manager

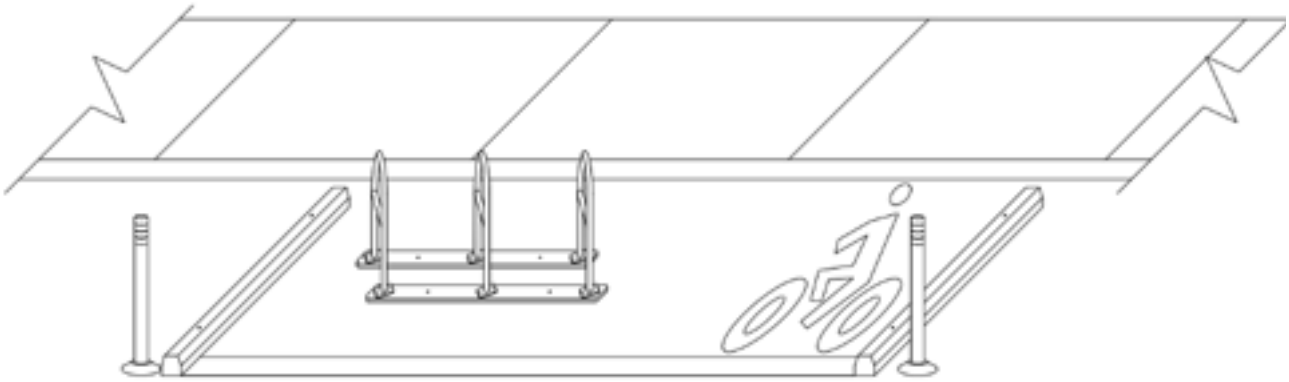
CITY OF LOS ANGELES
DEPARTMENT OF TRANSPORTATION

SHARED MOBILITY PARKING (SMP) AND SCOOTER PARKING 3/3

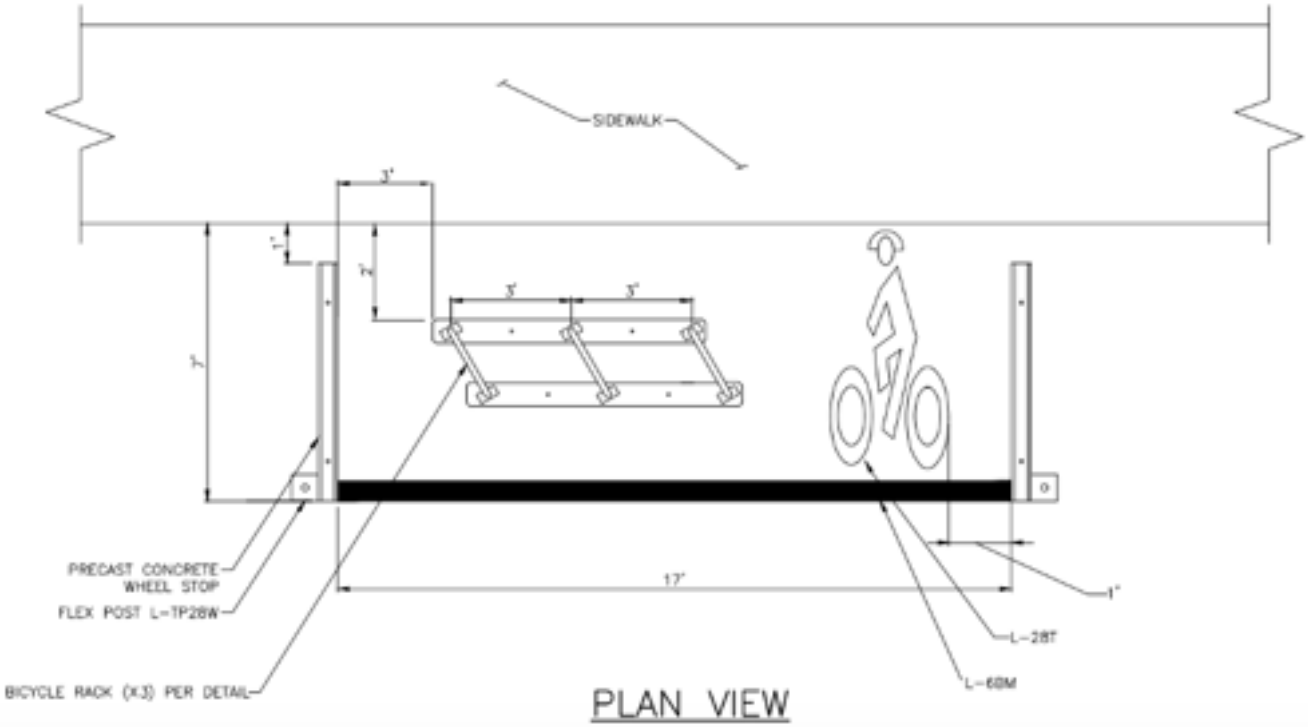
CKD. NO	SR. T.E. JV	PR. T.E.
DWN. EM	T.E. NO	S–404.3

Source: City of Los Angeles

Single Bike Corral Elevation and Site Plan, Seattle, WA



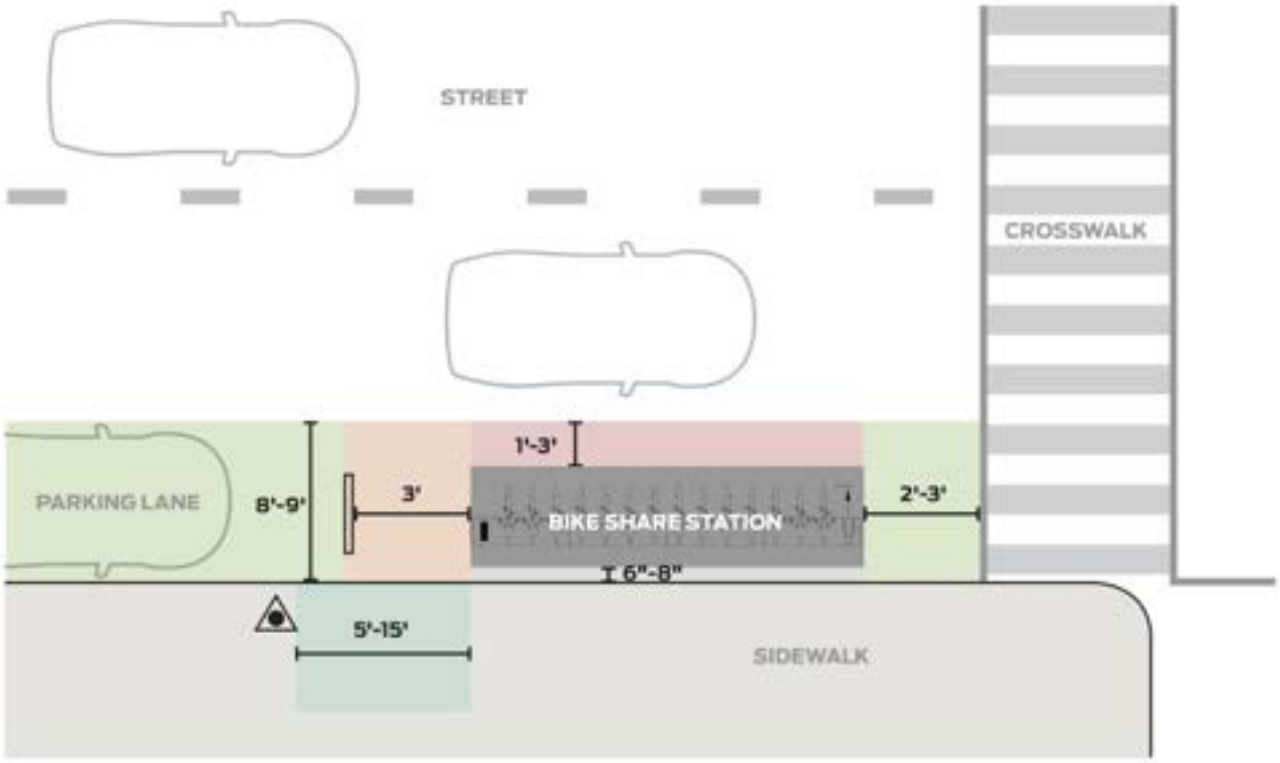
ISOMETRIC VIEW



PLAN VIEW

Image source: Seattle Department of Transportation. 2020. Seattle Bicycle Parking Guidelines. https://www.seattle.gov/documents/Departments/SDOT/BikeProgram/SDOT%20Bicycle%20Parking%20Guidelines%20%282020%29.pdf

NACTO Bike Share Station Siting Guide, 2016



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.

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.

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.

Image source: https://nacto.org/wp-content/uploads/2016/04/NACTO-Bike-Share-Siting-Guide_FINAL.pdf

REFERENCES

i Brown, A., Klein, N. J., Thigpen, C., & Williams, N. (2020). Impeding Access: The Frequency and Characteristics of Improper Scooter, Bike, and Car Parking. *Transportation Research Interdisciplinary Perspectives*, 4, https://doi.org/10.1016/j.trip.2020.100099;
James, O., Swiderski, J. I., Hicks, J., Teoman, D., & Buehler, R. (2019). Pedestrians And E-Scooters: An Initial Look at E-Scooter Parking and Perceptions By Riders and Non-Riders. *Sustainability,* 11(20), https://doi.org/10.3390/su11205591;
Klein, N., Brown, A., & Thigpen, C. (2023). Clutter and Compliance: Scooter Parking Interventions and Perceptions. *Active Travel Studies*, 3(1), https://doi.org/10.16997/ats.1196;
Portland Bureau of Transportation. (2018). E-Scooter Findings Report. https://www.portlandoregon.gov/transportation/article/709719.

ii Hemphill, R., MacArthur, J., Longenecker, P., Desai, G., Nie, L., Ibarra, A., & Dill, J. (2022). Congested sidewalks: The effects of the built environment on e-scooter parking compliance. *Journal of Transport and Land Use*, 15(1), https://doi.org/10.5198/jtlu.2022.2110.

iii Nicholas Klein, Anne Brown, and Calvin Thigpen (2023). 'Clutter and Compliance: Scooter Parking Interventions and Perceptions', Active Travel Studies, 3(1); Brown, A., Thigpen,

iv C., Klein, N. J., & Ralph, K. (2025). Pilots and Shifting Public Sentiment: Evidence From e-Scooters in Eugene (OR). Journal of the American Planning Association, 0(0), 1–16. https://doi.org/10.1080/01944363.2024.2441373.

v Klein, Brown, and Thigpen, Calvin, 'Clutter and Compliance: Scooter Parking Interventions and Perceptions'.

vi Sian Meng et al., 'Shared Scooter Parking: The Role of Parking Density and Land Use in Compliance and Demand' (2024) https://www.urbanismnext.org/resources/shared-scooter-parking. Urbanism Next Center.

vii City of Chicago, 'Scooter Sharing in Chicago' (2025) https://www.chicago.gov/city/en/depts/cdot/supp_info/escooter-share-pilot-project.html.

viii City of Portland, 'Rules of the Road for E-Scooters in Portland' (2025) https://www.portland.gov/transportation/regulatory/escooterpdx/rules.

ix Anne Brown. (2021). 'Micromobility, Macro Goals: Aligning Scooter Parking Policy with Broader City Objectives', T*ransportation Research Interdisciplinary Perspectives*, p.12, https://doi.org/10.1016/j.trip.2021.100508.

x Anne Brown, Nicholas J. Klein, and Calvin Thigpen. (2021). 'Can You Park Your Scooter There? Why Scooter Riders Mispark and What to Do about It', *Transport Findings*, doi: https://doi.org/10.32866/001c.19537.

xi Brown, Klein, and Thigpen, Calvin, 'Can You Park Your Scooter There? Why Scooter Riders Mispark and What to Do About It'.

xii Sian Meng et al., 'Shared Scooter Parking: The Role of Parking Density and Land Use in Compliance and Demand.'

xiii Mathias Willnat et al. (2024). 'Planning Factors in Municipal Bikesharing Network Design: A Qualitative Study', *Transportation Research Interdisciplinary Perspectives*, 27, https://doi.org/10.1016/j.trip.2024.101190.

xiv New York City Department of Transportation. (2025). 'Daylighting and Street Safety: An Analysis.' <https://www.nyc.gov/html/dot/downloads/pdf/daylighting-and-street-safety.pdf>.

xv Willnat et al., 'Planning Factors in Municipal Bikesharing Network Design: A Qualitative Study'.

xvi Allanah Murphy and Brandon Haydu. (2023). 'Right-Sizing Micromobility Parking: How Much Parking Does Your City Need?', The Lime Times, <https://www.li.me/blog/right-sizing-micromobility-parking-how-much-parking-does-your-city-need>.

xvii Meng et al., 'Shared Scooter Parking: The Role of Parking Density and Land Use in Compliance and Demand.'

xviii Anne Brown, Calvin Thigpen, and Nicholas Klein. (2024). 'Scooting around the Margins: Testing Scooter Parking Design Pilots', Findings, doi:https://doi.org/10.32866/001c.127199.

xix Brown et al., 'Pilots and Shifting Public Sentiment: Evidence from e-Scooters in Eugene, OR'.

xx NACTO. (2023). 'Material Success,' <https://nacto.org/publication/material-success/>.

xxi Max A Bushell et al., 'Costs for Pedestrian and Bicyclist Infrastructure Improvements',

xxii University of North Carolina Highway Safety Research Center, University of North Carolina, Chapel Hill, 45 (2013); Kathleen Pender, 'San Francisco Issues Permit Rules for Stationless Bike Share', SF Chronicle, 2017 <https://www.sfchronicle.com/business/networth/article/San-Francisco-issues-permit-rules-for-stationless-11281616.php>.

xxiii Bushell et al., 'Costs for Pedestrian and Bicyclist Infrastructure Improvements'.

xxiv Bushell et al., 'Costs for Pedestrian and Bicyclist Infrastructure Improvements'.

xxv John MacArthur, Kevin Fang, and Calvin Thigpen. (2024). 'Taxing Shared Micromobility: Assessing the Global Landscape of Fees and Taxes and Their Implications for Cities, Riders, and Operators.' https://ppms.trec.pdx.edu/media/project_files/PSU_SSU_micromobility_fees_and_taxes_report.pdf

xxvi City of Atlanta Department of Transportation. (2025). LinkedIn <https://www.linkedin.com/feed/update/activity:7283151703992856576>.

URBANISM NEXT CENTER

UNIVERSITY OF OREGON