

# Appendix B: E-Scooter Parking Solutions

## 2019 E-Scooter Findings Report

During the first e-scooter pilot in 2018, PBOT heard from the public that improper e-scooter parking was a top concern. In response, PBOT made a number of changes for the second pilot, including requiring e-scooter companies to provide Portland-specific laws in their apps, creating a citation mechanism to warn and fine companies and users for improperly parked e-scooters, requiring companies to respond quickly to public complaints about improperly parked e-scooters, and installing dedicated e-scooter parking corrals across the city.

This appendix:

- Provides an overview of **parking regulations** and **dedicated e-scooter parking** in Portland
- Describes **national and local research** on e-scooter parking compliance
- Outlines parking **options for a permanent e-scooter program**

### Parking e-scooters in Portland

#### Parking regulations

Portland's e-scooter [parking regulations](#) (9.D., p. 18) were created before the first E-Scooter Pilot Program in 2018 based on existing [regulations](#) for siting bike racks.<sup>i,ii</sup>

Many of these regulations have proven to be inappropriate for regulating parking for e-scooters. For example, limitations on parking near public art, grating/access lids, signs, and drinking fountains make sense when installing permanent bike racks but do not apply well to dockless e-scooters.

Revising e-scooter parking regulations by removing inapplicable provisions will clarify rules for riders and streamline operations for companies while preserving access for people who use the sidewalk.

#### Dedicated e-scooter parking

During the second e-scooter pilot, PBOT responded to concerns about parking by installing 24 dedicated e-scooter parking corrals in high-use areas across the city.

Before the pilot began on April 26, 2019, PBOT re-appropriated some of the space at 22 BIKETOWN stations in inner neighborhoods with high e-scooter ridership to create e-scooter parking corrals. In summer 2019, PBOT installed a corral at Hacienda CDC in the Cully neighborhood, one of the partner sites for the [Transportation Wallet for Affordable Housing Pilot](#), and another at NW 23<sup>rd</sup> and Quimby, where an intersection had recently been [daylighted for vision clearance](#).<sup>iii, iv</sup>

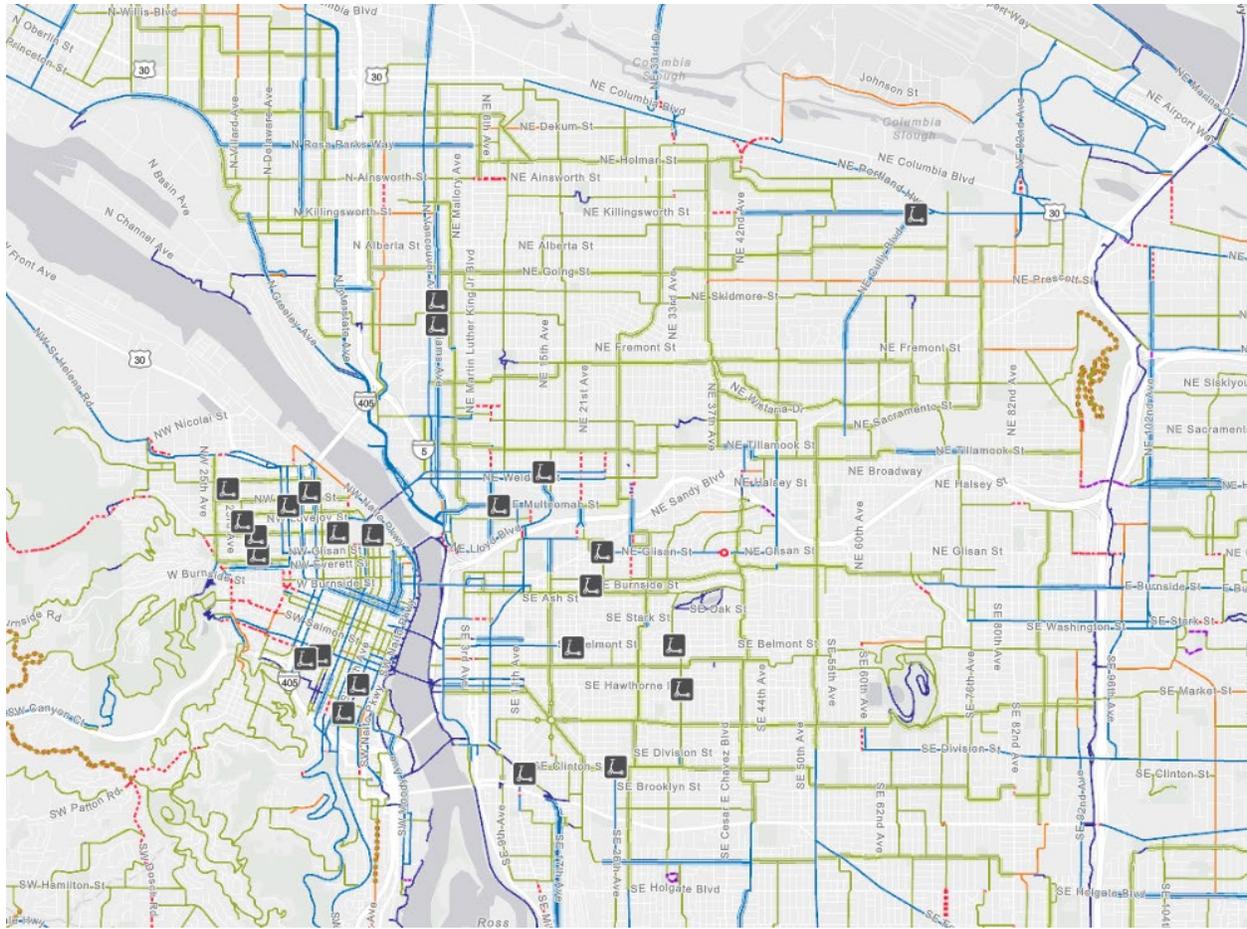
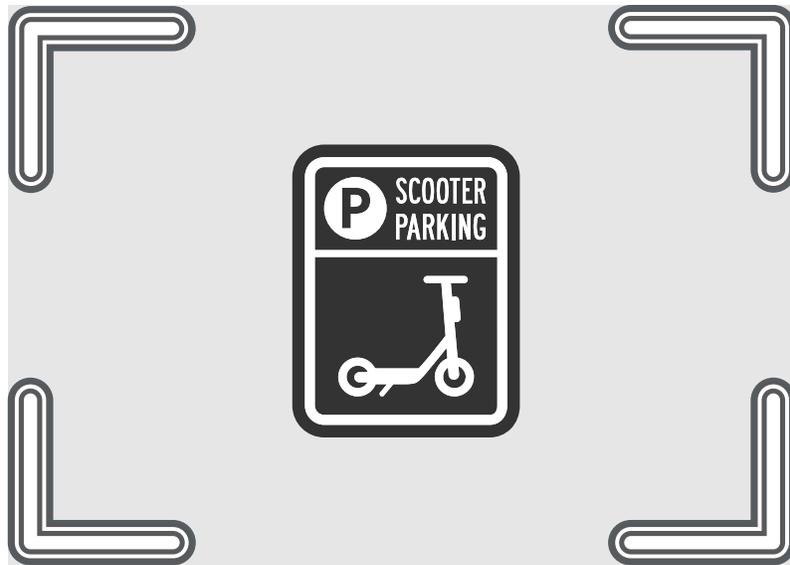


Figure 1: Map of e-scooter parking locations, visible on PBOT's [Portland by e-scooter map](#)<sup>v</sup>

Each corral consisted of a set of adhesive stickers that were applied to the ground with a roller and did not require heat nor overlaminating film for application. The stickers were easy to remove and left no residue. This approach was chosen over more permanent materials such as thermoplastic so that PBOT could assess the performance of the corrals and move or change them as needed.

The stickers cost approximately \$150 for a set of four corners plus a middle sticker with an icon of an e-scooter, a "P" parking icon, and the words "SCOOTER PARKING."



*Figure 2: Sample e-scooter parking corral stickers (not to scale)*



*Figure 3: Scooter parking corral at NE Multnomah St and NE 9<sup>th</sup> Ave*

Some existing corral stickers have worn away due to use, street debris, and vandalism. Stickers on sidewalks generally fared better than those on the street, but condition varied as of fall 2019, when stickers were replaced as resources allowed. Sticker life span ranged from a few weeks to a few months, shorter than the manufacturer's stated one-year lifespan.



*Figure 4: The corral at NW Glisan St and NW 21<sup>st</sup> Ave (left) saw lots of tree debris. The corral on the sidewalk at SW Columbia St and SW 10<sup>th</sup> Ave (right) fared much better.*

Most riders were not aware of e-scooter parking corrals. Summer 2019 e-scooter user survey results suggest that 17% of Portland riders had parked in an e-scooter corral, while 76% had never seen one and 7% saw one but did not use it. Anecdotal observations also suggest low usage at some corrals, but other corrals were used consistently. Several companies noted that they like to deploy their e-scooters in corrals because they offer a clear, simple, legal place for their staff or contractors to deploy and because reducing instances of improper parking is in their business interest.



*Figure 5: A Razor deployment in the NW 22<sup>nd</sup> Ave and NW Lovejoy St corral*

If e-scooter parking corrals continue to be part of Portland's e-scooter program, they will need to be reinforced by requirements for companies to symbolize them in their apps so riders know where they are. In addition, companies should be required or encouraged, through the application process or an incentives program, to gamify their apps to encourage riders to return e-scooters to corrals. If enough corrals are present, companies could be required or encouraged to charge riders for parking outside corrals.

## Research on e-scooter parking

### National research on parking compliance

Recent [research](#) on parking compliance of bikes, e-scooters, and motor vehicles in five U.S. cities shows that the rates of improper parking among bikes and e-scooters pale in comparison to that of motor vehicles.<sup>vi</sup> Among [over 3,600 observations](#), 0.8% of bikes and e-scooters were parked improperly, compared to almost 25% of motor vehicles.<sup>vii</sup>

Observations in Portland suggest a slightly higher rate of improper parking by bikes and e-scooters at 2.3%, defined by the researchers as leaving less than 32 inches of pedestrian throughway and measured on one downtown block at SW 12<sup>th</sup> Avenue and SW Harvey Milk Street. San Francisco prevailed with 0% of bikes and e-scooters parked improperly, likely due in large part to their “lock-to” system that requires e-scooters to come equipped with a cable lock and be fastened to bike racks (see more below).

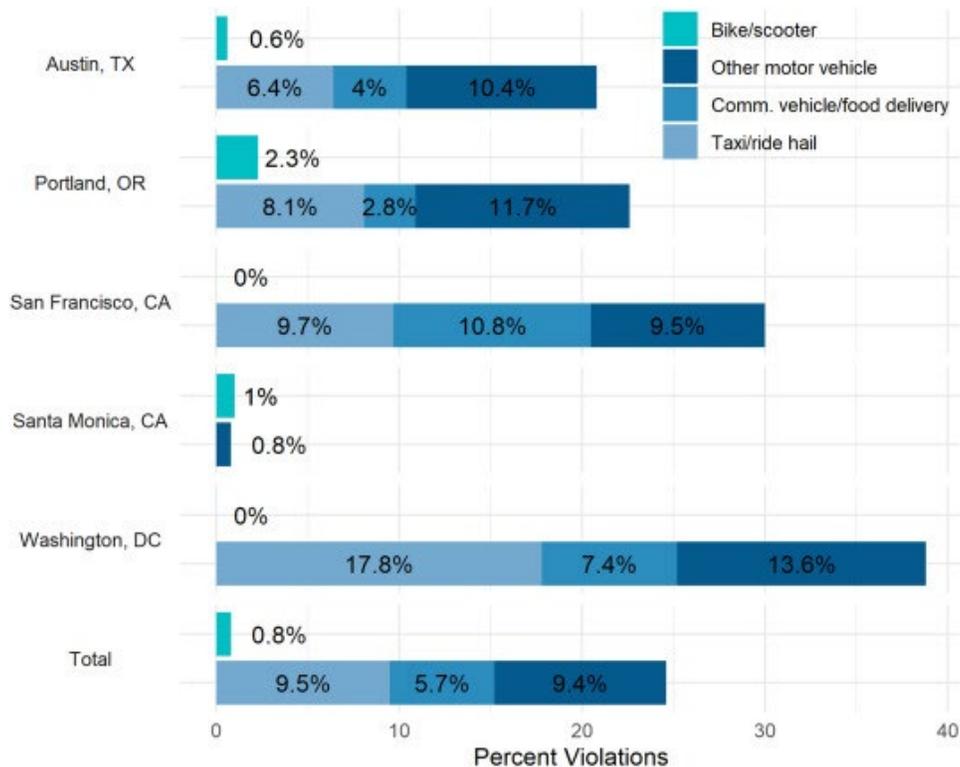


Figure 6: Vehicle parking compliance by mode and city (Brown et al.)

## **Research on parking compliance in Portland**

Forthcoming research by the Transportation Research and Education Center at Portland State University assesses the prevalence of improperly parked e-scooters in Portland. Researchers observed 576 e-scooters in three zones downtown, in the Pearl District, and on NW 23<sup>rd</sup> Avenue to determine whether e-scooters complied with Portland's parking regulations.

Given the high number of limitations on where e-scooters can be parked, which were based on the regulations for installing permanent bike racks and may not apply well to e-scooters as described above, preliminary findings suggest that only 28% of e-scooters complied with all city parking regulations.

Built environment features determined how well riders parked e-scooters. Dedicated e-scooter parking corrals significantly reduced instances of improper parking, and sidewalk width also statistically correlated with parking compliance.

Twelve percent of all violations were found to be obstructions of items including fire hydrants, drinking fountains, ADA ramps, public art, grating/access lids, and signs, as well as leaning on a building. Some of these obstructions are significant, such as blocking ADA ramps or leaning on a building in a way that poses navigational challenges for blind or low-vision people. Others, such as parking within 5 feet of public art or signs, are less problematic.

Parking within 5 feet of a bike rack, though prohibited, was common, given that e-scooter riders are encouraged to use other bike infrastructure like bike lanes. Removing this rule would increase overall compliance by 16% and provides an opportunity to solve parking challenges, as described below.

Researchers saw higher rates of compliance among groups of e-scooters compared to e-scooters parked individually, which suggests that companies make sincere efforts to follow city regulations during deployment and/or that one properly parked e-scooter leads other riders to park properly as well.

Nearly all e-scooters (98%) were found standing fully upright with kickstand, i.e., not flat on the ground or leaning on another object.

Finally, TREC researchers observed that no company exhibited significantly more improperly parked e-scooters than another.

## **Anecdotal observations**

Anecdotal observations outside of the Central City by PBOT staff suggest low rates of improper parking that impedes access for people using the sidewalk. However, companies sometimes deployed e-scooters on East Portland sidewalks that lacked furnishing zones and therefore did not leave the required amount of pedestrian throughway. In other parts of the city, companies and users sometimes parked e-scooters at bike racks, which is currently prevented by PBOT regulations. However, most e-scooters observed across the city were parked properly in a furnishings zone and/or parked in way that did not obstruct pedestrian access.

## Parking options for permanent program

### Lock-to system

Some cities, such as San Francisco, Chicago, and Washington, D.C., have adopted a “lock-to” model of e-scooter parking regulation in which e-scooters must come equipped with locks and riders and companies must lock e-scooters to bike racks. San Francisco has called the lock-to requirement the key to success of their program.

Lock-to systems offer a broad range of benefits:

- Reduces impact on **sidewalk accessibility** and sidewalk clutter
- Capitalizes on user experience with personal bikes, BIKETOWN, and bike infrastructure, so people **understand the rules**
- Supports creation of **multimodal parking zones** that accommodate both bikes and e-scooters with racks
- Helps e-scooters be seen as a **functional form of transportation**, not as a toy or as disposable
- **Reduces theft** and vandalism for companies
  - In San Francisco, Skip, Scoot and other companies voluntarily equipped their e-scooters with cable locks before the lock-to requirement came into effect.
- Prevents the specific ADA concern of e-scooters **blocking ramp-equipped vans**
  - PBOT heard that when there are no disabled parking spaces available, ramp-equipped van users must find other spots and are sometimes impeded by e-scooters at the curb.
  - Users may be left without a nearby parking option and/or may have to ask an able-bodied person to move the e-scooter—which sometimes then sets off alarms.



*Figure 7: An example of an ADA-accessible van that can be impeded by e-scooters parked on the sidewalk, even if they are parked legally according to all existing parking requirements*

- Could be a **more equitable locking system** due to **disparity in average sidewalk width** across the city, which makes requirements to park free-standing e-scooters in the furnishings zone harder to meet in East Portland and other historically underinvested parts of the city.
  - Figure 8 below shows in red where it is illegal to park an e-scooter based on sidewalk width one at least one side of the street (defined as places with sidewalks less than 9' wide, to estimate a 6' through zone plus 3' furnishings zone. Note this analysis does not take into account landscaping strips, which further limit where e-scooters can be parked.).
  - The city has a greater ability to install bike racks—whether on the sidewalk or on the street in corrals—than to change the width of the sidewalk in large parts of the city.

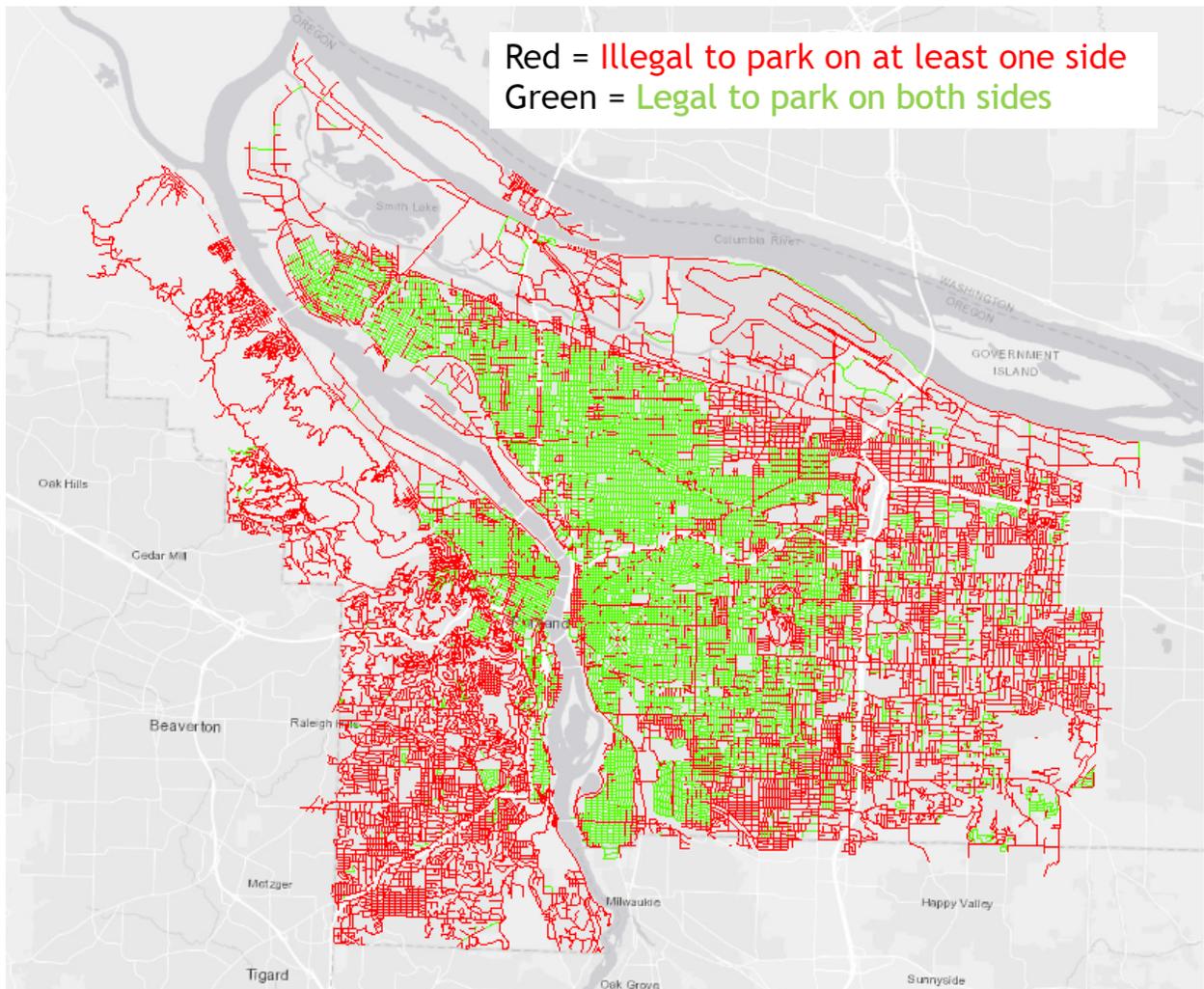


Figure 8: Legality of e-scooter parking based on sidewalk width

Because a lock-to system would require e-scooter riders and companies to compete with bike riders for existing bike parking space, a lock-to system would require an intentional **expansion of bike parking supply**. Other cities have approached this with e-scooter permit fees and additional staff capacity:

- Seattle is using fees from their dockless bike-share program to install 100 new bike racks per month for a total of 1,500 spaces a year.<sup>viii</sup>
- [San Francisco](#) is using a \$75/device fee to install 100 new bike racks per month, doubling their normal rate.<sup>ix</sup>

Currently, about 15,000 bike parking spaces have been installed by PBOT across the city. This number does not include parking spaces installed by TriMet (near transit stops, for example) or private property owners. When considering how many and where to install new racks, PBOT will need to identify:

- Places where **bike parking supply is already constrained**, particularly in the Central City—which is also where most e-scooter ridership is occurring
- Places where e-scooter **riders are starting and ending their trips**, according to MDS data
- Places where **new bike racks could spur e-scooter deployment** and ridership
- Places where bike racks could be installed in **intersections have been cleared** of car parking spaces for visibility

PBOT will also need to determine a fee and staffing structure to expand bike parking supply.

## Corrals

If PBOT moves forward without a lock-to system in a permanent e-scooter program, PBOT should consider how to expand and improve dedicated e-scooter parking corrals.

PBOT could take a number of approaches to dedicated parking corrals (from most to least effective):

- Require **riders to park in corrals** and require **companies to deploy in corrals**.
  - Phoenix [requires](#) all e-scooters to be parked in over 400 corrals the city created with white bollards reflective e-scooter icons.<sup>x</sup>
  - Toronto [will require](#) e-scooters to be parked and deployed at bike-share stations or on-street car parking spaces the city will convert into e-scooter corrals.<sup>xi</sup>
  - San Diego [has created](#) parking corrals across the city and requires e-scooters to be parked and deployed in them downtown—but e-scooters can be parked and deployed elsewhere outside of downtown and no-ride zones. If riders leave e-scooters on the sidewalk downtown, companies have three hours to remove them before the city impounds them.<sup>xii</sup>
- Require **companies to deploy in corrals** but allow **riders to park elsewhere**.
  - Long Beach [has created and designated](#) corrals for each company, and companies are required to deploy in them. e-scooters must be collected from the streets and redeployed in their assigned corrals by 8 a.m. daily. Users can park elsewhere.<sup>xiii</sup>

- Require or encourage companies to **incentivize users to park in e-scooter corrals**, like BIKETOWN rewards riders with credit for returning out-of-station bikes to stations
- Require companies to **symbolize parking corrals in their apps** and/or include **language** in their apps so riders know where to find them

Depending on the role of parking corrals and staff capacity for installation (including re-installation of current corrals) and maintenance, PBOT should consider how many new corrals to install and how to determine their locations. Potential locations include:

- Downtown and the rest of the Central City, which sees the highest e-scooter ridership
- The bus mall and other areas near—but not adjacent to—transit stops
  - Currently, there are no parking corrals on TriMet property, including the bus mall.
  - Scooter parking near transit has the potential to either increase access to transit, encouraging use; clutter transit areas and impede access, particularly for people with disabilities; and/or detract from transit by offering a substitute.
  - Data from Portland suggests that e-scooter trips are likely to displace transit trips, not serve as a last-mile connection—8 percent of Portlanders used a e-scooter to access transit, while 21 percent said they use transit less because of e-scooters.
  - Dedicated e-scooter parking corrals near—but not directly adjacent to—MAX stops, transit platforms, and other high-use bus stops, as well as along the bus mall, with all other e-scooter deployments and potentially rider parking prohibited within a certain area, could strike the right balance. Consider other ideas to create a healthy distance from transit that does not preclude connection but does preserve access.
- Other parts of town with constrained sidewalks and/or a surplus of street parking—particularly if the permanent program requires minimum deployments in new parts of town and/or caps on downtown deployment
- Places where businesses could benefit from additional foot traffic brought by corrals on the sidewalk or in car parking spots on the street
- Other locations; see considerations for siting bike racks above

Given the low durability of the materials used for parking corrals in the 2019-2020 pilot, sturdier materials, such as thermoplastic, bollards, curb bumps, will be necessary for corrals in a permanent program.

In addition to costs for materials and installation, PBOT will need to consider costs of converting car parking spaces into e-scooter parking corrals in parking districts.

Corral design could be **multimodal** with **bike racks plus space for e-scooters**. This will depend on whether Portland moves to a lock-to system (in which case a corral may look like a regular bike corral with additional e-scooter imagery), and/or whether BIKETOWN will be significantly semi-dockless and therefore parkable without a rack in corral locations.



*Bike corral in Washington, D.C. with bike racks and space for dockless bikes and e-scooters*



*Bike corral in Seattle with traditional racks and space for dockless bikes. In Portland, the bike icon could be replaced with a e-scooter icon to denote e-scooter parking*

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- <sup>i</sup> TRN-15.01 – New Mobility – Shared Electric Scooters. Portland Bureau of Transportation, May 2020. <https://www.portland.gov/sites/default/files/2020-06/updated-trn-15.01-may-2020.pdf>
- <sup>ii</sup> TRN-10.09 - Bicycle Rack Permit. Portland Bureau of Transportation, February 3, 2015. <https://www.portlandoregon.gov/citycode/article/43223>
- <sup>iii</sup> “Transportation Wallet for Residents of Affordable Housing Pilot.” Portland Bureau of Transportation. <https://www.portlandoregon.gov/transportation/78475>
- <sup>iv</sup> “Vision clearance at intersections.” Portland Bureau of Transportation, February 24, 2019. <https://www.portlandoregon.gov/transportation/article/697586>
- <sup>v</sup> Portland by Scooter. Portland Bureau of Transportation. <https://pdx.maps.arcgis.com/apps/webappviewer/index.html?id=e4495321371a4a4f964b941a07665c74>
- <sup>vi</sup> Aloï, Daniel. “Study explores micromobility, improper parking in 5 cities.” *Cornell Chronicle*, March 4, 2020. <https://news.cornell.edu/stories/2020/03/study-explores-micromobility-improper-parking-5-cities>
- <sup>vii</sup> Brown, Anne; Nicholas J. Klein; Calvin Thigpen; and Nicholas Williams. “Impeding access: The frequency and characteristics of improper scooter, bike, and car parking.” *Transportation Research Interdisciplinary Perspectives*, Volume 4, March 2020. <https://www.sciencedirect.com/science/article/pii/S2590198220300105>
- <sup>viii</sup> 2019 Quarter 3 Bike Share Summary Report. Seattle Department of Transportation. [https://www.seattle.gov/Documents/Departments/SDOT/BikeProgram/2019Q3\\_BikeShare\\_Summary\\_Report.pdf](https://www.seattle.gov/Documents/Departments/SDOT/BikeProgram/2019Q3_BikeShare_Summary_Report.pdf)
- <sup>ix</sup> “Rolling Out New Scooters.” San Francisco Municipal Transportation Agency, October 11, 2019. <https://www.sfmta.com/blog/rolling-out-new-scooters>
- <sup>x</sup> E-Scooter Pilot Program. City of Phoenix. <https://www.phoenix.gov/streets/scooters>.
- <sup>xi</sup> Rider, David. “E-scooters set to be corralled in Toronto.” *The Star*, February 4, 2020. [https://www.thestar.com/news/city\\_hall/2020/02/04/e-scooters-set-to-be-corralled-in-toronto.html](https://www.thestar.com/news/city_hall/2020/02/04/e-scooters-set-to-be-corralled-in-toronto.html)
- <sup>xii</sup> Emerson Smith, Joshua. “E-Scooter ridership plummets in San Diego as city looks to overhaul rules.” *The San Diego Union Tribune*, October 24, 2019. <https://www.sandiegouniontribune.com/news/transportation/story/2019-10-24/e-scooter-ridership-plummets-in-san-diego>
- <sup>xiii</sup> Shared Micro-Mobility Program 2019-2020. City of Long Beach, October 2019. [http://www.longbeach.gov/globalassets/go-active-lb/media-library/documents/programs/micro-mobility-program-e-scooterse-bikes/city-of-long-beach\\_shared-micro-mobility-program\\_permit\\_2019-2020](http://www.longbeach.gov/globalassets/go-active-lb/media-library/documents/programs/micro-mobility-program-e-scooterse-bikes/city-of-long-beach_shared-micro-mobility-program_permit_2019-2020)