2018 E-Scooter Findings Report

PBOT
PORTLAND BUREAU OF TRANSPORTATION

Contents


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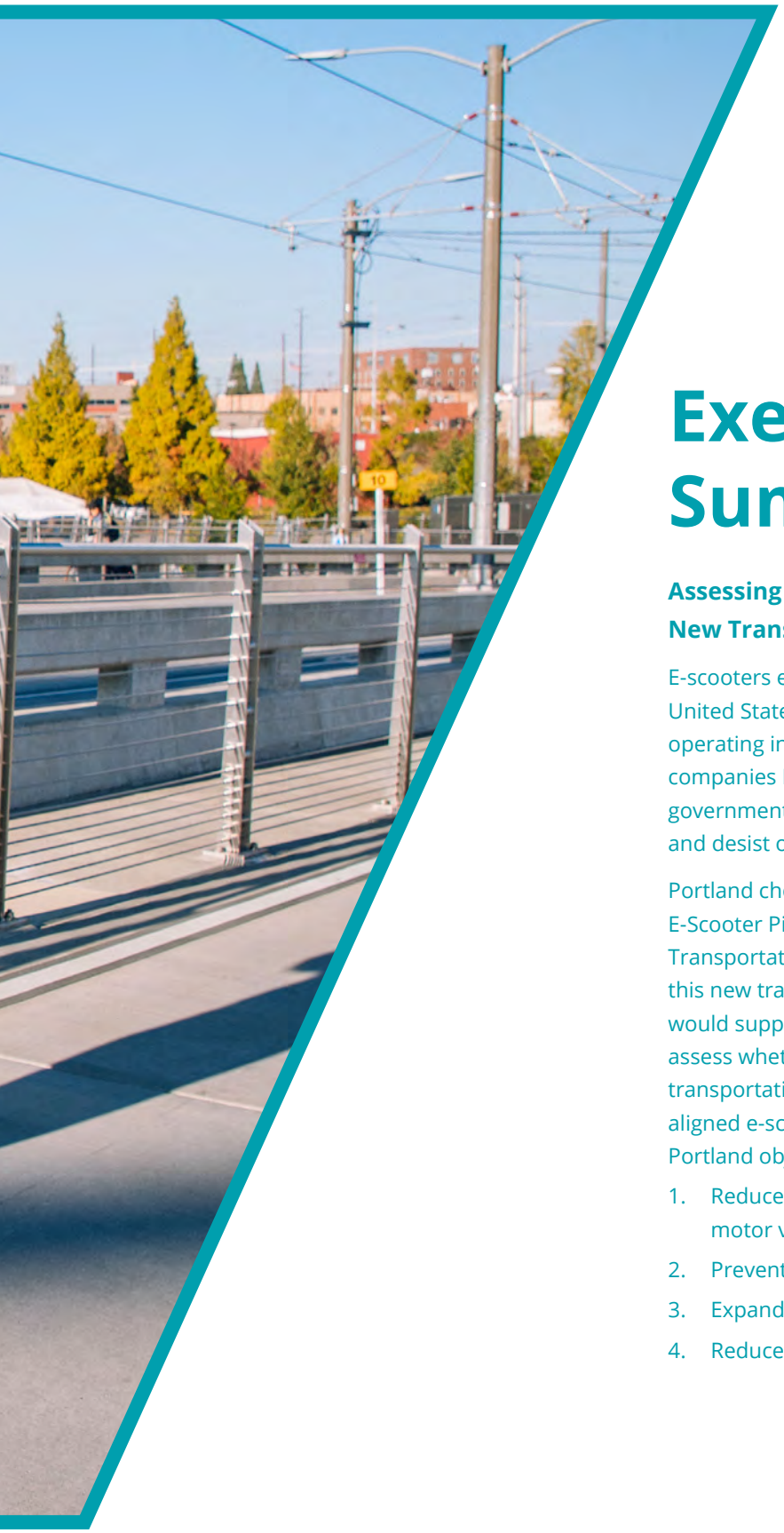


Executive Summary

Assessing the Potential of a New Transportation Technology

E-scooters emerged in 2017 as a new shared mobility service in the United States. Less than a year after their debut, e-scooters were operating in 65 U.S. cities. They did not arrive without disruption; companies Bird and Lime began operations in 43 markets without government permits or consent. Several cities responded with cease and desist orders, fines, or both.

Portland chose a different, proactive path, creating the E-Scooter Pilot Program. With the pilot, the Portland Bureau of Transportation (PBOT) focused on giving Portlanders access to this new transportation option while also ensuring that e-scooters would support Portland's fundamental policy values. Designed to assess whether – and how – e-scooters could help meet Portland's transportation needs, the pilot featured a permitting framework that aligned e-scooter company business practices with four critical City of Portland objectives:

1. Reduce traffic congestion by shifting trips away from private motor vehicle use
2. Prevent fatalities and serious injuries on Portland streets
3. Expand access to opportunities for underserved Portlanders
4. Reduce air pollution, including climate pollution

Using Data and Community Engagement to Drive Decisions

PBOT instituted data-sharing requirements as one tool to assess the impact of e-scooters. Through the 120-day pilot period, companies were required to provide data that included real-time availability, trip starts and destinations, routes, and safety information as a condition of the permit. With this data in hand, PBOT could understand where and when e-scooters were used and monitor compliance with East Portland deployment requirements. Data enabled City staff to see e-scooter riding patterns and miles traveled. Technical data collection was supplemented by **a rider survey, citywide poll, focus groups, an online complaint form, and community and stakeholder input.**

Pilot Findings: 700,000 Trips and Lots of Potential

Tens of thousands of Portlanders and visitors alike enthusiastically embraced scooters. During the four-month period, **people took 700,369 trips covering 801,887 miles on 2,043 e-scooters**. Trip data analysis and PBOT's user survey data revealed more about ridership trends:

- **A majority of Portlanders viewed e-scooters positively.** In a representative citywide poll by DHM Research, 62 percent of all Portlanders viewed e-scooters positively at the end of the pilot. Support was even higher among Portlanders under 35 (71 percent), from people of color (74 percent), and those with incomes below $30,000 (66 percent).
- **Portlanders primarily used e-scooters for transportation.** 71 percent of Portlanders reported that they most frequently used e-scooters to get to a destination, while only a third of respondents (28.6 percent) said they most frequently used e-scooters for recreation or exercise.
- **E-scooters replaced driving and ride-hailing trips.** 34 percent of Portland riders and 48 percent of visitors took an e-scooter instead of driving a personal car or using Uber, Lyft, or taxi.
- **E-scooter users preferred riding on low-speed streets and in bike lanes.** Many of the highest utilized streets were part of Portland's bikeway network. Staff observations also found lower rates of sidewalk riding on low-speed streets or those with dedicated space for non-motorized users. Users ranked bike lanes as their preferred road type, and sidewalks last.
- **E-scooters attracted new people to active transportation.** 74 percent of local users reported never riding BIKETOWN and 42 percent never bicycling.

Pilot Findings: Challenges Include Riding, Parking, and Equitable Access

The e-scooter pilot showed the potential of a small, light, electric shared vehicle to move people quickly and easily without adding to Portland traffic. At the same time, the pilot revealed several areas where more work is needed to integrate e-scooters safely and smoothly into the fabric of our city.

Despite an increase in scooter-related injuries during the pilot period, most injuries seen by emergency rooms across Multnomah County were not severe enough to warrant emergency transport. E-scooter injury visits accounted for about 5 percent of total traffic crash injury visits during the pilot period. PBOT additionally received 43 reports of collisions during the pilot period.

We heard from Portlanders throughout the pilot period about **illegal sidewalk riding** and **incorrect scooter parking.** With speeds capped at 15 mph, scooters are appropriate for bike lanes or low-volume streets, but they are too fast for use on sidewalks, where they make it unsafe or uncomfortable for people walking or using mobility devices. And while staff observations showed most scooters parked properly in the sidewalk furnishing zone, improperly parked scooters negatively impacted accessibility and created a hazard for people with visual impairments.

Although bicycles are allowed in Portland parks, including Waterfront Park and the Eastbank Esplanade, motorized vehicles are not. E-scooter use on Portland parks trails violated Portland Parks & Recreation's rules, but most riders (66 percent) said they weren't aware of the rules. **E-scooter use impacted other park users and presented a significant management challenge for Portland Parks & Recreation staff.**

To align business practices with the City's equity goals, PBOT required each e-scooter company to locate at least 100 scooters in East Portland communities each day and to offer a low-income fare. Only one company complied with the East Portland fleet requirement. Companies only enrolled 43 Portlanders in the low-income plan. Along with staff observations, this suggests low company performance in aligning business practices with City equity goals.

While many East Portlanders and Black Portlanders expressed enthusiasm for e-scooters, some focus group participants also expressed an **overall concern for traffic safety and the risk that Black e-scooter riders would be targeted for racial profiling and harassment.**

E-Scooter Pilot 2.0: Building on What We've Learned

E-scooters have the potential to advance Portland's transportation goals. This is one of this report's key findings. This report demonstrates that as Portland grows and traffic congestion gets worse, e-scooters can move more people safely and efficiently in the same amount of space. This helps reduce reliance on automobiles and shift trips to an efficient, potentially less-polluting travel option. We believe there is a preliminary indication that e-scooters are a less-polluting travel option. However, we need more data – especially regarding e-scooter operations and lifecycle costs – before we can definitively say how much or even whether e-scooters directly contribute to a reduction in greenhouse gasses.

During the pilot, riders took more than 700,000 e-scooter trips on various types of streets. Throughout the city, sidewalk riding was lower along streets with lower speeds or designated bikeways. For us, this clearly demonstrates how important it is to have protected facilities that minimize conflicts between pedestrians, e-scooters, and cars.

For all of the positives about scooters that emerged during the pilot, we also learned valuable lessons about the challenges related to making scooters a permanent part of Portland's transportation ecosystem.

Given the scale and scope of these challenges, we believe it is advisable to conduct a second pilot in 2019. This pilot will be longer to give us more time to collect data and test innovative solutions to the challenges that emerged this past summer and fall. We will specifically focus our efforts on improving equitable access across the city and ensuring safe and legal riding and parking.

With the release of this report, PBOT plans to conduct additional public and stakeholder engagement through February 2019. Public engagement will inform a revision of PBOT's administrative rule and permit application. PBOT anticipates have e-scooters on the ground again in early spring.

New Mobility Background and Context

E-scooters are an emerging technology and new mobility service. Like bike share and car share, the service provides a shared vehicle – in this case, a small electric-powered scooter – to rent for one-way trips. This new service makes use of an existing technology – the scooters themselves – and adds app-based technology that provides the ability to share the devices using a short-term rental business model. To begin a rental, users unlock a scooter through the company's smartphone app. Some companies offer a call or text service to unlock for those without smartphones. To end a trip, users park the scooter on the sidewalk close to the curb and out of the pedestrian travel zone. Many companies require riders to confirm they have parked the e-scooter correctly by submitting a photo through the company's app in order to end their rental. E-scooters are powered almost exclusively by an electric motor, after an initial kick-off to start the device. E-scooter technology is rapidly evolving. In 2018 multiple companies introduced new e-scooter models and several new companies entered the market.

Relative to other active transportation options, e-scooters are more expensive. The average 19-minute e-scooter ride cost users $3.85 (low-income fare varied by company: $1.83-$2.85). This is more expensive than taking TriMet (adult fare: $2.50, low-income fare: $1.25) or BIKETOWN (Pay-as-you-go fare: $1.52; low-income fare: $3 per month for 90 minutes of daily ride time).

Operationally, e-scooters differ from other new mobility services in that the vehicles are usually picked up every night to be charged and are deployed the next day. Companies hire a mix of independent contractors as well as regular employees to charge, deploy, maintain, and respond to service requests. Throughout the day, e-scooters are distributed throughout the city based on where they are deployed and where people ride them and end their trips. During Portland's four-month pilot, companies reported working with 1,533 independent contractors (primarily chargers) and paying $643,000 in total wagers to contractors.

E-scooters first launched in the U.S. in September 2017. In Santa Monica, California, Bird Rides Inc., borrowing tactics from ride hailing companies, deployed e-scooters without the City's permission. Santa Monica's experience set the stage for a series of unpermitted entrances in the U.S. by Bird and Lime. Throughout the spring and summer of 2018, e-scooters appeared in more than 43 cities in the U.S., in many cases without permission from local officials or warning from the companies that operate the scooters. By August 2018, scooters were in 65 cities across the nation.[1]

1. Irfan, Umair. (2018, Sept. 7). Electric scooters' sudden invasion of American cities, explained. Vox. https://www.vox.com/2018/8/27/17676670/electric-scooter-rental-bird-lime-skip-spin-cities. Accessed 5 Nov. 2018.

City of Portland 2018 E-Scooter Pilot

Against a national backdrop of unforeseen and unpermitted launches, City of Portland officials took a proactive approach to managing this new mobility service. In spring 2018, virtually every major e-scooter company contacted PBOT, requesting information about how the City might allow the new service. In May, PBOT presented the concept of an e-scooter pilot program to the bureau's Pedestrian Advisory Committee, seeking input on how the City should account for the needs of people with disabilities and others who depend on sidewalk space. PBOT advised e-scooter companies that it would provide a permit application process in June, and a pilot program to start in July. PBOT warned the companies not to start service until a pilot program could begin.

PBOT worked quickly to establish a permitting framework to run a 120-day e-scooter pilot from July through November of 2018. The framework enabled Portland to set out regulations and put consumer protections in place. It also required participating companies to agree to a set of comprehensive data sharing requirements.

Portland's pilot began July 23 and ended November 20, 2018. Five companies applied for permits, and three were permitted: Bird Rides Inc., Lime, and Skip Transport Inc. All three companies were operating e-scooters on Portland streets by early August. Each company started with 100 scooters to introduce Portlanders to the new technology and increased the number of e-scooters to their full permitted fleet quota by August 15. From August 15 through the end of the pilot, each company was permitted to have 683 scooters available for rent each day, for a total of 2,043 permitted scooters.

Advancing Portland's Policy Goals

Portland's 2035 Transportation System Plan (TSP) guides City decisions about transportation investment, innovation, and permitting. The TSP envisions a safe, equitable, multimodal transportation system that expands mobility, protects livability, and promotes economic vitality in a rapidly growing city. TSP policies seek to balance various transportation modes to help Portlanders move around efficiently, safely, and affordably. Key TSP goals include:

- Reduce private motor vehicle use and congestion
- Prevent fatalities and serious injuries on Portland streets
- Expand access for underserved Portlanders
- Reduce air pollution, including climate pollution

These goals are also foundational to the administrative rule establishing Portland's e-scooter pilot (see Appendix A). The findings in this report assess e-scooter potential to advance these goals, in addition to evaluating operations and management.

As one of several new mobility offerings that rely on digital technology to deliver transportation services, e-scooters must be evaluated along with other emerging new mobility modes, including shared e-bikes, car share, and ride-hailing services such as Uber and Lyft. In addition, e-scooter operations should be considered in the context of existing and future infrastructure – including bike lanes and shared streets – that accommodates these efficient, active, low-emission vehicles.

July 23, 2018 – November 20, 2018 (120 Days)

Total miles: 801,887.84

Service area: Portland city boundaries (145 sq. mi)

Average trips per day: 5,885

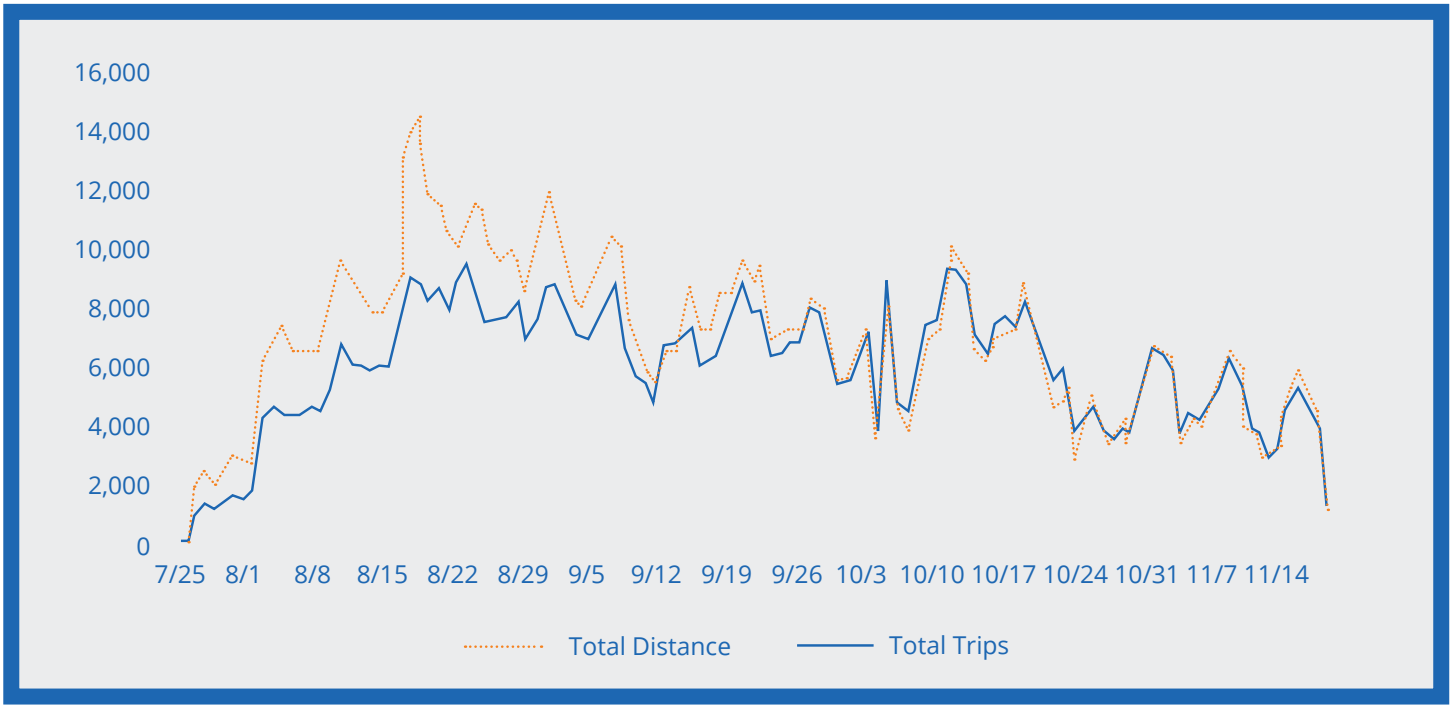
Citywide permitted cap: 2,043 scooters

Average trip length: 1.15 miles

Total trips: 700,369

Average East Portland trip length: 1.6 miles

Figure 1 : E-Scooters Daily Trips and Distances Traveled



Pilot Program Regulatory Framework

Portland's e-scooter pilot program was established by administrative rule and a permit that set specific conditions for providing this transportation service within the city. The total number of scooters was capped at 683 per company. To advance citywide equity goals, PBOT required that each company deploy at least 100 scooters in East Portland each day. Companies were required to limit scooters to a maximum speed of 15 mph.

By Oregon state law, e-scooter riders must wear a helmet and are prohibited from riding on sidewalks. City code prohibits the use of motorized vehicles, including e-scooters, on trails in Portland parks. Administrative rules require companies and riders to park scooters on the sidewalk and close to the curb, in a manner that does not interfere with pedestrian access or travel.

As a condition of receiving a permit, companies were required to educate riders about safe riding and proper e-scooter parking.

To advance citywide equity goals, PBOT required that each company deploy at least 100 scooters in East Portland each day.

Penalties and Warnings

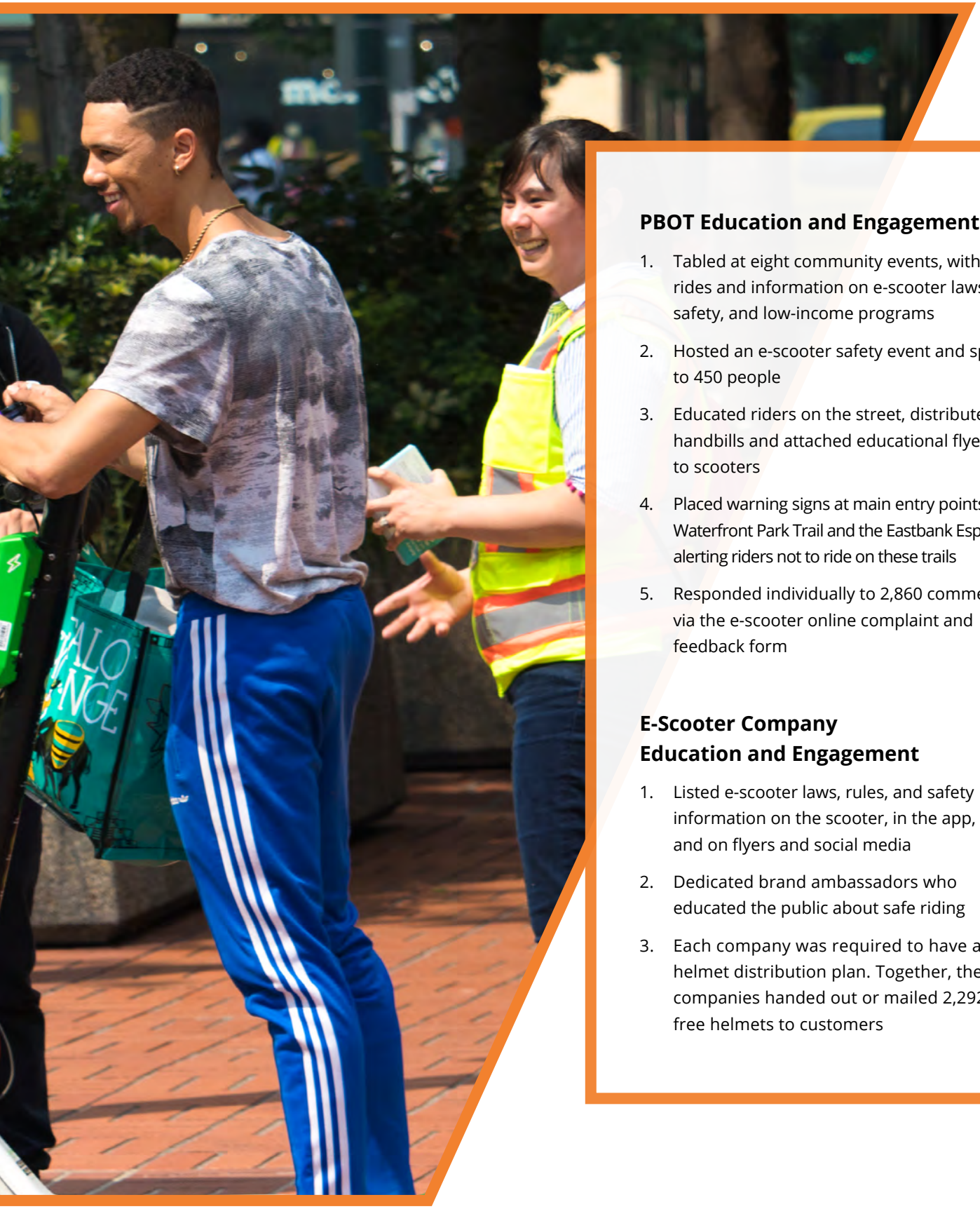
PBOT worked with each company to better understand the operational realities under the City's administrative rule and permit. After an initial observation period, PBOT regulatory staff began issuing compliance warnings regarding e-scooter deployment and performance. Staff communicated deployment data to each company on a weekly basis from the beginning of the pilot, urging companies to continually improve rider education efforts as well as their own performance. About halfway through the pilot, staff had sufficient information about performance trends to initiate formal compliance conversations with each company. Companies were given deadlines to comply with the requirements of their permit, and PBOT issued warnings for improperly identified vehicles, insufficient data, citywide fleet compliance, and East Portland fleet compliance.

Over the course of the pilot period, PBOT issued two penalties, both to Skip Transport, Inc. One cited failure to meet East Portland fleet deployment requirements, and the other cited failure to meet the citywide deployment requirements outlined in the administrative rule and permit. Penalties were calculated for each day the company was out of compliance after a specified deadline.

Public Engagement and Education

In the context of e-scooter launches around the country, time was of the essence in developing Portland's permit program. With a rapid rollout came the need for a significant amount of public education and engagement. To share information about the pilot and e-scooter rules of the road, PBOT developed education materials on e-scooter laws and proper riding and parking in five languages, distributing over 5,000 physical copies. Viewed more than 50,000 times, PBOT's project website extended the reach of e-scooter safety messages.

As the pilot period proceeded, PBOT and participating companies developed new educational materials and approaches to address emerging challenges. Staff solicited community input, hosted safety events, and hosted a helmet giveaway. E-scooter companies included riding rules in their app interface and posted them physically on the scooters.



PBOT Education and Engagement

1. Tabled at eight community events, with test rides and information on e-scooter laws, safety, and low-income programs
2. Hosted an e-scooter safety event and spoke to 450 people
3. Educated riders on the street, distributed handbills and attached educational flyers to scooters
4. Placed warning signs at main entry points to the Waterfront Park Trail and the Eastbank Esplanade alerting riders not to ride on these trails
5. Responded individually to 2,860 comments via the e-scooter online complaint and feedback form

E-Scooter Company Education and Engagement

1. Listed e-scooter laws, rules, and safety information on the scooter, in the app, and on flyers and social media
2. Dedicated brand ambassadors who educated the public about safe riding
3. Each company was required to have a helmet distribution plan. Together, the companies handed out or mailed 2,292 free helmets to customers


BIRD
BIRD

Data Sources and Methodology

This findings report is informed by quantitative and qualitative data collected throughout the pilot. Sources of data included:

- **Availability, trip, collision, and complaint data** provided by companies (data specifications were modeled after the Los Angeles Mobility Data Standard and can be found in Appendix B)
- **Injuries and collisions reported** by individuals, Portland Police Bureau, Portland Fire & Rescue, news outlets, and the companies themselves
- **ER and urgent care** hospital visit data, provided by the Multnomah County Health Department
- **A User survey** authored by PBOT and distributed by companies to users
- **A Citywide representative poll** by DHM Research (results can be found in Appendix J)
- **Observational studies** of user riding and parking behavior conducted by PBOT staff
- **Three separate focus groups** with Portlanders from the Black community, with community members from East Portland, and one with people with disabilities
- **Community feedback and complaints** provided via an online submission form, through email and phone calls, and through engagement with stakeholder committees

2018 Portland E-Scooter Routes Traveled

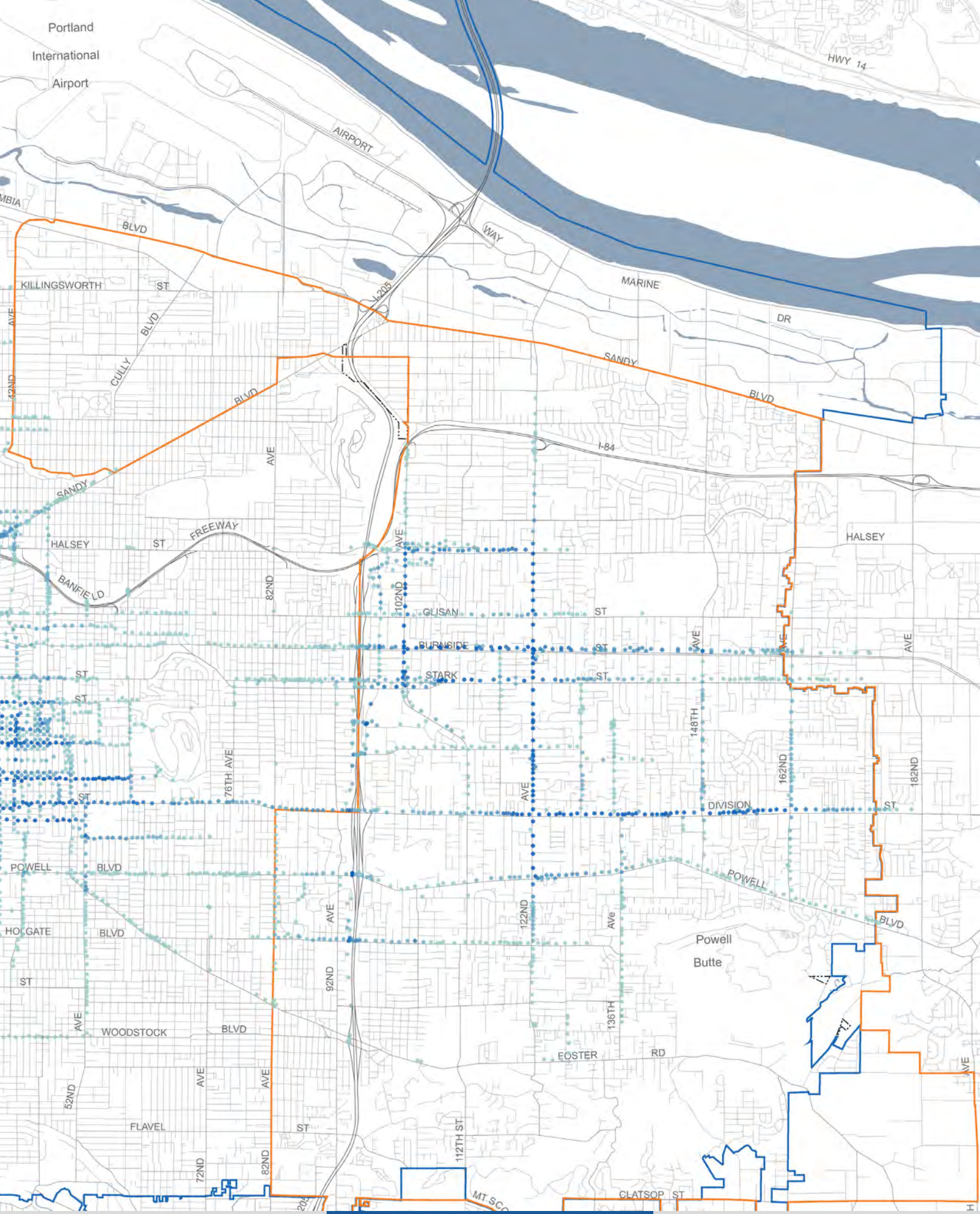
Informed by company-provided route data, this map shows routes traveled by e-scooter riders most often. Darker blue dots signify more trips taken on that street segment. Many of the heaviest utilized routes – including NE Going Street, SE 122nd Avenue, NW Johnson, SW Naito Parkway, and the Willamette Greenway Trail – are also a part of Portland's bikeway network. It is clear e-scooters were utilized in East Portland, where the City required companies to deploy at least 100 scooters.

Total Number of Trips

250 1000

Portland City Boundary

East Portland Pattern Area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2018 E-Scooter Pilot Findings

This Findings Report sets out to answer four key Transportation System Plan (TSP) goals:

- Reduce private motor vehicle use and congestion
- Prevent fatalities and serious injuries on Portland streets
- Expand access for underserved Portlanders
- Reduce air pollution, including climate pollution

QUESTION: Do e-scooters reduce private motor vehicle use and traffic congestion?

ANSWER: E-scooter trips replaced private motor vehicle use. However, the extent of motor vehicle use in managing e-scooter fleets is unknown.

Multiple responses from the e-scooter user survey support this finding:

- **E-scooters replaced personal car and ride-hailing trips.** Thinking of their last e-scooter trip, 34 percent of Portlanders said they would have either driven a personal car (19 percent) or hailed a taxi, Uber or Lyft (15 percent) had e-scooters not been available.
- **The auto trip replacement numbers were even higher among tourists and visitors (48 percent).** Thinking of their last e-scooter trip, 34 percent of visitors would have taken a taxi, Uber or Lyft, and 14 percent would have driven a personal vehicle had e-scooters not been available.
- **Portlanders reduced or considered reducing their auto ownership due to e-scooters.** Six percent of users reported getting rid of a car because of e-scooters and another 16 percent considered it.
- **Portlanders primarily used e-scooters for transportation.** Seventy-one percent of Portlanders stated they most frequently used e-scooters to get to a destination, while only a third of respondents (28.6 percent) stated they most frequently used e-scooters for recreation or exercise.

In addition to the survey results, pilot trip data shows a clear three-hour e-scooter evening commute peak, with 19 percent of all trips occurring between 3 p.m. and 6 p.m. on weekdays. As shown in the table to the right, weekend afternoons were also a peak riding time, with 10 percent of all trips occurring on Saturday and Sunday between 2 p.m. and 5 p.m.

While a large portion of e-scooter trips replaced car and ride-hailing trips, e-scooters also replaced lower-emission trips. Thinking of their last e-scooter trip, 42 percent of Portlanders said they would have either walked (37 percent) or ridden a personal bicycle (5 percent) had e-scooters not been available.

Finally, e-scooter operations likely added personal motor vehicle trips to the transportation system, to deploy and retrieve e-scooters each day. The extent and overall impact to the transportation system and traffic congestion is unknown.

Figure 2 : E-Scooter Use by Time of Day

Trip Start Time	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Grand Total
12 AM	1280	765	723	786	720	840	1470	6584
1 AM	989	517	475	518	545	575	1010	4629
2 AM	704	348	361	392	412	475	723	3415
3 AM	361	233	202	228	215	192	316	1747
4 AM	261	230	196	179	186	229	256	1537
5 AM	281	298	355	361	374	401	331	2401
6 AM	495	791	980	964	986	910	591	5717
7 AM	860	1839	2218	2354	2451	2187	950	12859
8 AM	1781	2942	3377	3640	3665	3430	2038	20873
9 AM	3515	3208	3408	3342	3579	3602	3730	24384
10 AM	5806	3746	3431	3552	3674	4110	5897	30216
11 AM	7935	5591	5188	5285	5611	6242	8081	43933
12 PM	9564	6958	6690	6654	7027	8058	9644	54595
1 PM	10584	7345	6614	6669	6952	8097	11120	57381
2 PM	10698	7731	7132	6796	6994	8726	12278	60355
3 PM	10754	8149	7855	7191	8204	9612	12175	63940
4 PM	10129	8677	8813	8532	8956	10125	11773	67005
5 PM	8485	8855	9235	9599	9468	9816	10165	65623
6 PM	6834	7477	7928	7923	8366	8516	8294	55338
7 PM	5303	5795	6231	6278	6709	7410	6474	44200
8 PM	4246	4526	4978	4838	5196	6330	5212	35326
9 PM	2112	2252	2439	2402	2539	3189	2579	17512
10 PM	1480	1478	1576	1510	1594	2124	1995	11757
11 PM	1007	1162	1110	1094	1299	1750	1620	9042
TOTAL	105464	90913	91515	91087	95722	106946	118722	700369

QUESTION: Do e-scooters prevent serious traffic injuries and fatalities? What are the safety impacts of e-scooters?

ANSWER: During the pilot period, scooter-related injuries increased however most scooter injuries were not severe enough to warrant emergency transport. There were no e-scooter-related traffic deaths during the pilot period. Eighty-four percent of emergency room visits were the result of an individual falling off a scooter.

The high number of public complaints regarding sidewalk riding, coupled with the 3 percent of injuries resulting from collisions with pedestrians, suggest an impact to pedestrian safety and comfort.

National data has found that when vehicle miles decrease, serious injuries and fatalities also decrease. With 34 percent of Portland scooter riders stating they replaced car trips with e-scooter trips, an increase in e-scooter use has the potential to contribute to a reduction in serious injuries and fatalities.

FINDING: Multnomah County Health Department's review found there were 176 scooter-related emergency room visits from July 25 – November 20, 2018. In the same period in 2017 there were 16 scooter-related emergency room visits. Visits increased from less than one per week before the pilot started to about 10 per week during the pilot period. Weekly visits peaked in late August and early September, then diminished to nearly pre-pilot levels before the pilot ended. This coincides with the typical annual peak in total traffic injury crash visits and vehicle miles traveled.

In addition to Multnomah County Health Department data, PBOT received 43 reports of collisions during the pilot period.

The scooter-related injury visits accounted for about 5 percent of total traffic crash injury visits during the pilot period. There were no e-scooter-related deaths during the pilot period. Although the number of e-scooter visits was lower than the number of bicycle-related visits (429), without comparable data on how many trips were taken and distance traveled while bicycling, we can't directly compare injury rates across modes.

There were several trends in the collision characteristics in triage notes:

- In 16 percent of reports, there was evidence of intoxication noted
- Helmet use was unknown in most injury reports (147, or 84 percent); in 3 percent of reports (six), it is noted that users were wearing a helmet, and in 13 percent of reports (23), it is noted that users were not wearing a helmet.

E-Scooter Related Emergency Room and Urgent Care Visits in Multnomah County July 25 – November 20, 2018

Colliding Mode	Total Visits	Percent of Total (Rounded to nearest tenth)
None/fall	146	83%
Car	22	12.5%
Truck	2	1.1%
Pedestrian (Scooter user injured after colliding with a pedestrian)	3	1.7%
Scooter (Pedestrian injured after being hit by a scooter user)	2	1.1%
Scooter (Scooter user injured after colliding with another scooter)	1	0.6%
Total	**176**	**100%**

Source: Multnomah County Health Department

National research has found that the strongest variables connected to traffic fatality rates are the number of automobile vehicle miles traveled and vehicles per capita.[2] With 34 percent of Portland scooter riders stating they replaced car trips with e-scooter trips, an increase in e-scooter use has the potential to contribute to a reduction in serious injuries and fatalities.

2. Ahangari, H., et. al. (2017). Automobile-dependency as a barrier to vision zero, evidence from the states in the USA. Accident Analysis and Prevention, 107(77-85).

Figure 3 : Complaints by Category

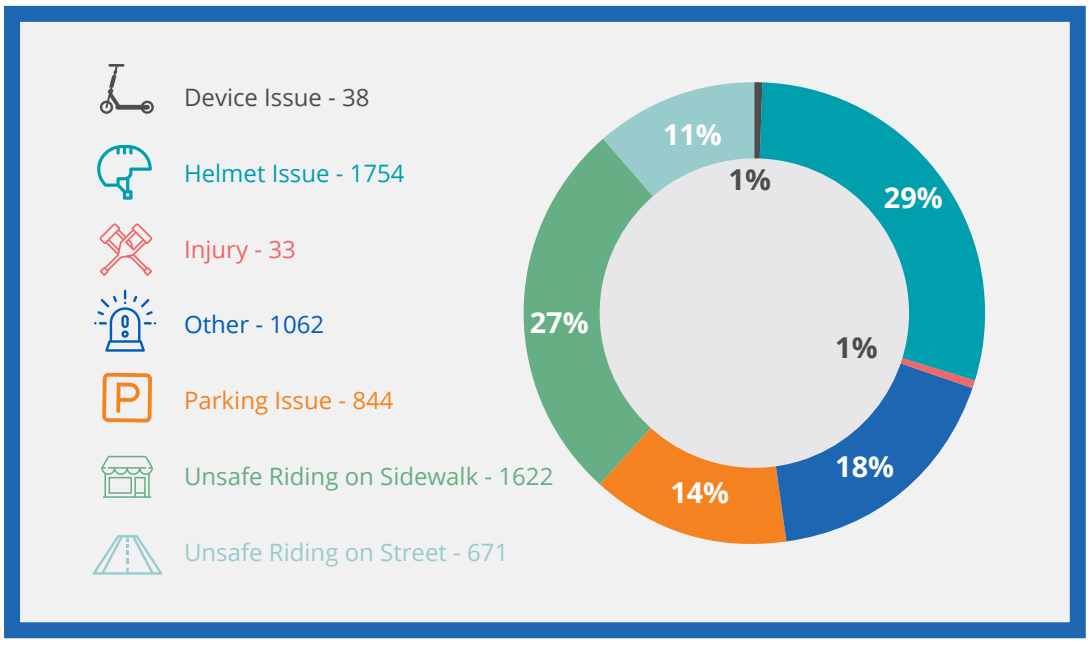
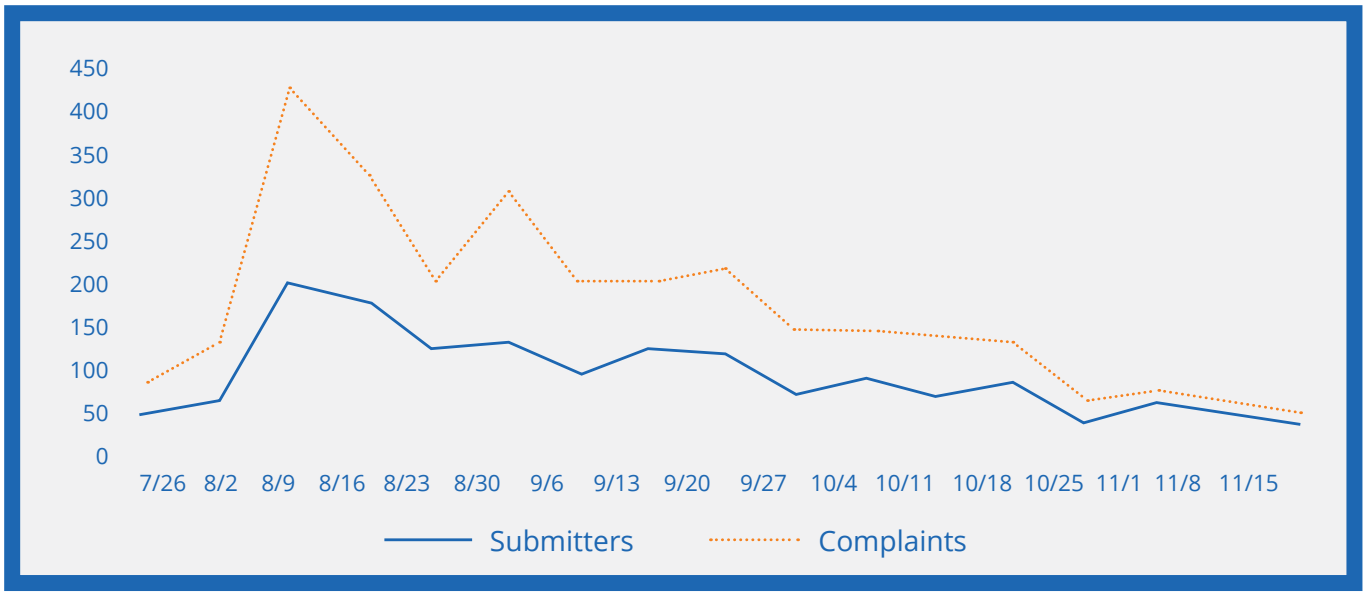


Figure 4 : Unique Complaints and Submitters per Week



FINDING: Sidewalk riding reduced pedestrian comfort.

We heard from Portlanders throughout the pilot that illegal sidewalk riding made sidewalks feel unsafe or uncomfortable for people walking or using mobility devices.

- 1,622 reports of sidewalk riding were submitted to PBOT's online form, 26.9 percent of all reports.
- Sidewalk riding was a key concern voiced by the Pedestrian Advisory Committee (PAC), TriMet's Committee on Accessible Transportation (CAT), and the Portland Commission on Disabilities (PCOD).

At TriMet's CAT, one committee member spoke to their fear of getting hit by a scooter rider: "I have to be really careful when stepping out of buildings now... scooters riding on the sidewalk is a safety issue for me and for others I know with disabilities."

With speeds capped at 15 mph, scooters are appropriate for bike lanes or low-volume streets but they are too fast for use sidewalks, where they make it unsafe or uncomfortable for people walking or using mobility devices.

Reduced safety and comfort of our most vulnerable road users undermines our citywide goals to prioritize people walking over all other modes. PBOT's Transportation System Plan (TSP) calls for decisions to consider the needs and safety of each group of users, and to ensure that "changes do not make existing conditions worse for the most vulnerable users" (see Appendix C).

In response to the public's concerns raised about sidewalk riding, PBOT conducted additional user education and on-the-street engagement and user observations.

FINDING: Users demonstrated a strong preference for bikeways and other protected infrastructure. In their absence, or on higher-speed streets, sidewalk riding increased.

In the PBOT user survey, respondents ranked the bike lane as their preferred place to ride and sidewalks their least preferred place to ride.

To better understand on-the-ground practices, PBOT conducted user riding observations. Staff observed 128 e-scooter users at seven locations across the city. Five of the seven locations had bike lanes on at least one street. All user observations were conducted during two-hour periods from 4 to 6 p.m., over eight days between October 2 and October 12, 2018. PBOT staff tallied the number of individual users, perceived gender, helmet use, facility type used (bike lane, with traffic, etc.) and took note of violations, such as riding in a park or riding the wrong direction with traffic. Observations showed that sidewalk riding was lowest on streets designed for people walking and rolling.

- When riding on a street with a neighborhood greenway, **zero percent** of riders used the sidewalk.
- When riding on a street with a protected bike lane, **8 percent** of riders used the sidewalk.
- When riding on a street with a bike lane, **21 percent** of riders used the sidewalk.
- When riding on a street with no bike facilities, **39 percent** of riders used the sidewalk.

When posted speed limits are 30 MPH or higher, most users rode illegally on the sidewalk.

- Where the speed limit is 20 mph, **18 percent** of riders used the sidewalk.
- Where the speed limit is 30 mph, **50 percent** of all riders used the sidewalk.
- Where the speed limit is 35 mph, **66 percent** of riders used the sidewalk.

"I have to be really careful when stepping out of buildings now... scooters riding on the sidewalk is a safety issue for me and for others I know with disabilities."

-Committee on Accessible Transportation Committee Member

FINDING: Helmet use is rare.

PBOT staff observed 90 percent of riders do not wear helmets. Of all complaints received by PBOT, 1,754 (29.1 percent) were regarding users not wearing helmets.

FINDING: While the majority of e-scooters are parked correctly, more work is needed to assure safety and access for pedestrians and people with disabilities.

PBOT staff conducted scooter parking observations from October 19 through November 20, 2018. Staff observed and recorded 357 parked scooters across the city with 67 percent observed in Southwest Portland, 17 percent observed in East Portland and 16 percent in other quadrants in Portland.

Parking observations showed:

- **72.8 percent** Properly parked in the furnishing zone (not blocking bike or pedestrian movement)
- **2.8 percent** Impeded ADA access (blocking access ramp, handrail, or curb cut)
- **5.3 percent** Completely blocked pedestrian movement (In middle of a sidewalk)
- **8.1 percent** Partially blocked pedestrian movement (placed partially outside the furnishing zone or parked next to a building)
- **0.6 percent** Parked within 30 feet of a bus stop, on a MAX or Streetcar platform (measured from the bus stop counter flow to traffic)
- **10.4 percent** Other (parked next to bike racks, in a park, on a street with no sidewalk or furnishing zone, or on private property)

Improperly parked scooters after a user's ride presented a challenge, especially for people with disabilities. This challenge increases in areas of Portland where the sidewalk is narrow or there is no sidewalk. Anecdotally, as the pilot progressed, staff received fewer complaints and saw better compliance to these rules.

QUESTION: Do e-scooters expand opportunity and access for underserved Portlanders?

ANSWER: E-scooters have the potential to expand opportunity and access for underserved Portlanders, though barriers exist.

FINDING: While many Black Portlanders and East Portlanders expressed enthusiasm and support for e-scooters, focus group participants also expressed an overall concern with traffic safety and being targeted for racial profiling and harassment. The prohibitive cost of renting and a lack of knowledge of e-scooter laws and low-income plans also presented barriers to use.

In a citywide representative poll, 74 percent of people of color viewed e-scooters positively. People living on low incomes also held positive views of e-scooters (66 percent).

PBOT hosted two focus groups in early November 2018. Portlanders from Black communities and East Portland communities participated in two focus groups, one with 10 participants and one with 12 participants. Both focus groups were facilitated and hosted by Self-Empowerment Inc (SEI).

Out of 22 Portlanders who participated, less than half (eight) had ridden an e-scooter. Focus group participants expressed enthusiasm as well as an overall concern for traffic safety and being targeted for racial profiling and harassment.

One individual spoke to the historical and current criminalization of people of color, stating, "it is not in our culture to pick up something off the street, ride it, and leave it for the next person." For some focus group participants, the overall threat of an escalating incident outweighed the desire to try e-scooters.

Other stated barriers to e-scooter use included needing to transport children, not having a helmet, not having a safe place to learn to ride, age restrictions, a reluctance to link a credit card to the app, and fear of being overcharged. Nearly all focus group members expressed a desire for more information, including what the e-scooter laws are and how to use the service.

Parents, youth, and single adults had differing views on e-scooters. Adults who did not have children were most enthusiastic. This group viewed e-scooters as another great transportation option, and a way to save money on Uber, Lyft, and taxis. Parents were the least likely to have ridden and did not see e-scooters as a way to transport their family. Youth expressed that e-scooters were fun and helpful to get to after-school activities, especially in the summer when their free youth bus pass is inactive. About half of the focus group members didn't know they could make money charging e-scooters, and most expressed interest in this kind of work.

According to reports from e-scooter companies, only 47 users were on low-income plans. While two companies stated they offered cash payment plans, they did not report that any users signed up for those plans. These small numbers, along with staff observations, suggest that companies did not adequately promote their low-income fares.

FINDING: East Portland deployment led to e-scooter utilization.

East Portland has historically been underserved by the transportation system, and PBOT was interested in understanding the utility and value of e-scooters in East Portland. On average, 243 e-scooters were deployed to East Portland (9.8 percent of the total fleet). Though this was significantly under the 300-scooter minimum requirement, 44,155 trips originated in East Portland during the pilot period. (See additional information in East Portland deployment compliance finding section.) This demonstrates demand for additional transportation options. One significant difference in e-scooter use in East Portland was the average trip length. Trips in East Portland averaged 1.6 miles, while in the Central City, trips averaged one mile.

In our user survey, we heard two distinct messages from East Portlanders. Many community members expressed appreciation that they had access to this new transportation option, and others expressed a concern for a lack of safe infrastructure:

"I LOVE having the scooters be part of the mix. They're fast, fun and convenient (when available, there needs to be a lot more). I live on 114th & E Burnside and have been pleased to see reasonable distribution of the scooters as far east as 150th. Keep and EXPAND the scooters!"

"I'd really like to see fewer cars everywhere, but the major thoroughfares are especially dangerous for non-driving travelers (peds, bikes, and now scooters)."

Comments from users and trip statistics show the desire for safer infrastructure and additional transportation options, such as e-scooters.

FINDING: Among people with disabilities, we heard that while e-scooters hold promise as a transportation option, improperly parked scooters impact access and safety for people with visual impairments and people who use mobility devices.

Seven Portlanders with disabilities and two City staff with disabilities participated in one focus group in early November, facilitated by staff in Portland's Office of Equity & Human Rights. The participants represented a wide range of mobility, hearing, and vision abilities.

Among people with disabilities, we heard that while e-scooters might not be a good fit for everyone, having more transportation options is a good thing for Portland.

While e-scooters hold promise, several individuals with disabilities expressed concerns about safety and user behavior enforcement. One participant, who is blind, said it is challenging to walk and that they bump into scooters often. Parking issues were the most challenging and concerning for focus group members when scooters blocked ADA access at a transit stop or access to ADA parking spots.

In the focus group, two individuals who had ridden e-scooters used them as a transportation option. For people in the focus group who haven't ridden, balance and blindness were stated barriers. For people who cited balance issues, a three- or four-wheeled scooter could be a good accommodation.

QUESTION: Do e-scooters contribute to a reduction in air pollution, including climate pollution?

ANSWER: More experience with e-scooters and more data collection are needed to determine whether e-scooters directly contribute to a reduction in greenhouse gases.

Based on our preliminary analysis of the available data, it is uncertain if e-scooters help advance Portland's Transportation System Plan goals and policies by contributing to a reduction in air pollution, including climate pollution. However, early findings show that e-scooters reduced automobile trips.

Analysis of the PBOT's user survey suggests that e-scooters facilitate mode shift, most notably away from walking, single occupancy vehicles, and ride-hailing. Comparing these percentages to the total number of scooter miles traveled during the e-scooter pilot (801,887 miles), we estimate that e-scooters replaced approximately 301,856 vehicle miles that would have been traveled in single occupancy vehicles and other shared vehicle trips (see Appendix F). Given the geographic distribution of e-scooter rides during the pilot, it is reasonable to expect that many of those miles would have occurred in the Central City and inner eastside neighborhoods, areas which experience traffic congestion issues. Using the U.S. Environmental Protection Agency's average CO2 emissions per vehicle mile, we estimate that during the pilot, e-scooters prevented automobiles from emitting approximately 122 metric tons of CO2, equivalent to removing nearly 27 average passenger vehicles from the road for a year.

E-Scooters replaced approximately 301,856 vehicle miles

While these findings are promising, it is important to note three key limitations to this analysis. First, whether survey respondents would behave in accordance with what they stated in the survey is unknown. Second, without occupancy data on the number of shared Uber and Lyft rides (i.e., two or more riders), we assumed that 10 percent of those rides would have been shared and 90 percent would have been single rides. Third, we simply do not have the data necessary to account for the emissions associated with e-scooter companies' business models. This includes data about emissions associated with e-scooter companies' supply chains, manufacturing processes, charging and deployment operations, frequency of scooter replacement, their waste stream, or more. Without these data, it seems reasonable to assume that if those emissions were accounted for, then they could potentially reduce or eliminate the greenhouse gas benefits modeled above. Understanding more about e-scooter-related emissions would also help evaluate the climate impact of e-scooter trips replacing walking and personal bicycling trips (42%) as reported in the user survey. Clearly, more data are needed to determine whether or how e-scooters contribute to Portland's adopted policy goals of reducing air pollution, including climate pollution.

QUESTION: Did companies comply with the permit requirements?

ANSWER: Overall, companies' compliance with the permit requirements varied. PBOT worked with individual companies on improving performance and better understanding each company's operational realities.

FINDING: The companies' compliance with the permit's data requirements varied. All companies supplied APIs to PBOT, however some key terms were not universally used and defined, which led to inaccurate data reporting by the companies.

PBOT required a robust suite of Application Programming Interfaces (APIs) including device availability, trips (start, end, and route data), collisions, complaints, and enumerated values that are referenced in the API specifications (Appendix B). This set of data was a primary source for both the findings report and company compliance.

The pilot revealed that participating companies categorize their device information differently and adapting to permit API specifications wasn't as straightforward as originally speculated. For example, it was discovered toward the end of the pilot that Bird's availability data, which was informing our compliance dashboards, was underreporting their Portland fleet. This issue appeared to be the result of undefined terms, thought to be universally understood, which was ultimately corrected. To rectify this discrepancy, PBOT asked for historical data to supplement what was collected during the pilot to produce a more accurate reflection of the pilot for the purpose of this report.

FINDING: Two companies complied with the citywide fleet requirement.

Companies were required to make 90 percent of their permitted fleet available per day. Data shows that Bird and Lime performed the best, deploying almost 100 percent of their fleet on average throughout the pilot. Skip averaged below 90 percent of the citywide fleet requirement.

Skip consistently deployed fewer devices due to a misunderstanding of the requirement, which the Bureau clarified after identifying the compliance issue. Later in the pilot, Skip chose to temporarily halt deployment due to rain, which has been accounted for in this compliance report.

Compliance was calculated based on data received through the API from all companies and historical data provided by Bird

FINDING: Only one company complied with the East Portland fleet requirement.

PBOT required companies to deploy at least 100 scooters or 20 percent of their fleet (whichever is less) in East Portland. Data shows that Bird performed the

best, deploying more than 100 percent of the minimum required scooters on average throughout the pilot. Both Lime and Skip deployed below 90 percent of the minimum required scooters on average throughout the pilot.

Compliance was calculated based on data received through the API from all companies and historical data provided by Bird.

FINDING: While companies performed well in responding to emergency and non-emergency response requirements from the City, companies' complaint data was not reported to PBOT's expectations. Therefore, we are unable to analyze how responsive companies were to public complaints.

Lime was the only company to report community-generated complaint data. However, all companies consistently responded to emergency and non-emergency requests from the City. Companies had between 20 and 60 minutes to respond to a City-initiated complaint depending on the nature of the complaint. Each company either met or made a good faith effort to meet these time requirements.

FINDING: Companies complied with capping the speed of their e-scooters. However, PBOT staff vehicle testing suggests several factors affect speed.

Early in the pilot, a local news outlet reported that e-scooters exceeded the maximum speed permitted in the administrative rule by almost 5 mph. Responding to this concern, three staff members conducted a test to understand the variability of scooter speeds and the ability of companies to modify their vehicles to comply with local regulations. Staff chose a minimally populated street with a low grade and tested the speed of scooters from each company using both a smartphone app and a handheld speed-reader. The test resulted in speeds ranging from 14.5 mph to 18.6 mph. Several factors, including but not limited to street activity, grade, user weight, user driving style, and environmental conditions, contributed to the variability in device speeds. Companies asserted that while these variables exist and should be reflected in local regulations, they can also cap the speed of devices within a reasonable margin.

FINDING: Companies complied with user education requirements.

Companies educated their e-scooter users by listing applicable laws in their apps, on their vehicles, and distributed educational flyers and helmets at events.

In addition, companies required their users to take a picture of their parked e-scooter at the end of their trip. PBOT is unclear whether the pictures are monitored by the companies to ensure users are properly parking e-scooters.

FINDING: With regards to deployment locations, company compliance improved as the pilot progressed, but was still not satisfactory.

PBOT's permit parking requirements reflect our values of accessibility for our most vulnerable road users – pedestrians and people with disabilities. The permit language prohibited deployment under 19 conditions.

Major issues included deployments blocking access to transit, blocking access to ADA facilities, blocking pedestrian throughways, on private property, and in neighboring jurisdictions.

Through frequent management conversations, deployment compliance improved as the pilot progressed. The companies were quick to respond to specific deployment modifications PBOT requested.

2018 E-Scooter Pilot Financials

The Purpose section of Portland's New Mobility Shared Electric Scooter administrative rule, TRN-15.01 states that "1.D. Shared Scooter fees, surcharges and penalties will be placed in a New Mobility Account to be used by PBOT for administration and enforcement; evaluation; safe travel infrastructure; and expanded and affordable access."

The Fee Schedule in the Shared Electric Scooter Permit included:

- Permit Application Fee: $250
- Pilot Permit Fee: $5,000
- Per-Trip Surcharge: $0.25

Together, these permit and ride fees covered project start-up and program administration costs for the e-scooter pilot, as well as educational materials and public outreach.

Permits & Fees		
Pre-Pilot Phase		
n/a	$	-
Subtotal	$	-
Pilot Phase		
Application and permit fees	$	15,500
Per trip surcharge	$	187,577
Fines and penalties	$	9,000
Subtotal	$	212,077
Post-Pilot Phase		
n/a	$	-
Subtotal	$	-
Total Permits & Fees	$	212,077

Expenses		
Pre-Pilot Phase		
Program design	$	48,995
Subtotal	$	48,995
Pilot Phase		
Program administration and outreach	$	155,415
Educational materials	$	11,455
	$	
Subtotal	$	166,870
Post-Pilot Phase		
Program evaluation	$	71,417
Subtotal	$	71,417
Total Expenses	$	287,282
Balance	**$**	**(75,205)**


BIKE
SIGNAL


GPS Tracked

Conclusion and Recommendations

E-scooters have the potential to advance Portland's transportation goals. This is one of this report's key findings. This report demonstrates that as Portland grows and traffic congestion gets worse, e-scooters can move more people safely and efficiently in the same amount of space. This helps reduce reliance on automobiles and shift trips to an efficient, potentially less-polluting travel option. We believe there is a preliminary indication that e-scooters are a less-polluting travel option. However, we need more data – especially regarding e-scooter operations and lifecycle costs – before we can definitively say how much or even whether e-scooters directly contribute to a reduction in greenhouse gasses.

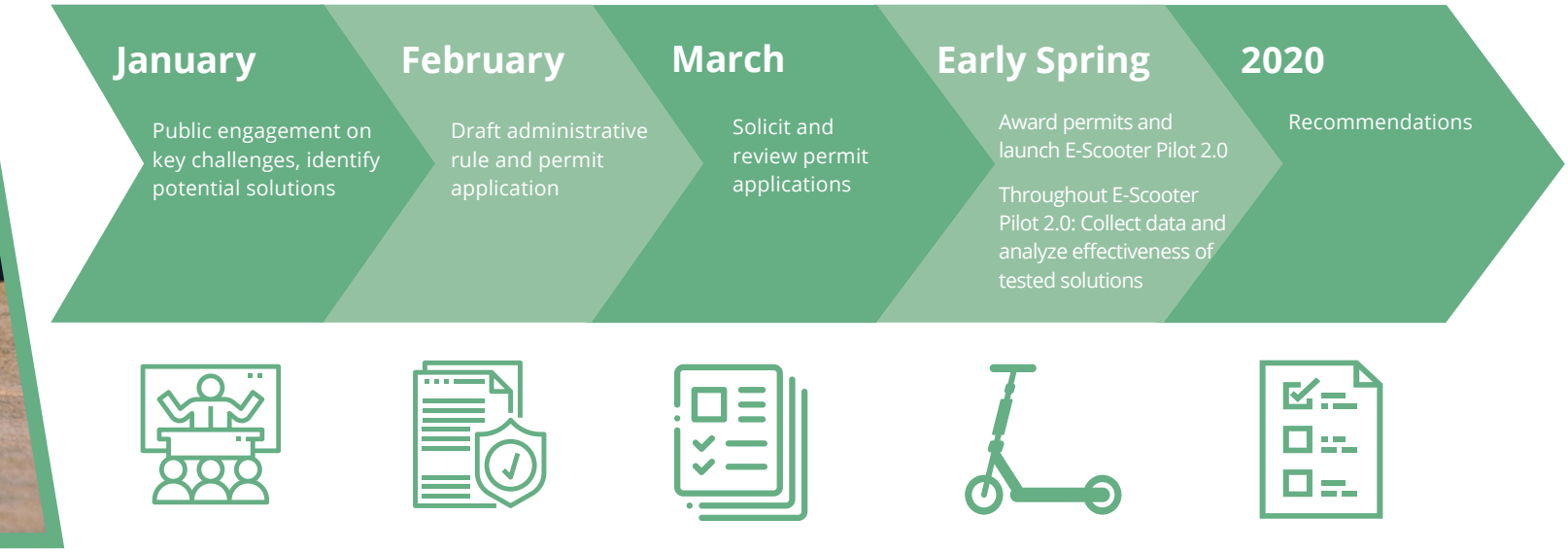
During the pilot, riders took more than 700,000 e-scooter trips on various types of streets. Throughout the city, sidewalk riding was lower along streets with lower speeds or designated bikeways. For us, this clearly demonstrates how important it is to have protected facilities that minimize conflicts between pedestrians, e-scooters, and cars.

For all of the positives about scooters that emerged during the pilot, we also learned valuable lessons about the challenges related to making scooters a permanent part of Portland's transportation ecosystem.

Given the scale and scope of these challenges, we believe it is advisable to conduct a second pilot in 2019. This pilot will be longer to give us more time to test innovative solutions to the challenges that emerged this past summer and fall. We will specifically focus our efforts on improving equitable access across the city and ensuring safe and legal riding and parking.

Next Steps

With the release of this report, PBOT plans to conduct additional public and stakeholder engagement through February 2019. Public engagement will inform a revision of PBOT's administrative rule and permit application. PBOT anticipates having e-scooters on the ground again in early spring.



E-Scooter Findings Report Appendix

The E-Scooter Findings Report Appendix is available online at: https://www.portlandoregon.gov/transportation/e-scooter

A. New Mobility Shared Electric Scooter Administrative Rule - TRN-15.01

B. Permit Application

C. TSP Goals

D. API Data Methodology and Limitations / Assumptions

E. Data Analytics Process

F. Climate Reduction Methods

G. User Survey Results

H. Complaint Form Questions

I. Multnomah County Health Department Injury Data

J. DHM Research E-Scooter Pilot Project Survey Report

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