

PBOT

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ADVISORY BIKE LANES AND SHOULDERS REQUEST TO EXPERIMENT

Submitted to:

Federal Highway Administration, Office of Transportation Operations

Submitted by:

City of Portland Bureau of Transportation

Revision 1

January 25, 2022



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Background

Portland has a reputation for being a good city to walk and bike as a means of transportation. Walking and bicycling are fundamental pillars of Portland's fully integrated transportation system, with plans for more than a third of all daily trips taken by walking or bicycling. The city continuously focuses on adding and improving walking and bicycling infrastructure as part of multimodal capital improvements, maintenance, and safety interventions. However, there is much more to do to build out the walking and bicycling networks in the city. An incomplete pedestrian network limits the city's ability to absorb growth and meet the livability needs of residents, including safe walking access to public transit and essential services. Safe and attractive bikeways are needed to connect neighborhoods across the city.

As part of the Portland's effort to improve walking and bicycling, the City adopted PedPDX – Portland's citywide pedestrian plan – and the Portland Bicycle Plan for 2030. These plans call for the provision of walking and bicycling infrastructure citywide – even in the hardest to reach neighborhoods. Advisory Bike Lanes and Shoulders are included as a facility type in both plans but have not yet been implemented due to outstanding questions about traffic control device guidelines, application criteria, and experimental status with FHWA. The Portland Bureau of Transportation (PBOT) wants to clarify the design and application of traffic control devices necessary to implement Advisory Bike Lanes and Shoulders.

Nature of the Problem

While many of Portland's older neighborhoods feature streets that can accommodate typical walking and bicycling infrastructure, the city also has many neighborhoods with narrow streets, often lacking curbs and sidewalks or pedestrian facilities. Many of these substandard streets are characterized by narrow pavements and rights-of-way, steep or environmentally-sensitive sideslopes, and streetside constraints like buildings or retaining walls, and it is either infeasible or financially prohibitive to install sidewalks or conventional bikeways in the near future. Nevertheless, these streets serve as the access to homes, transit, and other destinations in these neighborhoods, and warrant solutions to provide safe access for people walking and bicycling.

Oregon State Law allows streets that are 18' or narrower to be designated as shared streets, with posted 15 mph limits and legal walking in the street. For streets that are wider than 18' but lack sidewalks, a solution is needed to designate safe access.

Some of these narrow streets also carry policy designations as bikeways, yet topographic and built barriers constrain their improvement with conventional bicycle facilities. Providing a bicycle facility on these streets is desirable to accomplish the city's goals of providing a complete citywide bicycling network.

Proposal

PBOT proposes experimenting with Advisory Bike Lanes and Advisory Shoulders. These treatments are expected to improve access, legibility, safety, and attractiveness for walking and bicycling along treated streets, and clarify where drivers should expect to encounter these users. This request for experimentation will allow the City of Portland to use pavement markings to designate Advisory Bike Lanes and Advisory Shoulders as follows:

Advisory Bike Lanes (ABL) will be used on streets that are not wide enough to accommodate designated bicycle facilities. Advisory Shoulders (AS) would also allow for pedestrian use when there are no pedestrian facilities. Dashed white lane markings will be applied to define the inside edge of Advisory Bike Lanes and Advisory Shoulders. Bicycle stencils will be used in Advisory Bike Lanes. No additional markings beyond the dashed lane markings are proposed to be used in Advisory Shoulders. Signs to indicate a two-way roadway may be used.

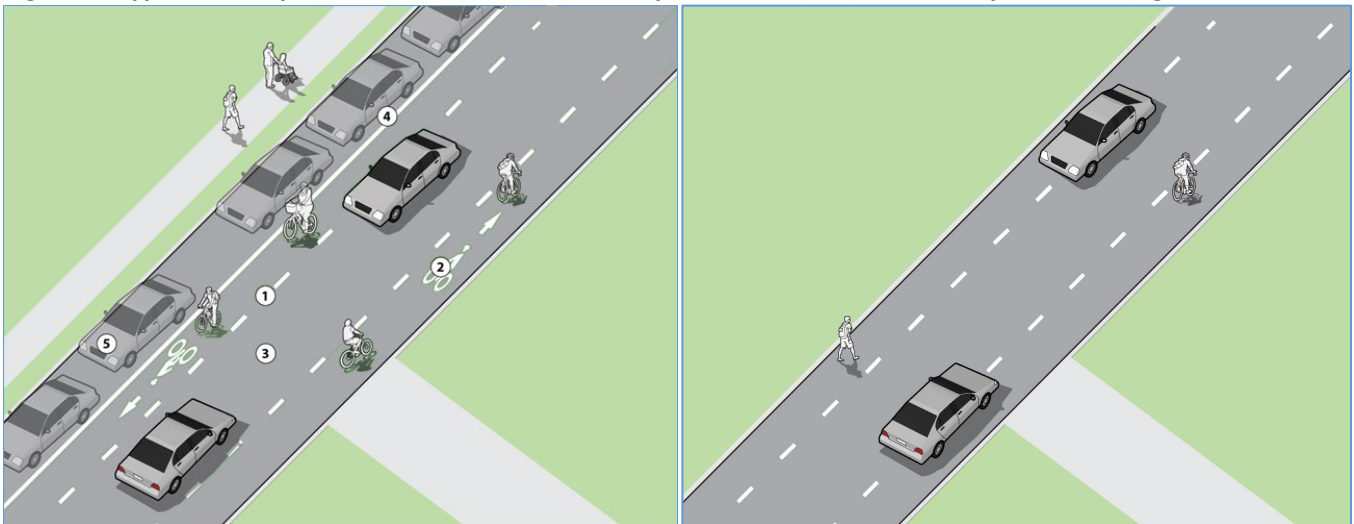
A solid white edge line may be used where on-street parking or loading is adjacent to the Advisory Bike Lane or Shoulder or where it is desirable to define the edge of pavement (such as where there is no curb). No parking signage may be installed where parking is prohibited along an Advisory Bike lane or Shoulder.

Where the Advisory Bike Lanes or Shoulders continue through an intersection as the major (uncontrolled) street, the broken white markings may continue through the intersection.

The design of Advisory Bike Lanes or Shoulders applies traffic control markings in a way not directly described by the MUTCD. Typical design elements for advisory bike lanes are shown in Figure 1 and include:

1. Advisory lane markings (Described in the Design Details section)
2. Lane use marking and signs (Described in the Design Details section)
3. Two-way travel lane with no center line
4. Edge line markings (optional)
5. On street parking lane (optional)

Figure 1: Typical and Optional Elements of an Advisory Bike Lane (left) or Advisory Shoulder (right)



Supporting Data

North American jurisdictions have installed Advisory Bike Lanes across a range of community character types (small town vs. urban), land use contexts (commercial and residential), and roadway classifications (local, collector). According to Alta Planning + Designs report *Lessons Learned: Advisory Bike Lanes in North America* (2017), all installations share some common characteristics:

- Low-to-moderate traffic volume ($\leq 5,000$ ADT)
- Low-to-moderate motor vehicle speed (≤ 30 mph)
- A roadway width too narrow to support dedicated bicycle lanes without roadway widening or removal of other high-demand street elements

Approximately 30 formal installations exist in North America as of 2019. These installations had ADTs between 200 and 5,000 and posted speeds of 25-30 mph. They used a motor vehicle lane width of 9-22 feet, and treatment lengths of 900-2,400 feet.

Six installations completed evaluation studies, generally finding:

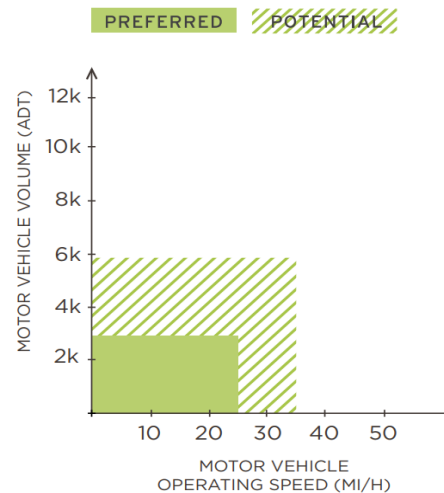
- a reduction or no change in crash rate
- a reduction or no change in motor vehicle speed
- a reduction or no change in motor vehicle volume
- mixed results with respect to bicycle volume changes.

While more research is needed on the safety and operations of this facility, these installations conform to the contextual guidance provided for the Advisory Shoulder treatment featured in the FHWA *Small Town and Rural Multimodal Networks* document as shown in Figure 2. While Advisory Bike Lanes have been used on higher volume streets outside of North America, it is PBOT's intent to use this range of volume and speeds to guide decision making around Advisory Bike Lane and Advisory Shoulder installation.

Advisory Bike Lanes and Advisory Shoulders are emerging treatments in the US. While all required traffic control device elements necessary to implement the treatment are included in the MUTCD, the manual does not fully address the specific combination of traffic control devices.

FHWA provides experimentation guidance on Advisory Bike Lanes, referred to as "Dashed Bicycle Lanes" on their [bicycle and pedestrian program website](#).

Figure 2: Speed and volume criteria for advisory bike lane installation



Adapted from FHWA *Small Town and Rural Multimodal Networks* report. Preferred traffic volume range raised to 4,000 ADT to reflect urban operating conditions.

Design Details

Lane Design

A key design specification for Advisory Bike Lanes and Advisory Shoulders is the street width allocation between the center lane and the bike lane or shoulder. Most literature for Advisory Bike Lanes suggests minimum widths of 5 feet for the bike lane and 9 feet for the center lane, which would be the likely allocation for a 19-foot wide street. For wider streets, the allocation of space would be intended to provide adequate width for the expected vehicle and user types while clearly communicating the two-way nature of the center lane. PBOT anticipates using a range of 10'-14' for the center lane and 5'-8' for the bike lanes or shoulders.

Examples of potential lane width allocation by street width and use are provided in Appendix A, while specific widths for each site are detailed in the Test Locations and Treatment Details section (below).

Markings and Signs

PBOT will use typical pavement marking materials (paint, MMA, or thermoplastic) for white lane striping. PBOT will apply the materials through their maintenance group or through a bid process to a private contractor.

PBOT anticipates using 8-inch dotted white lane markings of 3 feet with gaps of 3-6 feet, and 4-inch solid white outer edge line markings when needed (outer edge lines maybe used adjacent to on-street parking or curbsless pavement edges). The advisory lanes will terminate 50 feet or more before stop-controlled approaches and at least 70 feet before signal-controlled approaches. Bike stencils will be used in advisory bike lanes but not advisory shoulders. Figure 3 depicts the typical striping approach.

Appropriate signage to clarify the two-way operations (W6-3) may be installed as part of the experiment. These signs are shown in Figure 4. Signage would meet MUTCD standards. No Parking signs may be installed where parking is not allowed.

Figure 3: Typical Markings (adapted from draft NCUTCD information). Bike stencils will be used in advisory bike lanes but not advisory shoulders.

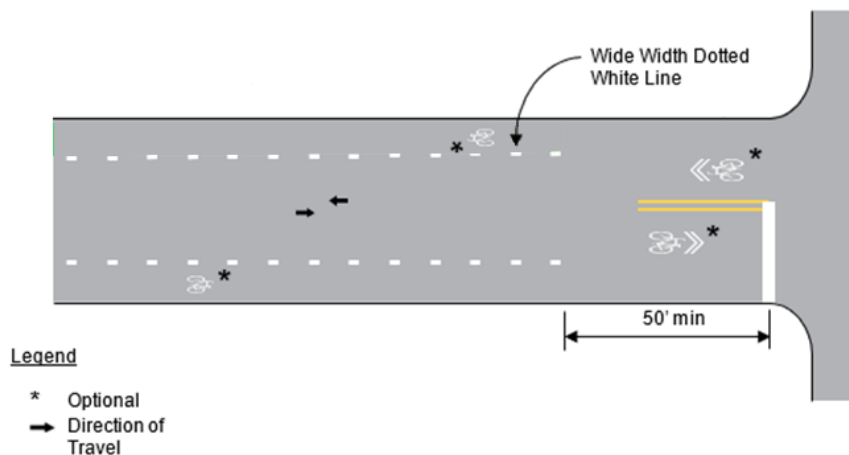


Figure 4: Typical sign (optional)



Traffic Control Device Compliance

A review of the compliance of existing traffic control devices with MUTCD will be included in the design of each project. Features such as speed bump markings and speed limit signs will be updated to current standards.

Proposed Evaluation Plan

PBOT will collect and analyze data to support findings related to experimental treatments. The proposed evaluation approach also includes assessments of:

- **User Comprehension:** Do users understand the facilities, including markings and signage? Are there observed differences in comprehension based on facility design? The proposed methodology includes observing operations along each treated street and quantifying the number of users whose behavior meets or does not meet expectations by mode of travel and movement type (unimpeded travel, passing maneuver).
- **Compliance:** Are users operating as intended on the facilities, including generally staying in their designated space? The proposed methodology includes observing on-site operations along each treated street and assessing by mode of travel, and outcome of incursion (did a moving or parking incursion affect another user or not?). PBOT will also collect and review video footage of operations at some sites as budget permits to assess by time of day.

The table below lists data to be collected as part of the user compliance evaluation approach described above.

Street Characteristics (fixed)	Unit of Measure
Street width, lane widths	Feet
Posted speed	mph
Before/After Data	Unit of Measure
Parking configuration and utilization	Number of parking lanes (0 to 2), Utilization (high, med, low)
Motor vehicle counts	Average daily traffic (automated counters)
Motor vehicle speeds	Average and 85 th percentile speeds (automated counters)
Bicycle counts	Average daily count (automated counters)
Pedestrian counts (shoulder installations only)	Two-hour count
Compliance evaluation	Percent of correct use by mode (auto, ped, bike)
Crash data (where available)	Number of crashes by mode and severity

Observation and Review (Compliance Evaluation)

User compliance will be assessed through observations at each of the proposed treatment locations, using PBOT staff or a data collection contractor. In-person or video data will be collected in a weekday two-hour period between 2 – 6 pm. Observations will be documented at each location within one month of implementation, at two to six months after implementation, and each six months thereafter (plus/minus a month) for the first two years after installation. Observations will be preferred between April and October when bicycling is more prevalent in Portland. The observations will assess the questions in the following table:

Mode of Travel	Assessments
Drivers	<ul style="list-style-type: none"> • Where are motorists driving when bicyclists and oncoming traffic are not present (within center lane, or with passenger-side wheels into bike lane)? • Where are motorists driving when bicyclists are present (within center lane or with passenger-side wheels in bike lane)? • When a motorist encounters oncoming traffic, are they shifting into the bicycle lane and then returning to the center?
Bicyclists	<ul style="list-style-type: none"> • Where are bicyclists riding (within advisory lane or within center lane)?
Pedestrians	<ul style="list-style-type: none"> • Where are people walking (within advisory lane or within center lane)?

Control Sites

PBOT will collect data on motor vehicle counts, speeds, and bicycle counts at three control sites as a basis of comparison. These sites will likely be shared street neighborhood greenways in order to provide a statistically-significant sample of bicycle counts.

Schedule

Time Period	Activity
February 2022 – December 2022	Advance design concepts
May 2022 – October 2022	Start “before” data collection
July 2022 – November 2023	Begin installations
April 2023 – April 2024	Start “after” data collection (ongoing)
August 2022	Semi-annual progress report #1
February 2023	Semi-annual progress report #2
August 2023	Semi-annual progress report #3
February 2024	Semi-annual progress report #4
August 2024	Semi-annual progress report #5
February 2025	Semi-annual progress report #6
August – October 2025	End evaluation/monitoring – Deliver final report to ODOT and FHWA

Test Locations and Treatment Details per Location

PBOT intends to install advisory lanes at the locations shown below. The final decision to advance a project will be based on public engagement and more detailed design, and small number of these sites may fail to advance.

Advisory Lane Location	Map	Length (mi.)	Hours of Operation	ADT	Juris.	Expected Typical Configuration
NE San Rafael Street, 111th to 122nd	1	0.5	All Times and Days	1,400	City of Portland	Segments with no curbs or sidewalks; Two AS’s or ABLs at approx. 6’ and auto lane at approx. 12’.
NE San Rafael Street, 122nd to 132nd	1	0.5	All Times and Days	4,500	City of Portland	Curbed with on-street parking; Two ABLs at approx. 6’ and auto lane at approx. 12’.
NE San Rafael Street, 132nd to 148th	1	0.8	All Times and Days	2,400	City of Portland	Segments with no curbs or sidewalks; Two AS’s or ABLs at approx. 6’ and auto lane at approx. 12’.
NE Sacramento Street, 132nd to 148th	1	0.9	All Times and Days	n/a (<2,000)	City of Portland	Curbed with on-street parking; Two ABLs at 5’-7’ next to parking and auto lane at 10’-14’ (widths will vary within this range due to the varying street width).
SE Ellis Street, 84th to 92nd	2	0.3	All Times and Days	1,800	City of Portland	No curbs or sidewalks; Two AS’s or ABLs at approx. 6’ and auto lane at approx. 12’.
SW 40th Avenue, Wilbard to Huber	3	0.05	All Times and Days	400	City of Portland	No curbs; Two AS’s at approx. 5’ and auto lane at approx. 10’. Edgelines planned at uncurbed EPs.
SW Talbot Road, Fairmount at Gaston to Fairmount (Fairmount is a loop)	4	0.2	All Times and Days	2,900	City of Portland	No curbs or sidewalks; Two AS’s or ABLs at approx. 5’, auto lane at approx. 10’. Edgelines planned at EP.

Notes: ABL=advisory bike lane; AS=advisory shoulder.

Length of Experimentation

The experiment is proposed to last three years, expected to begin in 2022 and end in 2025, with the final report delivered within three months of completion (by October 2025).

City of Portland Responsibilities

- Develop final designs for installations in proposed test locations.
- Develop detailed evaluation methodology.
- Lead material procurement, storage, and treatment on city facilities.
- Overall evaluation and management of the pilot program.
- Ongoing coordination with FHWA, state, and local agencies as needed.

Site Restoration

The City of Portland agrees to restore the experiment sites to a state complying with the provisions of the MUTCD at their professional discretion due to hazards attributable to the experiment. The FHWA's Office of Transportation Operations also has the right to terminate the interim approval at any time if there is an indication of safety concerns. If the evaluation process and results demonstrate an improvement, PBOT may seek approval to extend the pilot project or to expand it to new locations.

Reporting

The City of Portland will submit semiannual progress reports to the FHWA Office of Transportation Operations and Oregon Department of Transportation (ODOT) for the duration of the experiment as required by the FHWA Experiments Program, and as documented in the Schedule above. The City will submit a final report within three months following completion of the experiment, per the Schedule above.

Project Administration

The City of Portland will be the sponsoring agency and consultant or partner organization/agency services may be used as needed. The concept of Advisory Bike Lanes and Advisory Shoulders is not protected by patent or copyright.


Appendix A: Maps of Proposed Test Locations

Map 1: NE Sacramento and NE San Rafael

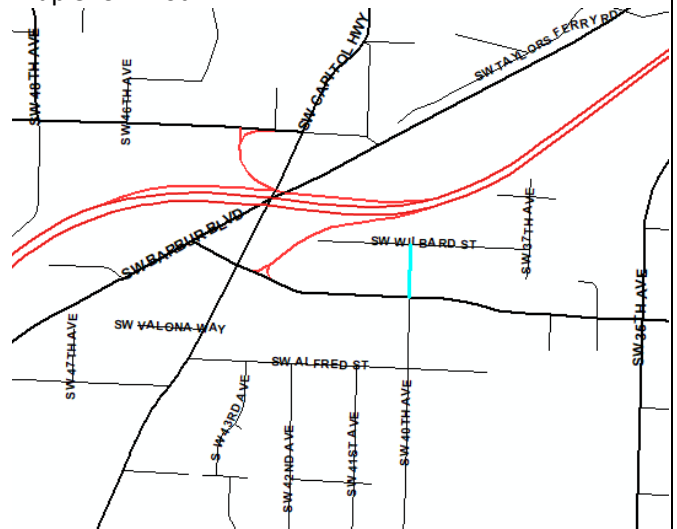


Map 2: SE Ellis

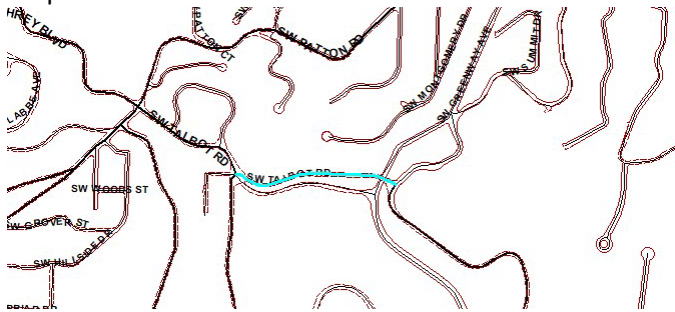


Legend:
 Test Locations

Map 3: SW 40th



Map 4: SW Talbot



Appendix B: Advisory Bike Lanes and Shoulders – Example Design Options

Width	Parking Both Sides	Parking One Side	No Parking
40 ft		<p>Conventional bike facility is preferred in this configuration</p>	<p>Conventional bike facility is preferred in this configuration</p>
36 ft			<p>Conventional bike facility is preferred in this configuration</p>
28 ft	<p>Shared roadway facility is preferred in this configuration</p>		
20 ft	<p>This configuration is not possible</p>	<p>Shared roadway facility is preferred in this configuration</p>	

Notes:

Color shown for clarity only. Treatments within this experiment will not include colored pavement.

Advisory Bike Lanes and Shoulders are considered only for streets that are 19' wide or more.

Where pedestrian facilities do not exist, Advisory Shoulders may provide for both walking and bicycling.

When adjacent to a continuous parking lane, use a minimum 6' bicycle lane width.

Parking lane widths of 7' immediately adjacent to a bike facility should only be used in low-turnover residential contexts.