

PDOT Guidelines for Using Shared Lane Pavement Markings

3/28/05 Draft

BACKGROUND AND GENERAL GUIDELINES

A recent study in San Francisco demonstrated that Shared Lane Pavement Markings are an effective bikeway tool in a shared lane environment on roadways that should otherwise be striped with bicycle lanes. They have been shown successful at increasing separation between cyclists and parked cars and between cyclists and overtaking vehicles. Despite these benefits, they are not to be seen as a substitute for bicycle lanes, but are rather a method of last resort for roadways where the preferred treatment is striped bicycle lanes. Shared lane markings can be used on corridors in the absence of bicycle lanes, or to fill gaps on roadways where bicycle lanes are otherwise striped. Their intent is to improve operating conditions for cyclists on City Bikeways where bicycle lanes are not feasible.

A developed bikeway represents a commitment to city residents to provide safe and convenient conditions for bicycling. This is especially true on streets striped with bicycle lanes, where the decision to stripe bicycle lanes acknowledges that an untreated shared lane riding environment on the street in question is inappropriate for safe and convenient bicycle travel. According to a recent survey conducted by the Bicycle Transportation Alliance, among the top complaints of area cyclists are bicycle facilities that abruptly end without connecting to another facility. It is also our policy to develop bikeways that provide travel as direct as possible and to not divert cyclists from a direct route, as might be the case when needed bicycle lanes cannot be striped. For these reasons, the highest priority for applying shared lane pavement markings should be on bikeway corridors where striped bicycle lanes drop due to operational or geographic barriers to their continuation.

WARRANTS FOR USE

Shared lane pavement markings should be used in limited circumstances on roadways only after all other possibilities that would allow for striped bicycle lanes have been exhaustively and comprehensively explored. Shared lane markings should only be used on City Bikeways when bicycle lanes are the recommended treatment but cannot be striped due to one or more of the following conditions:

- A change in automobile operations needed to stripe bicycle lanes would result in a level of service that falls short of City of Portland guidelines.
- A change in automobile operations needed to stripe bicycle lanes would result in conditions considered unsafe by city traffic engineers.
- Striping bicycle lanes would result in a significant and widespread loss of needed automobile parking.

Recommended Applications

Bridging Gaps on a Developed City Bikeway. Shared lane pavement markings are appropriately used to bridge gaps in bikeways otherwise developed with striped bicycle lanes. The obvious application is along a roadway segment with a gap in striped bicycle lanes. Another, similar application would be at intersections where a bicycle lane is dropped to allow for needed turning lanes. In addition to signing (“Right Turn Only Except Bikes”), the shared lane marking would be used as a more obvious indication about where cyclists should position themselves.

Corridor Improvements on an Undeveloped City Bikeway. Roadway corridors that are classified City Bikeways, with conditions that would warrant striped bicycle lanes, but that have not been striped with lanes, can also be considered for shared lane markings.

Factors to Consider

For all Roadways. There are five typical roadway configurations in which shared lane markings might be used. They are listed below, in order of preference for use.

1. One-way highway with more than one travel lane in the direction of travel.
2. Two-way highway with more than one travel lane in the direction of travel.
3. Two-way highway with one travel lane in the direction of travel with dashed centerline.
4. Two-way highway with one travel lane in the direction of travel with solid centerline.
5. One-way highway with one travel lane in the direction of travel.

Roads with more than one travel lane in the direction of travel (Roadway Configurations 1 and 2).

Encouraging cyclists to ride more toward the middle of the travel lane on roadways with more than one travel lane in the direction of travel is arguably supported by the Oregon Revised Statutes.¹ These configurations seem to offer no legal complications.

Roads with one travel lane in the direction of travel (Roadway Configurations 3, 4, and 5). This condition is more problematic from a legal perspective. In these situations a cyclist is obliged to yield to overtaking vehicles “into an area sufficient for safe turnout...” In the absence of on-street parking this may not be an issue as with a narrow lane there is no area sufficient for safe turnout. However, where there is on-street parking and it is not used, cyclists could reasonably be expected to pull over into those areas. They may naturally do so, but the presence of the shared lane markings could encourage cyclists to stay more in the lane than out of it. For this reason, these configurations should be a lower priority for use of the marking than the previous two configurations.

Additional Factors to Consider for Corridor Improvements on Undeveloped City Bikeways.

- The presence of existing, developed parallel bikeway corridors and whether these corridors were developed as alternatives to the roadway in question.
- Existing bicycle use of corridor.
- Automotive operating conditions on corridor.

The above should be considered for undeveloped bikeway corridors because shared lane markings on such corridors could create the type of traffic operations purposefully avoided by not striping the corridor with bicycle lanes. This should be carefully considered especially where parallel corridors exist, as shared lane markings could attract riders currently using the parallel corridors. While each corridor should be evaluated independently, the above are significant, and should be considered as follows:

- The presence of existing, developed parallel bikeways. The presence of functional, parallel corridors is an argument against shared lane markings. This is especially true if the corridor is of a roadway type and conditions unfavorable to shared lane markings, as described below. Their presence is more significant if they were identified in a planning process specifically as an alternative to the corridor and were developed in a capitol project into a functional Bikeway. Conversely, the absence of parallel routes argues for a shared lane treatment for the principal corridor.
- Existing bicycle use of corridor. The desirability of the corridor for bicycle use should be considered. A good indication of that is the current level of bicycle use. Parallel corridors may not exist, or may not serve as well the same destinations as the corridor. A well-used corridor should be considered for a shared lane treatment.

¹ ORS 814.430 allows for cyclists to not ride “as close as practicable to the ...curb or edge of the roadway” “when reasonable necessary to avoid hazardous conditions, including...[a] roadway that is too narrow for a bicycle and vehicle to travel safely side by side.” Since ODOT recognizes defines a “wide outside lane,” at 14-15 feet, as a bicycle facility, and states that it “usually allows an average size motor vehicle to pass a bicyclist without crossing over into the adjacent lane”, we assume that any travel lane narrower than 14 feet does not allow for safe side-by-side passage within the same travel lane.

Under ORS 811.425, a cyclist, as a “slower moving vehicle,” is normally required to yield to overtaking vehicles and pull off the main traveled portion of the highway when it is safe to do so. However, a slower moving vehicle is only required to pull over when operating on a “two-directional, two-lane highway...” Thus, on roads other than two-directional two lane highways a cyclist is not legally required to yield to overtaking vehicles.

- Automotive Operating Conditions on Corridor. High speeds, and volumes sufficient to subjectively clog available travel lanes for many hours of the day, are likely inimical to shared lane markings.

Length of Segments with Shared Lane Markings

Gaps in existing bikeways striped with bicycle lanes should use shared lane pavement markings regardless of the length of the gap.

If a bikeway corridor currently not striped with bicycle lanes is to be marked instead with shared lane pavement markings, based on the criteria in this document, then the segment length is defined by the length of the corridor.

Placement of Marking

Longitudinal Alignment

These markings should be used in travel lanes regardless of lane width in the presence of on-street parking². There will be two typical situations in which shared lane markings will be used, with on-street parking, and without on-street parking.

With On-Street Parking. San Francisco's draft guidelines call for placing the shared lane pavement markings a minimum of 11' from the face of curb in the presence of on-street parking. They note this distance can be increased for:

- Downhill sections (greater than 5%)
- Areas where wider vehicles park
- Where cyclists may still encounter motorists trying to pass without changing lanes, as in lanes at 20'-21' wide.

Without on-street parking. To be used in any travel lane narrower than 14'. Recommended placement is at 4' from face of curb, but may be shifted further into travel lane to avoid obstacles near the curb, such as longitudinal joints or seams, or depressed inlets, etc.

On highways with one lane in direction of travel; either one-way or two-way with solid centerline.

In the situation where there is only one travel lane in the direction of travel, either on a one-way street or on a two-way street with solid centerline, there presumably is no means for a motorist to safely pass a cyclist³. On these streets, the shared lane pavement marking should be placed so as to send an unequivocal message that motorists cannot pass in the segments with the markings.

Therefore, the markings should be placed closer to the center of the travel lane (see Attachment A).

Frequency of Application

San Francisco recommends placements so as to provide two markings per block face, which in that city translates into one marking every 250-400 feet. The effectiveness of this marking is likely increased by its frequency, therefore, install two markings per block face in locations where motorists are likely to be neither turning, accelerating nor decelerating.⁴ Place markings 50' toward the center of the roadway segment from the inside of crosswalks at both ends of the segment. If the roadway segment is 300' or greater, as measured from inside of crosswalk to inside of crosswalk, add another marking midway between the first two.

² The caveat here is that beyond a certain lane width (generally 23.5') it makes sense to provide a striped bicycle lane.

³ SE Woodstock between 42nd and 52nd is an example.

⁴ This recommendation is for purposes of increasing the marking's longevity. It is acceleration, deceleration and turning movements across markings that hastens their wear.

Material and Design

Material is likely a standard thermoplastic, though a more durable material, if it exists, is desirable. Design should borrow from that used in San Francisco, as shown on this page.

Discussions about design and maintenance should continue other issues are resolved.

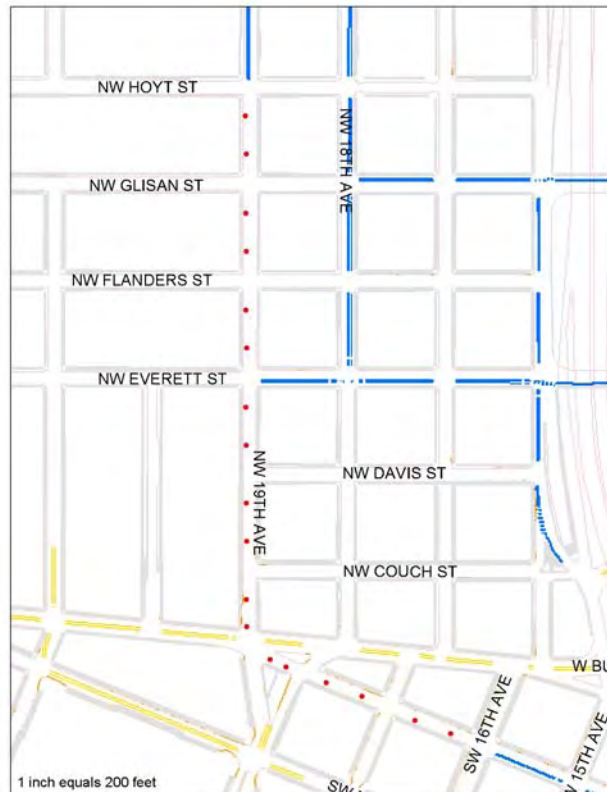
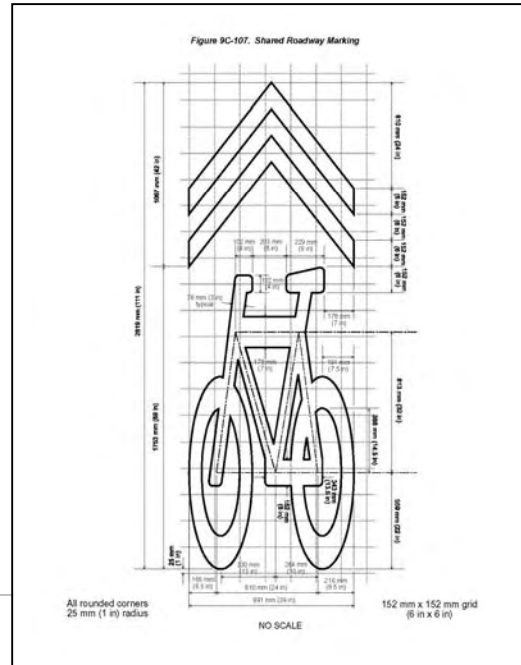
Candidate Streets Based on Above Guidelines

The best candidate streets on which to begin using the shared lane pavement markings are the NW 19th-NW Alder corridor between NW 19th and Hoyt and NW Alder and 16th. There are existing bicycle lanes on NW 19th north of Hoyt and on NW Alder east of 16th. The gap between these intersections exists due to operational and physical constraints. These streets are one-way roadways with two travel lanes. Using the above guidelines, we would apply 18 markings in this corridor.

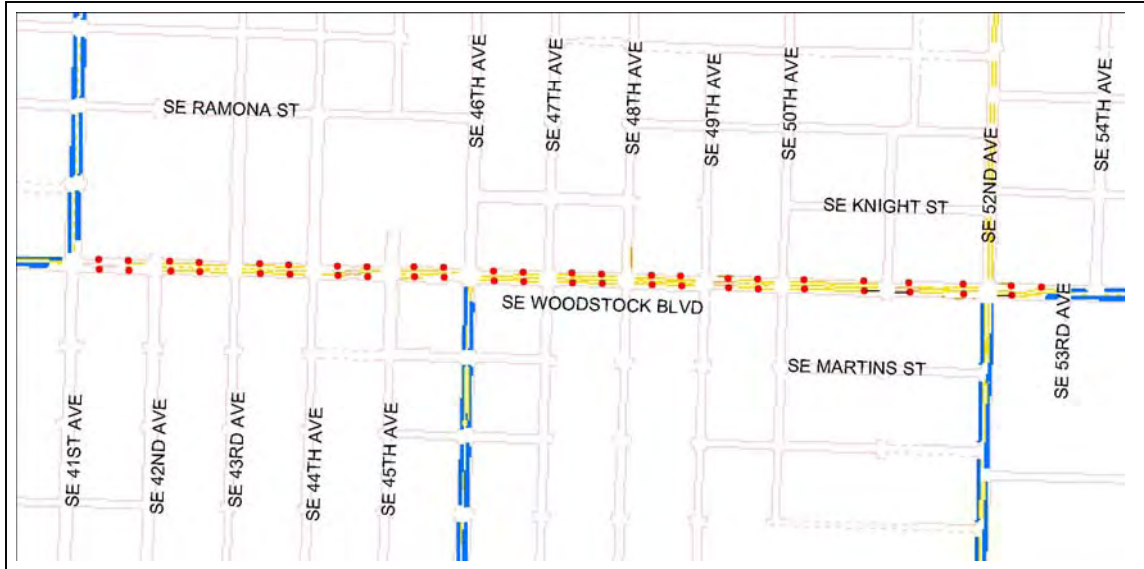
Other candidate streets include SE Woodstock between 41st and 53rd, where there is a half-mile gap in a bicycle lane system. Woodstock. Because Woodstock has only one travel lane in the direction of travel and a solid centerline, operational issues are likely to be more problematic than on 19th and Alder. Following the above guidelines, we would apply 47 markings in this corridor.

Study Design

Alta Planning and Design conducted a study of shared lane markings in San Francisco. Their study resulted in the adoption in August of the bike and chevron “sharrow” by the California Traffic Control Device Committee. Adoption is expected by Caltrans for adoption into the MUTCD 2003 California Supplement, making it available for use in California.



Based on the above, and on our lack of funding for duplicating the above study, our analysis should consist of before and after observation (video and live) and noting any concerns.

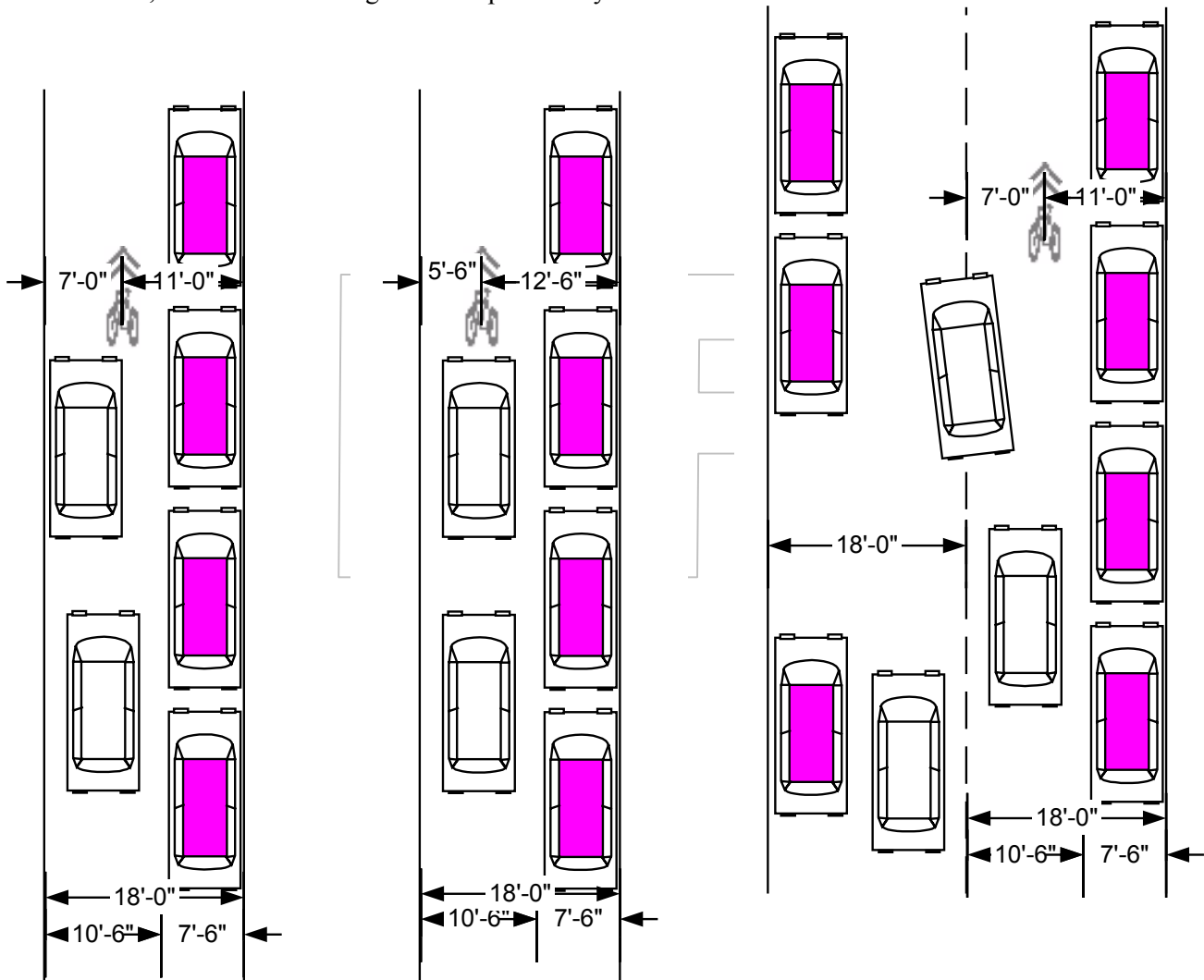


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Attachment A. One-way roadway with one travel lane in direction of travel (applies on street with median)

In this situation, in an 18' travel lane, overtaking motorists may try to pass within the same lane, as there remains 7' from center of marking to curb/centerline. As the intent of the marking is to discourage unsafe passing in the travel lane the marking may be more effective positioned further from the curb—at 12' or 13'—in order to send the unequivocal message that there is insufficient room for passing in the travel lane.

Compare this to the signature where there is an adjacent lane into which an overtaking vehicle can go. In that case, motorists can change lanes to pass the cyclist.



A. No passing lane available; marking at 11'

B. No passing lane available; marking at 12.5'

C. Passing lane available; marking at 11'

Drawings are to scale with cars at 74" wide.

Matrix for Assessing Use of Shared Lane Pavement Markings

Evaluation Criteria	YES	NO	Comments
City Bikeway?			Because the intended use of shared lane markings is to address gaps in the City's bikeway network where lanes are called for but cannot be provided, they are primarily to be used on roads classified as City Bikeways.
Is segmented bracketed by existing bicycle lanes/developed bikeways?			
Assessment & Evaluation Process			Shared lane pavement markings are a method of last resort for City Bikeways that otherwise warrant striped bicycle lanes. They are at the bottom of the hierarchy of facilities for roadways with more than 3,000 ADT, ranking below bicycle lanes and wide outside lanes. As such, before they can be applied there needs to be a thorough process that both documents the inability to provide either of the other facilities—through either lane reconfiguration or parking removal—and that communicates that to the public. Only then should shared lane pavement markings be considered.
Public Involvement as part of Process?			
Traffic Study Conducted to Assess Feasibility of Lane Reconfiguration?			
Parking Demand Study Conducted to Assess Feasibility of Parking Removal?			
Roadway Configuration			Cyclist and motorist behaviors in response to the shared lane pavement markings are intended to be those supported by ORS 814.430 and 811.425. These conditions are best created when there is either more than one lane in the direction of travel or the absence of a centerline, or a dashed centerline. In these conditions, an overtaking motorist can change lanes to pass a slower-moving vehicle (i.e., the cyclist) and the cyclist is not required to move out of the way.
More than 1 lane in direction of travel?			
If only 1 lane in direction of travel is there...			
...no centerline?			
...a dashed centerline?			
...a solid centerline?			
Are there developed parallel bikeways?			Parallel bikeways may serve the same function as the primary corridor. Factors to consider in evaluating the functionality of the parallel bikeways are: commercial nature of primary corridor and whether or not parallel bikeway serve commercial areas; impediments to travel along the parallel bikeways; existing bike use of primary corridor
If yes, were they developed specifically as alternatives to proposed roadway?			The classification and development of parallel bikeways as a direct response to an inability to provide lanes on the primary corridor signal an acknowledgement that the corridor cannot be made usable for cyclists in its current configuration.
Length of Proposed Segment:		feet	Gaps in established bikeways are a more comfortable application than an entire corridor.
Average Daily Traffic:		vpd	Volumes and speed enter into the equation of how appropriate it is to direct cyclists into a shared lane environment.
85 th Percentile Speed:		mph	
Current Bicycle Use			A lot of current bicycle use would tend to argue for some facility.