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ODOT

**Guidebook for**

Counting **Bicycles**

with Pneumatic

Tubes



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Prepared by researchers at Portland State University

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## Introduction

This guidebook is intended to provide recommendations for those wishing to count bicycles using pneumatic tubes. It provides detailed instructions for five brands of tube counters, as well as general site selection and safety information that pertains to all types of counters. These recommendations should be used in conjunction with each manufacturer's instructions. The recommendations are based on research conducted at Portland State University as part of an ODOT funded research project conducted in 2015 at three sites:

- a bicycle only environment
- a low traffic volume rural 2-lane roadway with paved shoulders
- a set of bicycle lanes and sidewalks in a high-traffic suburban area

Managers of non-motorized count programs should recognize that error exists with all count collection equipment. Error rates depend on site selection and setup as well as device choice. For more information on possible error rates please reference ODOT Research Report SPR 772 - *Investigation of Bicycle and Pedestrian Continuous and Short Duration Count Technologies*. Applying results beyond the types of locations tested may not be appropriate.

## Safety

It is mandatory that all personnel involved in the installation and removal of equipment receive appropriate safety training prior to field work. Both governmental and organizational safety regulations and procedures should be followed at all times. These include, but are not limited to the installation and removal of equipment during non-peak hours when visibility is not limited, and on-site safety briefs. When working in the roadway, it is important that all personnel wear personal protective gear that meets current standards and use extreme caution. The use of a spotter is necessary when the person installing equipment is in the roadway and unable to be continuously looking for oncoming traffic.

## Site Selection

Sites with low motor vehicle volumes (<1000 AADT) are desired to minimize error from motor-vehicles erroneously being counted as bicycles, an error which may yield misleading traffic patterns. Moderate bicycle volumes are also desired. Locations with fewer than 10 bicyclists per day are difficult to count accurately since one missed cyclist can represent a high percentage of the counts. Locations with high bicycle volumes can also be challenging, especially when cyclists travel side-by-side obscuring one another.

Roadways should be relatively flat in order to control for abnormally fast or abnormally slow cyclists. Hills that are too steep may result in cyclist speeds above or below the technology's threshold. If a steep hill must be counted, be sure to adjust default minimum and maximum speeds in the counter software.

It is important that tubes be installed perpendicular to traffic flow to avoid tires hitting the tubes at an odd angle. Locations where vehicles and bicycles could be stopping or turning over the tubes should also be avoided as these locations will yield inaccurate counts.

Many manufacturers offer standard sized road tubes (approximately 0.7 inch outside diameter) or mini tubes (approximately 0.4 inch outside-diameter). Mini-tubes have been found to be associated with higher accuracy. When laying tubes in the roadway where there is minimal risk

of pedestrians walking over them, standard sized tubes can be used. However, in locations such as sidewalks or paths, it is recommended that mini-tubes be used in order to decrease tripping hazards for pedestrians. Figure-eight road tube clamps were found to be effective in decreasing likelihood of tubes coming loose. Note that mini tubes are more likely to become pinched or pull out of anchoring devices. Care must be taken to ensure that the small air pulse from bicycles passing over the tubes can be detected by the counters. Using tape along with the anchors has proven helpful in keeping mini tubes from pinching and slipping. Also, make sure to knot or put stoppers in the free end of the tubes.

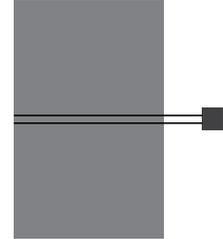


The layout of the tubes depends on both the goals of the study and the type of roadway or path to be counted. For instance, if counting bikes in a bike lane is the only goal, simply laying tubes over the bike lane and/or sidewalk is recommended because this decreases error caused by motor vehicles. The figure on the next page outlines recommended tube layouts for various types of roadways.

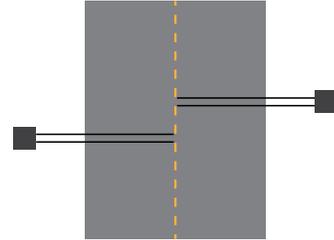
Unless using Eco-Counter road tubes, which should not be cut, we recommend using 15-foot long (or shorter) mini-tubes, because bicycles greater than 15 feet from the counter are less likely to be counted accurately. Shorter is better and it is recommended that excess tube either be cut or coiled on the side of the road opposite the counter. It is recommended that no more than one lane of traffic be counted in order to shorten tube lengths and, therefore, increase accuracy.

# Recommended Tube Layouts

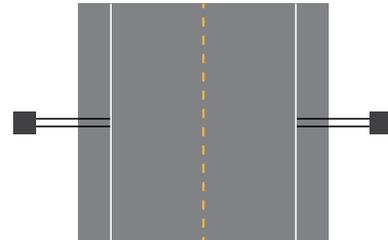
Off street paths and sidewalks



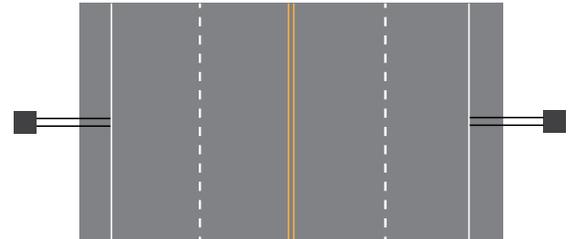
Two-lane road - bicycles share road with motorists, low AADT



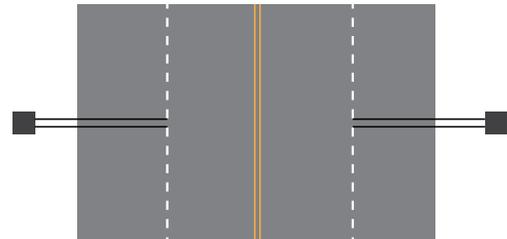
Two-lane road with bike lanes or shoulders



Multi-lane highway with bike lanes or shoulders



Multi-lane highway with no shoulders, low AADT



## Where Not to Install Tubes



Near driveways



In high vehicle volume roads



Where bicycles may stop on tubes or vehicles may run over tubes while turning



Locations where cars may park on tubes

\*It is also important to avoid locations with steep slopes or where the roadway curves.

## JAMAR Trax Cycles Plus



### Tips for Bicycle Counting

- Set tube spacing at 2'
- Select either layout L5 or L6 for bicycle studies as these allow for vehicle classification.
- When downloading data for classification, use the FHWA with Bicycles scheme.

For more detailed information, see the Trax Cycles Plus Manual at [http://www.jamartech.com/files/TRAX\\_Cycles\\_Plus\\_Manual.pdf](http://www.jamartech.com/files/TRAX_Cycles_Plus_Manual.pdf)

## Diamond Traffic Tally 6



### Tips for Bicycle Counting

- Only use the Traffic Tally 6 in locations where there is very low probability of motor vehicles or pedestrians interacting with the counters. This is a single-tube volume counter and does not classify vehicles. Appropriate sites for the Traffic Tally 6 include separated bike lanes and other bicycle-only facilities.

For more detailed information, go to [diamondtraffic.com](http://diamondtraffic.com) to find counter and software manuals.

## Time Mark Gamma



### Tips for Bicycle Counting

- Ensure that tubes are spaced 6' apart.
- Select the Advanced Settings tab in the Counter view and set the sensitivity threshold to 15 to enable bicycles to be counted.
- Select the layout that applies to the study being done. (Layouts 11, 41, 51/52, or 67 are recommended for bicycle studies.) A vehicle study layout must be used if bicycles are to be counted in mixed traffic.
- Use TimeMark's FHWA with bicycles classification scheme for mixed traffic situations and the Bicycle only classification scheme for bicycle only locations such as bike lanes and paths.

For more detailed information, go to [timemarkinc.com](http://timemarkinc.com) and log in with your credentials to find counter and software manuals.

## MetroCount 5600



### Tips for Bicycle Counting

- Ensure 1.5' spacing
- Use BOCO classification scheme. This scheme has been shown to be more accurate than the FHWA with Bicycles scheme. More info on the BOCO scheme can be found at <http://tinyurl.com/jb56pwr>

For more detailed information, go to <http://metrocount.com/support/> to find counter and software manuals

## Eco-Counter Tubes



Photo from <http://www.eco-compteur.com/en/>

### Tips for Bicycle Counting

- Ensure 1' spacing.
- For mixed traffic, use 30' Eco-Counter tubes. Do NOT cut these tubes.
- For paths and bike lanes, use Eco-Counter mini tubes. These tubes should also not be cut.
- Use filter tubes when mini tubes are to be used.

## Summary

COUNTER	TUBE LENGTH	TUBE SPACING	NOTES
 <p>JAMAR</p>	15'	2'	Use FHWA w/ Bikes Scheme
 <p>Diamond</p>	15'	N/A	Single tube counter - No classification scheme
 <p>Time Mark</p>	15'	6'	Use Bicycles Only or FHWA w/ Bikes Scheme
 <p>Metro Count</p>	15'	1.5'	Use BOCO Classification Scheme
 <p>Eco-Counter</p>	30'	1'	Do not cut tubes. Use filter with mini tubes