

# Bicycling Infrastructure Provisions

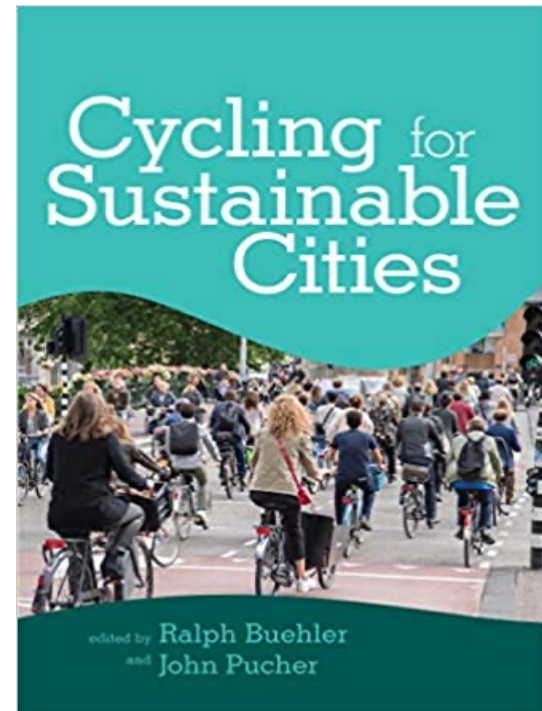


# Purpose

- Separation of cyclists from motor vehicle traffic has been shown to improve cycling safety as well as increase cycling levels
- The purpose of this presentation is to examine a range of infrastructure provisions for cyclists, from no special provisions to paved, off-road paths

This presentation draws extensively from:

Ralph Buehler and John Pucher (eds.) (2021). *Cycling for Sustainable Cities*. Cambridge, MA: The MIT Press.



# Common Types of Bike Route Facilities

- Stand-alone paths
- Cycle tracks (protected bike lanes)
- Conventional bike lanes
- Mixed traffic or sharrows (bikes and automobiles using the same lanes)





# Cyclists vary in their tolerance for interacting with traffic

- Roger Geller, a bicycle planner in Portland, Oregon, categorized people into four groups (2009)
  - Strong and fearless: will ride in almost any traffic condition (1% of population)
  - Enthused and confident: demand a bit more separation but willing to ride in a bike lane (6%)
  - Interested but concerned: find cycling appealing but too dangerous (60%)
  - No way, no how: not interested (33%)





# “Traffic Stress”

- A term to describe the perceived danger that traffic imposes on cyclists
- Furth et al. (2016) spelled out the criteria that bike lanes and mixed-traffic segments must meet to be considered a “low-traffic stress” environment for cycling





# Criteria for “Low-stress” Bike Lanes

- The road should have no more than one lane per direction
- Traffic speed should be no more than 25 mph when lane is next to parking lane and up to 35 mph otherwise
- If next to parking lane, the bike lane should be at least 7 ft wide (to avoid being “doored”)
- The bike lane should not be frequently blocked by parked/stopped vehicles





# Who knew?

- In the United States, cycle tracks (protected bike lanes) were essentially outlawed until 2011, with only a few exceptions!
- U.S. policy strongly resisted the notion of separation from traffic until recently, instead promoting the idea that bikes should be treated as part of traffic (John Forester's vehicular cycling (VC) theory; 1992, 2001)



VACATION  
MOTOR  
LODGE

QUEEN BEDS *With* COLOR TV

VACANCY

QUEEN BEDS  
COLOR TV AIRCOND  
DAILY WEEKLY  
1/2 BLOCK EAST





# The winds shift to favor separation

- For “low-stress” bike networks to emerge, cities needed to embrace the concept of protected bike lanes and/or cycle tracks
- Examples of early success stories: Davis, California; Portland, Oregon; Boulder, Colorado
- Turning point: the building of cycle tracks in New York City that resulted in dramatic increases in cycling levels
- Overthrow of the VC philosophy (2011)



# Other Obstacles Faced

- Finding space for bikes; repurposing road space for bikes
  - Resizing travel lanes, parking lanes, and shoulders
  - Reducing the number of travel lanes (“road diet”)
- Opposition can be intense, but available data suggest these types of changes can often be implemented without negatively impacting traffic capacity and safety





# Stand-Alone Paths



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КНАНKH  
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# Stand-Alone Paths

- A paved path that has been designated for use by cyclists outside the right of way of a public road
- Frequently built along waterways (ex. rivers) and/or take advantage of abandoned trail corridors, old rail lines
- Used to promote recreational cycling
- Need to be wide enough to accommodate cyclists traveling in opposite directions
- Not always separated from pedestrians





# Cycle Tracks



# Cycle Tracks

- Protected bike lanes that provide space that is intended to be exclusively or primarily used for bicycles and are separated from motor vehicle travel lanes, parking lanes, and sidewalks
- In situations where on-street parking is allowed cycle tracks are located to the curb-side of the parking (in contrast to bike lanes)
- Cycle tracks may be one-way or two-way, and may be at street level, at sidewalk level, or at an intermediate level



# Cycle Tracks

- If at sidewalk level, a curb or median separates them from motor traffic, while different pavement color/texture separates the cycle track from the sidewalk
- If at street level, they can be separated from motor traffic by raised medians, on-street parking, or bollards (posts)
- By separating cyclists from motor traffic, cycle tracks can offer a higher level of safety than bike lanes





# Conventional Bike Lanes



# Conventional Bike Lanes

- Defined as a portion of the roadway that has been designated by striping, signage, and/or pavement markings for the preferential or exclusive use of bicyclists
- Located adjacent to motor vehicle travel lanes and typically flow in the same direction as motor vehicle traffic
- Enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions



# Conventional Bike Lanes

- Require less space to install than protected bike lanes (cycle tracks)
- Riding next to a parking lane involves a risk of being “doored”; to accommodate for this hazard requires lanes to be extra wide
- Conventional bike lanes are often blocked by illegally parked cars and delivery vehicles; one study found almost 50% of cyclists in commercial areas had to leave the bike lane because it was blocked (Meng, 2012)









1 MILL ST.



BIKE LANE

ENDS

OK



TIRE EXPRESS

Smokin' 54.9

Ford



Brookline, MA

# Mixed Traffic Sharrows



# Mixed Traffic - Sharrows

- Sharrows or Shared Lane Markings (SLMs) use road markings to indicate a shared lane environment (mixed traffic) for bicycles and automobiles
- SLMs reinforce the legitimacy of bicycle traffic on the street, recommend proper bicyclist positioning, and may be configured to offer directional guidance
- They can create confusion and should not be considered a substitute for bike lanes, cycle tracks, or other separation treatments if these types of facilities are otherwise warranted or space permits





**MAY USE  
FULL LANE**



# Developing Local Street Bikeways

- Local streets with low traffic speed and volume are important components of any urban bicycle network
- Partial street closures, median barriers, traffic circles, and speed bumps can be utilized to slow traffic and encourage vehicle traffic to take alternate routes
- Cyclists are typically not willing to use local street bikeways if routes are too indirect or require large detours (Broach et al., 2012)
- Short path connectors can successfully be used to join together discontinuous segments





# Planning Bicycle Networks

The requirements for successful bike networks can be summarized in one phrase – **low stress connectivity** (Furth, 2017) and should meet the following criteria:

- Separation from traffic stress
- Pleasant, well-lit, and low-crime surroundings
- Smooth, well-maintained pavement
- Avoiding long, steep climbs
- Connected and direct with safe intersection crossings







# Cost Comparisons

- Costs will vary depending on the specifics of a project
- Stand-alone bike path: \$1-2 million/mile
- Curb-separated cycle track: \$10-\$20 million per mile
- Bike lane striping: \$15,000/mile (but must be replaced very few years)
- By comparison, highway infrastructure can cost \$300 million to over a billion \$/mile

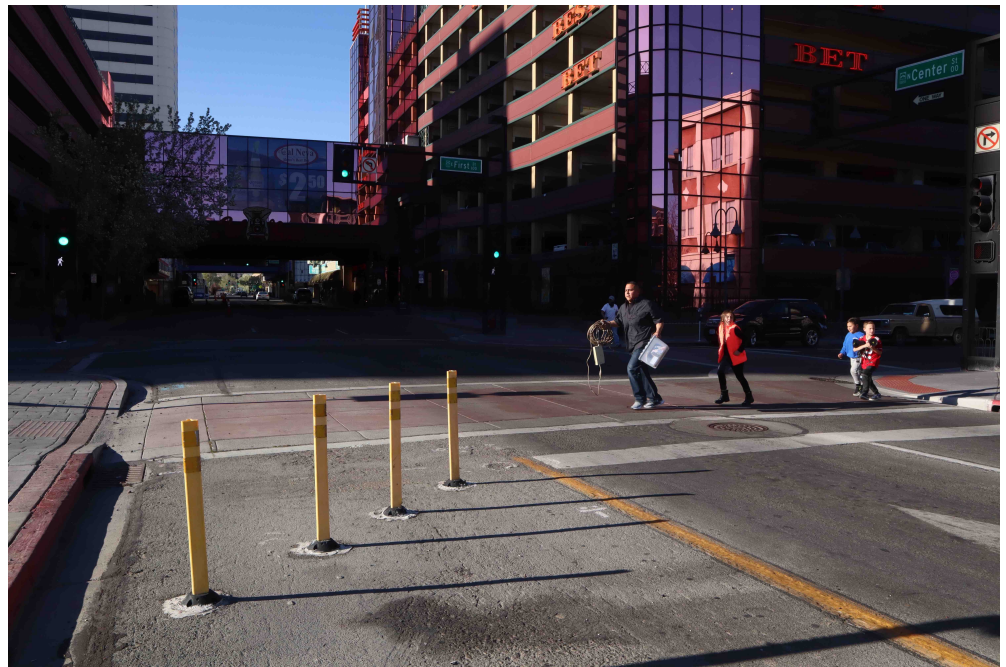
Source: Cycling for Sustainable Cities



# Funding for Bicycling Infrastructure

- Bicycling infrastructure is very inexpensive compared to highway and street infrastructure
- Still, it is difficult to accomplish without dedicated funding; a piecemeal approach doesn't work well
- The challenge is generating enough support, both public and political, to convince governments to invest in bike network development and to do so at a reasonable pace





# Virginia Street



# Questions?



# Select References

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