

Bicycle Facilities Planning

Overview

Bicycle facilities range from conventional bike lanes to coordinated way finding systems, all acting to improve the safety and comfort of bicyclists. This module will review different types of facilities available to jurisdictions to improve their bikeway network. They are drawn from international best practices and this module give an overview of when and how they can be used. There are two separate lectures, one focused on types of facilities and the second focused on bike parking only.

Learning Objective:

- Identify the needs of different types of cyclists
- Compare types of facilities that are available in a bikeway network
- Judge which types of facilities are appropriate in different environments

Suggested Use

Professional Development

Graduate Level

Undergraduate

Time Required

Less than 1 hour

1 hour

2-3 hours

Half-day Workshop

Full-day Workshop

Instructions

1. Announce purposes and give brief overview of the day
2. Give lecture
3. Summarize lecture and discussion
4. Assignment
5. Circulate handouts and evaluations

Lecture

“Bicycle Facilities Planning”

1. Types of Cyclists
2. Purpose for Riding
3. Types of Facilities
 - a. Bike Lanes
 - b. Bicycle Boulevards (Neighborhood Greenways)
 - c. Cycle Tracks
 - d. Intersections
 - e. Signals
 - f. Signing and Marking
4. Discussion

“Bicycle Facilities: Parking”

1. Why Parking?
2. Long term vs. short term
3. Types of racks
4. Placement & installation
5. Other facilities
6. International examples
7. Discussion

Materials/Handouts

- Bike Boulevard Design

Assignments and Activities

1. Bike Boulevard Audit
2. Code write up for parking types
3. Op/Ed piece for facility type in community

Suggested Readings

“Evaluation of Bike Boxes at Signalized Intersections.” (2010) Jennifer Dill.

<http://www.ibpi.usp.pdx.edu/bikebox.php>

"Infrastructure, Programs and Policies to Increase Bicycling: An International Review," *Preventive Medicine*, Vol. 50, No. S1, January 2010, pp S106-S125 (with Jennifer Dill and Susan Handy). Prepared for the Active Living Research Program of the Robert Wood Johnson Foundation.

http://policy.rutgers.edu/faculty/pucher/Pucher_Dill_Handy10.pdf

Federal Highway Administration University Course on Bicycle and Pedestrian Transportation (2006) Lesson 17- Bicycle Parking and Storage:

<http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt17.cfm>

“What Would Get Americans Biking to Work? Decent Parking.” Tom Vanderbilt. *The Slate* (August 17, 2009).

<http://www.slate.com/id/2225511/pagenum/all/>

Association of Pedestrian and Bicycle Professionals, Bicycle Parking Guidelines. (2002):

http://www.apbp.org/resource/resmgr/publications/bicycle_parking_guidelines.pdf

Association of Pedestrian and Bicycle Professionals, Bicycle Parking Guidelines. (2002):

http://www.apbp.org/resource/resmgr/publications/bicycle_parking_guidelines.pdf

BicyclingInfo.Org, Engineering Bicycle Facilities. <http://www.bicyclinginfo.org/engineering/parking.cfm>

Street Films. A series of films on bike parking facilities. <http://www.streetfilms.org/tag/bike-parking/>

Related Modules

- Pedestrian Facility Design
- Master Planning
- Context of Other Movements

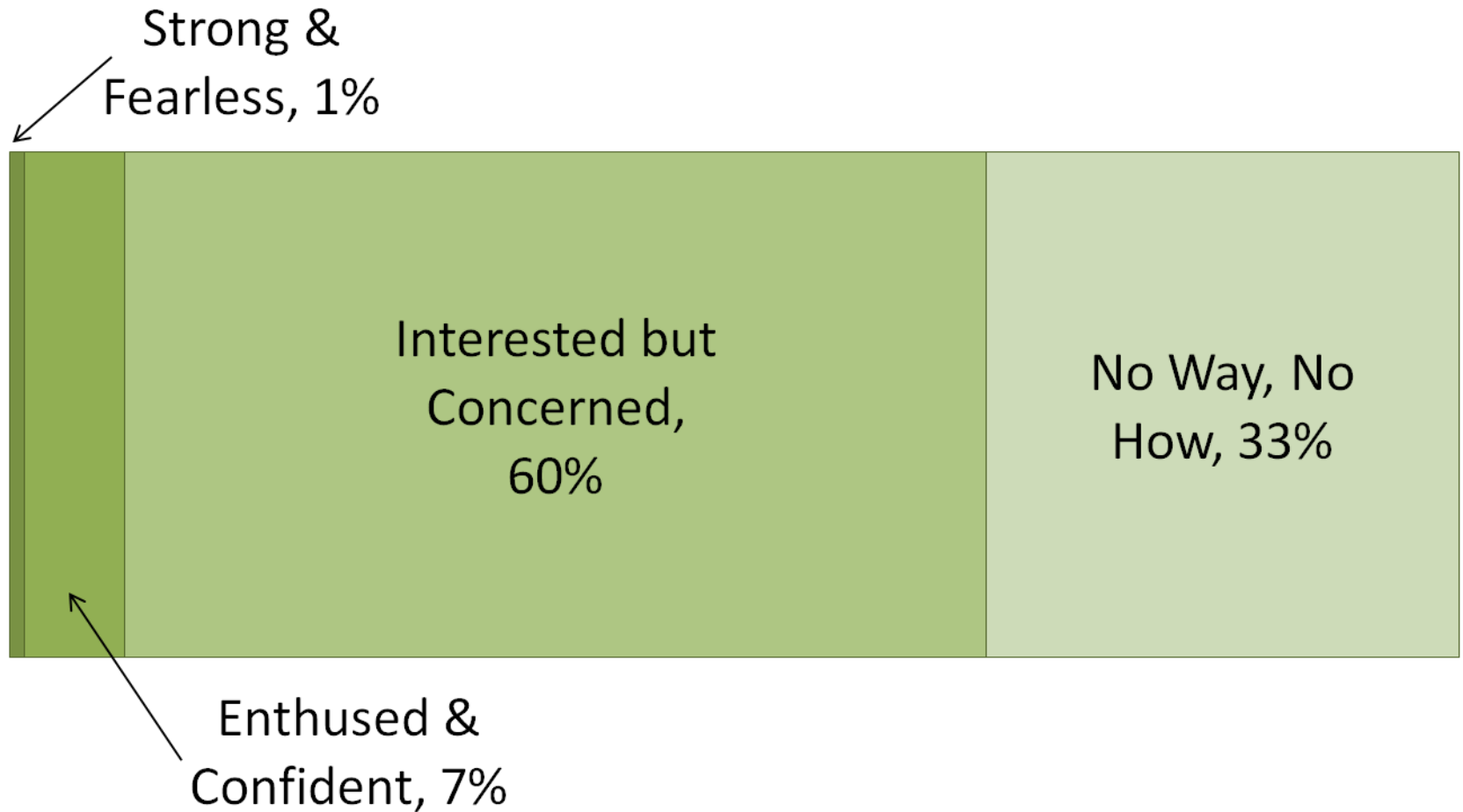


Bicycle Facilities Planning

- Types of Cyclists
- Purpose for Riding
- Types of Facilities
 - Bike Lanes
 - Bicycle Boulevards
 - Cycle Tracks
 - Intersections
 - Signals
 - Signing and Marking
- Discussion



Types of Bicyclists



Purpose for Riding

- Utilitarian
 - Commuting
 - Errands
 - Kids to school
- Recreational
 - Exercise & fun
 - Family rides
- Athletic
 - Competitive riders
 - Events
 - Training rides



Bikeway Networks

On and Off-Street Facilities



Bike Lanes

Conventional Bike Lanes

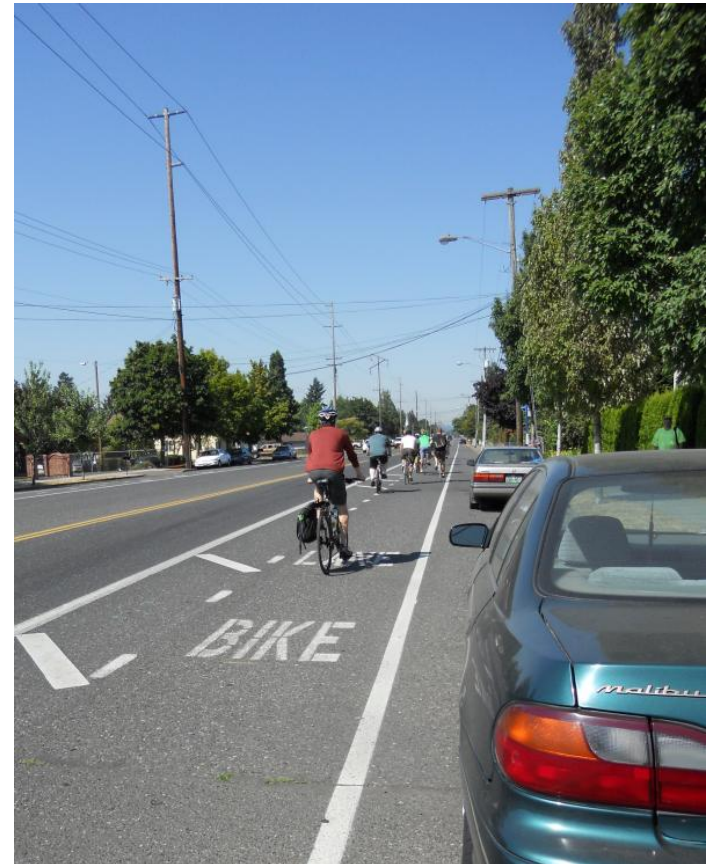
- Increases comfort & confidence on busy streets
- Increases total capacities of streets
- Visually reminds motorists of bicyclists



Bike Lanes

Buffered Bike Lanes

- Greater shy distance between autos & bikes
- More space without being mistaken for travel or parking lane
- Appeals to more users, increases perceived safety



Bike Lanes

Contra-flow Bike Lanes

- Provides connectivity and access
- Decreases trip distance
- Allows bicyclists to use safer, less trafficked streets



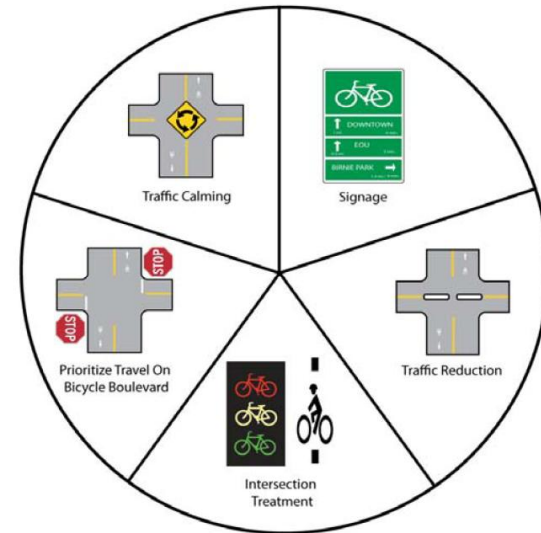
Left-side Bike Lanes on One-Way Streets

- Avoids potential right-side bike lane conflicts
- Improves bicyclist visibility by motorists
- Minimizes door zone conflicts



Bicycle Boulevard

- Attractive, convenient shared roadway
- Low-volume, low-speed streets
- Traffic calming and diverters
- Signage & pavement marking



- Includes both a separated path & on-street infrastructure
- Curb-side of parked cars
- Attractive to more types of cyclists

Cycle Tracks



Cycle Tracks

One-Way Protected

- Street level
- Protect from passing traffic
- Increases perceived comfort and safety
- Comparatively low implementation costs



Cycle Tracks

Raised Cycle Track

- Grade separation between cyclists & motor vehicles
 - Some separated from pedestrians
- At intersection go to street or sidewalk level
- Mountable curb for bikes



Cycle Tracks

Two-Way Cycle Track

- Bicycle movement in both directions on one side of road
- Raised or street level
- More driveway & cross-street considerations



Intersection Treatment

- Junctions where modes meet
- Potential source of conflict
- Needs high visibility & clear Right-of-Way indication
- Reduce risk and increase comfort for cyclists



Intersection Treatments

Bike Boxes (or Advanced Stop Line)

- Area reserved for cyclists in front of traffic at signalized intersection
- Provides visibility
- Bicyclist can get ahead of queuing traffic
- Helps prevent “right-hook” accidents with turning vehicles



Intersection Treatment

Intersection Crossings

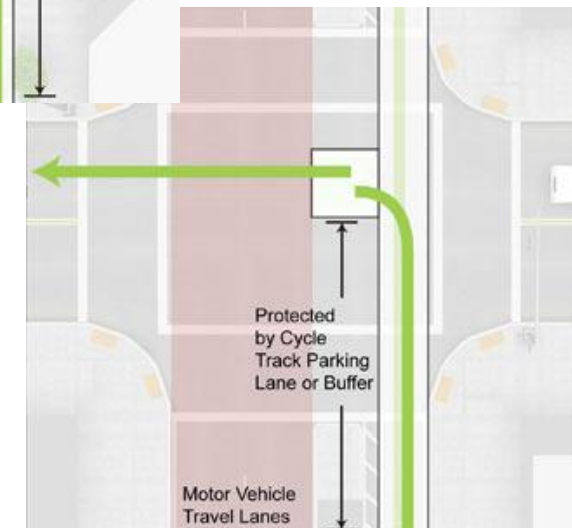
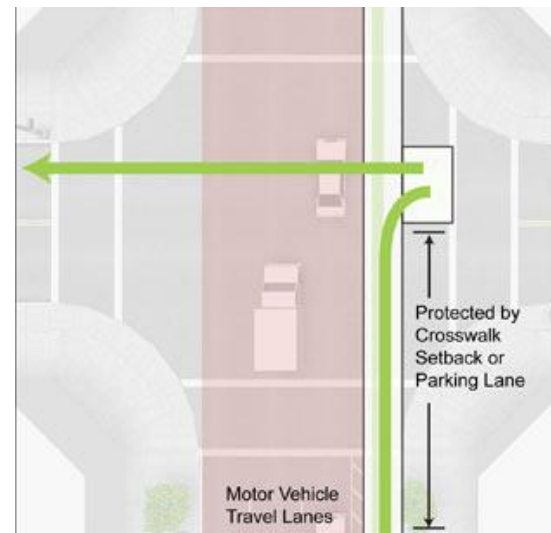
- Pavement markings through intersection
- Guide bicycles
- Increase visibility for automobile
- Raise awareness of conflict areas



Intersection Treatment

Two-Stage Turn Queue Boxes

- Safe way to make left-turns from right side
- Higher average signal delay
- Reduces turning conflict



Intersection Treatment

Median Refuge Island

- Protected space in center of street
- Reduces crossing length & exposure to vehicles
- Traffic Calming



Intersection Treatment

Combined Bike Lanes/Turn Lanes

- Suggested bike lane within motor vehicle turn lane
- Signage to encourage proper positioning
- Reduce “right hook” conflicts



Cycle Track Intersection Approaches

- Bringing cycle track next to (or shared with) motor vehicle
- Similar to conventional bike lane
- Less expensive than full bike signals



Bicycle Signal Heads

- Indicates bicycle signal phases
- Provides priority to cyclists
- Simplifies bicycle movements through complex intersections



Signal Detection & Actuation

- Activate traffic signal for cyclists
 1. Detect cyclists
 2. Guidance for detection
- Improves efficiency and convenience



Active Warning Beacon

- Unsignalized intersections & mid block crossings
- User activated
- Higher visibility, supplement signage



Hybrid Signal (HAWK)

- High-intensity Activated Crosswalk (HAWK)
- Bike route crossing at major intersections
- Improve crossings with low side street volumes



Signing and Marking

Bike Route Wayfinding

- Comprehensive signs and markings
- Guide bicyclists to destinations along preferred routes
- Can include destination, time for travel



Signing and Marking

Colored Bike Facilities

- Increases visibility
- Identify potential conflict areas
- Reinforces bicycle priority
- Consistency



Signing and Marking

Shared Lane Markings (Sharrows)

- Indicate a shared lane between vehicles and cyclists
- Pavement marking to support network
- Reinforce legitimacy of bike on roadway
- Provide positioning for cyclist





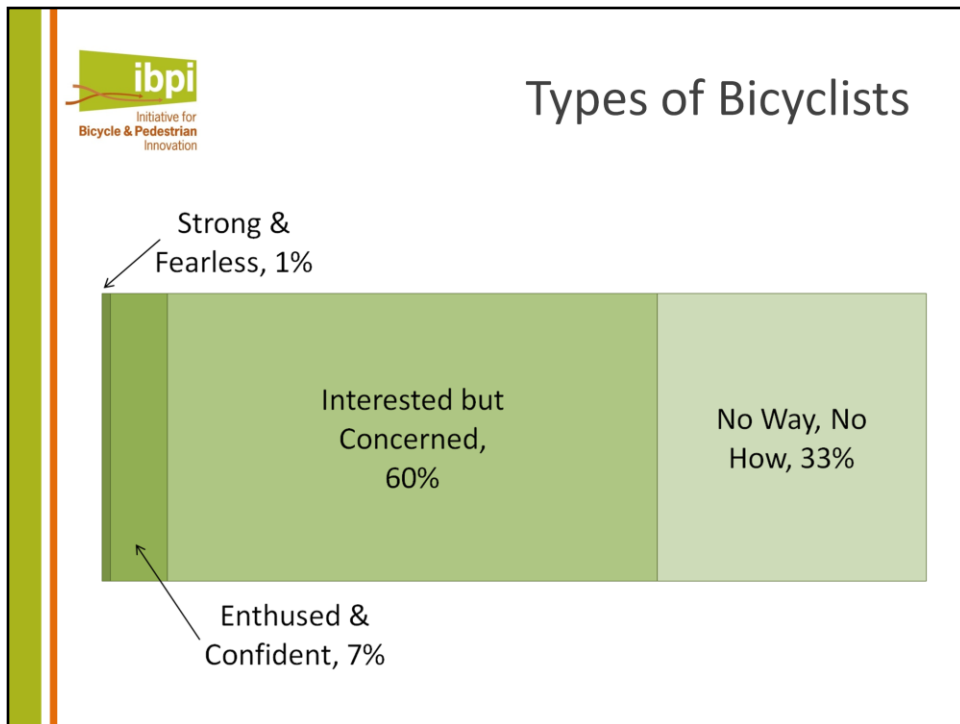
Discussion



Bicycle Facilities Planning

- Types of Cyclists
- Purpose for Riding
- Types of Facilities
 - Bike Lanes
 - Bicycle Boulevards
 - Cycle Tracks
 - Intersections
 - Signals
 - Signing and Marking
- Discussion





Not all people view bicycling in the same way. To better understand cyclists needs, the City of Portland developed these 4 categories of cyclists based on public response and engagement. Each have different priorities and needs to consider in planning and facilities design.

- The strong and fearless are often call the vehicular cyclists--they are comfortable riding with traffic on major streets and represent a very small proportion of riders.
- The next group--enthused and confident--represents a group that likes to ride, rides often and is comfortable in most situations.
- On the other end, the “no-way-no how” are those who will never get on a bike.
- But that leaves a large group in the middle--usually more than ½ the population--who is interested but concerned. As the title implies they are interested in cycling but have concerns-usually around safety, routes, and wayfinding. This groups is where there is a large opportunity for growth in cycling. Plans and facilities should address this group if increased mode share is the goal.



Purpose for Riding

- Utilitarian
 - Commuting
 - Errands
 - Kids to school
- Recreational
 - Exercise & fun
 - Family rides
- Athletic
 - Competitive riders
 - Events
 - Training rides



There are also ways to break down the way bicyclists choose to ride. None of these groups are mutually exclusive, but they do require or use facilities differently.

Utilitarian riders are using their bicycles most like a personal vehicle, for commuting, running errands, and getting around town.

Recreational users you may think of as a “Sunday rider” or “fair weather cyclist”. They are out biking for exercise and fun, special occasions, or events with their family and friends.

Finally, athletic riders are may choose to cycle for events and competition.

On and Off-Street Facilities



Traffic engineers and planners often look at two types of bicycle facilities when creating a bikeway network. Those located on existing street network and those that are off the network--typically paths and trails, and intersection design and signage for facilities.

This module will cover on-street facilities including design, planning considerations, intersections, and signage.

Off street facilities are covered in more depth in the trails module.

Conventional Bike Lanes

- Increases comfort & confidence on busy streets
- Increases total capacities of streets
- Visually reminds motorists of bicyclists



Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and flows in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge, or parking lane. This facility type may also be located on the [left side](#) when installed on one-way streets, or may be [buffered](#) if space permits. See [contra-flow bike lanes](#) for a discussion of alternate direction flow.

Bike lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions. Bike lanes also facilitate predictable behavior and movements between bicyclists and motorists. Bicyclists may leave the bike lane to pass other bicyclists, make left turns, avoid obstacles or debris, and avoid other conflicts with other users of the street.

Bike lanes are most helpful on streets with $\geq 3,000$ motor vehicle average daily traffic. Bike lanes are most helpful on streets with a posted speed ≥ 25 mph.

Creates separation between bicycles & cars

Buffered Bike Lanes

- Greater shy distance between autos & bikes
- More space without being mistaken for travel or parking lane
- Appeals to more users, increases perceived safety



Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.

Encourages bicyclists to ride outside of the door zone when buffer is between parked cars and bike lane.

Provides a greater space for bicycling without making the bike lane appear so wide that it might be mistaken for a travel lane or a parking lane.

Provides space for bicyclists to pass without going into auto lane

Contra-flow Bike Lanes

- Provides connectivity and access
- Decreases trip distance
- Allows bicyclists to use safer, less trafficked streets



Contra-flow bicycle lanes are bicycle lanes designed to allow bicyclists to ride in the opposite direction of motor vehicle traffic. They convert a one-way traffic street into a two-way street: one direction for motor vehicles and bikes, and the other for bikes only. Contra-flow lanes are separated with yellow center lane striping.

The contra-flow design introduces new design challenges but may introduce additional conflict points as motorists may not expect on-coming bicyclists.

They reduces dangerous wrong-way riding; decrease sidewalk riding; influence motorist choice of routes without limiting bicycle traffic.

Left-side Bike Lanes on One-Way Streets

- Avoids potential right-side bike lane conflicts
- Improves bicyclist visibility by motorists
- Minimizes door zone conflicts



Left-side bike lanes are [conventional bike lanes](#) placed on the left side of one-way streets or two-way median divided streets.

Left-side bike lanes offer advantages along streets with heavy delivery or transit use, frequent parking turnover on the right side, or other potential conflicts that could be associated with right-side bicycle lanes.

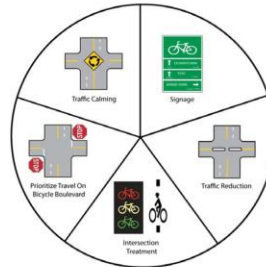
*Provides consistent facility configuration in locations where right-side travel lanes are subject to rush hour parking restrictions and other flexible uses.
*Fewer bus and truck conflicts as most bus stops and loading zones are on the right side of the street.
*Minimizes door zone conflicts next to parking because of fewer door openings on the passenger side of vehicles.

When to use:

- On one-way streets or median divided streets with frequent bus stops or truck loading zones on the right side of the street.
- On streets with high parking turnover.
- On streets with rush hour parking restrictions.
- On streets with high volumes of right turn movements by motor vehicles.
- On streets with a significant number of left-turning bicyclists.
- On streets where traffic enters into an add lane on the right-hand side, as from a freeway off-ramp.

Bicycle Boulevard

- Attractive, convenient shared roadway
- Low-volume, low-speed streets
- Traffic calming and diverters
- Signage & pavement marking



Bicycle Boulevards are also called Local Street Bikeways, Bike/Walk Streets, Bicycle priority streets, and Neighborhood Greenways.

Whatever it is called, they share similar design elements and are used to create attractive, safe facilities for both cyclists and other non-auto travelers. They are designed to be on low traffic volume streets that have low speeds, a typical residential, neighborhood street is often thought of when describing Bicycle Boulevards. To create the boulevard, elements of **traffic calming** should be included to further reduce traffic speed and discourage heavy traffic along these routes.

Bicycle Boulevards should also be distinguishable from other streets for both cyclists and motorists through the usage of signs and pavement markings (seen in the above photo). Pavement markings can supplement wayfinding and will also help bicyclists position themselves properly to share the lane width motor vehicles.



- Includes both a separated path & on- street infrastructure
- Curb-side of parked cars
- Attractive to more types of cyclists

Cycle Tracks



Cycle tracks are relatively common in many European cities and are becoming more popular within the United States. They act as a hybrid between an off-street, separated path and bike lane. It is lane protected from traffic on the street infrastructure.

This separation from traffic increases perceived comfort of cyclists, making it a more attractive facility to more levels of cyclists. The separation also increases safety for cyclists: "Compared with bicycling on a reference street...these cycle tracks had a 28% lower injury rate."

Lusk, A., Furth, P., Morency, P., Miranda-Moreno, L., Willett, W., Dennerlein, J. (2010). [Risk of injury for bicycling on cycle tracks versus in the street](#). Injury Prevention.

One-Way Protected

- Street level
- Protect from passing traffic
- Increases perceived comfort and safety
- Comparatively low implementation costs



These are also known as “on-street bike paths” in New York City. They will be on the street level and use different methods to distinguish them as exclusive use for bikes and protect from traffic. Could have pavement markings to separate from parked cars, or bollards and other design elements to further separate.

Since the lane is protected, there is a decreased risk of “dooring” or interference with motor vehicles. The increase in comfort for cyclists and the increased safety makes a cycle track a more attractive route option for many levels of cyclists.

Good option to use on streets with many lanes, high traffic volumes, and generally stressful bike environments. Still relatively new in the United States so many standards come from international examples. Portland, San Francisco, and New York City all use cycle tracks.

Cycle Tracks

Raised Cycle Track

- Grade separation between cyclists & motor vehicles
 - Some separated from pedestrians
- At intersection go to street or sidewalk level
- Mountable curb for bikes



Good option for streets with higher speeds and fewer cross streets or driveways.

When constructing a new road, a raised cycle track can be less expensive than a standard bicycle lane and require less maintenance since there is no motor vehicle wear on the cycle track.

Photo example is on Cully St in Portland

Cycle Tracks

Two-Way Cycle Track

- Bicycle movement in both directions on one side of road
- Raised or street level
- More driveway & cross-street considerations



This is a good option for a street where there is not enough room for a one-way track on either side of the road.

On one-way streets, reduces out of direction travel by providing [contra-flow](#) movement.



Intersection Treatment

- Junctions where modes meet
- Potential source of conflict
- Needs high visibility & clear Right-of-Way indication
- Reduce risk and increase comfort for cyclists



Intersections:

- Bike boxes
- Intersection Crossing
- Two Stage Turn
- Median Refuge Island
- Through Bike Lanes
- Combined bike turn lane
- Cycle track Intersection

Intersection Treatments

Bike Boxes (or Advanced Stop Line)

- Area reserved for cyclists in front of traffic at signalized intersection
- Provides visibility
- Bicyclist can get ahead of queuing traffic
- Helps prevent “right-hook” accidents with turning vehicles



Bike boxes move cyclists to the front of traffic at signalized intersections, which allows for higher visibility of the cyclists. This visibility helps prevent conflicts between cyclists and motor vehicles turning right at the intersection.

Groups bicyclists together to clear an intersection quickly, minimizing impediment to transit or other traffic and reducing the signal delay for cyclists.

Contributes to the perception of safety among users of the bicycle network. “77% of cyclists felt bicycling through the intersections was safer with the bike boxes”
Monsere, C., & Dill, J. (2010). [Evaluation of Bike Boxes at Signalized Intersections](#). Final Draft. Oregon Transportation Research and Education Consortium.

Typically used at intersections with high volumes of cyclists and motor vehicles, especially where there may be turning conflicts.

Intersection Treatment

Intersection Crossings

- Pavement markings through intersection
- Guide bicycles
- Increase visibility for automobile
- Raise awareness of conflict areas

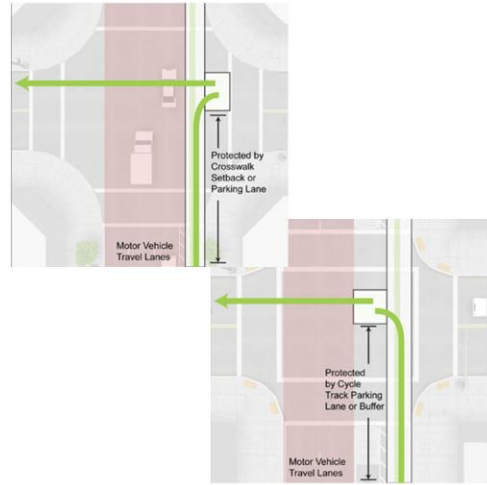


Intersection crossings make the bike lane visible through the intersection by the use of pavement markings. They help guide the cyclists and also make the area more visible for automobiles. This should raise awareness for both of the potential conflict area.

Intersection Treatment

Two-Stage Turn Queue Boxes

- Safe way to make left-turns from right side
- Higher average signal delay
- Reduces turning conflict



Also called a hook turn, box turn, or Copenhagen left. Here the cyclist moves to the right before realigning themselves to go straight across the intersection safely making a left hand turn.

Intersection Treatment

Median Refuge Island

- Protected space in center of street
- Reduces crossing length & exposure to vehicles
- Traffic Calming



This is used more often for pedestrians on wide streets. Can also be used for trails crossing a roadway.

Intersection Treatment

Combined Bike Lanes/Turn Lanes

- Suggested bike lane within motor vehicle turn lane
- Signage to encourage proper positioning
- Reduce “right hook” conflicts



When traveling in a bike lane, approaching a vehicular turn lane can present a challenge and be a source of potential conflict between cyclists and automobiles. A through bike lane allows bicyclists to align themselves to get through the intersection safely and clarifies the travel movements for both bikers and drivers (by signifying an appropriate location for motorists to safely merge across the bike lane into the turn lane).

A combined bicycle lane/turn lane places a suggested bike lane within the inside portion of a dedicated motor vehicle turn lane. A dashed line can either delineate the space for bicyclists and motorists within the shared lane or indicate the intended path for through bicyclists. This treatment includes signage advising motorists and bicyclists of proper positioning within the lane. Maintains bicyclist comfort and priority in the absence of a dedicated bicycle through lane.

Guides bicyclists to ride in part of the turning lane, which tends to have lower speed traffic than the adjacent through lane, allowing higher speed through traffic to pass unimpeded.

Cycle Track Intersection Approaches

- Bringing cycle track next to (or shared with) motor vehicle
- Similar to conventional bike lane
- Less expensive than full bike signals



This treatment reduces turn conflicts for bicyclists and can provide connections to intersecting bicycle facility types. To achieve this intersection, protected cycle track barriers are typically removed and a raised cycle track is brought down to street level. The bicycle lane then becomes adjacent to the shared motor vehicle travel.

Now becomes a more traditional bike lane that can use similar strategies to reduce conflicts and increase safety and comfort of cyclists. Can be used where cycle tracks approach intersections where turning movements across the path of the bicyclist (either left or right) is allowed.

Bicycle Signal Heads

- Indicates bicycle signal phases
- Provides priority to cyclists
- Simplifies bicycle movements through complex intersections



Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, average daily traffic (ADT), anticipated bicycle crossing traffic, and the configuration of planned or existing bicycle facilities.

A bicycle signal head can be used at signalized intersections to assist the traffic flow and give guidance to bicycle signal phases. They are used at intersections where a stand-alone bike path or multi-use path crosses a street, especially where the needed bicycle clearance time differs substantially from the needed pedestrian clearance time or at intersections with contraflow pathways.

Signal Detection & Actuation

- Activate traffic signal for cyclists
 1. Detect cyclists
 2. Guidance for detection
- Improves efficiency and convenience



Signal detection and actuation by bicycle at traffic signals alerts the traffic signal of a bicycle needing to cross. This can be done by push button or having it automated with in-pavement signals that are calibrated to activate at the detection of a bicycle.

Proper detection will need to both accurately detect the cyclist and provide guidance to the biker on how to activate the detection (how to position the bicycle or which button to push)

Signal detection can be:

Loop – Induction loop embedded in the pavement

Video – Video detection aimed at bicyclist approaches and calibrated to detect bicyclists

Push-button – User-activated button mounted on a pole facing the street

Microwave – Miniature microwave radar that picks up non-background targets

Active Warning Beacon

- Unsignalized intersections & mid block crossings
- User activated
- Higher visibility, supplement signage



Active warning beacons are user-actuated amber flashing lights that supplement warning signs at unsignalized intersections or mid-block crosswalks. Beacons can be actuated either manually by a push-button or passively through detection.

Hybrid Signal (HAWK)

- High-intensity Activated Crosswalk (HAWK)
- Bike route crossing at major intersections
- Improve crossings with low side street volumes



Hybrid beacons were developed specifically to enhance pedestrian crossings of major streets, however several cities have installed examples of hybrid beacons explicitly incorporating bicycle movements. Used to improve non-motorized crossings of major streets in locations where side-street volumes do not support installation of a conventional traffic signal (or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street). Hybrid beacons may also be used at mid-block crossing locations (e.g., trail crossings).

The hybrid beacon can significantly improve the operations of a bicycle route, particularly along bicycle boulevards or neighborhood greenway corridors. Because of the low traffic volumes on these facilities, intersections with major roadways are often unsignalized, creating difficult and potentially unsafe crossing conditions for bicyclists.

Signing and Marking

Bike Route Wayfinding

- Comprehensive signs and markings
- Guide bicyclists to destinations along preferred routes
- Can include destination, time for travel



Signage and markings can help bring awareness to the presence of a bicycle facility and distinguish that facility from other uses. Bikeway markings represent any device applied onto the pavement surface and intended to designate a specific right-of-way, direction, potential conflict area, or route option. These markings must take into consideration the use of particular colors, materials, and designs, as well as the legibility of these elements for motorists and pedestrians. Markings may be used to augment a particular lane, intersection, or signal treatment. In all cases, markings must strive for a high level of visibility, instant identification, and take into account both motorist and bicyclist movements in relation to the marking placement.

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

Signing and Marking

Colored Bike Facilities

- Increases visibility
- Identify potential conflict areas
- Reinforces bicycle priority
- Consistency



Colored pavement within a bicycle lane increases the visibility of the facility, identifies potential areas of conflict, and reinforces priority to bicyclists in conflict areas and in areas with pressure for illegal parking.

Though rarely done in North America, color can be applied along the entire length of bicycle lanes to increase the overall visibility of the facility. Motorists are expected to yield right of way to bicyclists at these locations. Along bikeway corridors, color should be applied either in intersection conflict areas, or between conflict areas, or both; whichever approach is preferred, it is important to be consistent.

Signing and Marking

Shared Lane Markings (Sharrows)

- Indicate a shared lane between vehicles and cyclists
- Pavement marking to support network
- Reinforce legitimacy of bike on roadway
- Provide positioning for cyclist



Sharrows can be used along bicycle boulevards and other roadway facilities where vehicles and cyclists are sharing a roadway. It can act as a reminder to vehicles that bicycles have a legitimate place on the roadway. Their placement also helps align bikers properly in the roadway to avoid being in the “door zone” and be visible to traffic. Supportive of a larger bikeway network and can be used as a wayfinding device.



Discussion

Bicycle Facilities Planning

Assignment 1: Bike Boulevard Audit

Assignment Description for *Instructor*:

This audit will allow students to assess the potential of a roadway to be developed into a bicycle boulevard or to assess the success of an existing bicycle boulevard. The audit will walk through the elements that should be present for a bicycle boulevard and provide a greater understanding of developing a neighborhood greenway.

Instructor Prep Work:

- Select the potential streets to be assessed by students. May have students audit same street or different ones.
- Remind students about travel patterns varying by time of day and day of the week.
- Make and distribute copies of the Bicycle Boulevard Audit from “Bicycle Boulevard Planning and Design Guidebook-V1.1”
- Provide a map of the area to note destinations, design elements, conflict areas, etc.
- Give students the parameters for the day and time of audits.

Time Required:

- 2-3 hours in the field
- 1 hour write up
- In class: 5-10 minute group summary presentations

Assignment:

Students should turn in a completed audit form and a 2 page write up of observations about the audit, its process, and suggestions for the future development of this bicycle facility. The write up will then be discussed in class.

Bicycle Facilities Planning

Assignment 1: Bike Boulevard Audit

Assignment Description for Students:

This audit will have you assess the potential of a roadway to be developed into a bicycle boulevard or the success of an existing bicycle boulevard. The audit will walk through the elements that should be present for a bicycle boulevard and provide a greater understanding of developing a neighborhood greenway. You should walk the street segment you have been assigned and complete the audit form based on your observations.

Things to consider

- What could be done to improve the facility
- What is working successfully on the street
- How does the street segment's location impact the audit?

Time Required:

- 2-3 hours in the field
- Completion of audit, write up of observations.
- 5-10 minute summary presentation in class.

Assignment:

You will turn in a completed audit form and a 2 page write up of your observations from the audit and suggestions for the future development of this bicycle facility. You will be asked to discuss your summary in class.

Bicycle Facilities Planning

Bicycle Parking

Assignment 2: Bike Parking Ordinance Write Up

Assignment Description for *Instructor*:

This assignment will have students propose a code amendment to a city government on their bicycle parking facilities. The code should explain the purpose of the facility, descriptions and examples of the type of preferred facilities, metrics for determining the number of required spaces, and requirements for implementation.

Instructor Prep Work:

- Circulate examples of bicycle parking code requirements. Note: students should have had an introduction to planning codes and ordinances in prior coursework.
 - Portland, OR: <http://www.portlandonline.com/bps/index.cfm?a=53320>
 - San Francisco, CA: <http://www.sfbike.org/?planningcode>
 - Minneapolis, MN: <http://www.ci.minneapolis.mn.us/bicycles/BicycleParkingRegulations.pdf>
 - Australian Capital Territory: <http://203.9.249.2/draft-tplan/pdf%20files/Folder%202/Part%2011%20General%20Codes/02%20Bicycle%20Parking%20General%20Code.pdf>
 - Municipal Research and Services Center of Washington: <http://www.mrsc.org/Subjects/PubWorks/PW-Bike.aspx#Parking>
- Complete lecture which covers parking facilities. Be sure students understand
 - Requirements for short and long term parking
 - Amount and location of facilities
 - Type of facility (staple racks, covered facilities, etc)
 - End of trip facilities
 - Funding mechanisms

Time Required for students:

- Out of class: 2 hours

Assignment:

Students will write an ordinance that describes the purpose and type of bicycle parking facilities required in the city. Their proposed ordinances should be long enough to adequately address all of the items above.

Bicycle Facilities Planning

Bicycle Parking

Assignment 2: Bike Parking Ordinance Write Up

In this assignment you will propose a code amendment or ordinance to a city government to require bicycle parking facilities. The code should explain the purpose of the facility, descriptions and examples of the type of preferred facilities, metrics for determining the number of required spaces, and requirements for implementation. Review sample ordinances provided by instructor as well as any others you find or are familiar with.

Things to consider

- Requirements for short and long term parking
- Amount and location of facilities
- Type of facility (staple racks, covered facilities, etc)
- End of trip facilities
- Funding mechanisms

Time Required:

- Out of class: 2 hours

Assignment:

You will write an ordinance that describes the purpose and type of bicycle parking facilities required in the city. Your proposed ordinance will be long enough to adequately address all of the items above.

Bicycle Facilities Planning

Assignment 3: Editorial Article for Bicycle Facility

Assignment Description for *Instructor*:

This is an opportunity to further research a type of bicycle facility and make the case for why it should be considered for implementation by a community. The specific facility type (bike boulevard, cycle track, etc) should be described and advocated for a local newspaper in form of an editorial or opinion piece.

Things to consider

- Why the general public should be interested in facility
- Description and example of the facility
- Benefits to the public
- Potential costs & funding

Instructor Prep Work:

- Give bicycle facilities lecture.
- Discuss the typical format and language appropriate for an editorial article (persuasive language, etc.).
- Students should consider:
 - Why the general public should be interested in facility
 - Description and example of the facility
 - Benefits to the public
 - Potential costs & funding

Time Required for Students:

- 1-3 hours out of class time.

Assignment:

The students will each write an article that advocates for a specific type of bicycle facility to be implemented in the city.

Bicycle Facilities Planning

Assignment 3: Editorial Article for Bicycle Facility

Assignment Description for Students:

This is an opportunity to further research a type of bicycle facility and make the case for why it should be considered for implementation by a community. The specific facility type (bike boulevard, cycle track, etc.) should be described and advocated for a local newspaper in form of an editorial or opinion piece. Using information learned from the bicycle facilities lecture as well as any relevant additional research on your selected facility type; write an editorial article considering the following:

Things to consider

- Why the general public should be interested in facility
- Description and example of the facility
- Benefits to the public
- Potential costs & funding

Time Required:

- 1-3 hours out of class time.

Assignment:

An article that advocates for a specific type of bicycle facility to be implemented in the city.