Designing Streets for Bicyclists

Cheyenne WY– December 6, 2010




Creating walkable/bikeable communities part 1 planning 1

Self Introductions

Please tell us:

1. Who you are
2. Who you work for and what you do
3. How your work relates to bicycle issues:
   - What would you like to know more about?

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Part 1:

Planning issues that affect biking

- Land use
- Street connectivity
- Access management
- Site design
- LOS standards

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Land Use

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Why do we have cities?

To ***minimize*** travel & ***maximize*** exchange *(to be closer together)*

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How have we built our urban roadway system?

To ***facilitate*** travel over longer distances

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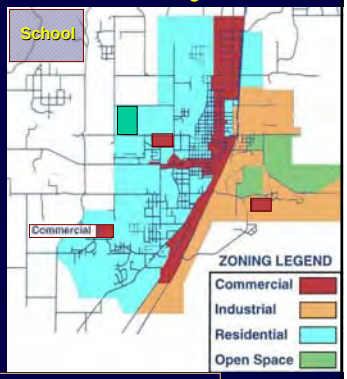
Reducing travel demand is best achieved changing *Land Use* policies that bring destinations closer together

The problem:
- Commercial activities concentrated in auto-dominated corridors.
- Segregated land uses
- Result: long travel distances, not conducive to walking

Potential solutions?
1. Allow small-scale retail in neighborhoods
2. Create neighborhood parks
3. Site smaller schools close to residences & parks



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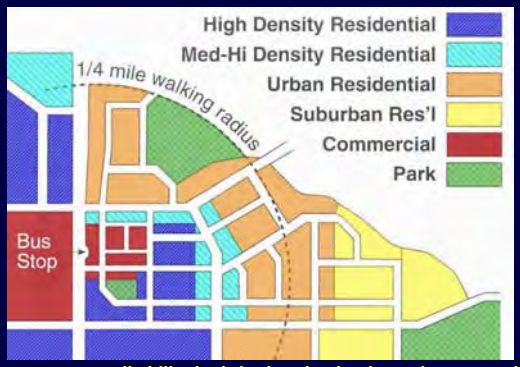
Neo-traditional, new urbanist, smart growth…



…create walkability by bringing destinations closer together

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Neo-traditional development: destinations are close to residential areas

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Street Connectivity

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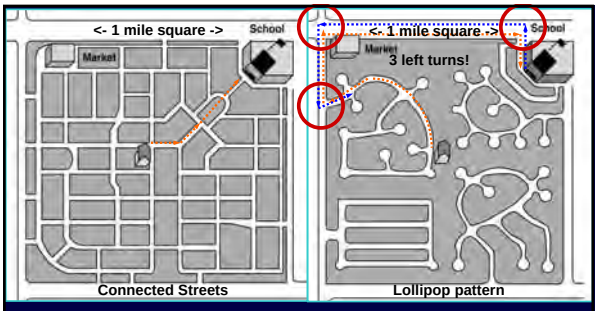

Connectivity creates a walkable street system by:
- Reducing walking distances;
- Offering more route choices on quiet local streets;
- Dispersing traffic – reducing reliance on arterials for all trips

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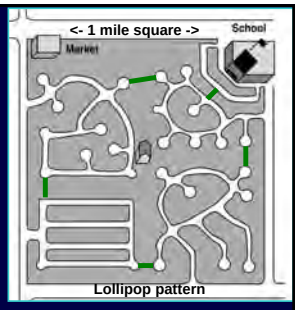
Can you increase connectivity with paths, greenways?

- Reduces wbiking distances:
  - YES
- Offers more route choices:
  - YES
- Reduces traffic:
  - YES
- Disperses traffic:
  - NO
- Politically feasible? What's been your experience?



Lollipop pattern

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1. *Imagine giving directions in this environment*
2. *Think about emergency responders*

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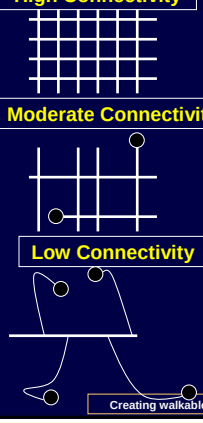
High Connectivity

Moderate Connectivity

Low Connectivity

Travel Lanes Required



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Disconnected streets result in very wide thoroughfares

Las Vegas NV

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Disconnected streets result in very large intersections

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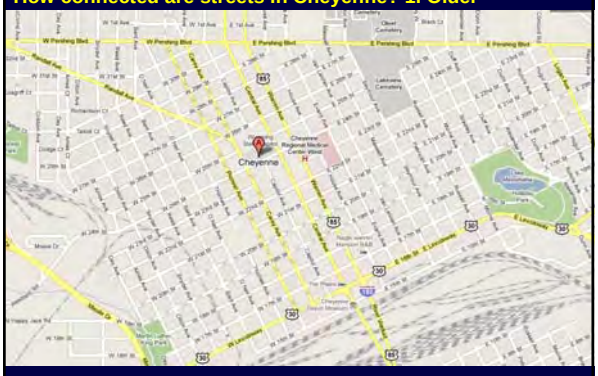
How connected are streets in Cheyenne? 1. Older



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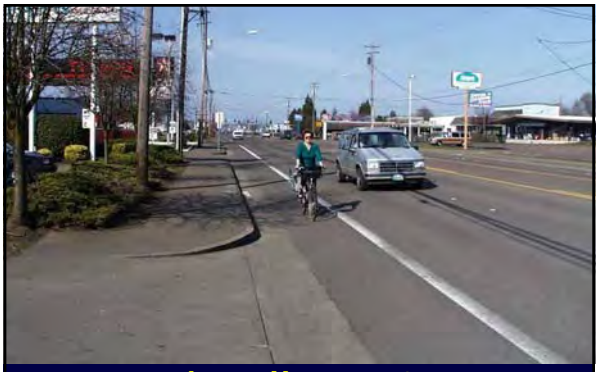
How connected are streets in Cheyenne? 2. Newer

Access Management



Access Management:
Every driveway is a potential conflict

Benefits of A.M. - fewer conflicts at driveways

Severing public streets not a desirable access management outcome

This limits people's ability to walk or bicycle

Connecting severed streets reestablishes biking routes

Alleys create connections

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Whoops! Design details matter…

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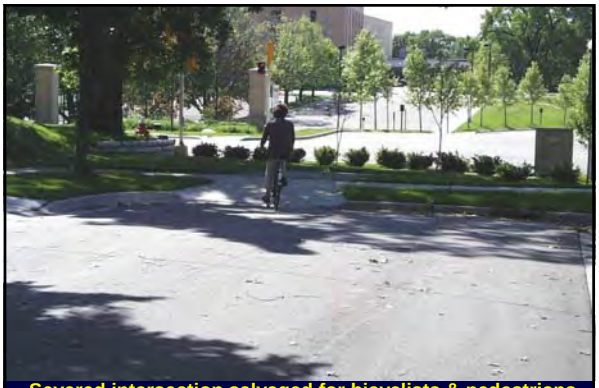

Severed intersection salvaged for bicyclists & pedestrians

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Severed intersection salvaged for bicyclists & pedestrians

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Tying it all together: integrating land use and connectivity in Davis CA

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Rethinking the role of urban streets

Level of Service (LOS) standards
Street design and bikeability

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Aiming for high LOS => large intersections

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HCM says LOS = A; little traffic, no impediments
Result: very wide roads, poor bicyclist access & safety

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Auto-oriented street: high risk

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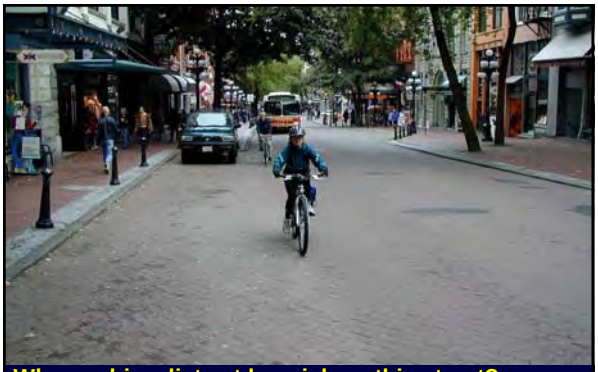

Why are bicyclists at low risk on this street?
Narrow roadway, low speeds, busy

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Reinventing the roadway:
Transform a 5-lane commercial strip to …

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…a safer road for everyone

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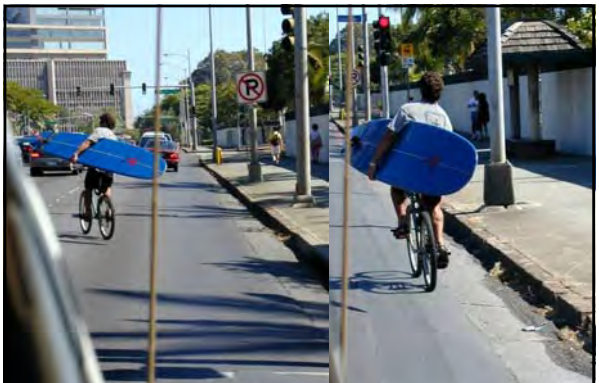
The basic principles of on-road cycling

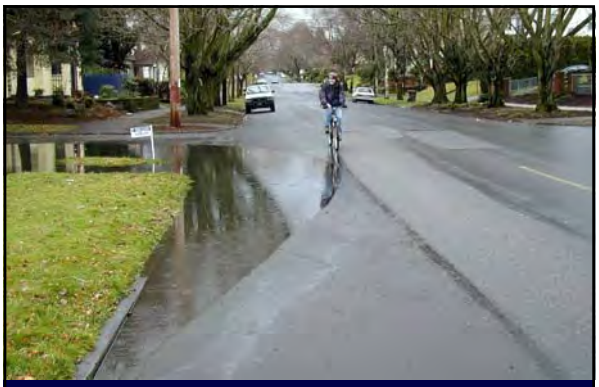
Who are these bicyclists?

H.G. Wells: "When I see an adult on a bicycle, I realize there is hope for civilization."



Bicyclists come in all skill levels

Bicyclists come from all walks of life



Is weather a factor?

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For Whom Are You Building A Bikeway Network?

1. Four Types of Cyclists
   - Strong & Fearless
   - Confident & Enthused
   - Interested but Concerned
   - No Way, No How
2. Different Needs & Concerns for Each
3. Mix of Design & Strategic Issues

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Different Riders and Their Needs

Strong & Fearless
Will ride regardless of facilities
Trip distance not an issue

Enthused & Confident
Comfortable in traffic with appropriate facilities
Prefer shorter trip distances

Interested but Concerned
Not attracted by bike lanes
Not comfortable in traffic
Will ride in low-volume, low-speed conditions (boulevards, off-street)

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PRINCIPLES OF DESIGN

1. Allow cyclists to use the road
   - Provide a smooth riding surface
   - Make room for cyclists
2. Make road inviting to cyclists
   - Slow traffic down
   - Reallocate roadway space
3. Make drivers aware of bicycle presence
   - Stripe or mark or sign *when needed*
4. Build paths where appropriate
   - To supplement to the street system

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An adult bicyclist on a sidewalk is not a good sign

Washington DC Designing Streets for Bicyclists – Bicycling Principles 2-11

A cyclist on a sidewalk interferes with pedestrians

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A cyclist on a sidewalk places himself at risk

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Especially when riding against traffic!

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At what age should kids ride the streets?

It's a parental decision, not engineering; 12 +/- about right

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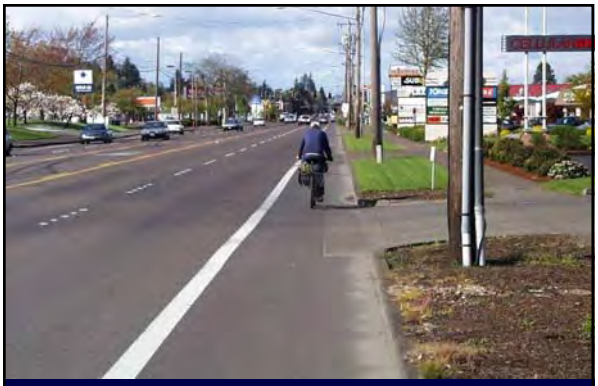

Provide space on streets …

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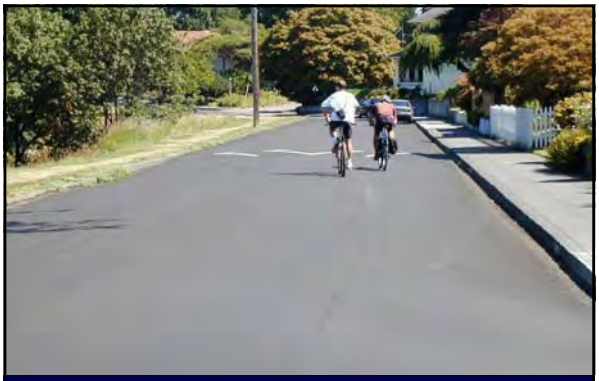

… or slow traffic down

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Why isn't this rider in the bike lane?
He's preparing to turn left

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BASIC BICYCLING PRINCIPLE:
Cyclists are vehicle operators

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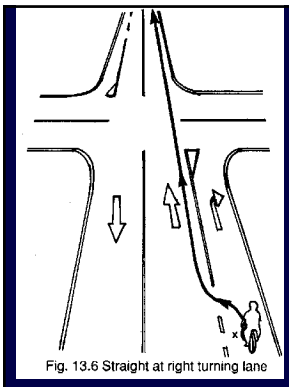
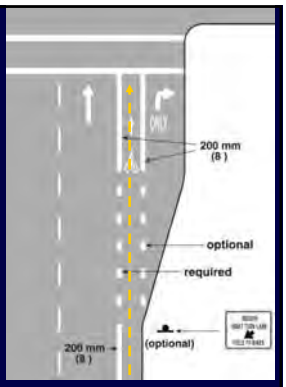


"Expert" recommendation



Standard design

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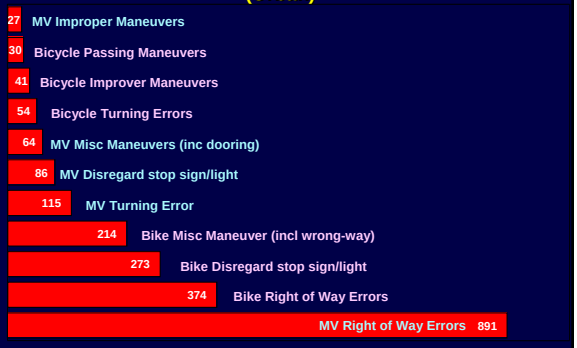
OR Bicyclist-Motor Vehicle Crashes Contributing Errors (Urban)



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#1 Error: *Motorist* fails to yield

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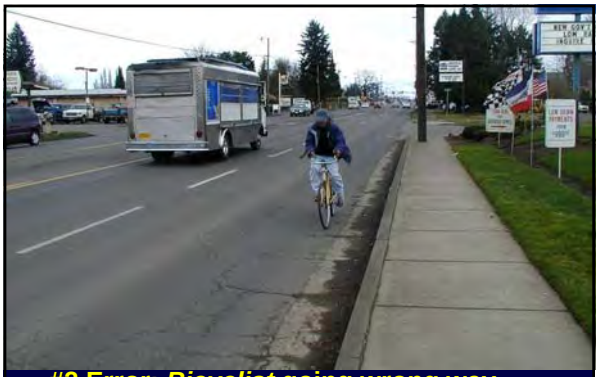
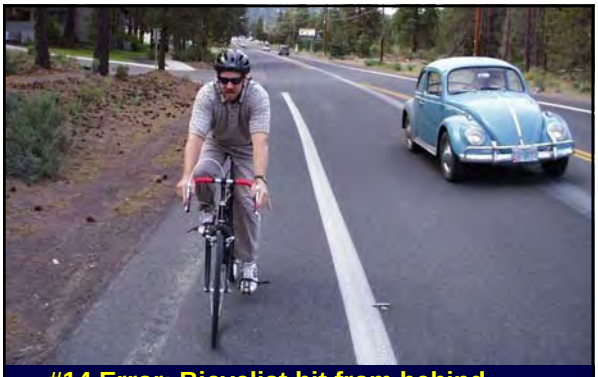


#2 Error: *Bicyclist* going wrong way

Woodburn OR | Designing Streets for Bicyclists – Bicycling Principles | 2-23



#14 Error: Bicyclist hit from behind

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If it doesn't work for cyclists, it's poor design

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If it doesn't work for cyclists, it's poor design

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Don't ask: "where should we put cyclists?"

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Don't ask: "where should we put cyclists?"

Ask: "how can we design the road to better accommodate bicyclists?"

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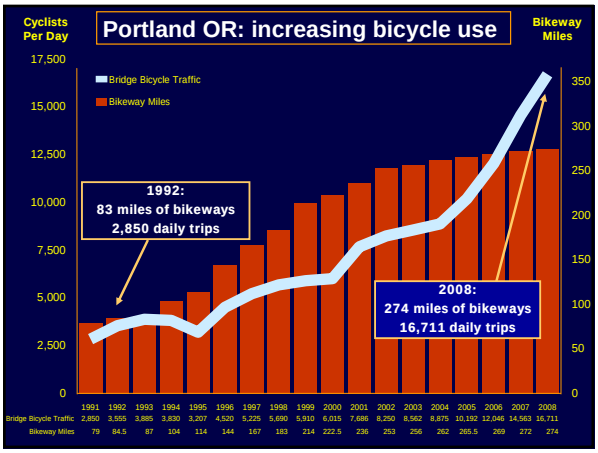
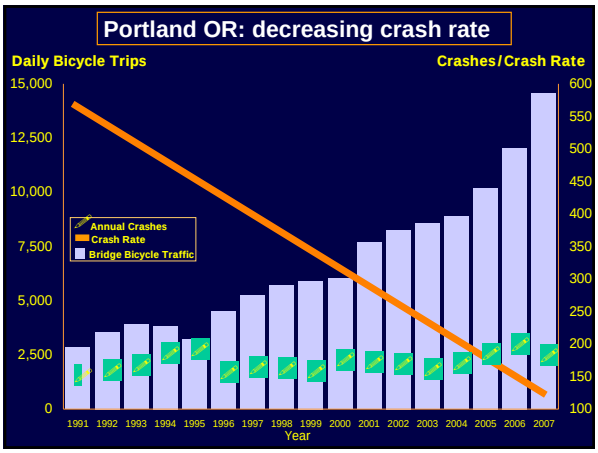
Do bikeways make a difference in ridership?

Portland OR | Designing Streets for Bicyclists – Basics of Bikeway Design




Portland OR: decreasing crash rate
Daily Bicycle Trips
Crashes/Crash Rate
15,000
12,500
10,000
7,500
5,000
2,500
0
600
550
500
450
400
350
300
250
200
150
100
Annual Crashes
Crash Rate
Bridge Bicycle Traffic
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
Year


BRIDGE PEDAL
JAMIE'S
Conclusion: Bicyclists can be accommodated on streets through good design
Portland OR
Designing Streets for Bicyclists – Bicycling Principles
2-32

BASICS OF BIKEWAY DESIGN

Types of Bikeways *

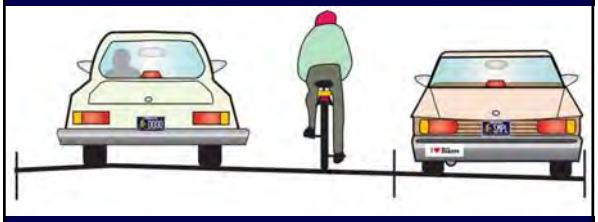
- Shared Roadways
  - Wide outside lanes
  - Bike boulevards
- Paved Shoulders
- Bike Lanes
- Shared-Use Paths

In increasing order of complexity, not preference – not all are intentionally created as bicycle facilities.

Older Bikeway Types

- "Bike Route"
- "Bike Path"
  - Neither term is very clear

SHARED ROADWAY

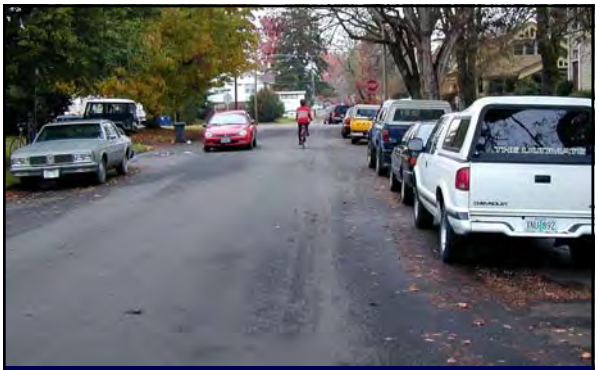


Most common type of bikeway:

- Roads as they are - *no specific dimensions*
- Appropriate on low-volume or low-speed streets
  - ✓ *85% or more of streets in a well-connected grid*

Shared Roadway

- Work well on local streets *in a well-connected grid*
- Great for getting around neighborhoods
- Not as practical for longer distances
- Intersections stop controlled the "wrong way"



Appropriate on low-volume/low-speed streets

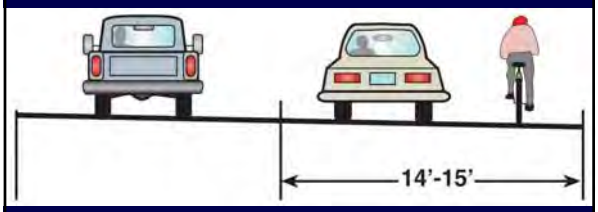
Shared roadway common and appropriate on rural back roads

Benton Co. OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-7

As traffic speeds or volumes increase, shared roadways become less acceptable

Salem OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-8

Shared Roadway Special Case #1: Wide Outside Lane



- Used on retrofits of busy streets with insufficient room for bike lanes
- 14' allows cars & bikes to share the lane side-by-side
- Any wider should be striped - wide lanes don't improve safety: *anti-traffic-calming?*

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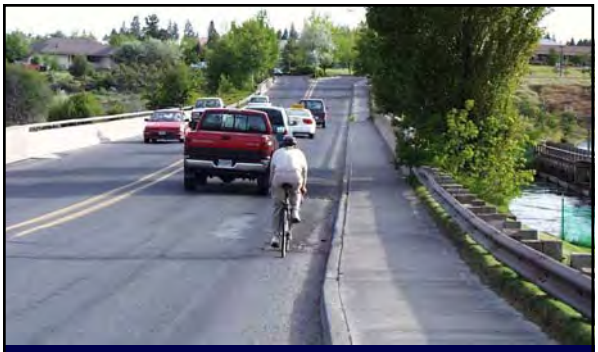

WIDE OUTSIDE LANE

Drivers can pass cyclists in same lane

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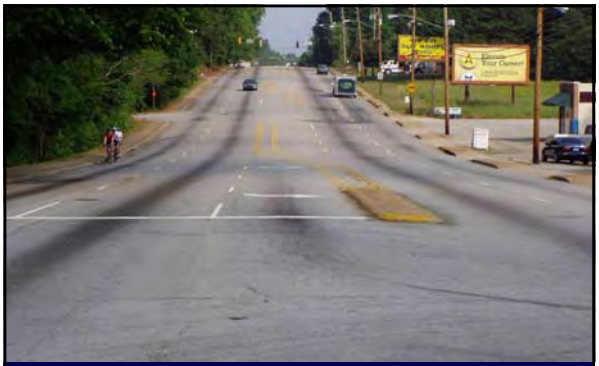
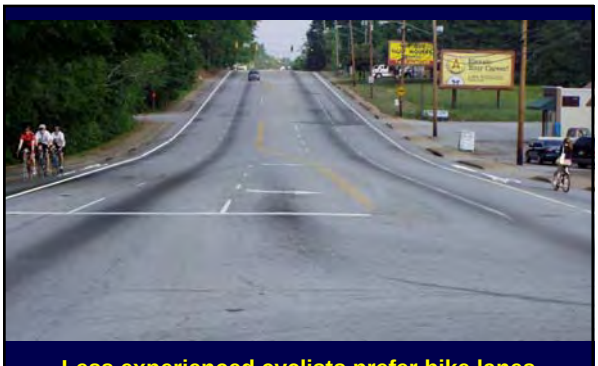


Experienced cyclists are comfortable with wide lanes

Spartanburg SC | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-11



Less experienced cyclists prefer bike lanes

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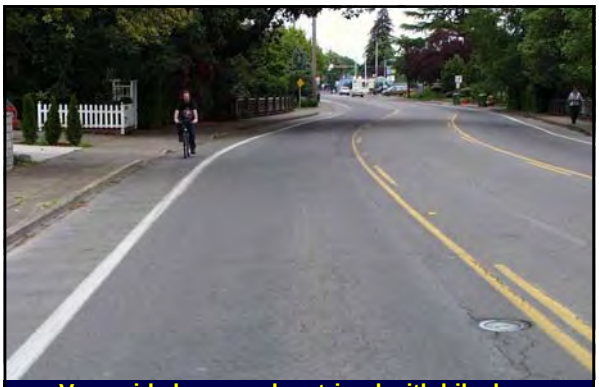


Very wide lane can be striped with bike lane

Shared Roadway Signing and Marking

- Generic "Bike Route" signs not recommended
- Routes should be designated with a name or number.
- Directional and destination signs are useful for cyclists
- Bike warning signs have little value
- Shared lane markings and/or signs can encourage better behavior

Use numbered, lettered or named routes instead of generic "bike route" signs

Directional and destination signs are being added to the MUTCD

Shared Lane Markings

- Primarily for narrow shared roadways
- Encourages bicyclists to ride away from parked cars and take the lane as allowed by law
- Encourages drivers not to pass cyclists too closely
- Useful to provide continuity on constrained blocks
- *Inclusion in the draft MUTCD for 2009*

Shared Lane Marking Placement

- If parallel parking, 11' minimum from the curb
- If no parking, 4' minimum from the curb or pavement edge
- Place immediately after each intersection and not more than 250 feet apart
- Not recommended on roads with speed limits of 40 mph and above

Share the road signs don't send a clear, consistent message: Ride side-by-side?

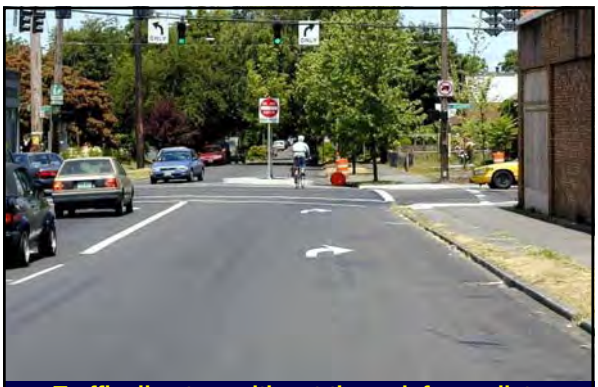
Share the road signs don't send a clear, consistent message: Car chases cyclist?

MUTCD recommendation – meaning may be unclear

CALIFORNIA – of course

Shared Roadway Special Case #2: BIKE BOULEVARD

- A local street becomes a through street for bicyclists *(traffic controls are modified to give priority to through bicycle movement)*
- Automobile access is restricted to local traffic
- Traffic calming reduces speeds & through trips
- Works only in connected grid



Traffic diverters with cut-through for cyclists

Traffic diverters with cut-through for cyclists

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Median island to help arterial crossing

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Mini roundabout: intersection control + traffic-calming

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Ped & bike activated signal to cross arterial

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Two-way left-turn lane for bikes where bike boulevard jogs over half a block

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Portland, OR bike boulevard wayfinding

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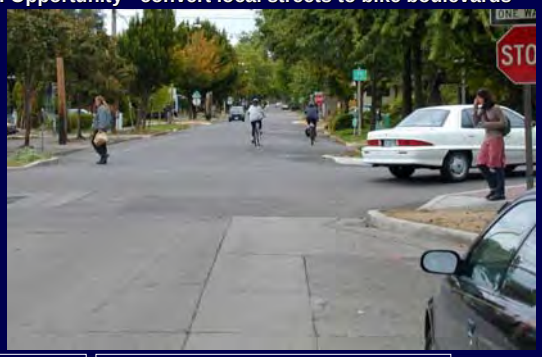
ADVANTAGES of BB

1. Opportunity - convert local streets to bike boulevards



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ADVANTAGES of BB

2. Attract cyclists who prefer low traffic streets

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ADVANTAGES of BB

3. Residents favor traffic calming

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ADVANTAGES of BB

4. Traffic calming & crossings good for pedestrians

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DISADVANTAGES of BB

- May be located on streets that don't provide direct access to destinations: *Cyclists may have to ride on a busy street to complete their trip*
- May be difficult to find local street long enough to provide continuity
- May cause traffic diversion onto other streets
- May not be acceptable to turn stop signs and/or add traffic signals
- May be difficult & expensive to retrofit arterial crossings to create safe bicycling conditions

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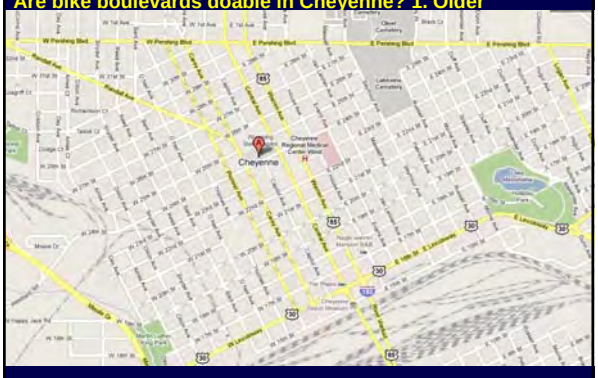
Are bike boulevards doable in Cheyenne? 1. Older



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Are bike boulevards doable in Orem? 2. Newer

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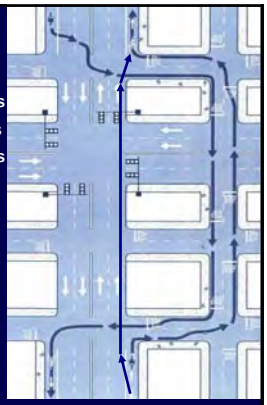
Bike Boulevards:
Not "Diversionary Bike Routes"

- Thoroughfares offer most direct routes
- Destinations located on thoroughfares
- Local streets are slow & discontinuous
- Arterials can be difficult to cross
- Reentering thoroughfare can be difficult (especially left turns)
- Some cyclists choose thoroughfares anyway, even without treatment



Designing Streets for Bicyclists – Basics of Bikeway Design 3-38

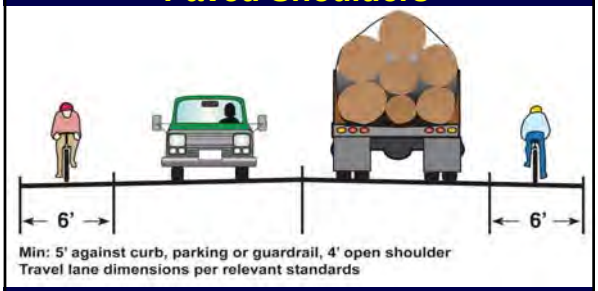
If you're a local cyclist, where do you go?

Lincoln City OR Designing Streets for Bicyclists – Basics of Bikeway Design 3-39

STOP BIKE ROUTE?

Salem OR Designing Streets for Bicyclists – Basics of Bikeway Design 3-40

Paved Shoulders



Min: 5' against curb, parking or guardrail, 4' open shoulder
Travel lane dimensions per relevant standards

Use AASHTO ***shoulder*** standards; *6' desirable for bicycles*

No special markings

Designing Streets for Bicyclists – Basics of Bikeway Design 3-41

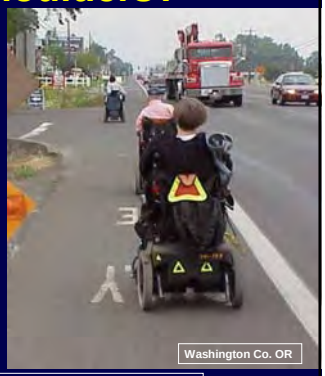
Shoulders common practice on rural highways

Benton Co. OR Designing Streets for Bicyclists – Basics of Bikeway Design 3-42

Shoulders a good practice on county roads

Why Shoulders?

SAFETY:
- Room to avoid crashes
- A place to pull over
- Room for pedestrians



Why Shoulders?

SAFETY:
- Room to avoid crashes
- A place to pull over
- Room for pedestrians

MAINTENANCE:
- Better drainage
- Structural support to pavement

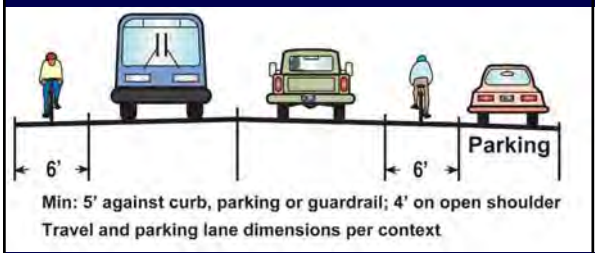
Adding shoulders – tip:

- Add shoulders prior to overlay – *seamless!*

Adding shoulders – why it matters:

Rough joint makes shoulder unridable

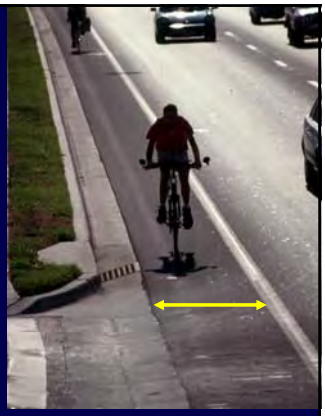
Bike Lanes: *shoulders dedicated to bikes*



Oregon standard: 6'
AASHTO Guide for the development of bicycle facilities: 5'
AASHTO Green Book: Shoulders are desirable on <...> urban arterials <...> the shoulder width should be <...> at least 6' wide

When measuring for bike lanes, the gutter pan matters

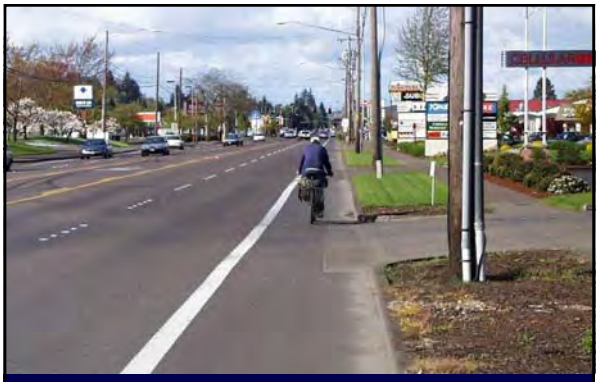
4' preferred,
3' minimum in retrofits



Tallahassee FL | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-49

Placement of gutter seam really matters!

Designing Streets for Bicyclists – Basics of Bikeway Design | 3-50



Urban arterials: shoulders? Or bike lanes?

Corvallis OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-51

Advantages of bike lanes

- Create a lane so cyclists can travel at their own pace *(can pass stopped motor vehicles)*

Geneva CH | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-52

Advantages of bike lanes

- Create a lane so cyclists can travel at their own pace *(can pass stopped motor vehicles)*
- Guide cyclists in a manner consistent with good operation *(close to traffic, where they're visible: drivers can predict their movements)*

Salem OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-53

Advantages of bike lanes

- Create a lane so cyclists can travel at their own pace *(can pass stopped motor vehicles)*
- Guide cyclists in a manner consistent with good operation *(close to traffic, where they're visible: drivers can predict their movements)*
- Reduce bicycle/pedestrian conflicts *(cyclists no longer ride on sidewalks)*

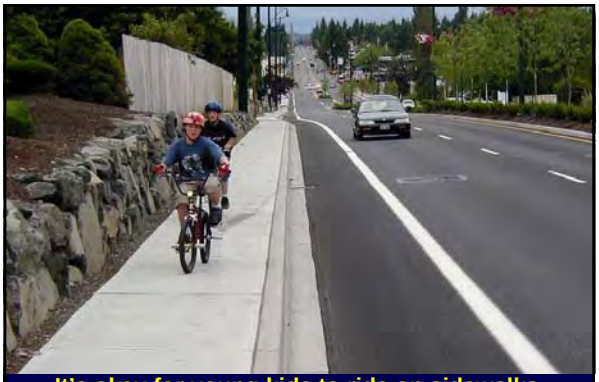
Washington DC | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-54

Bike lanes encourage cyclists to ride on streets, not sidewalks

Ft Lauderdale FL | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-55

Bike lanes encourage cyclists to ride on streets, not sidewalks

Ft Lauderdale FL | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-56



It's okay for young kids to ride on sidewalks

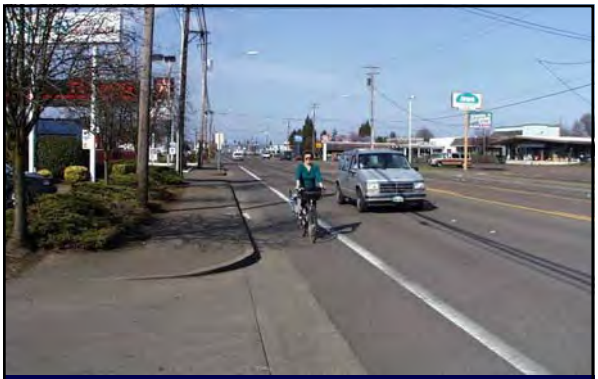
Troutdale OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-57

- Bike lanes most appropriate on urban thoroughfares
- They get you from one part of town to another efficiently
- Intersections stop or signal controlled – the "right way"
- *No point in striping minor streets with bike lanes*

Designing Streets for Bicyclists – Basics of Bikeway Design | 3-58

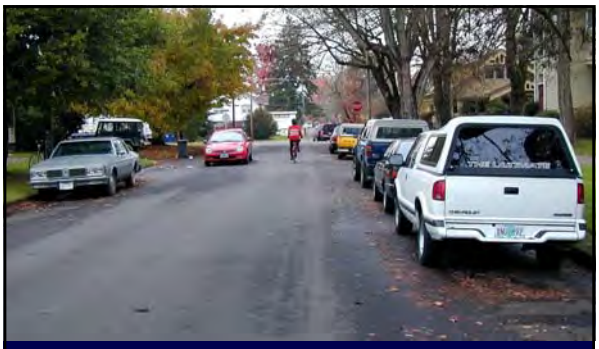
- *No point in striping minor streets with bike lanes*

Designing Streets for Bicyclists – Basics of Bikeway Design | 3-59



Bike lanes appropriate on high-volume/high-speed streets

Corvallis OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-60

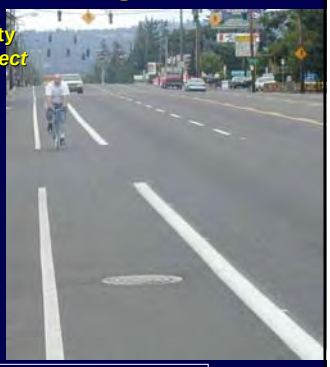


Shared roadway appropriate
on low-volume/low-speed streets

Corvallis OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-61

BIKE LANES

- Are not provided for safety *(white stripe doesn't protect cyclists from motorists)*



Portland OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-62

BIKE LANES

- Are not provided for safety *(white stripe doesn't protect cyclists from motorists)*
- Striping creates conditions whereby behaviors change

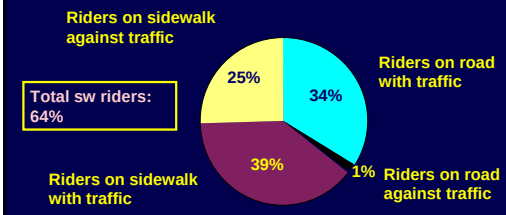
Bend OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-63

BIKE LANES

- Are not provided for safety *(white stripe doesn't protect cyclists from motorists)*
- Striping creates conditions whereby behaviors change
- More cyclists on the road leads to increased driver awareness

Portland OR | Designing Streets for Bicyclists – Basics of Bikeway Design | 3-64

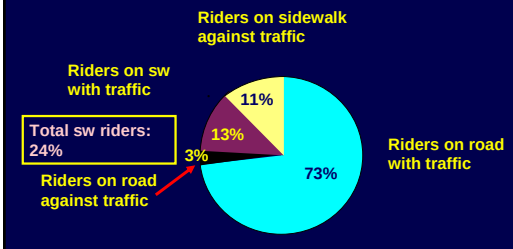
Bike lanes: effect on rider characteristics



Riders at sites with sidewalks & no bike lanes

Designing Streets for Bicyclists – Basics of Bikeway Design | 3-65

Bike lanes: effect on rider characteristics



Riders at sites with sidewalks & bike lanes

Designing Streets for Bicyclists – Basics of Bikeway Design | 3-66

RELATIVE DANGER INDEX
Of various types of facilities

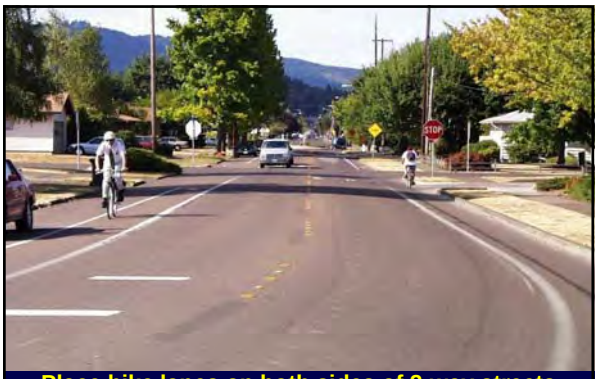
Major Streets w/o bike lanes	1.28
Minor Streets w/o bike lanes *	1.04
Streets with bike lanes	0.5
Mixed-use paths	0.67
Sidewalks	5.32

(* = shared roadway)

1.00 = median

Source: William Moritz, U.W. - "Accident Rates for Various Bicycle Facilities" - based on 2374 riders, 4.4 million miles

Designing Streets for Bicyclists – Basics of Bikeway Design 3-67



Place bike lanes on both sides of 2-way streets

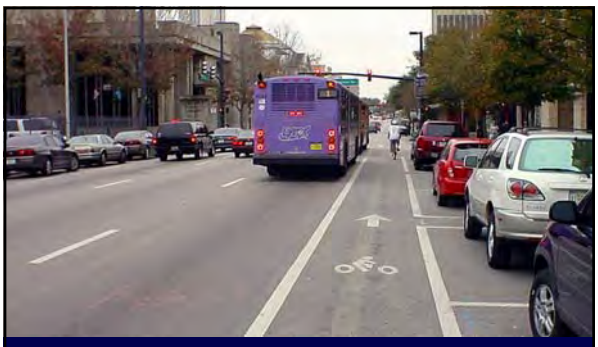
Corvallis OR | Designing Streets for Bicyclists – Basics of Bikeway Design 3-68

Exception: uphill bike lane
None needed in downhill direction

Washington DC | Designing Streets for Bicyclists – Basics of Bikeway Design 3-69

Add shared lane marking downhill for continuity and to discourage wrong way riding

Washington DC | Designing Streets for Bicyclists – Basics of Bikeway Design 3-70



Place bike lane between parking and travel lanes

Orlando FL | Designing Streets for Bicyclists – Basics of Bikeway Design 3-71

In general, place bike lane on right of one-way street

Portland OR | Designing Streets for Bicyclists – Basics of Bikeway Design 3-72

Place on left if there are too many conflicts on the right : Bus stops, double turn lanes

Place on left if there are too many conflicts on the right : Parking, driveways

Bike Lane Signing and Marking

- Pavement markings (line and symbol) are required*
- Signs should supplement pavement markings*
- Solid white line between bike lane and motor vehicle lanes
- Line encouraged between bike lane and parking lane

*Forthcoming change to MUTCD

R3-17 Standard Bike Lane Sign

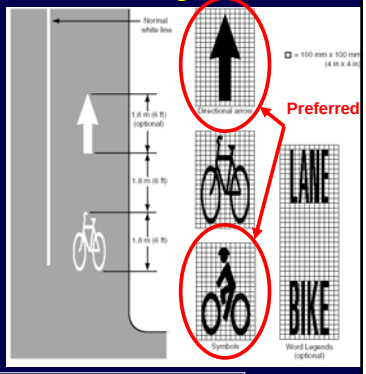
1988 2000

2009? MUTCD

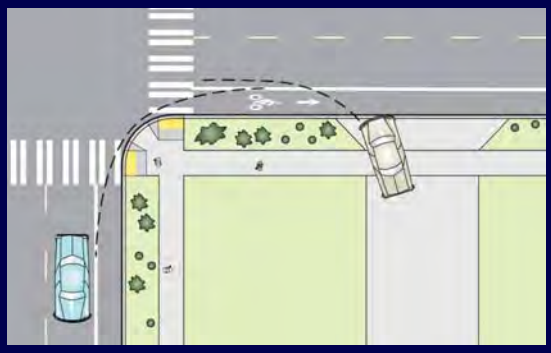
"Bicycle Lane signs … should be used in advance of the beginning of a marked bicycle lane, at the end of the bicycle lane, and at periodic intervals."
Proposed 2009? MUTCD

Bike Lane Markings

- 6" solid white line
- The bicycle lane symbol marking should be placed immediately after an intersection and at other locations as needed.
- Either of the bike symbols shown or the words BIKE LANE may be used
- Diamond symbol no longer used



Keep symbols out of swept path



Example of poor symbol placement

Designing Streets for Bicyclists – Basics of Bikeway Design 3-79

Example of good symbol placement

Designing Streets for Bicyclists – Basics of Bikeway Design 3-80

Bike Lanes – Think beyond bicycling…

Designing Streets for Bicyclists – Basics of Bikeway Design 3-81

This woman enjoys her independence

Designing Streets for Bicyclists – Basics of Bikeway Design 3-82

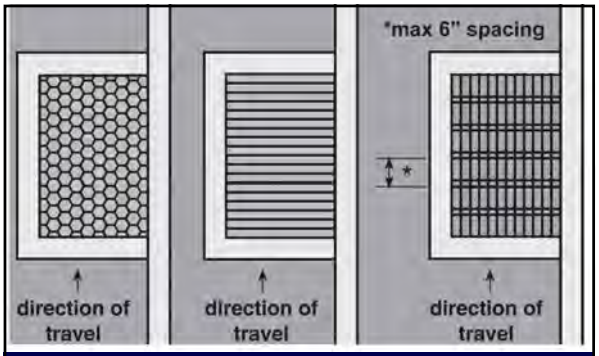
Other On-Road Bikeway Issues

Or is it on-street bike parking?

What we will look at

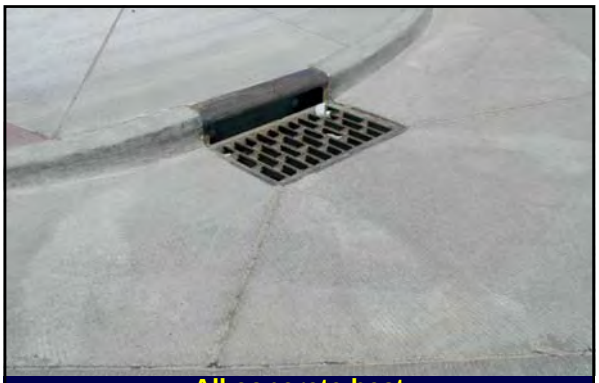
- Drainage grates
- Railroad crossings
- Rumble strips
- Chip seal
- Maintenance

Oxford MS

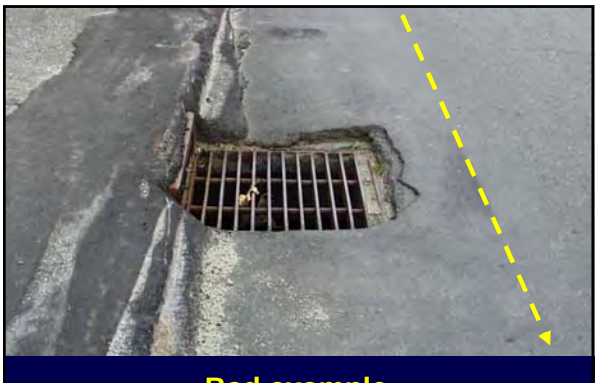


Bicycle-safe grates; a variety of designs

Just as important as the grate design: keeping area around grate smooth with no gaps or grade change

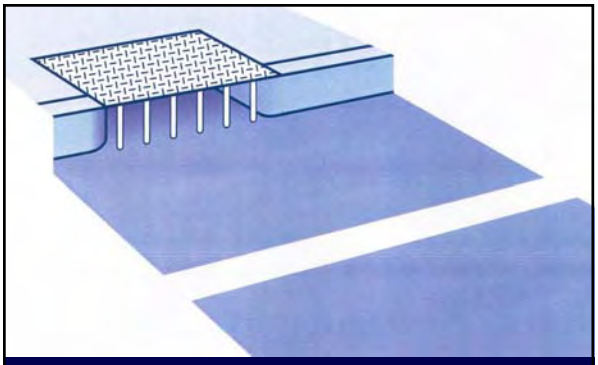


All concrete best



Bad example

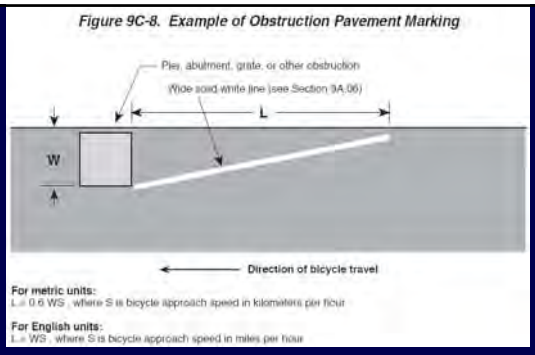
Retrofit – weld straps transverse to bicycle travel



Best design – curb inlet only

Drainage grates are often wider than the normal gutter – one solution is to expand the gutter width

Better solution: indent grates into the planter strip

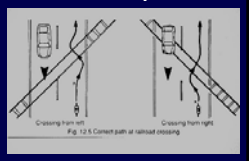


MUTCD Marking for obstructions including drainage grates

RAILROAD CROSSINGS

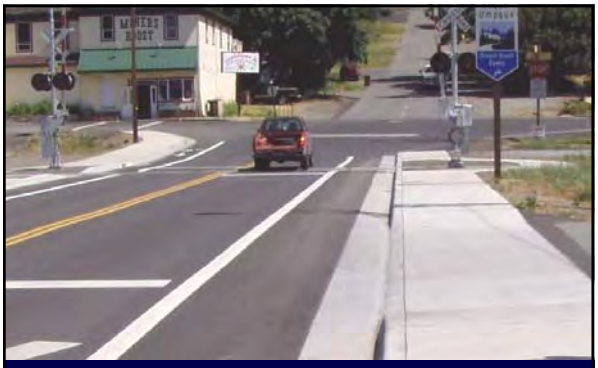
3 IMPORTANT FACTORS:

- Smoothness: Concrete *best* (even when wet); rubber *2nd best* (but slippery when wet); asphalt *OK if maintained;* timber *OK if maintained*
- Flange opening: keep to a minimum
- Angle: best is 90°. Less than 45° should be improved (to 60° or greater)
  - The *combination* of smoothness, flange opening and angle interrelate



Not bad…

Not good…



Fixed!

Crossing materials:
Asphalt – OK at first ,but must be maintained

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-19

Crossing Materials:
Timber – a bit better, but still requires maintenance

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-20

Crossing Materials: Rubber works when new, but is slippery when wet and deteriorates rapidly

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-21

Crossing Materials: Concrete – best

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-22

The best is expensive

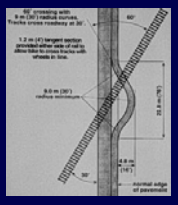
Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-23

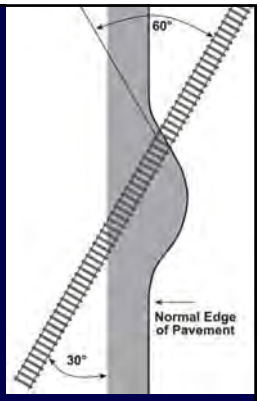
Wide flange opening can trap wheels

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-24

Creating a better angle

- Design for 60° to 90° angle
- Older designs suggested a separated bike lane (below); can be problematic
- Create a bulge and let cyclists choose their own path (right)





Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-25

Good example; each cyclist can choose their line

Madison WI | Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-26

Poor example – curves are too sharp; the concrete area is an obstacle; poorly placed grate

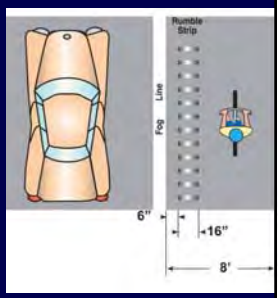
Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-27

Triple whammy: sharp angle, rough surface, and wide flange opening (*gravel thrown in for good measure*)

La Pine OR | Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-28

RUMBLE STRIPS

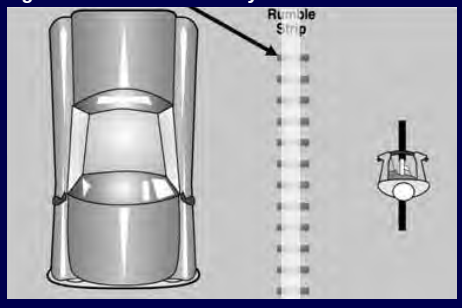
- Provided to alert motorists on long straight rural roadways – most important on freeways
- Bumps/grooves across the entire shoulder are bad for cyclists
- On roads open to cyclists, be sure to leave 4' clear shoulder width for bicyclists
- More bicycle-friendly design: grooves cut within a few inches of the fog line, leaving usable shoulder for bicyclists



Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-29

RUMBLE STRIPS

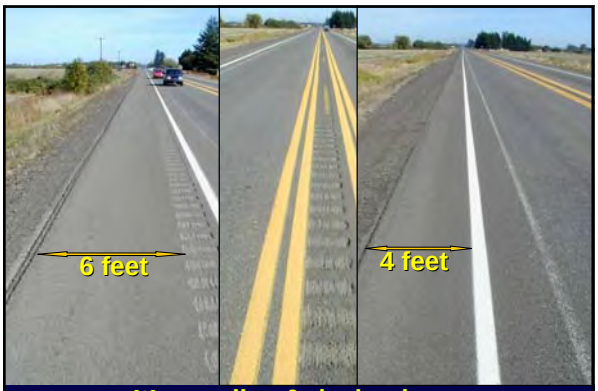
- Most bicycle-friendly design: grooves in the fog line, leaving entire shoulder for bicyclists



Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-30

Alternatives

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-31



It's a policy & design issue

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-32

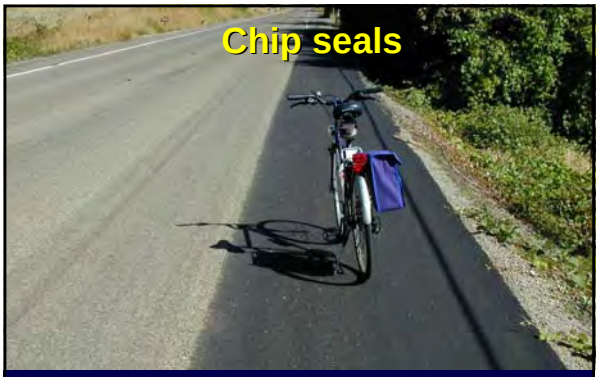
Poorly done, could ruin biking on rural back roads

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-33

Mitigate with finer rock and/or slurry seal

Note poor location of edge of treatment

Salem OR Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-34



Mitigate by not covering shoulders

Benton Co. OR Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-35

Maintenance

- Bike lanes and shared roadways must be maintained
  - If the surface is broken up or uneven, cyclists are more likely to lose control

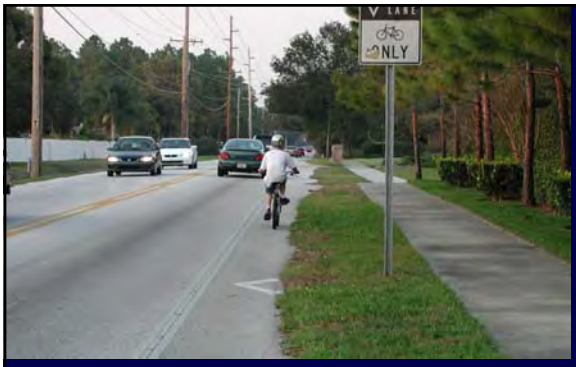
Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-36

Bicyclists must be able to use the bike lane and transition to the roadway when needed

Wisconsin | Designing Streets for Bicyclists – Other On-road Bikeway Issues | 4-37

Cyclists shouldn't normally ride in the gutter, but this still poses a significant hazard

Designing Streets for Bicyclists – Other On-road Bikeway Issues | 4-38



Grass encroaching on the bike lane reduces its effectiveness

Florida | Designing Streets for Bicyclists – Other On-road Bikeway Issues | 4-39

Potholes can be hazardous for cyclists

New Orleans LA | Designing Streets for Bicyclists – Other On-road Bikeway Issues | 4-40

These RR tracks are settling; the gaps can cause a flat tire or a cyclist to crash

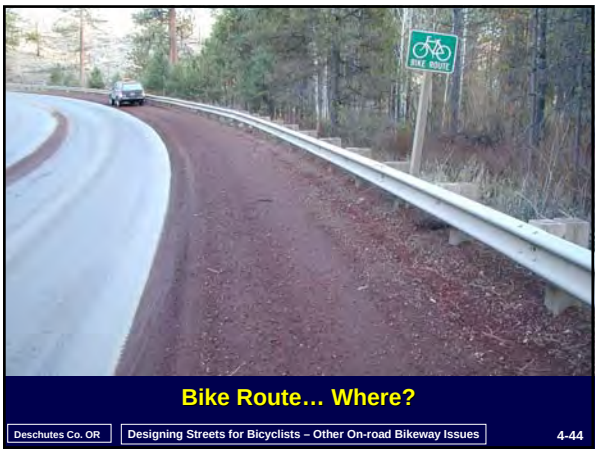
Designing Streets for Bicyclists – Other On-road Bikeway Issues | 4-41

Periodic sweeping can avoid problems like this

Benton Co. OR | Designing Streets for Bicyclists – Other On-road Bikeway Issues | 4-42

Shoulder surfacing must be as smooth as the adjacent roadway or cyclists won't use them

Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-43



Bike Route… Where?

Deschutes Co. OR Designing Streets for Bicyclists – Other On-road Bikeway Issues 4-44

Intersections

Two bodies can't occupy the same space at the same time

Designing Streets for Bicyclists – Intersections 5-1

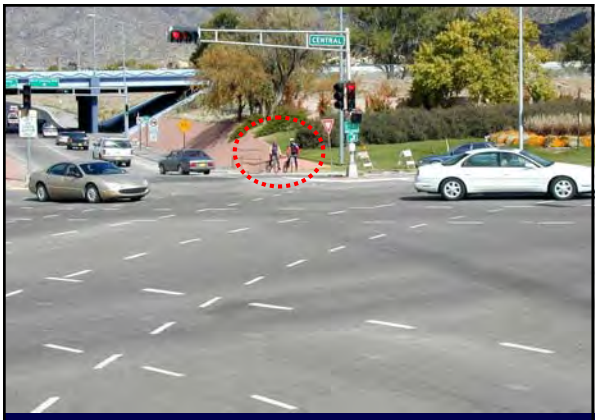
Intersections

- Avoid unusual conflicts
- Provide direct path for cyclists, close to that of motor vehicles
- Bicyclists should be visible; their movements should be predictable
- Simple right angles best for bicyclists

Designing Streets for Bicyclists – Intersections 5-2

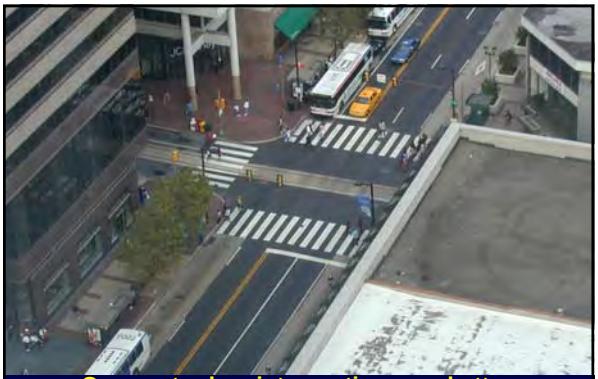
Bigger isn't always better…

Albuquerque NM Designing Streets for Bicyclists – Intersections 5-3



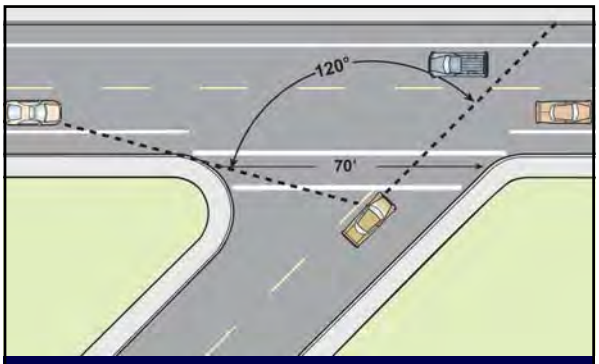
Albuquerque NM Designing Streets for Bicyclists – Intersections 5-4

Albuquerque NM Designing Streets for Bicyclists – Intersections 5-5



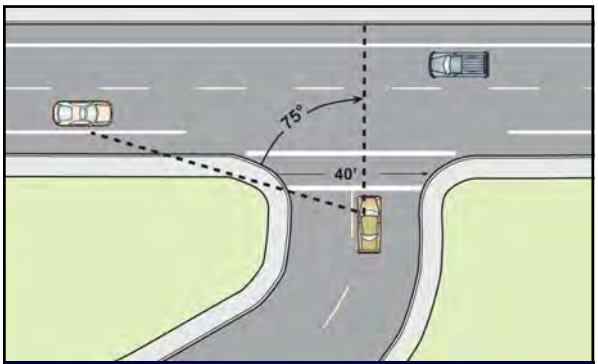
Compact urban intersections are better

Philadelphia PA Designing Streets for Bicyclists – Intersections 5-6



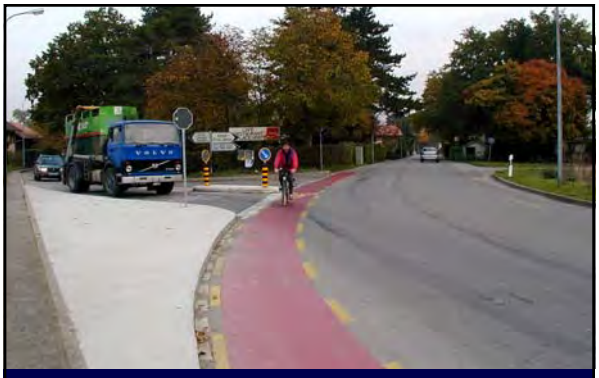
Skew decreases driver's ability to see cyclists

Designing Streets for Bicyclists – Intersections 5-7



Right angle increases visibility

Designing Streets for Bicyclists – Intersections 5-8



Right angle/better visibility helps cyclists

Geneva CH Designing Streets for Bicyclists – Intersections 5-9

Right angle/better visibility helps cyclists

Geneva CH Designing Streets for Bicyclists – Intersections 5-10

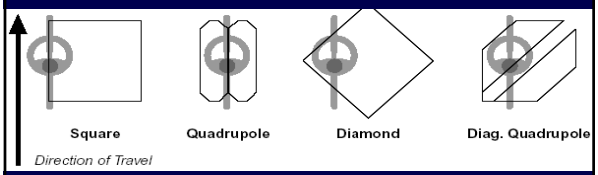
Shallow angle/poor visibility not good for cyclists

Honolulu HI Designing Streets for Bicyclists – Intersections 5-11

Driver relies on rear-view mirror to see traffic

Honolulu HI Designing Streets for Bicyclists – Intersections 5-12

Bicycle Detection at Signals



This figure indicates where cyclists should wait in order to actuate the signal

Signal technicians should use a bike wheel to test loop detector sensitivity

Loop detector in bike lane detects cyclists

Advance loop detector extends green time for cyclists

Loop detector in travel lane with cyclist stencil

Optional MUTCD sign

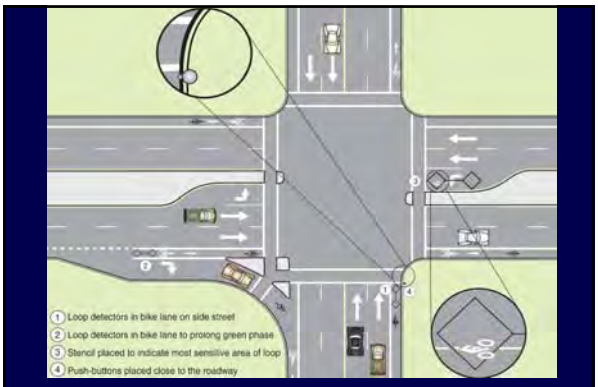
MUTCD standard

Loop detector sensitive to cyclists: it works!

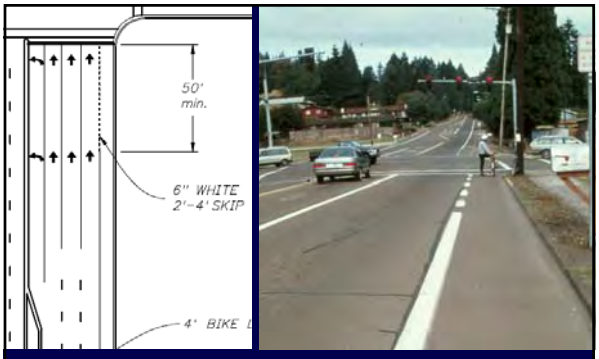
Good advice:

"Lean for the green"

What if loop detectors are impractical?
Video or microwave detection are also solutions

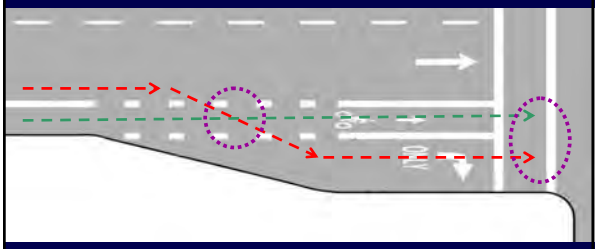


Summary of provisions for bicyclists at signals



Dash bike lane stripe for 50 to 200 feet at intersections

Bike lane & right-turn lane channelization

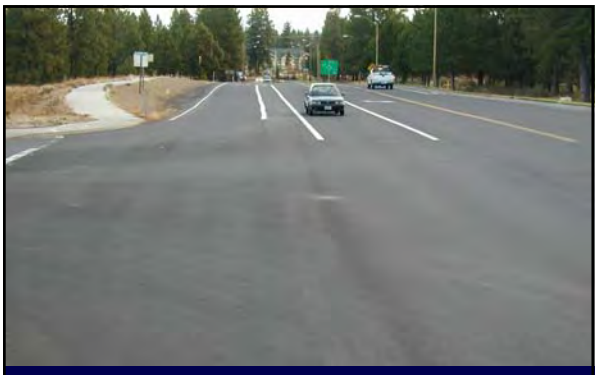


Always place bike lane to left of RTL to
- Separate conflicts
- Make bicyclists' movements more predictable
- Take advantage of speed difference

Corvallis OR

This is the standard (optional) MUTCD sign where right turn lanes cross bike lanes

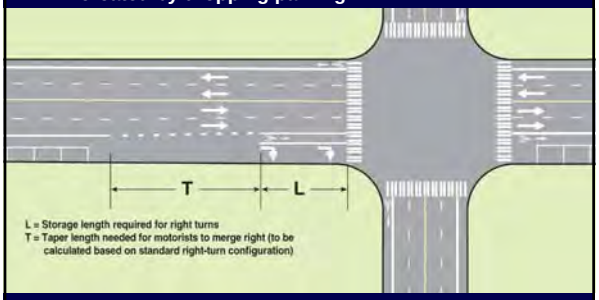
Before: where the cyclist wants to be

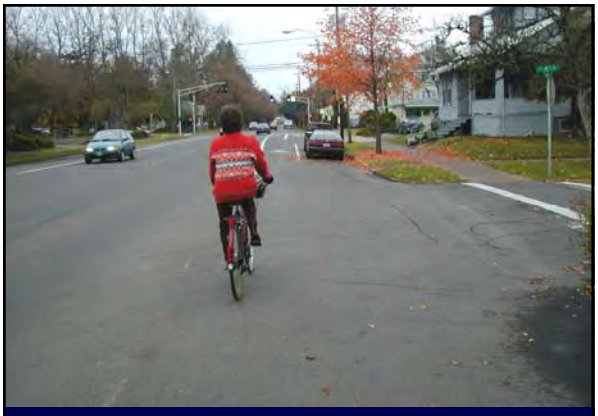


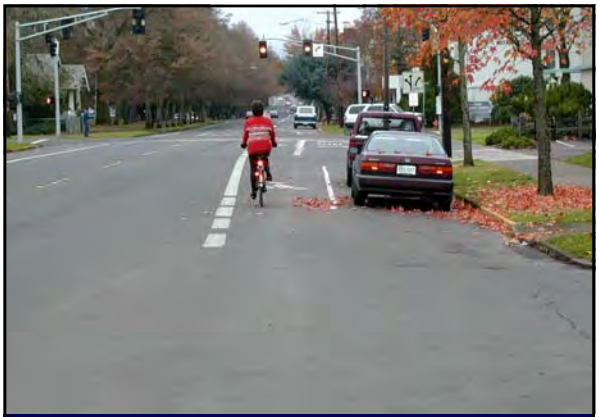
After: where the cyclist should be

Other scenario

1. RTL created by dropping parking



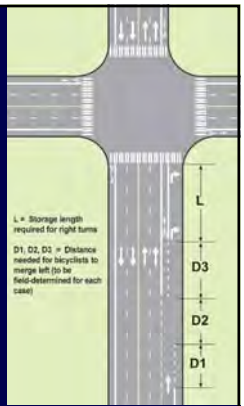




Other scenario

2. RTL created by dropping through lane

In this case, bicyclists must move over across a lane to reach through bike lane

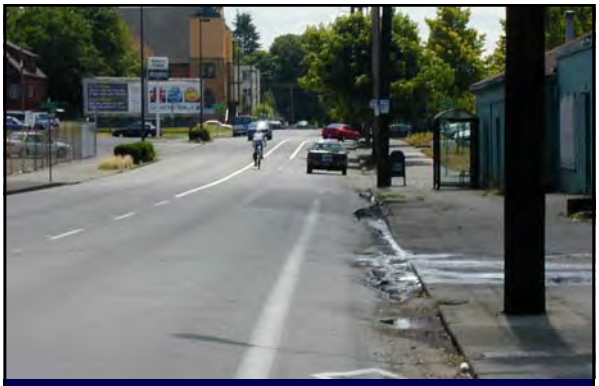


Bicyclists must cross a lane to reach through bike lane

Portland OR | Designing Streets for Bicyclists – Intersections | 5-31

Bicyclists must cross a lane to reach through bike lane

Portland OR | Designing Streets for Bicyclists – Intersections | 5-32



Portland OR | Designing Streets for Bicyclists – Intersections | 5-33

Seek opportunities for minor improvements

Bend OR | Designing Streets for Bicyclists – Intersections | 5-34

Place bike lane correctly even if it ends beyond intersection

Designing Streets for Bicyclists – Intersections | 5-35

Roundabouts

- Roundabouts slow motorists to speeds compatible with bicyclists (bicycle speeds: 10-20 mph)
- Bicyclists have wide range of skills and comfort levels
  - Experienced cyclists (e.g. frequent commuter, utility, and recreational cyclists)
  - Inexperienced cyclists (e.g. children and occasional utility or recreational cyclists)

5-1

A roundabout is a type of intersection control

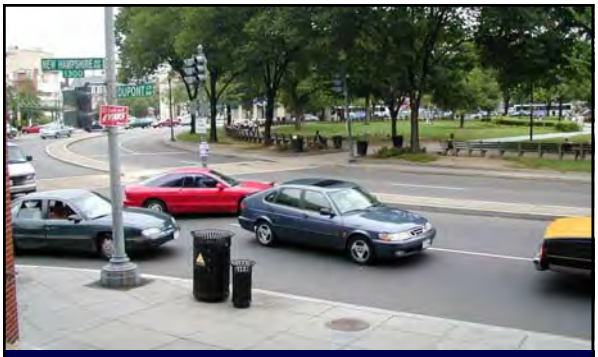
Clearwater FL

5-2

A roundabout is not:
1. A New England style rotary, with large size & high speeds

Augusta ME

5-3



A roundabout is not:
2. A Washington DC style circle, with traffic signal controls

Washington DC

5-4

A roundabout is not:
3. A traffic-calming mini circle

5-5

A roundabout is not:
4. Paris

Paris FR

5-6

Why roundabouts are safer for all users:

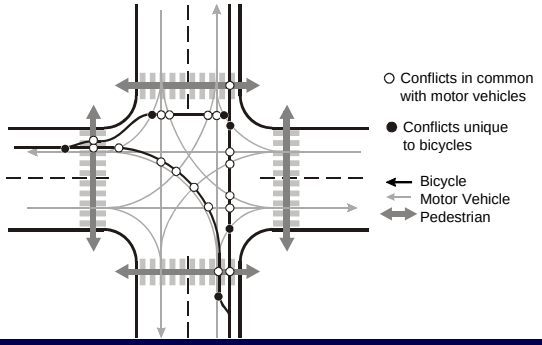
- **Slow speed:**
  - ***Deflection, truck apron, splitter islands, "reverse super"***
- **Reduced conflicts**
- **No left turns**
- **Yield on entry**

Crash Reduction (all users):

- **About 54% overall**
- **27% pedestrian crashes**
- **Up to 76% fatalilties and serious injuries**

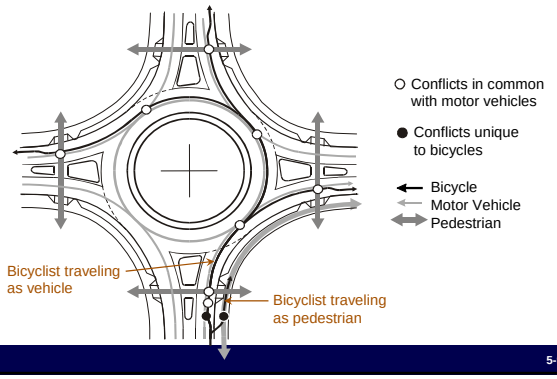
5-7

Conflicts at Conventional Intersection



5-8

Conflicts at single-lane roundabout



5-9

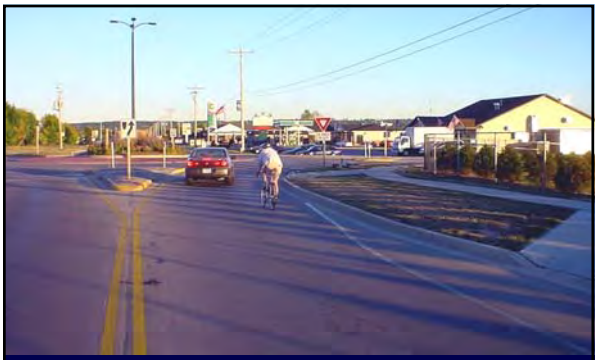
General Principles for Bicyclists

- **No bike lanes within the circulatory roadway**
  (through cyclist is to right of exiting traffic)
- **Low-volume:**
  - **Bicyclists can generally circulate with other vehicles**
- **High-volume:**
  - **Give bicyclists option of traversing like a vehicle or like a pedestrian**

5-10

Designing for Bicyclists to Traverse Roundabouts Like Other Vehicles

Designing Streets for Bicyclists – Intersections 5-11



Entering single lane roundabout – single up

De Pere WI 5-12

End bike lane to encourage cyclist to enter roadway

Bend OR 5-13

Circulating: “Take the lane” in single lane

Clearwater FL 5-14

Slow speed allows cyclists to share roadway

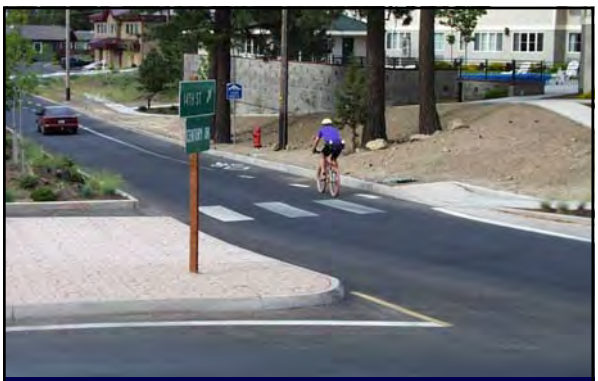
Bend OR 5-15

No bike lane on circulatory roadway

Bend OR 5-16

Upon exiting, cyclist moves out of the travel lane

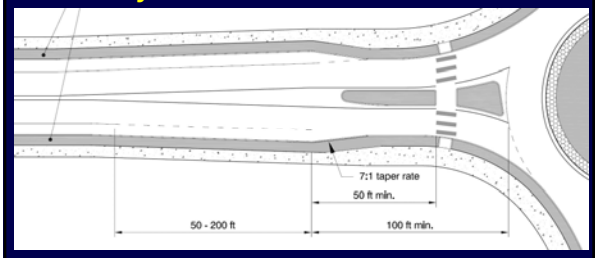
De Pere WI 5-17



Resume bike lane on exit, after crosswalk

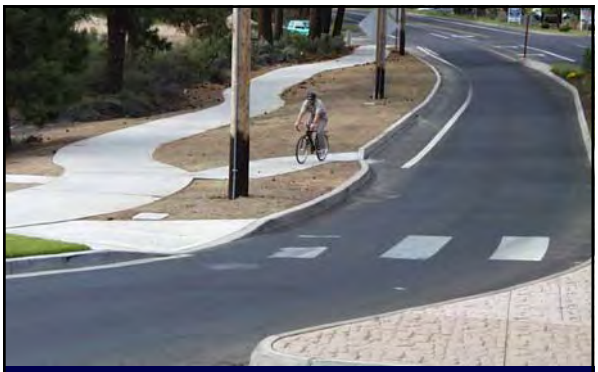
Bend OR 5-18

Summary – Roundabout Design for Bicyclists to Travel Like Vehicles



- Drop bike lane on entry with appropriate taper and dashes, (indicates that merging is expected)
- Resume bike lane on exit, after crosswalk
- No bike lane on the circulatory roadway

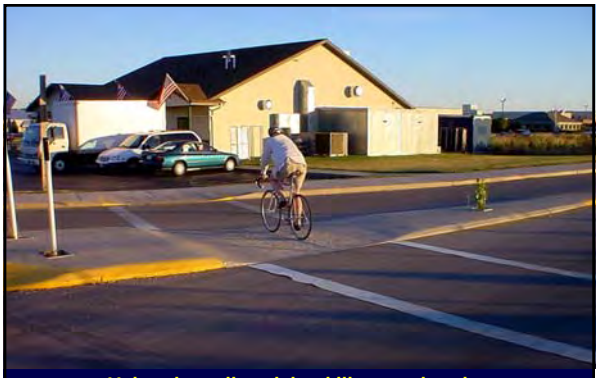
5-19



What if a cyclist doesn't want to enter the roundabout? Provide a ramp at multi-lane roundabouts

Bend OR

5-20

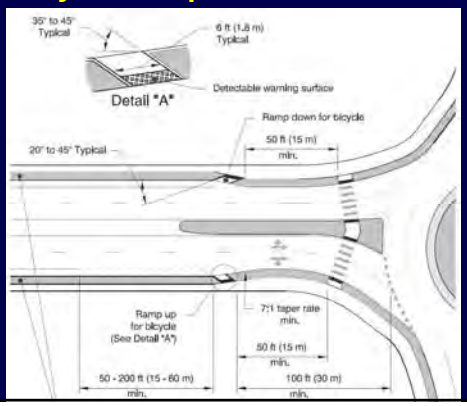


Using the splitter island like a pedestrian

De Pere

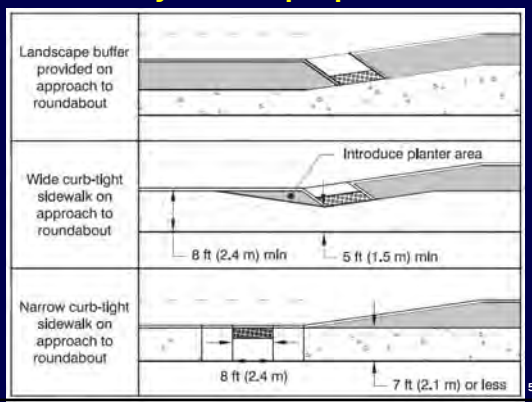
5-21

Bicycle Ramps at Roundabouts

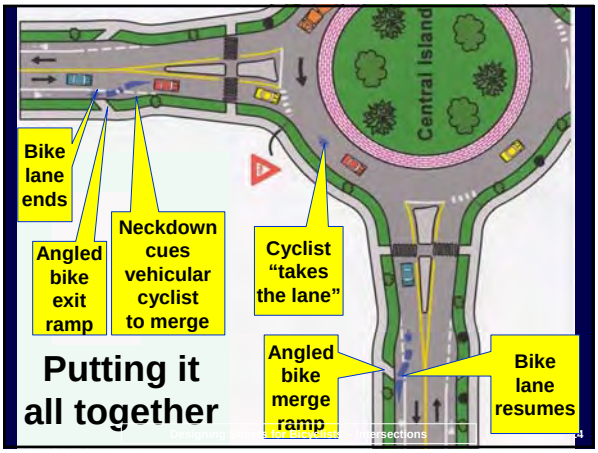


5-22

Bicycle Ramp Options



5-23



BIKE LANE RESTRIPING

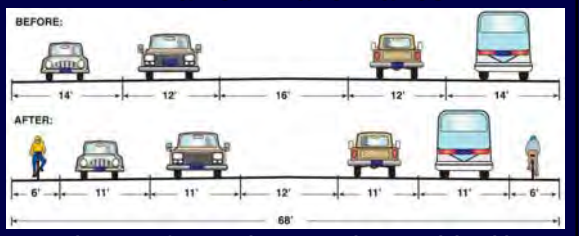
Why Restriping?

- Most urban roads were built without bike lanes, discouraging bicycling & causing cyclist/ motorist conflicts
- Restriping is most expedient way to provide bike lanes where road widening is unlikely

3 TECHNIQUES

1. Narrow Travel Lanes
2. Remove/reallocate/rearrange parking
3. Remove Travel Lanes

1. Narrow Travel Lanes



10' - 11' just as safe as 12' lanes on urban arterials with speeds < 45 MPH *. AASHTO allows narrow lanes:

- 9' on local residential streets
- 10' on low speed arterials & collectors
- 11' for streets with trucks

* "Relationship of Lane Width to Safety for Urban and Suburban Arterials": Study by Potts, Harwood, and Richard

1. Narrow Travel Lanes

As is: wide CTL

1. Narrow Travel Lanes

Restriped for bike lanes

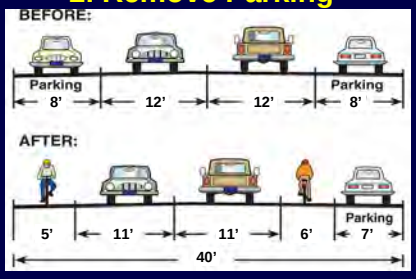
Reinventing the roadway:
Transform a 5-lane commercial strip to …

Portland OR 6-7

…a safer road for everyone

6-8

2. Remove Parking



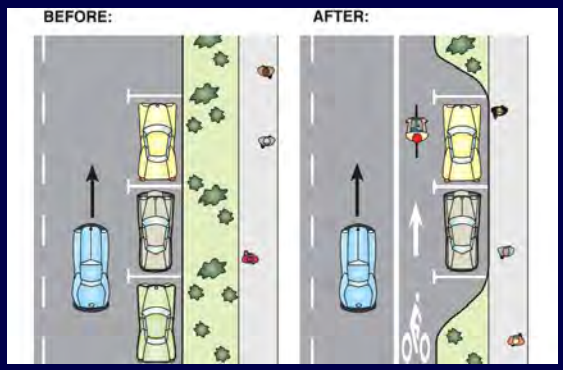
- Remove from one side only *(leave on one side)*
- Removal is a negative for pedestrians & businesses
  - *Do not consider in CBD or on local residential streets; speeds should be slow enough for shared roadway*

Designing Streets for Bicyclists – Restriping for Bike Lanes 6-9

Remove from one side only *(leave on one side)*

Corvallis OR Designing Streets for Bicyclists – Restriping for Bike Lanes 6-10

Provide parking bays where parking is critical



Designing Streets for Bicyclists – Restriping for Bike Lanes 6-11

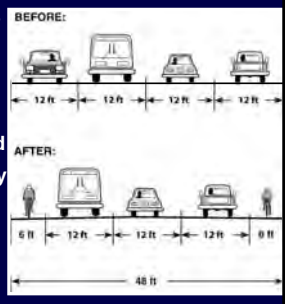
Provide parking bays where parking is critical

Only possible with planter strip/furniture zone

Corvallis OR Designing Streets for Bicyclists – Restriping for Bike Lanes 6-12

3. Remove travel lanes

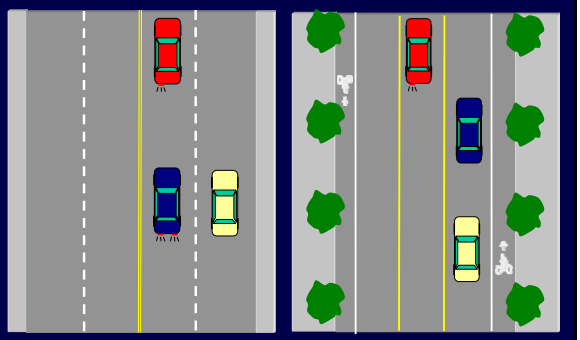
- Restriping 2-way street with 4 travel lanes to a CTL, 2 travel lanes & 2 bike lanes can improve safety & traffic flow
- Many one-way couplets have more travel lanes than needed
- Always conduct a traffic study to determine if traffic can be handled with fewer lanes



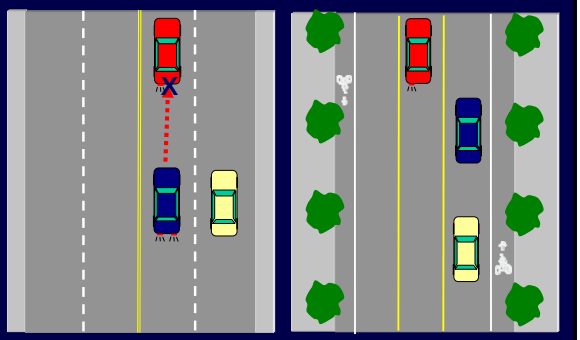
Removing travel lanes and Safety

"Classic" 4-3 lanes

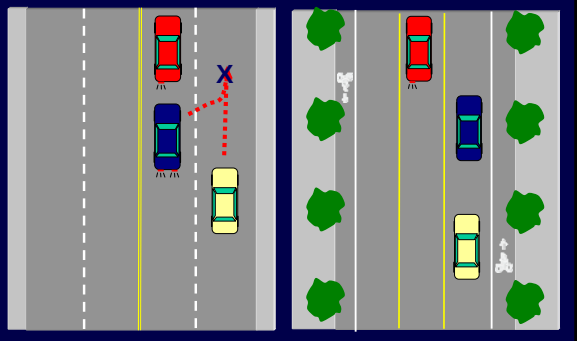
3 crash types can be reduced by going from 4 to 3 lanes: which ones?



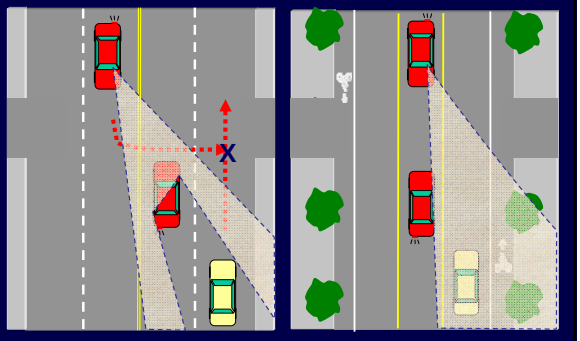
3 crash types can be reduced by going from 4 to 3 lanes: 1 – rear enders

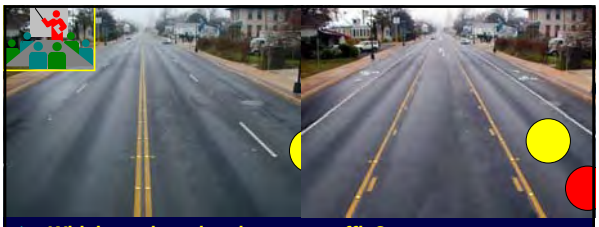


3 crash types can be reduced by going from 4 to 3 lanes: 2 – side swipes



3 crash types can be reduced by going from 4 to 3 lanes: 3 – left turn/broadside





- Which road carries the most traffic?
- Which road produces the highest speed?
  - ✓ With a 4-lane road a fast driver can pass others
  - ✓ With a 2-lane road the slower driver sets the speed
- Which road produces the highest crash rate?
- Which is better for bicyclists, pedestrians, businesses?

Case study 1: Iowa DOT results

25% reduction in total crashes/mile

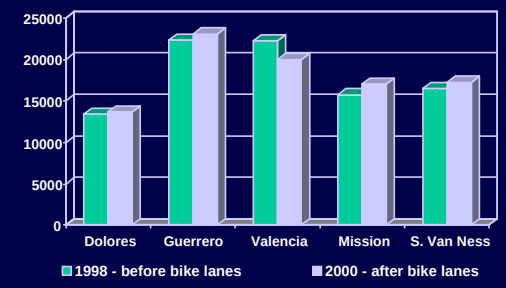
19% reduction in crash rate

Based on 15 road diet projects with 15 control sites over 23 years

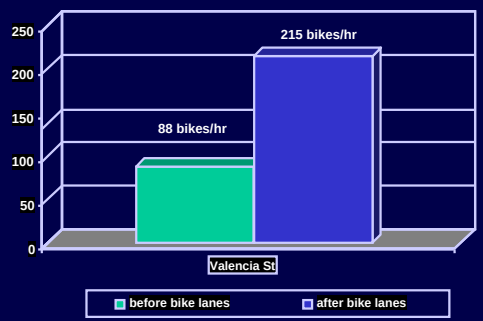
Case study 2: Valencia St San Francisco)

Before After

Traffic counts (ADT): virtually no diversion



Valencia Street Bicycle Volumes PM peak hour counts

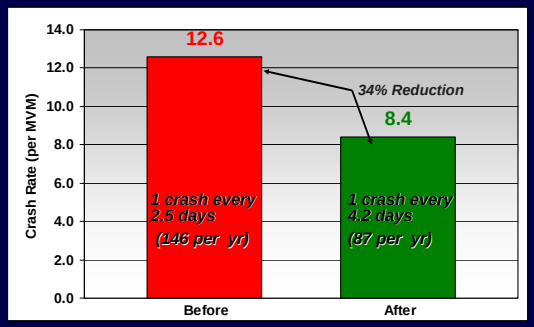


Case study 3: Edgewater Drive (Orlando FL) Resurfacing Project

- $589,000 project scheduled in FDOT 5-year work plan
- FDOT open to 3-lane option if City takes over jurisdiction
- Changes must be accepted by neighborhood and business associations; before/after studies

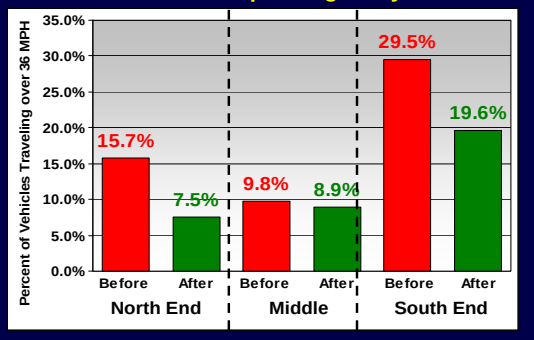
Before After

Before/after studies: 1. Crash rate



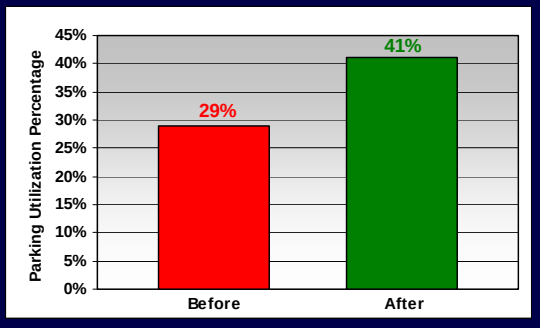
Before/after studies: 2. Injury rate

Before/after studies: 3. Speeding analysis

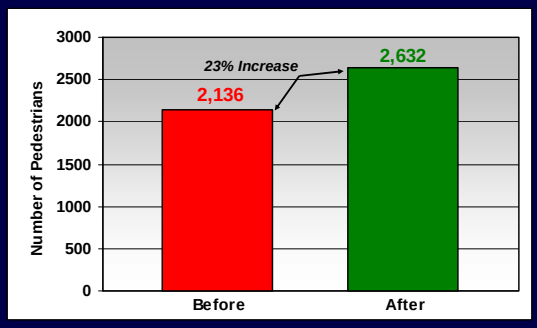


Before/after studies: 4. Traffic volumes

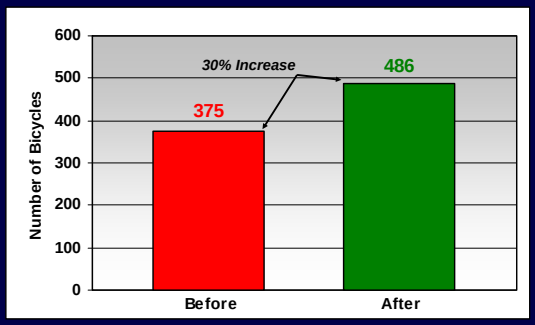
Before/after studies: 5. On-street parking utilization



Before/after studies: 6. Pedestrian volumes



Before/after studies: 7. Bicyclist volumes



Designing Streets for Bicyclists – Restriping for Bike Lanes 6-31

Alternatives

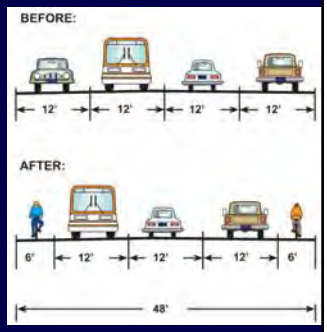
There are many other potential types

Designing Streets for Bicyclists – Restriping for Bike Lanes 6-32

Uneven traffic flows

In some corridors, there is more traffic in one direction than the other:

- Alternate routes
- Uneven am/pm peak



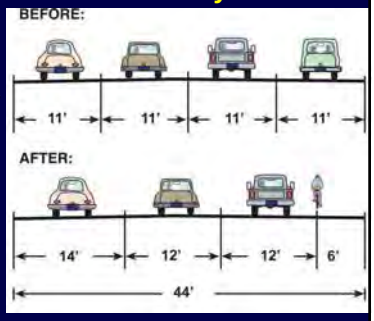
Designing Streets for Bicyclists – Restriping for Bike Lanes 6-33

Uneven traffic flows

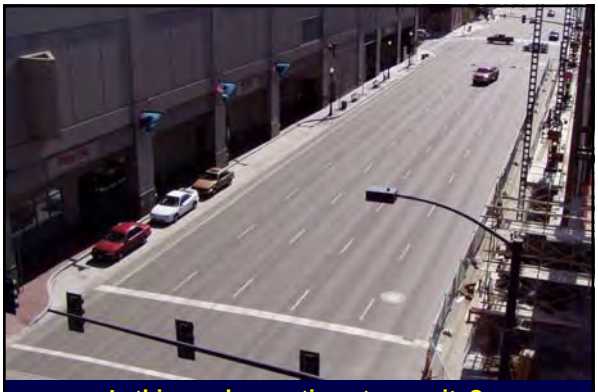
Washington DC Designing Streets for Bicyclists – Restriping for Bike Lanes 6-34

Remove a lane from a one-way street

- In many cases, 2-way streets were converted to 1-way with no traffic study
- Existing streets were simply "filled"
- 1-way carries more traffic per lane, so fewer lanes are needed



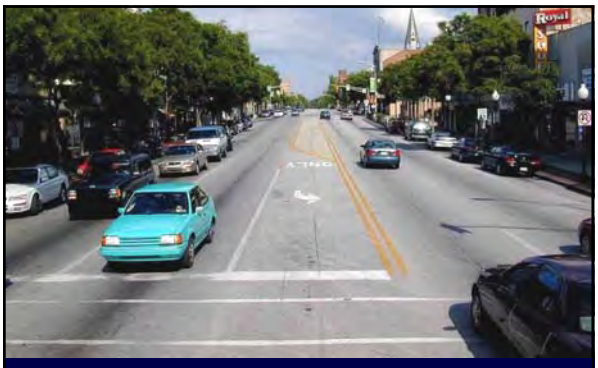
Designing Streets for Bicyclists – Restriping for Bike Lanes 6-35



Is this road operating at capacity?

Boise ID Designing Streets for Bicyclists – Restriping for Bike Lanes 6-36

This space recaptured from 4th travel lane



This 5-lane Main Street was converted to…

Name 4 things that changed

Fewer travel lanes; added bike lanes; parallel to back-in diagonal parking on one side; new pavement

OTHER CONSIDERATIONS

- Surface should be smooth

Not ready for ~~prime time~~ bike lanes

OTHER CONSIDERATIONS

- Drainage grates, utility covers should be fixed

Uh-oh

Portland OR | Designing Streets for Bicyclists – Restriping for Bike Lanes | 6-43

OTHER CONSIDERATIONS

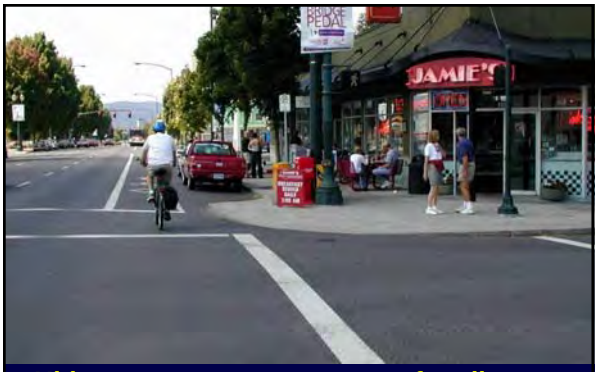
- Make sure the bike lanes ends gracefully…

Honolulu HI | Designing Streets for Bicyclists – Restriping for Bike Lanes | 6-44

Chase the pavers: restripe after overlay

- Guarantees smooth surface
- Low cost
- System gets built steadily
- Removing stripes is difficult & expensive

Designing Streets for Bicyclists – Restriping for Bike Lanes | 6-45



Ultimate message: streets are for all users

Portland OR | Designing Streets for Bicyclists – Restriping for Bike Lanes | 6-46

Are Cheyenne streets wide enough for bike lanes?

Dell Range Boulevard

Designing Streets for Bicyclists – Restriping for Bike Lanes | 6-47

Are Cheyenne streets wide enough for bike lanes?

Henderson Drive

Designing Streets for Bicyclists – Restriping for Bike Lanes | 6-48

INNOVATIVE BIKEWAY DESIGNS

- Raised Bike Lanes
- Colored Bike Lanes
- Separated Bike Lanes (cycle tracks)
- Innovative Intersection Designs

1

Colored bike lanes

- Ride on the street
- Psychological separation
- Novice cyclists more likely to ride in bike lane, not on sidewalk
- Street appears narrower; motorists drive slower

2

- Colored bike lanes can be a traffic-calming technique: roadway appears narrower
- Other elements also add “friction”

3

Technique 1: dye

4

Before

5

After *(stamping not needed)*

6

Technique 2: A/C & PCC (provides contrast)

7

8

Smoothness is important:
Joints must be saw-cut, not trowelled

9

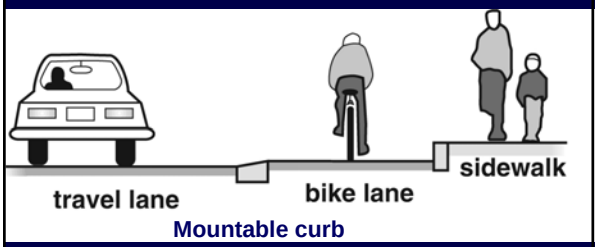
Brick street, concrete bike lanes

10

Brick street, concrete bike lanes
In this case, bike lane too narrow

11

Raised Bike lane

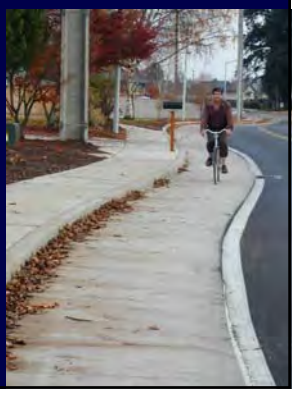


Combines the convenience of riding on the street with the psychological separation of a barrier

12

Raised Bike lane

- Convenience of riding on the street + psychological separation of a barrier



Raised Bike lane

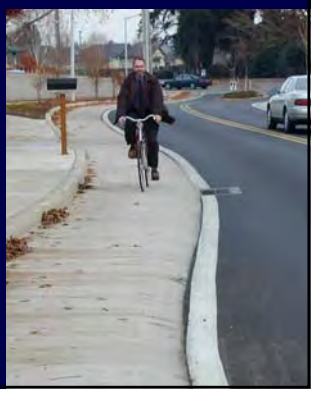
- Convenience of riding on the street + psychological separation of a barrier
- Mountable curb allows cyclists to leave bike lane for turning or overtaking

Raised Bike lane

- Convenience of riding on the street + psychological separation of a barrier
- Mountable curb allows cyclists to leave bike lane for turning or overtaking
- Motorists feel bump when they stray into curb

Raised Bike lane

- Convenience of riding on the street + psychological separation of a barrier
- Mountable curb allows cyclists to leave bike lane for turning or overtaking
- Motorists feel bump when they stray into curb
- Novice bicyclists more likely to ride in bike lane than on sidewalk



Swiss example

17

Drainage grates in roadway

18

US example: Bend OR (raised and dyed)

19

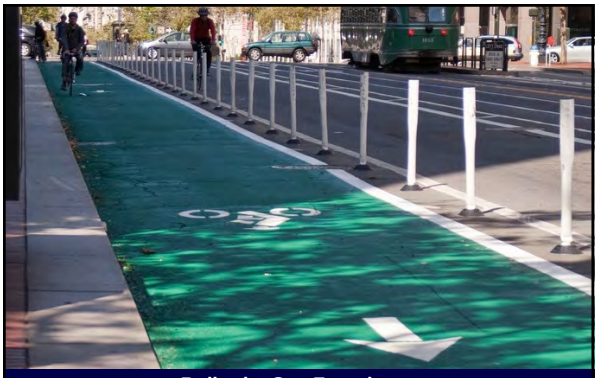
Transition

20

Separated bike lanes (cycle tracks)

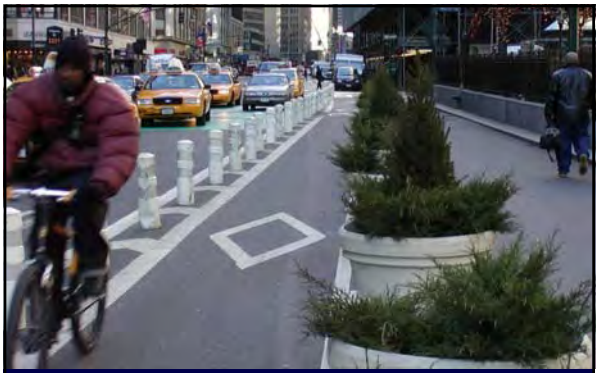
- Physical separation
- Novice cyclists more likely to ride in bike lane, not on sidewalk
- Street appears narrower; motorists drive slower

21



Bollards: San Francisco

22

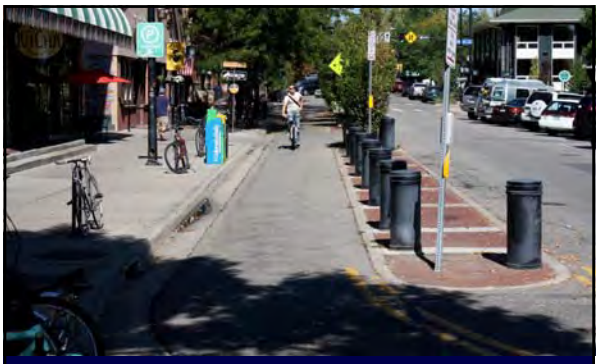


Bollards: NYC

23

Curb: Missoula MT

24



Curb: Boulder CO

25

Separated bike lanes challenges

- Maintenance
- Bicyclist left-turns
- Motorist right turns
  - May require separate signal phases

26

Bike lanes and diagonal parking

Usually not recommended

Can be done

Salem OR

Bike lanes and diagonal parking

Mitigate w/ back-in parking

Better for bicyclists and others

Vancouver WA

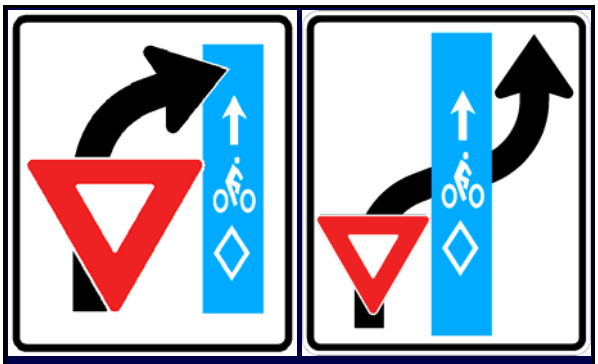
Innovative intersection designs

Unique Situations Require Creative Thinking

Blue bike lanes at intersections

29

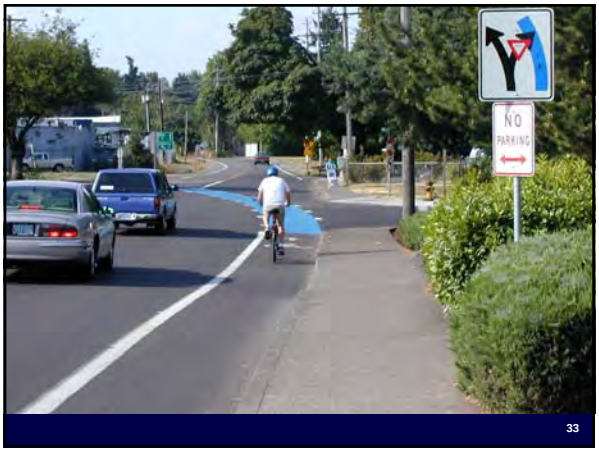
30



Unique Signs developed

31

32



33

34

35

Bike boxes

NAACTO Design

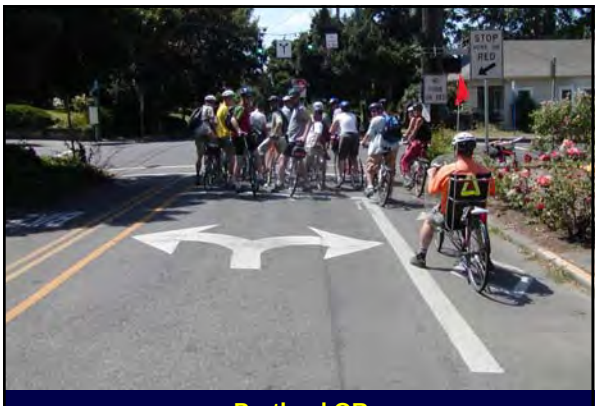
At signals:

- Bicyclists may pull forward when light is red
- Bicyclists may proceed before cars when light turns green
- Must ban RTOR

36

The Netherlands

37



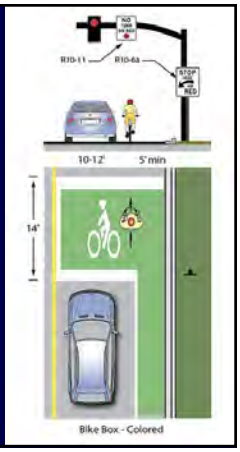
Portland OR

38

Bike boxes + color

Portland design:

- Color adds emphasis
- Sign holds drivers back
- RTOR banned



Portland OR

40

Portland OR

41

Vancouver BC

42

Redmond OR | Designing Streets for Bicyclists – Shared Use Paths | 8-1

Shared-use; not just for bikes!

Madison WI | Designing Streets for Bicyclists – Shared Use Paths | 8-2

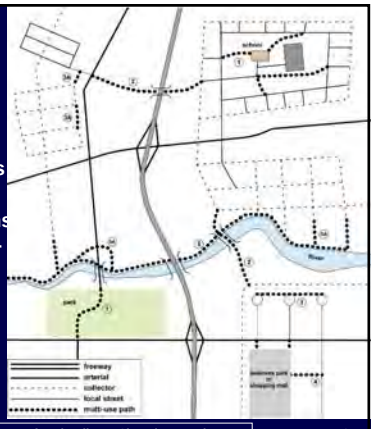
Keys to successful paths

1. Separate from traffic
2. Scenic qualities
3. Connect to destinations
4. Well-designed street crossings
5. Visibility
6. Good design
7. Proper maintenance

Madison WI | Designing Streets for Bicyclists – Shared Use Paths | 8-3

Good locations for urban path

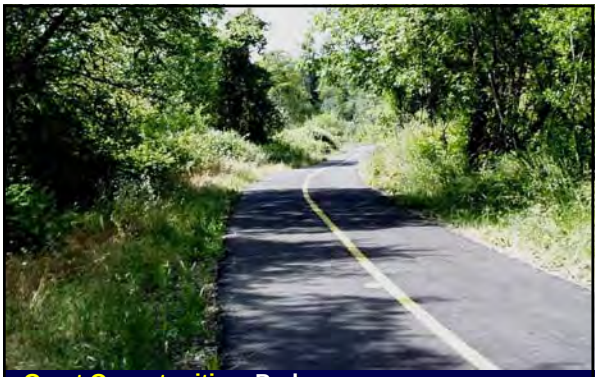
1. Short-cuts
2. Bridge obstacles *(freeways, rivers)*
3. Connect cul-de-sacs & dead ends
4. Connect destinations
5. Along rivers & other corridors, *linked to street system!*



Designing Streets for Bicyclists – Shared Use Paths | 8-4

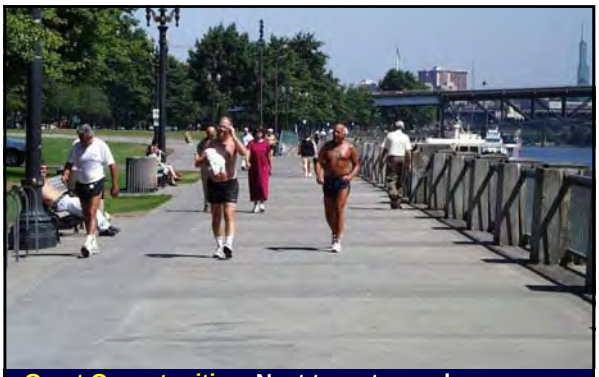
Great Opportunities: Abandoned railroads

Designing Streets for Bicyclists – Shared Use Paths | 8-5



Great Opportunities: Parks

Designing Streets for Bicyclists – Shared Use Paths | 8-6



Great Opportunities: Next to water - urban

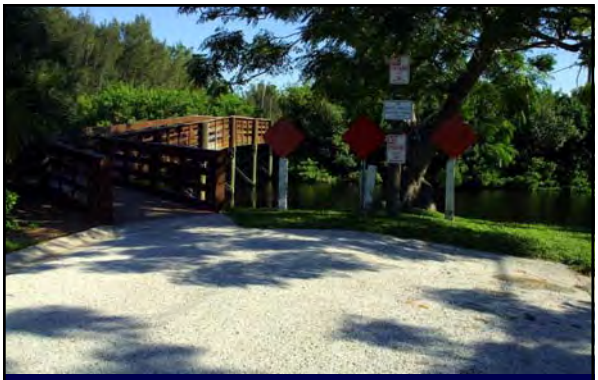
Portland OR | Designing Streets for Bicyclists – Shared Use Paths | 8-7

Great Opportunities: Next to water - rural

Bend OR | Designing Streets for Bicyclists – Shared Use Paths | 8-8

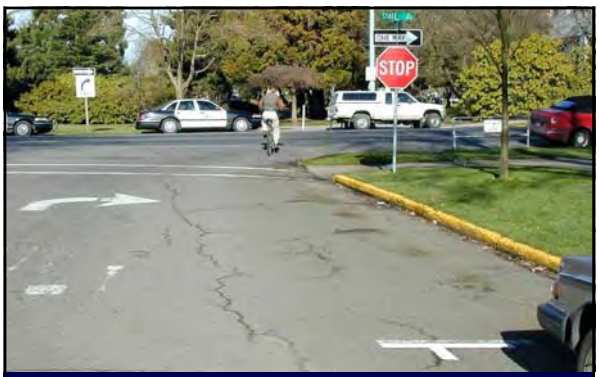
Great Opportunities: As connections

St. Petersburg FL | Designing Streets for Bicyclists – Shared Use Paths | 8-9



When creating short cuts, connect paths to streets

St. Petersburg FL | Designing Streets for Bicyclists – Shared Use Paths | 8-10



Short cut not well-connected to street

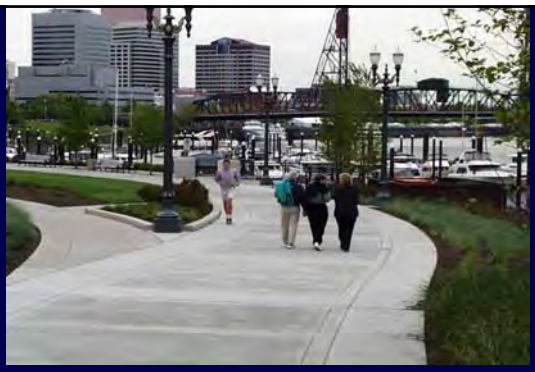
Salem OR | Designing Streets for Bicyclists – Shared Use Paths | 8-11

Considerations: *Grade separation* from busy streets

Portland OR | Designing Streets for Bicyclists – Shared Use Paths | 8-12

Considerations: Frequent/convenient *access* to local streets

Ashland OR | Designing Streets for Bicyclists – Shared Use Paths | 8-13



Considerations: *Personal security:* visibility, illumination

Designing Streets for Bicyclists – Shared Use Paths | 8-14

PATHS NEXT TO ROADWAYS

- Drivers don't see cyclists coming from right

Designing Streets for Bicyclists – Shared Use Paths | 8-15

PATHS NEXT TO ROADWAYS

- Cyclists often required to stop or yield at cross-streets
- Stopped cars block path

Designing Streets for Bicyclists – Shared Use Paths | 8-16

PATHS NEXT TO ROADWAYS

- Access to and from path can be difficult

Corvallis OR | Designing Streets for Bicyclists – Shared Use Paths | 8-17

PATHS NEXT TO ROADWAYS

- Maintenance is often neglected
- Barriers may be needed to separate path from roadway

Designing Streets for Bicyclists – Shared Use Paths | 8-18

PATHS NEXT TO ROADWAYS

- Older paths: remove path designation – it's a sidewalk

Consider path next to roadway if:

- High-traffic, high-speed road *(bike lanes & sidewalks inappropriate)*
- Good separation from traffic
- Path provides continuity
- Few conflicts with side streets
- No alternatives on nearby parallel streets
- Access to local cross-streets along the path

The Department of Redundancy Department

How did Davis CA successfully integrate paths into the city?

With planning and foresight: dedicated R.O.W. links cul-de-sacs with linear parks; connections to schools etc.

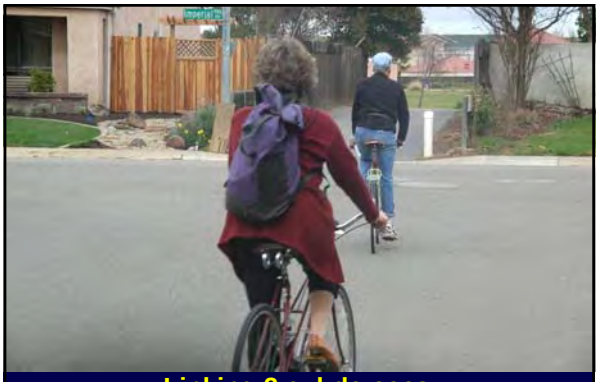
Close-up: linear parks linking cul-de-sacs

Path in park

Davis CA | Designing Streets for Bicyclists – Shared Use Paths | 8-25

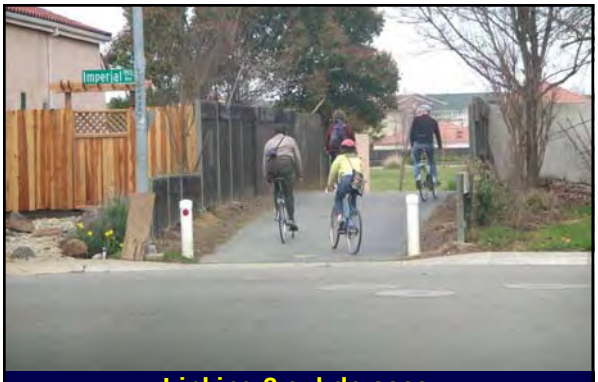
Bridge over freeway

Davis CA | Designing Streets for Bicyclists – Shared Use Paths | 8-26



Linking 2 cul-de-sacs

Davis CA | Designing Streets for Bicyclists – Shared Use Paths | 8-27



Linking 2 cul-de-sacs

Davis CA | Designing Streets for Bicyclists – Shared Use Paths | 8-28

Crossing Thoroughfares

- Major source of conflicts
- Grade separation desirable for high traffic roads

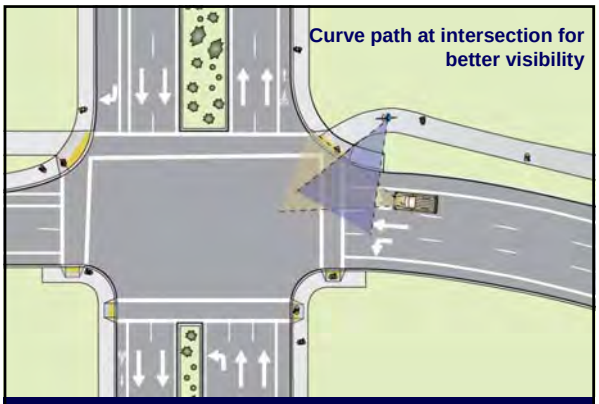
Bend OR | Designing Streets for Bicyclists – Shared Use Paths | 8-29

Crossing Thoroughfares

Treatments:

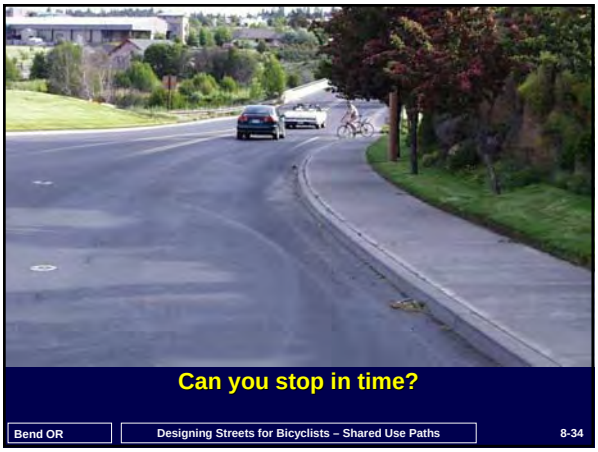
- $ - Signs, pavement markings
- $$- Geometric design: median island; curved path
- $$$ - Signal
- $$$$ - Grade separation

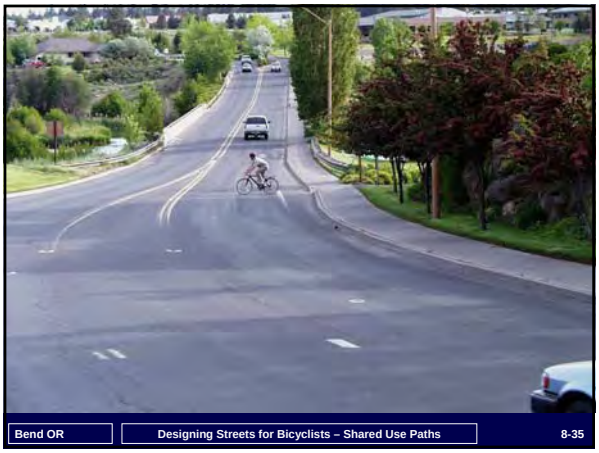
Designing Streets for Bicyclists – Shared Use Paths | 8-30


Curve path at intersection for better visibility
Designing Streets for Bicyclists – Shared Use Paths
8-31

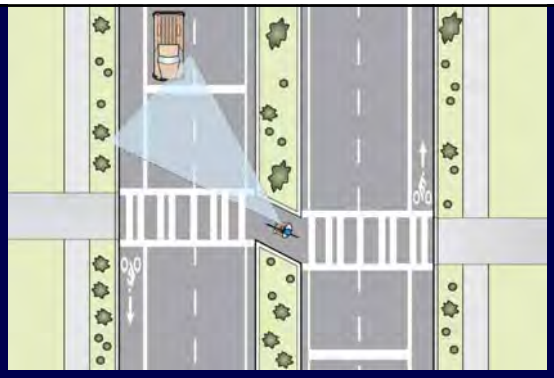

Midblock – more difficult to treat
Bend OR
Designing Streets for Bicyclists – Shared Use Paths
8-32


Can you see the cyclist approaching?
Bend OR
Designing Streets for Bicyclists – Shared Use Paths
8-33

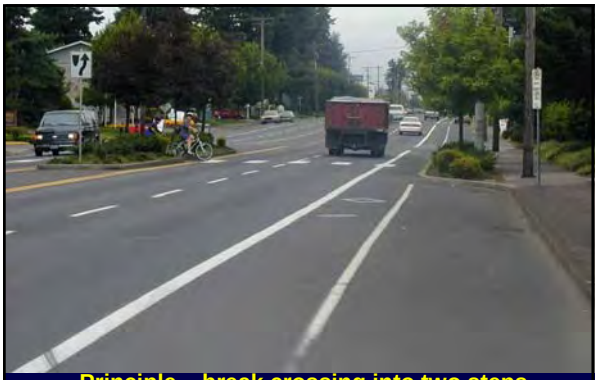

Can you stop in time?
Bend OR
Designing Streets for Bicyclists – Shared Use Paths
8-34


Bend OR
Designing Streets for Bicyclists – Shared Use Paths
8-35


Good news
Most of pedestrian crossing techniques work for trail crossings
Designing Streets for Bicyclists – Shared Use Paths
8-36



Median island w/ angled cut-through, adv. stop line

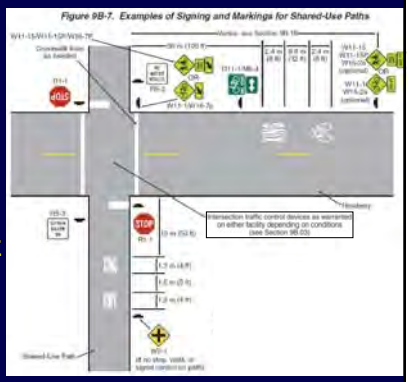


Principle – break crossing into two steps

Assigning the right of way

Do NOT just give this figure from the MUTCD to your drafter and say "do it like this"

READ THE FINE PRINT!



Assigning the right of way

- Use sound traffic engineering principles
- Meet people's needs:
  - Bicyclists & skaters want to stay in motion
  - Too many STOP signs breeds disrespect
  - The MUTCD states:

Priority at a path/roadway intersection should be assigned considering:

A. Relative speeds of path and roadway users
B. Relative volumes of path and roadway traffic
C. Relative importance of path and roadway

Conflicting message: marked crosswalk, STOP / warning sign

Minor street, heavily used path – no one stops

Signalization: Paths users expect protection

Problem meeting warrants: how to anticipate use

Portland OR | Designing Streets for Bicyclists – Shared Use Paths | 8-43

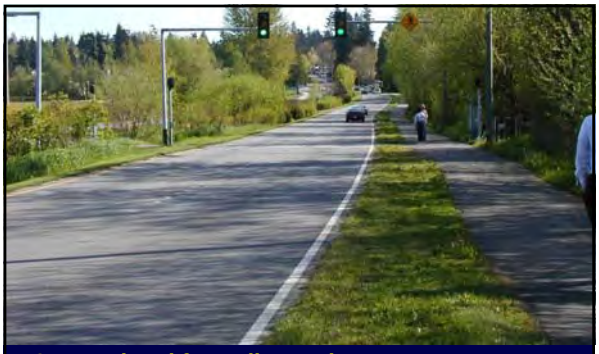
Pedestrians and bicyclists respond differently:
Pedestrians push button for signal

Portland OR | Designing Streets for Bicyclists – Shared Use Paths | 8-44

Pedestrians and bicyclists respond differently:
Cyclist rides thru, makes it because of higher speed

Portland OR | Designing Streets for Bicyclists – Shared Use Paths | 8-45

Designing Streets for Bicyclists – Shared Use Paths | 8-46

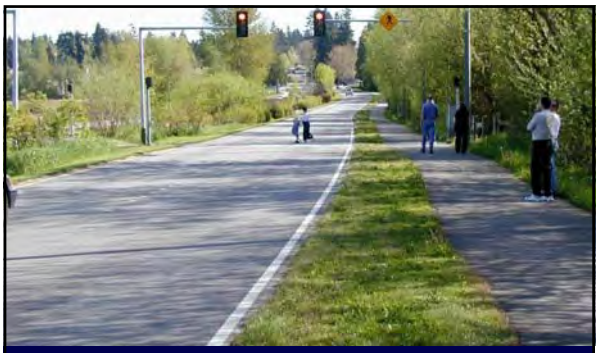


2-step signal for trail crossing

Bellevue WA | Designing Streets for Bicyclists – Shared Use Paths | 8-47

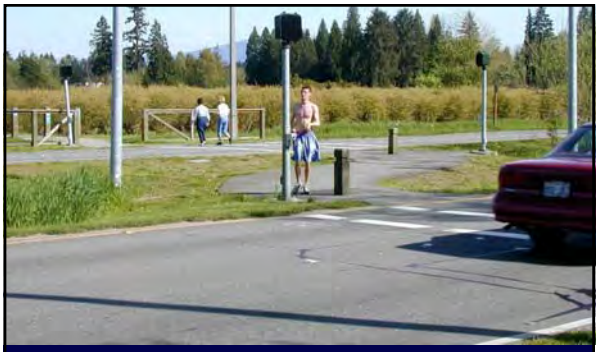
2-step signal for trail crossing
Phase 1: stop traffic in one direction

Bellevue WA | Designing Streets for Bicyclists – Shared Use Paths | 8-48



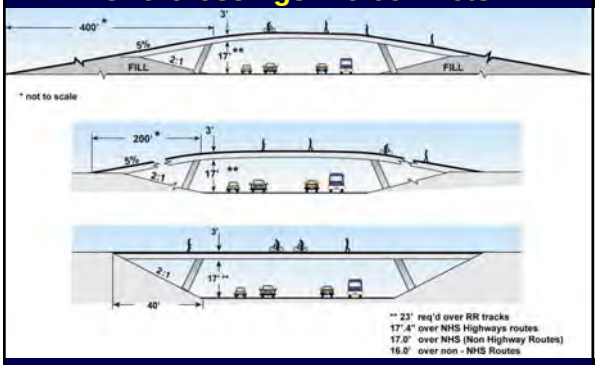
2-step signal for trail crossing
Phase 1: users cross stopped traffic

2-step signal for trail crossing
Phase 2: users cross traffic in other direction



2-step signal for trail crossing
Cycle repeats; traffic moves on

Overcrossings: no conflicts



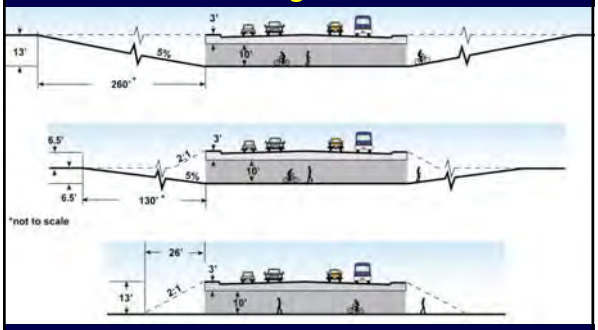
Overcrossing: long ramps can be placed in line with the trail

Overcrossing: take advantage of terrain

Overcrossing: long spirals needed in confined area

Salem OR | Designing Streets for Bicyclists – Shared Use Paths | 8-55

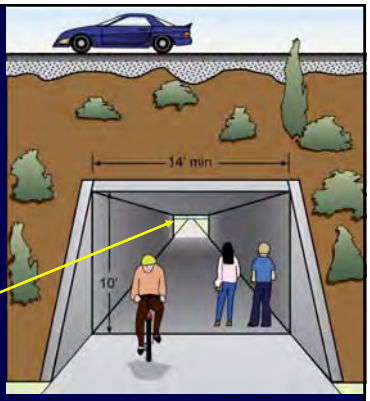
Undercrossings: no conflicts



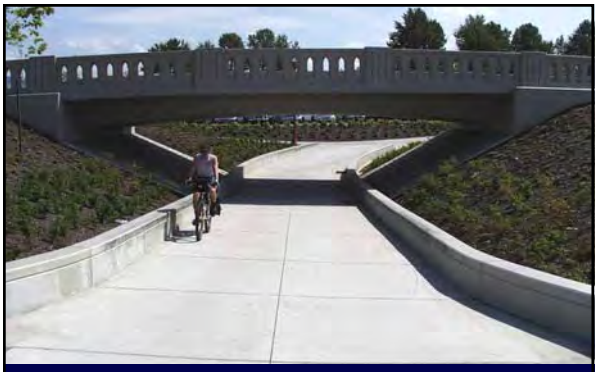
Designing Streets for Bicyclists – Shared Use Paths | 8-56

Undercrossings require generous dimensions to be attractive to users; security is main issue

Must see light at the end of the tunnel



Designing Streets for Bicyclists – Shared Use Paths | 8-57



Undercrossings: elevate roadway slightly

Eugene OR | Designing Streets for Bicyclists – Shared Use Paths | 8-58

Retrofit existing bridges with path: 1. cantilever

Pittsburgh PA | Designing Streets for Bicyclists – Shared Use Paths | 8-59

Retrofit existing bridges with path: 2. suspended

Missoula MT | Designing Streets for Bicyclists – Shared Use Paths | 8-60

Retrofit existing bridges with path: 2. suspended

Missoula MT | Designing Streets for Bicyclists – Shared Use Paths | 8-61

Retrofit existing bridges with path: 2. suspended

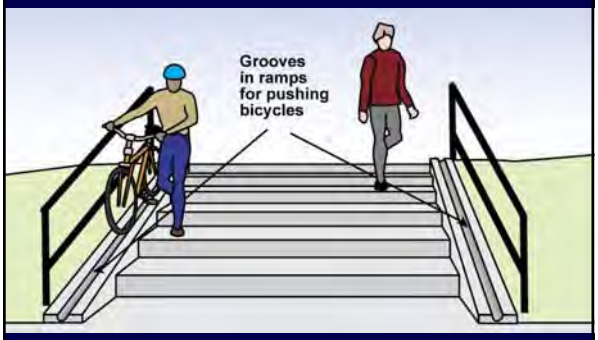
Missoula MT | Designing Streets for Bicyclists – Shared Use Paths | 8-62

STAIRWAYS

- Use where terrain is too steep for path
- Use as connection: won't meet all ADA specs *(provide access along flatter but longer route)*

Redmond OR | Designing Streets for Bicyclists – Shared Use Paths | 8-63

Groove/trough helps with pushing bicycles



Designing Streets for Bicyclists – Shared Use Paths | 8-64

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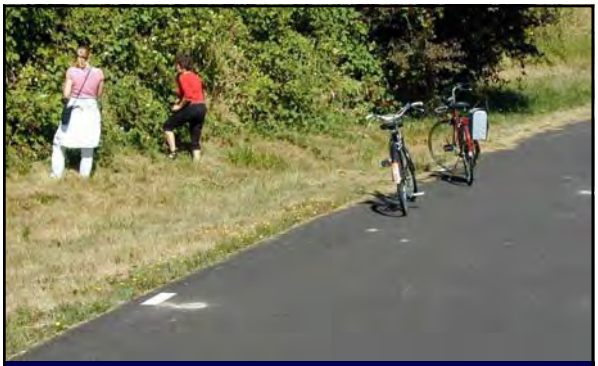
Designing Streets for Bicyclists – Shared Use Paths | 8-65

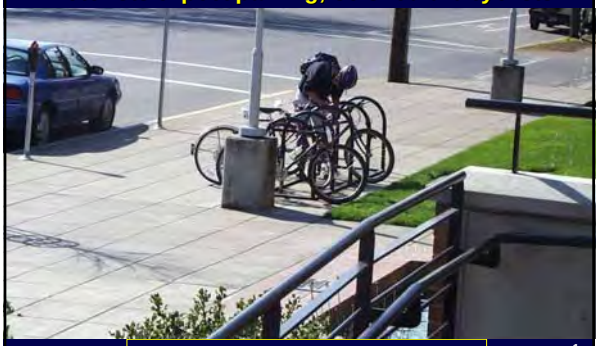


Take time to pick blackberries: it's not all about design…

Corvallis OR | Designing Streets for Bicyclists – Shared Use Paths | 8-66

BICYCLE PARKING

Motorists expect parking; so should bicyclists



BICYCLE PARKING

So easy to do well; why is it so often done poorly?

"On-wall parking"

"In-tree parking"

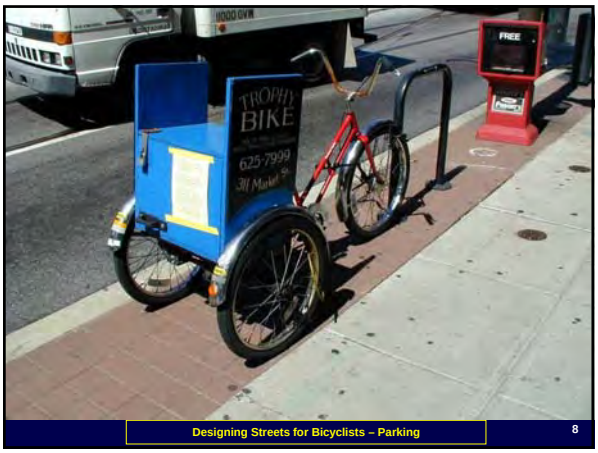
On-street bike parking?

BIKE PARKING BASICS - RACKS SHOULD:

- Not bend wheels or damage bicycle parts
- Accommodate high security U-locks and secure the frame and front wheel
- Not get in the way of pedestrians

The average pole works better than a lot of "bike parking"

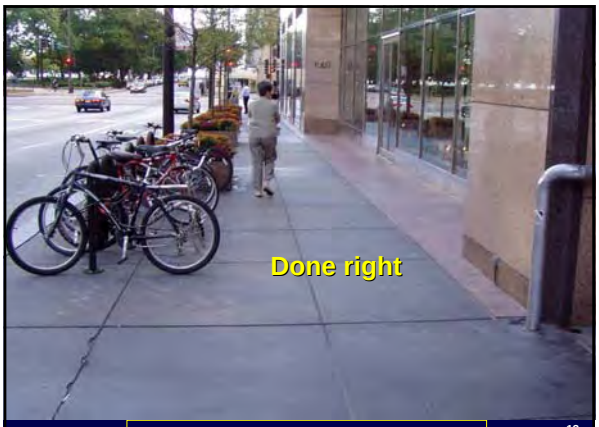

Bike parking that meets these criteria

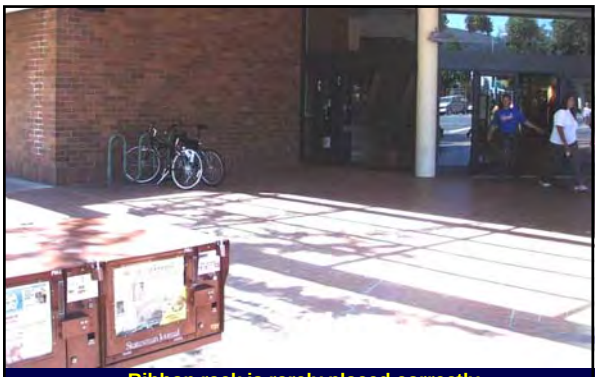

TROPHY BIKE
625-7999
FREE


Tandem!


What about the ribbon rack?


It can work, but it's rarely done right



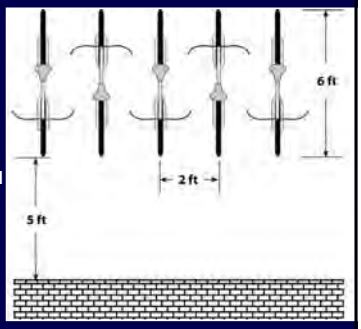


Ribbon rack is rarely placed correctly

Plain old rack works best AND makes a good leaning post

Recommended dimensions

- Bicycle parking spaces should be at least 6' long and 2' wide
- Overhead clearance in covered spaces should be at least 7'
- A 5' maneuvering aisle should be provided and maintained beside or between each row of bicycle parking.



Bike parking location

- Well lit, secure, close to main entrance of building
- No further from entrance than closest automobile parking space
- Highly visible, with pedestrian traffic
- Should not conflict with pedestrians
- No dark corners

Cyclists will use what they find

It takes more than good intentions

Covered bike parking guidelines

- Primarily for residential and school uses
- Commercial & employment: if motor vehicle parking is covered, bike parking should also be covered

Employee & institutional (county gov't)

On Curb Extension Bicycle "Oasis"

Designing Streets for Bicyclists – Parking 31

Transit

Designing Streets for Bicyclists – Parking 32

Train station (Netherlands)

Designing Streets for Bicyclists – Parking 33

School (Switzerland)

Designing Streets for Bicyclists – Parking 34

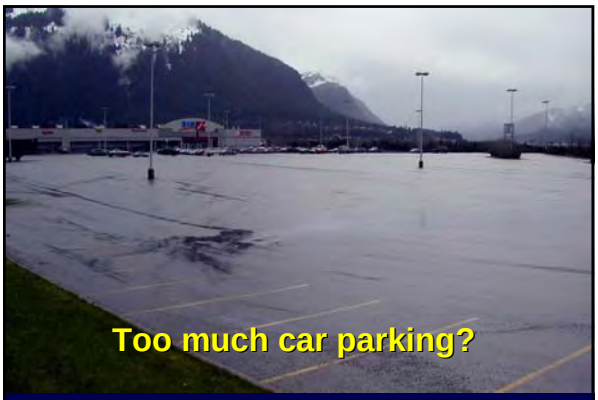
How can you tell when there isn't enough parking?
When it overflows…

Too much bike parking?

Bike parking is full during events

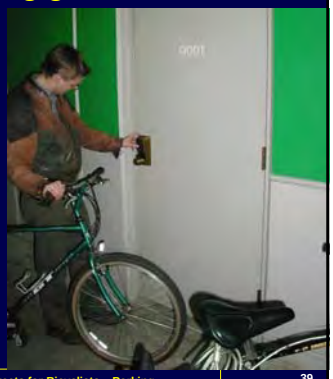
Designing Streets for Bicyclists – Parking 36

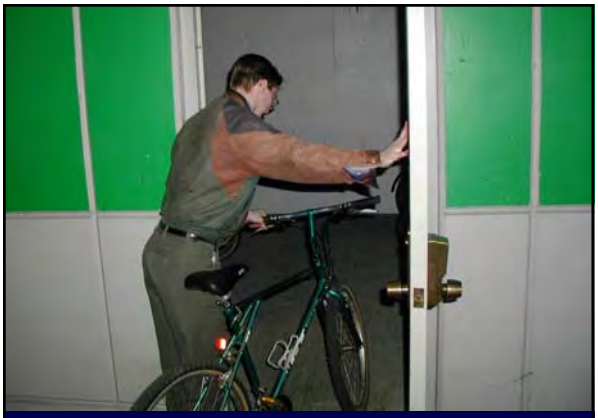
On-Street Bicycle "Corrals"

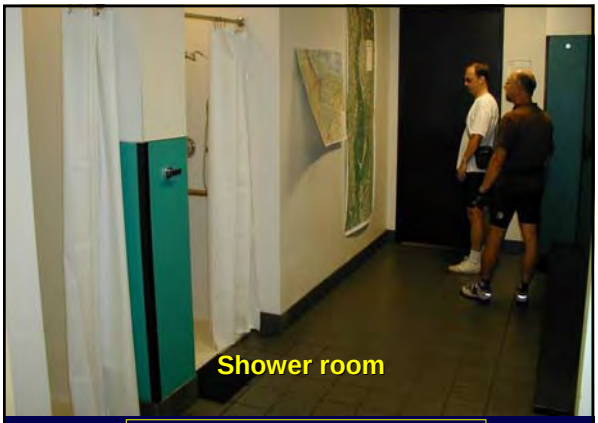


Secure bike parking guidelines

- Bike parking inside a building in secure and accessible location
- Dedicated room with card locks are best
- Locate room close to changing and showering facilities







An excellent resource:

APBP Bicycle Parking Guidelines

http://www.bicyclinginfo.org/pdf/bikepark.pdf

Bike parking:
It's what bike-friendly communities do