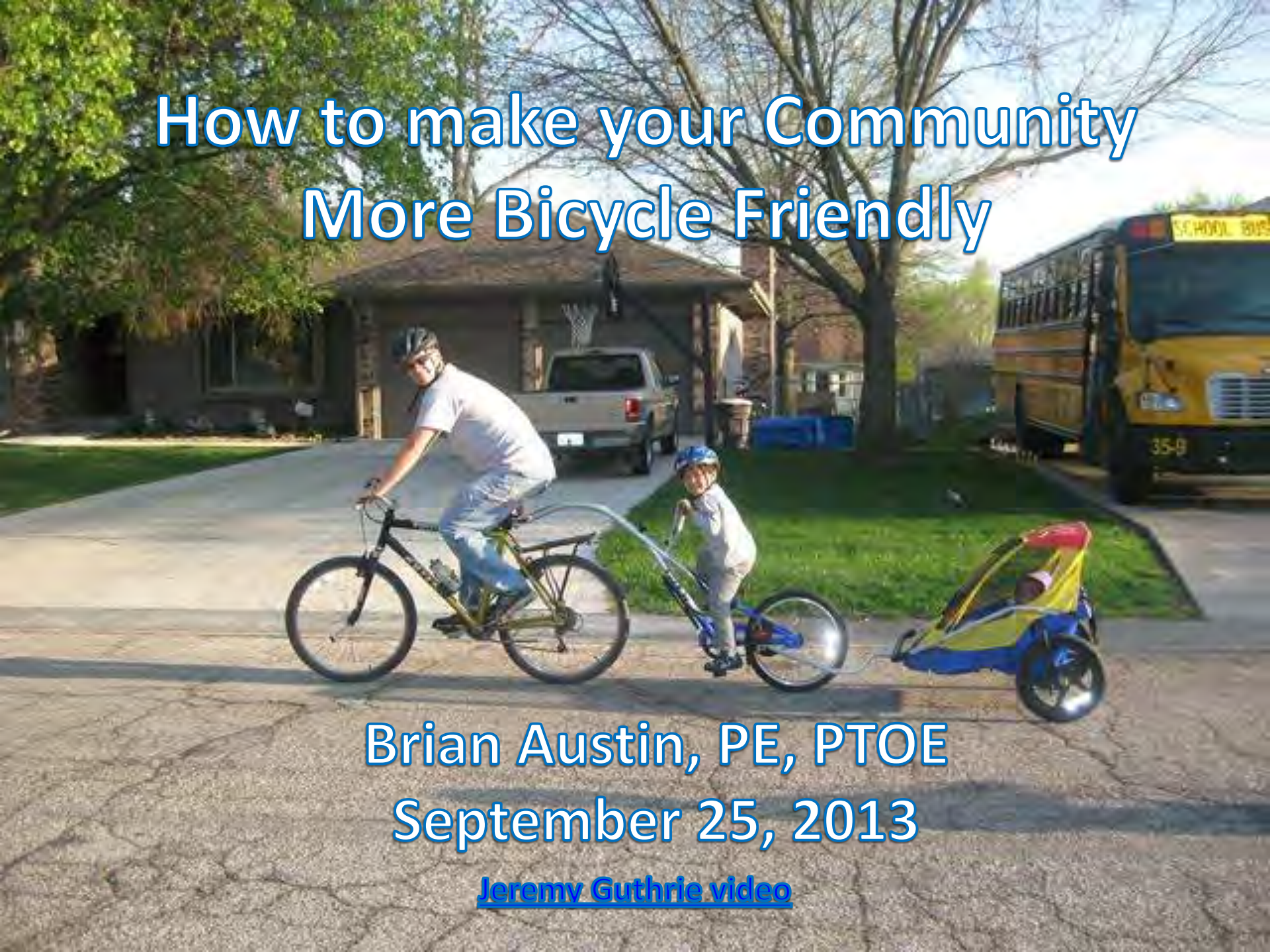
# How to make your Community More Bicycle Friendly



Brian Austin, PE, PTOE

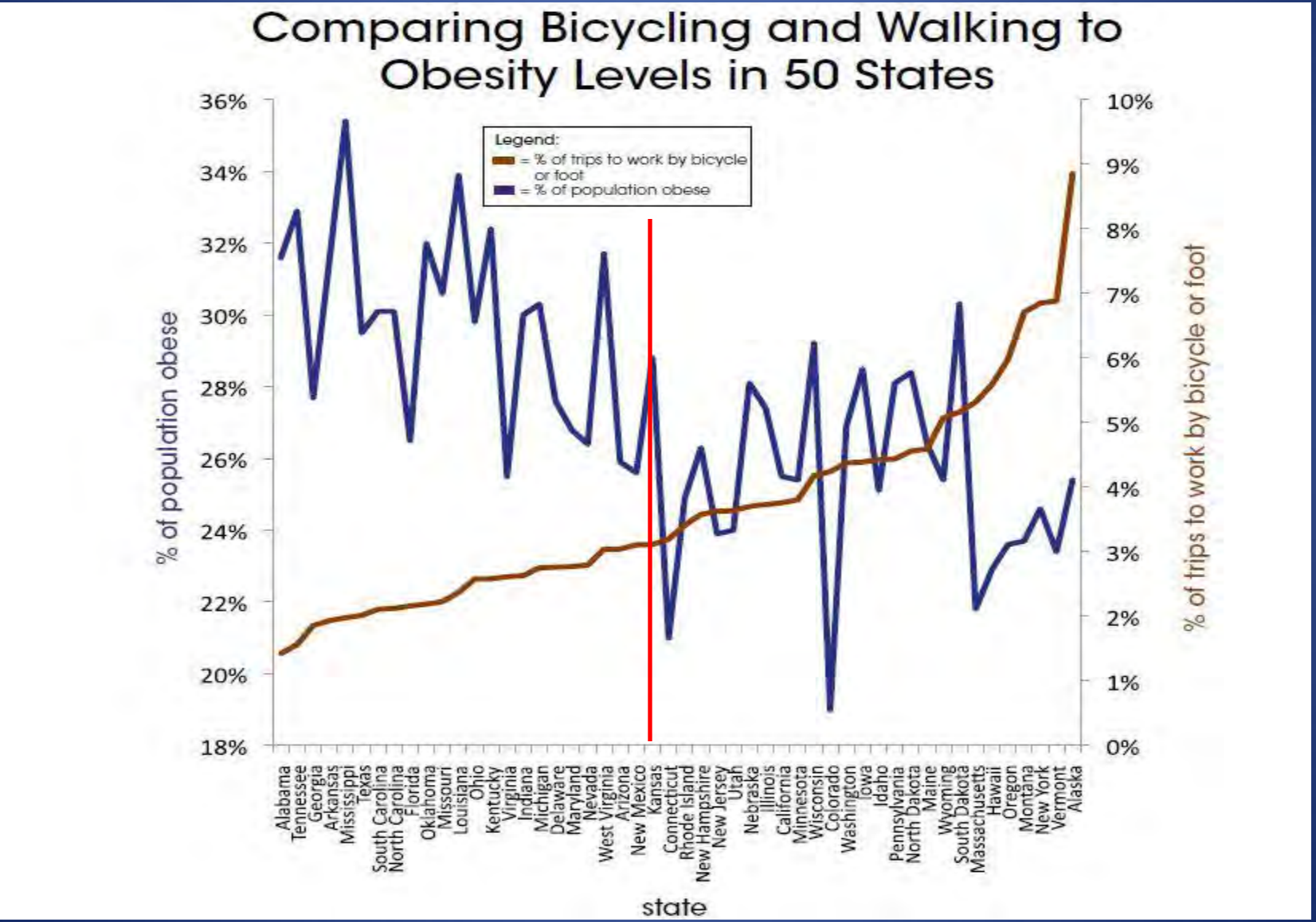
September 25, 2013

Jeremy Guthrie video

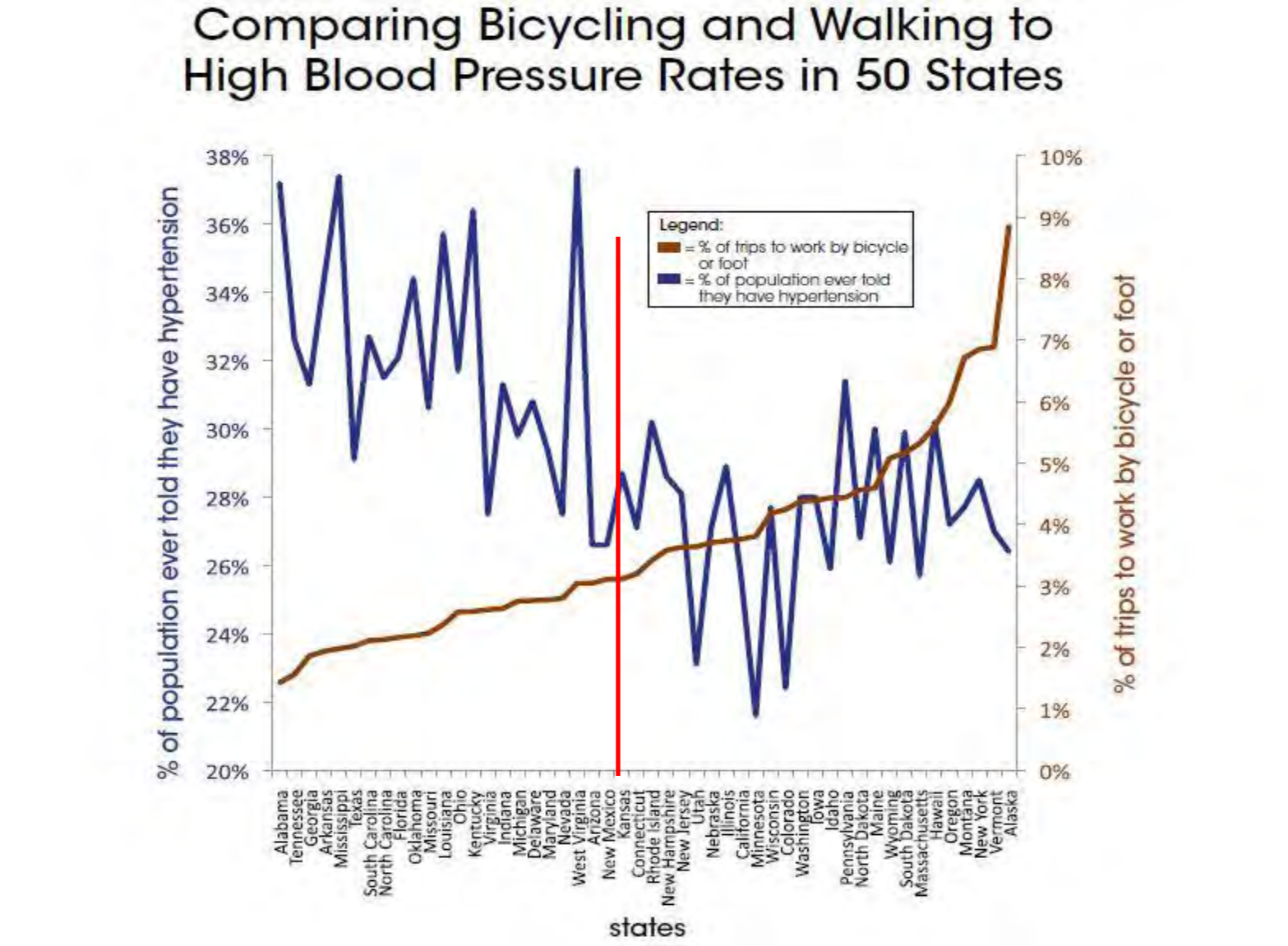
# Why?

- Health
- Environment
- Economy
- Quality of Life
- Traffic

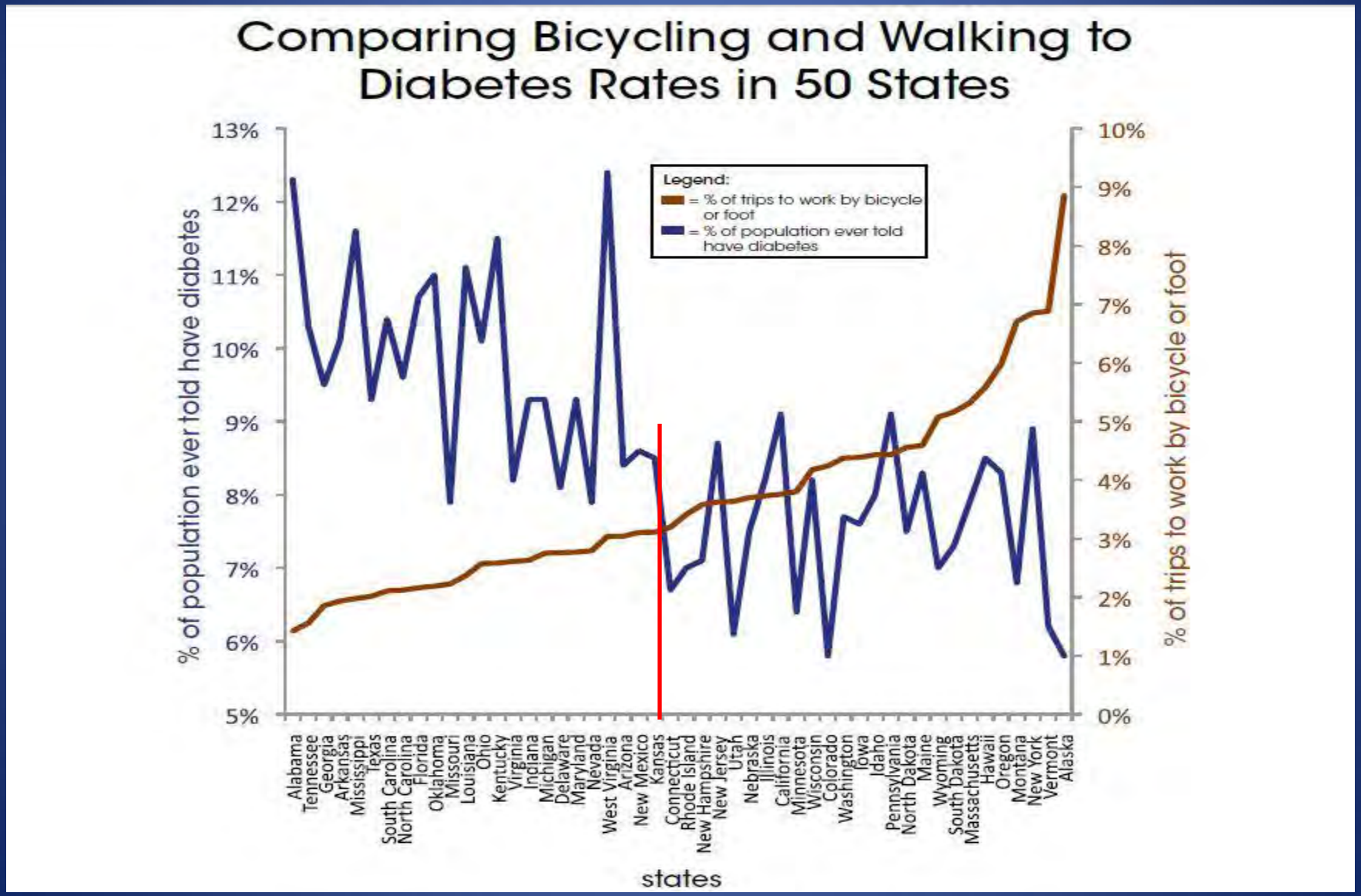
# Health Benefits



# Health Benefits (cont)



# Health Benefits (cont)



# Economic Benefits

## Obesity Costs and Potential Health Care Savings

| State | Obesity related health care cost per taxpayer per year | Saving if 1 in 10 state walking or cycling program |
|---|---|---|
| Kansas | $163 | $43,000,000 |
| US | $180 | $5,600,000,000 |

Source: National Governors Association 2006. http://www.nga.org/Files/pdf/0608HEALTHYREPORTNH.PDF

# Economic Benefits (cont)

- 11-14 jobs vs 7 jobs per $1 million spent
- 66% said bikes lanes positively affect business
- Property values increase
- Cost of owing and operating a car > $8,000/year

# You build bicycle facilities for motorists

http://www.youtube.com/watch?v=xFM5QiAd3QA

# Bicycle Safety

Table 1

**Total Fatalities and Pedalcyclist Fatalities in Traffic Crashes, 2002–2011**

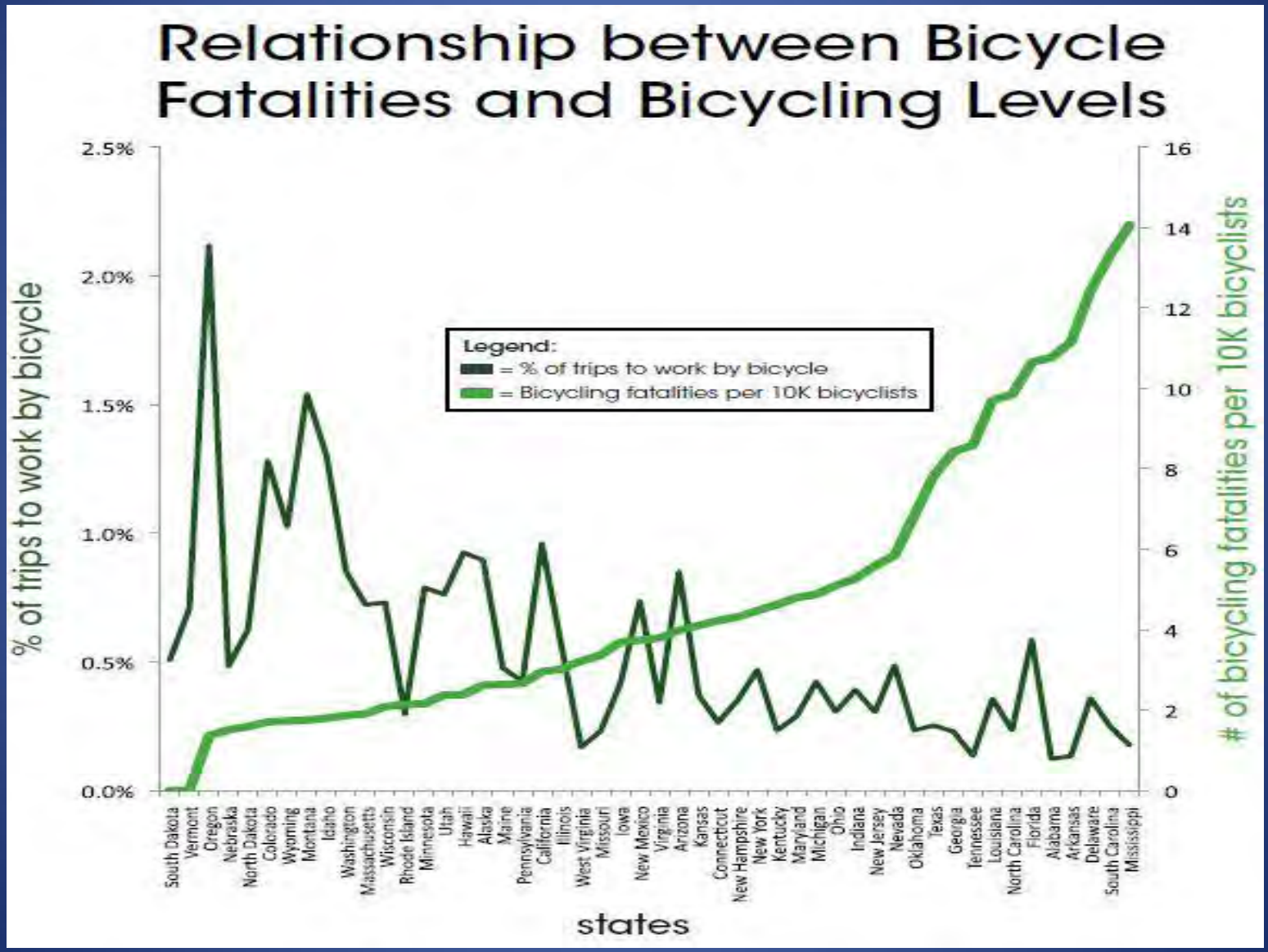
| Year | Total Fatalities | Pedalcyclist Fatalities | Percent of Total Fatalities |
|---|---|---|---|
| 2002 | 43,005 | 665 | 1.5 |
| 2003 | 42,884 | 629 | 1.5 |
| 2004 | 42,836 | 727 | 1.7 |
| 2005 | 43,510 | 786 | 1.8 |
| 2006 | 42,708 | 772 | 1.8 |
| 2007 | 41,259 | 701 | 1.7 |
| 2008 | 37,423 | 718 | 1.9 |
| 2009 | 33,883 | 628 | 1.9 |
| 2010 | 32,999 | 623 | 1.9 |
| 2011 | 32,367 | 677 | 2.1 |

# Bicycle Safety

**Crashes Involving a Pedalcyclist Fatality by the Highest BAC of Involved Riders and Drivers**

| Year | BAC=.00 | | BAC=.01–.07 | | BAC=.08+ | | BAC=.01+ | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number |
| 2010 | 413 | 66 | 28 | 4 | 182 | 29 | 209 | 34 | 622 |
| 2011 | 424 | 63 | 41 | 6 | 210 | 31 | 251 | 37 | 675 |

# Bicycle Safety



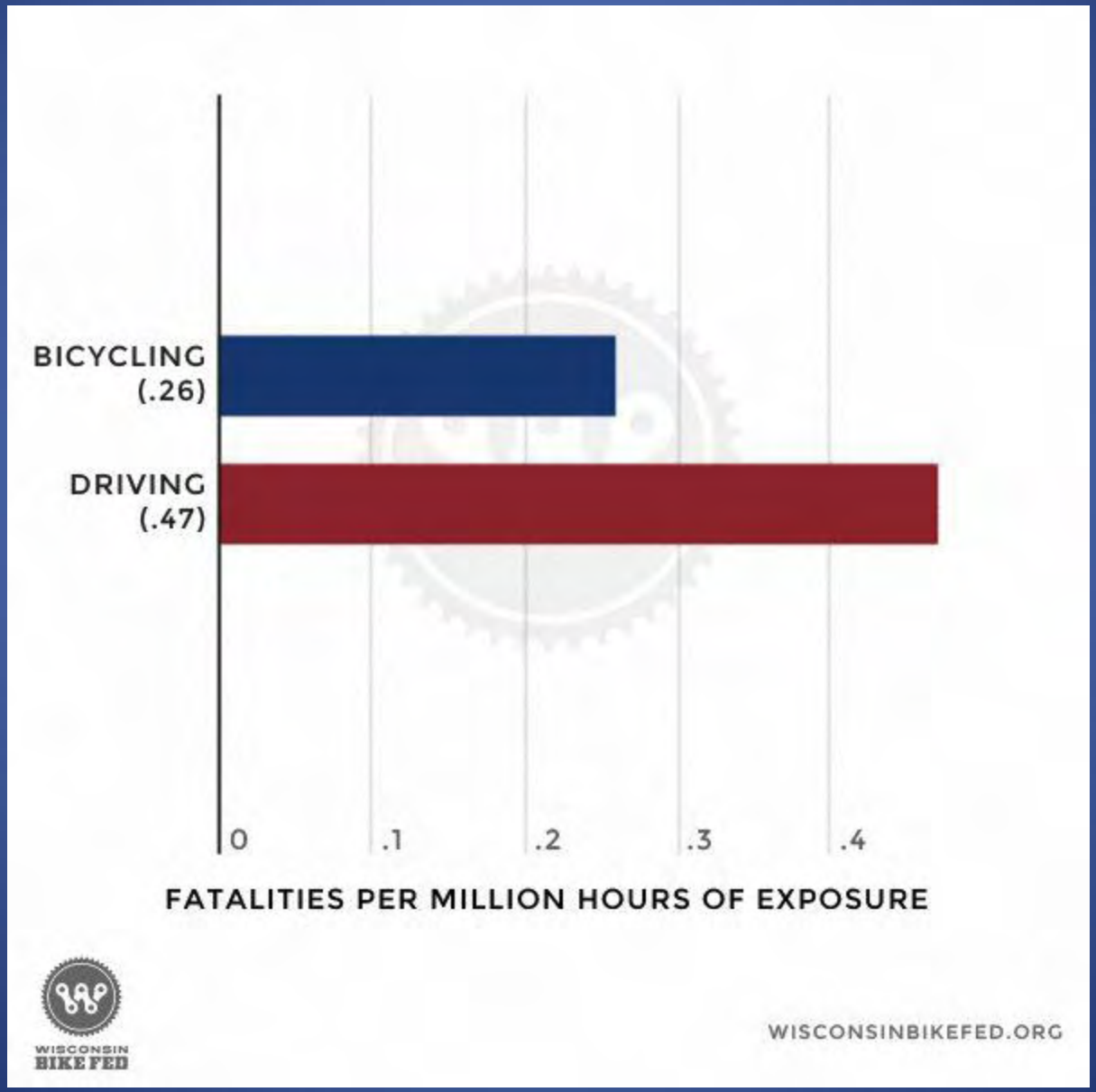
# Million Second Quiz

What age range saw the highest number of bicycle fatalities in 2011?

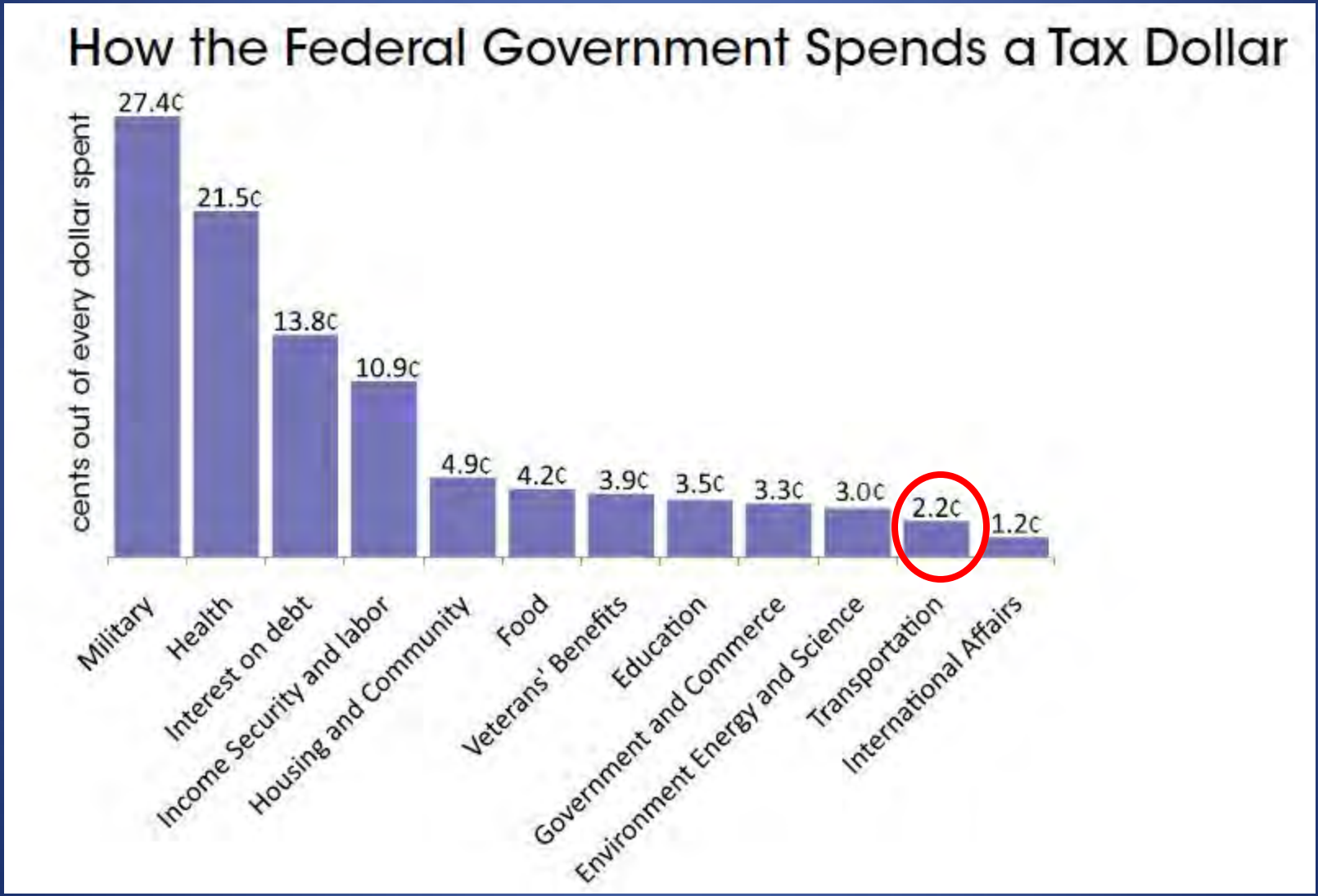
a) 10-15
b) 25-34
c) 35-44
d) 45-54

The average age of a bicycle fatality in 2011 was 43 years old.

# Bicycle Safety



# Bicycle Funding



# Million Second Quiz

Through MAP-21, the federal government will spend this much for bicycle and pedestrian projects per capita in 2013.

a) 0

b) $3

c) $30

d) $300

Map-21 will allocate $2.57 per capita in 2013. This is less that 2% of transportation spending.

# Bicycle Funding…

Highway Authorizations: Moving Ahead for Progress in the 21st Century Act (MAP-21)
P.L. 112-__
*(Contract Authority From Highway Account of Highway Trust Fund Unless Otherwise Indicated)*

7/2/2012

| | FY 2013 | FY 2014 | Total | Average |
|---|---|---|---|---|
| **Division A--Federal-aid and Highway Safety Construction Programs** | | | | |
| **Title I - Federal-aid Highways** | | | | |
| Federal-aid Highway Program 1/ | 37,476,819,674 | 37,798,000,000 | 75,274,819,674 | 37,637,409,837 |
| *Estimated Split among Programs:* | | | | |
| National Highway Performance Program | [21,751,779,050] | [21,935,691,598] | [43,687,470,648] | [21,843,735,324] |
| Surface Transportation Program | [10,005,135,419] | [10,089,729,416] | [20,094,864,835] | [10,047,432,418] |
| Highway Safety Improvement Program | [2,390,305,390] | [2,410,515,560] | [4,800,820,950] | [2,400,410,475] |
| Railway-Highway Crossings (setaside) | [220,000,000] | [220,000,000] | [220,000,000] | [220,000,000] |
| Congestion Mitigation & Air Quality Improvement Progam | [2,209,172,618] | [2,227,860,477] | [4,437,033,095] | [2,218,516,548] |
| Metropolitan Transportation Planning | [311,667,197] | [314,302,948] | [625,970,145] | [312,985,073] |
| Transportation Alternatives 4/ | [808,760,000] | [819,900,000] | [1,628,660,000] | [814,330,000] |
| Transportation Infrastructure Finance and Innovation Program | 750,000,000 | 1,000,000,000 | 1,750,000,000 | 875,000,000 |
| Tribal Transportation Program | 450,000,000 | 450,000,000 | 900,000,000 | 450,000,000 |
| Federal Lands Transportation Program | 300,000,000 | 300,000,000 | 600,000,000 | 300,000,000 |
| Federal Lands Access Program | 250,000,000 | 250,000,000 | 500,000,000 | 250,000,000 |
| Territorial and Puerto Rico Highway Program | 190,000,000 | 190,000,000 | 380,000,000 | 190,000,000 |
| Puerto Rico Highway Program | [150,000,000] | [150,000,000] | [300,000,000] | [150,000,000] |
| Territorial Highway Program | [40,000,000] | [40,000,000] | [80,000,000] | [40,000,000] |
| FHWA Administrative Expenses | 454,180,326 | 440,000,000 | 894,180,326 | 447,090,163 |
| Emergency Relief | 100,000,000 | 100,000,000 | 200,000,000 | 100,000,000 |
| Projects of National and Regional Significance *(General Fund)* | 500,000,000 | - | 500,000,000 | 250,000,000 |
| Construction of Ferry Boats and Ferry Terminal Facilities | 67,000,000 | 67,000,000 | 134,000,000 | 67,000,000 |
| Tribal High Priority Projects Program *(General Fund)* | 30,000,000 | 30,000,000 | 60,000,000 | 30,000,000 |
| **Total -- Division A** | **40,568,000,000** | **40,625,000,000** | **81,193,000,000** | **40,596,500,000** |

**Transportation Alternatives = $808 million**

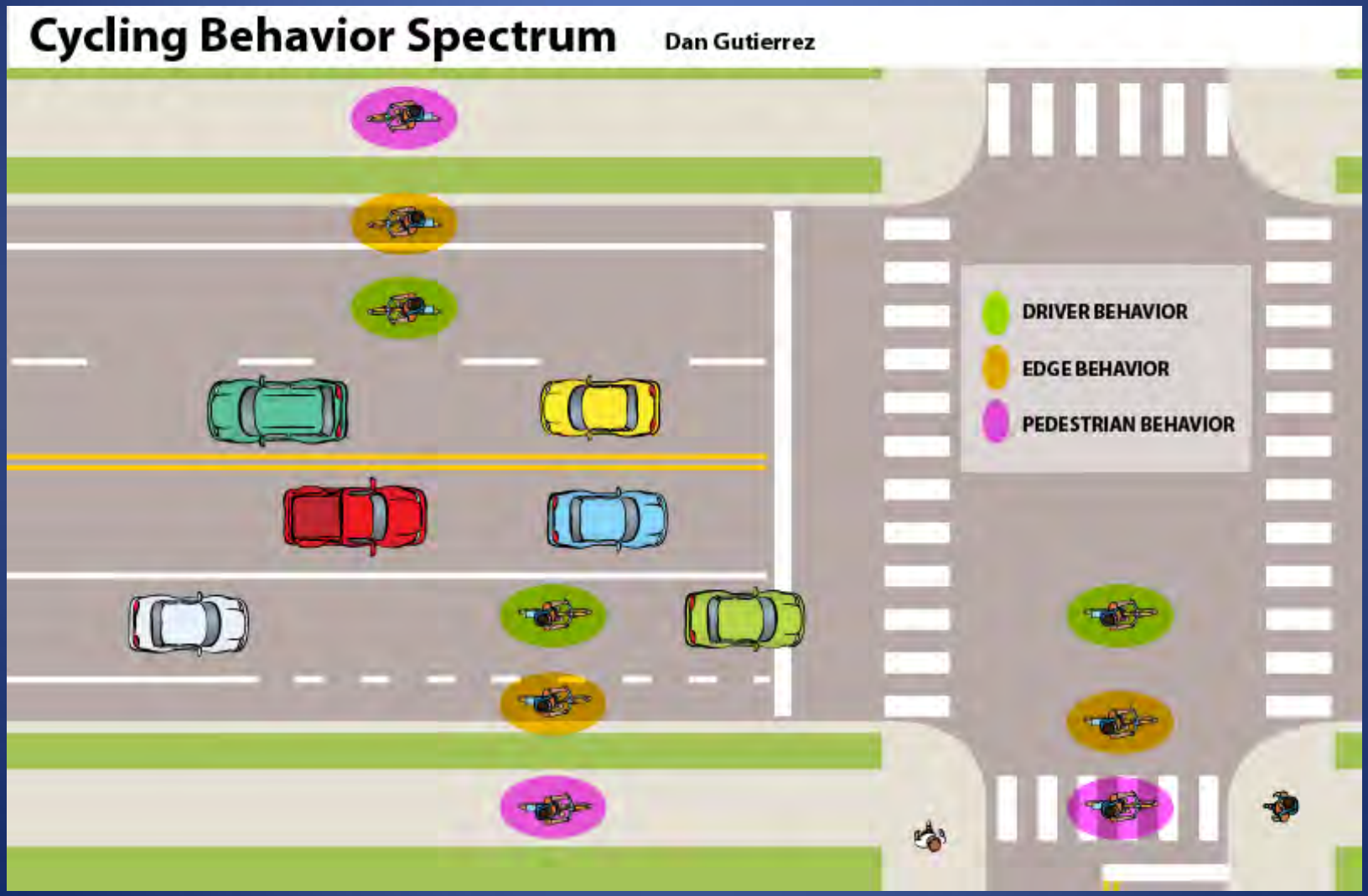
# Bicycle Infrastructure – Know the user



# Bicycle Infrastructure – Know the user

| Experienced/Confident Riders | Casual/Less Confident Riders |
|---|---|
| Most are comfortable riding with vehicles on streets, and are able to navigate streets like a motor vehicle, including using the full width of a narrow travel lane when appropriate and using left-turn lanes. | Prefer shared use paths, bicycle boulevards, or bike lanes along low-volume, low-speed streets. |
| While comfortable on most streets, some prefer on-street bike lanes, paved shoulders, or shared use paths when available. | May have difficulty gauging traffic and may be unfamiliar with rules of the road as they pertain to bicyclists; may walk bike across intersections. |
| Prefer a more direct route. | May use less direct route to avoid arterials with heavy traffic volumes. |
| Avoid riding on sidewalks. Ride with the flow of traffic on streets. | If no on-street facility is available, may ride on sidewalks. |
| May ride at speeds up to 25 mph on level grades, up to 45 mph on steep descents. | May ride at speeds around 8 to 12 mph. |
| May cycle longer distances. | Cycle shorter distances: 1 to 5 miles is a typical trip distance. |

# Bicycle Infrastructure – Know the user



# Guide for the Development of Bicycle Facilities

2012 • Fourth Edition


American Association of State Highway and Transportation Officials

AASHTO The Voice of Transportation

# NACTO

# Urban Bikeway Design Guide

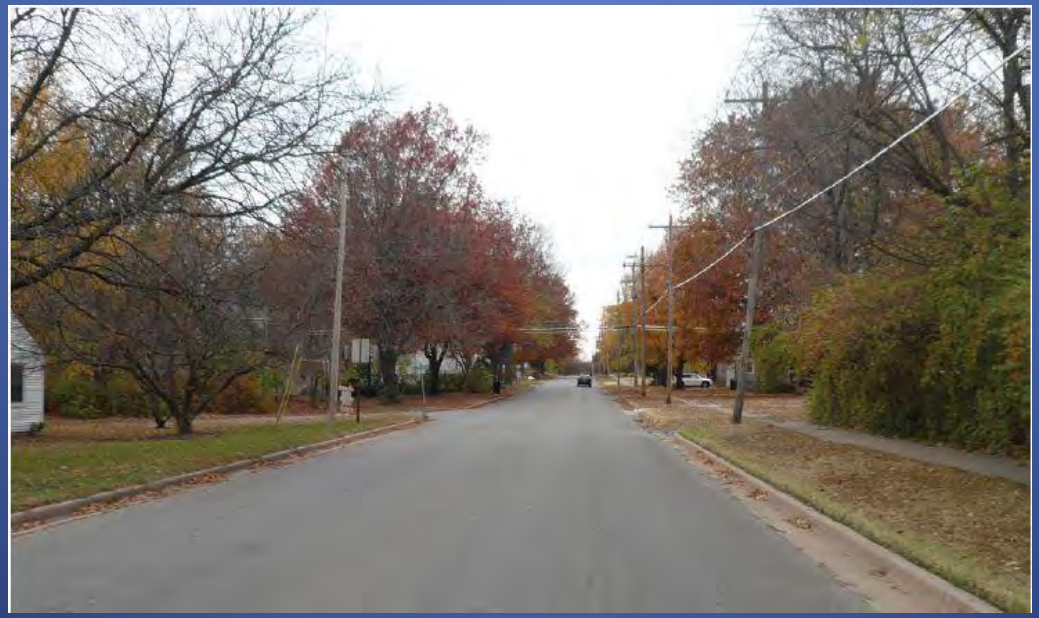
April 2011 Edition

# Types of Facilities

- Shared lanes
- Marked shared lanes
- Paved shoulders
- Bike lanes
- Bicycle Boulevards
- Shared use paths
- ~~Sidewalks~~

# Shared lanes

- No markings
- Low speed, <30 mph
- Low volume, < 3000 vpd
- Local and Collector Roads



# Shared lanes on major roadways

- Should have wide curb/outer lane
  - 14’ wide outer lane
- Varying speeds
- Traffic volume, > 5000 vpd
- Major and minor arterials
- Generally the most direct routes

# Marked Shared lanes

- Designed bicycle route
- Low speed, 35 mph max, <30 preferred
- Consider number of lanes

# Paved shoulders

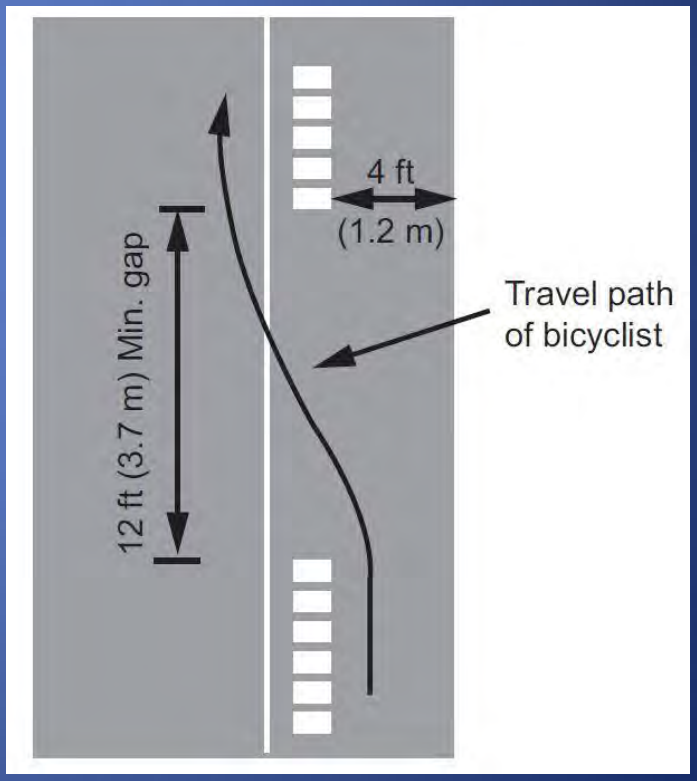
- 5’ Minimum width
- Reduces edge deterioration
- Varying speeds, volumes, and road types

# Paved shoulders

- 5’ Minimum width
- Reduces edge deterioration
- Varying speeds, volumes, and road types

# Paved Shoulders (cont)

- Rumble Strips
  - •Provide 4’ min. shoulder outside of rumble strips



# Bike Lanes

- 4-7’ width
- Consider speed, volume, on-street parking

# Bike Lane Benefits

## Conventional Bike Lane Benefits

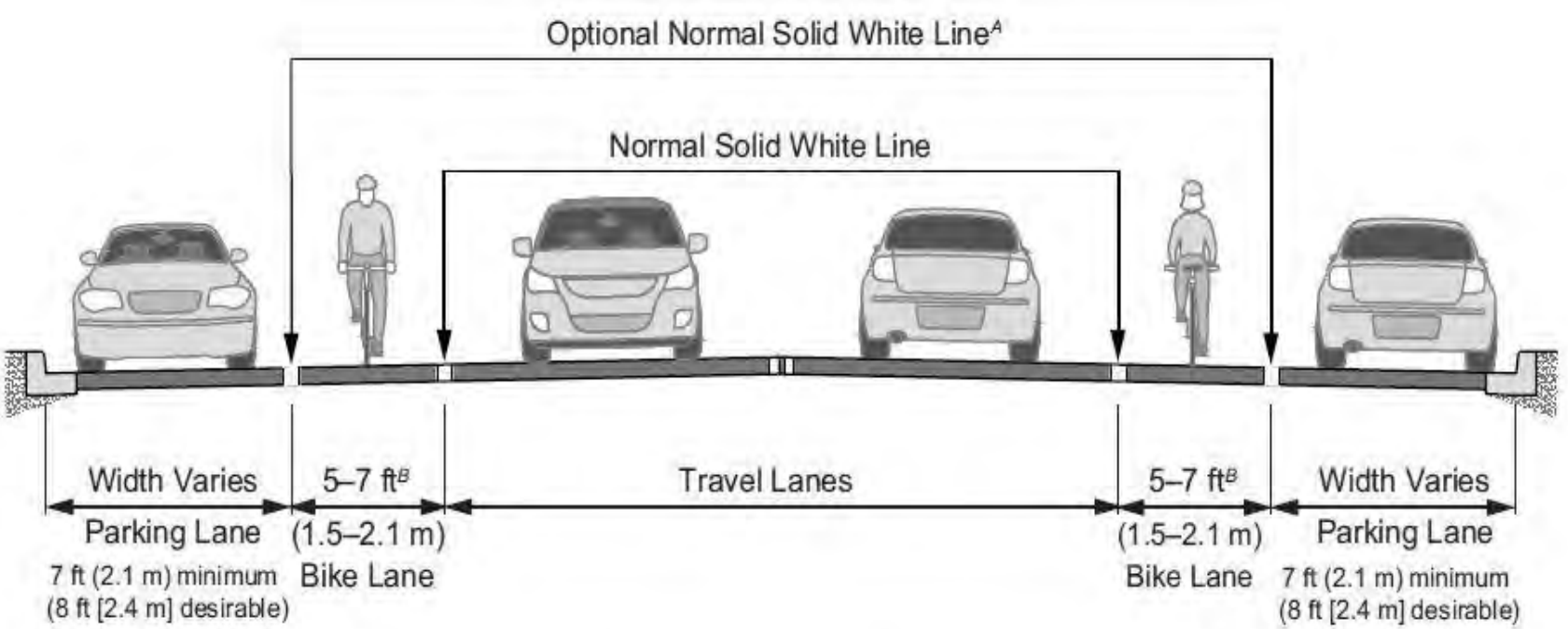
- Increases bicyclist comfort and confidence on busy streets.
- Creates separation between bicyclists and automobiles.
- Increases predictability of bicyclist and motorist positioning and interaction.
- Increases total capacities of streets carrying mixed bicycle and motor vehicle traffic.
- Visually reminds motorists of bicyclists' right to the street.

## Typical Applications

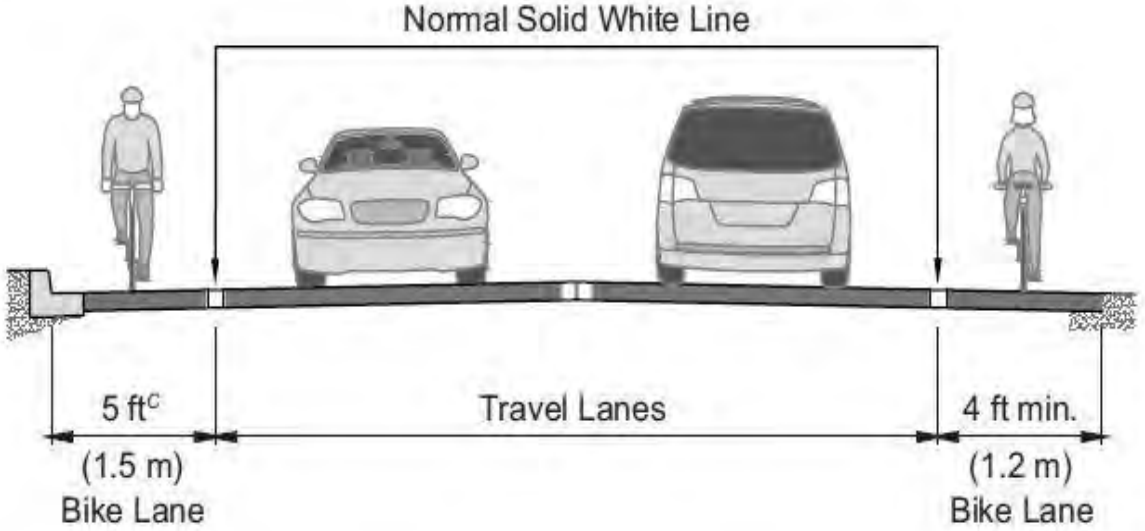
- Bike lanes are most helpful on streets with ≥ 3,000 motor vehicle average daily traffic.
- Bike lanes are most helpful on streets with a posted speed ≥ 25 mph.
- On streets with high transit vehicle volume.
- On streets with high traffic volume, regular truck traffic, high parking turnover, or speed limit > 35 mph, consider treatments that provide greater separation between bicycles and motor traffic such as:
  - Left-sided bike lanes
  - Buffered bike lanes
  - Cycle tracks

# Bike Lanes (cont)
# - Considerations

- On-street parking
  - Diagonal
  - Back-in Diagonal
  - Parallel
- Right turn lanes
- Left turn lanes
- One-way streets
- Intersection design
- Intersection/driveway visibility




## On Street Parking




## Parking Prohibited

# Buffered Bike Lanes

# Contra-flow Bike Lanes

# Left side Bike Lanes

# Cycle Tracks

# Raised Cycle Tracks

# Two Way Cycle Tracks

# Intersection Design

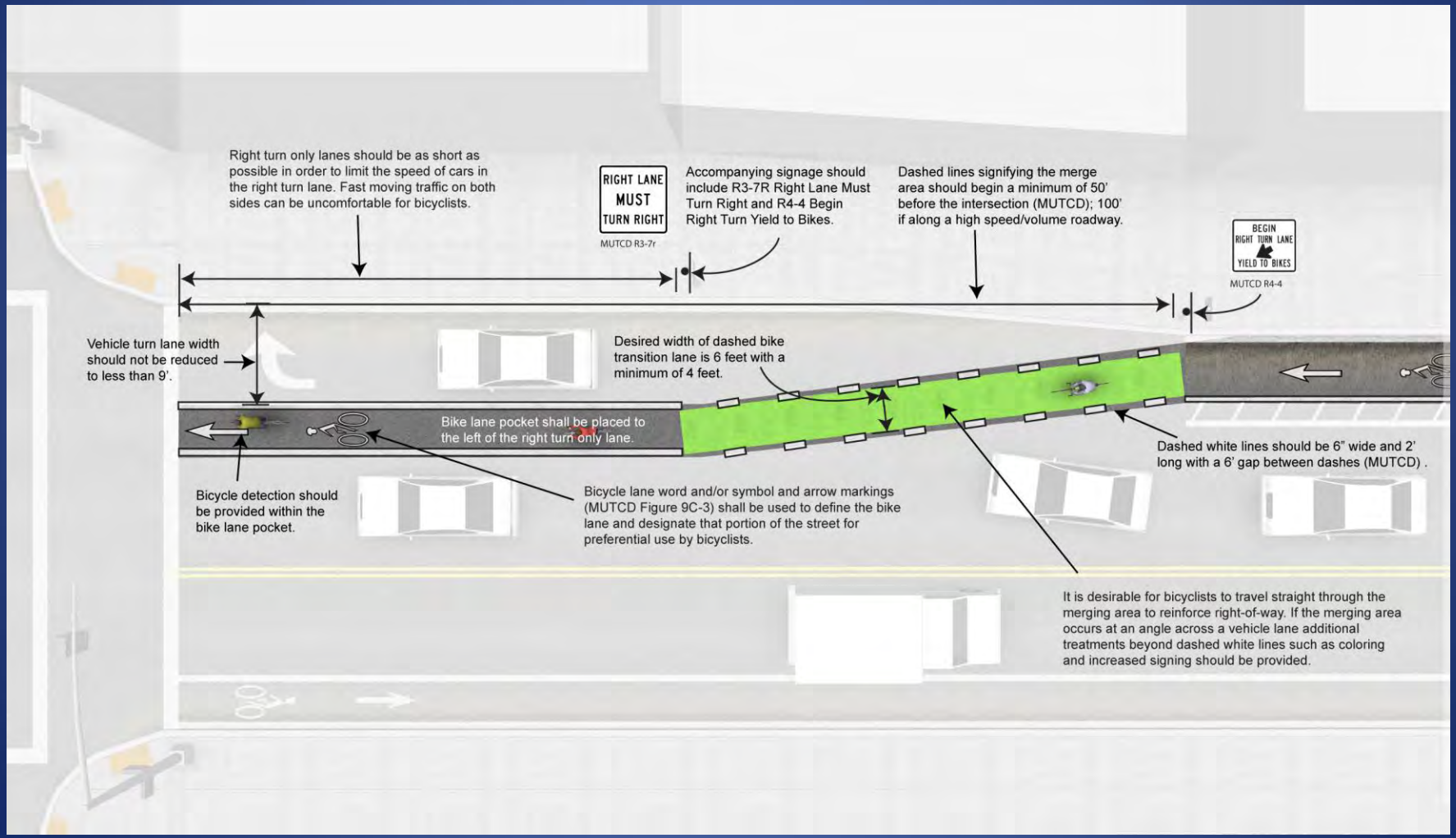
- Bike Boxes
- Two Stage Left Turn Boxes
- Median Refuge Islands
- Through Bike Lanes
- Combined Through/Right Turn
- Cycle Track Approach
- Roundabouts

# Bike Boxes

# Two Stage Left Turn Queue Boxes

# Median Refuge Islands

# Through Bike Lanes



# Combined Bike Thru/Right Turn Lane

# Cycle Track Intersection Approach

# Bike Facilities at Roundabouts

# Retrofitting Existing Streets for Bicycle Facilities

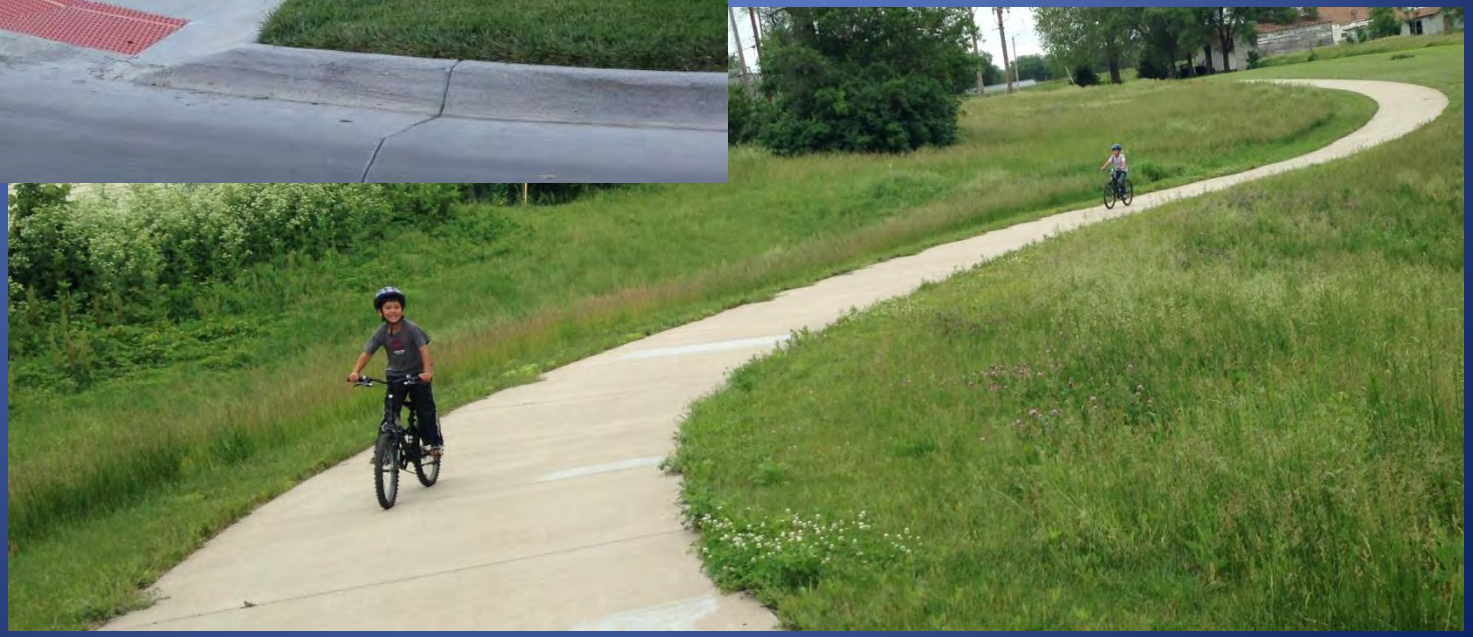
- Street widening
  - Expensive
  - Inlet and Storm sewer reconstruction
  - Bicycle facilities can be added when there are roadway capacity issues

# Retrofitting Existing Streets for Bicycle Facilities

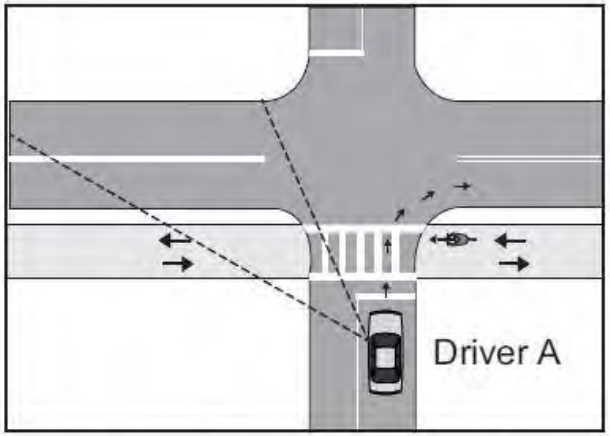
- Without Street Widening
  - Add Shared Use Path
  - Reduce lane width
  - Reduce number of lanes
  - Reconfigure or reduce on-street parking

# Retrofitting Existing Streets for Bicycle Facilities (cont)

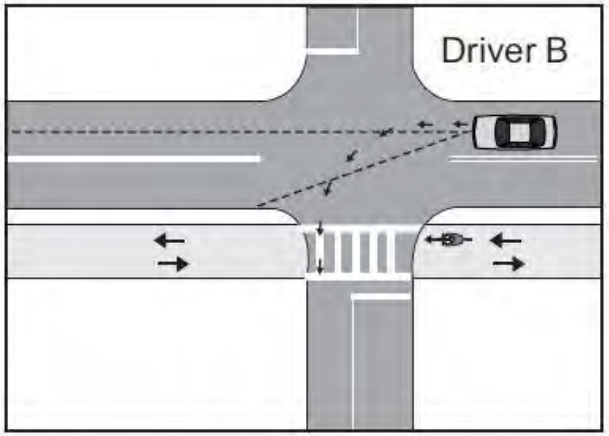
# Shared Use Paths & Side Paths



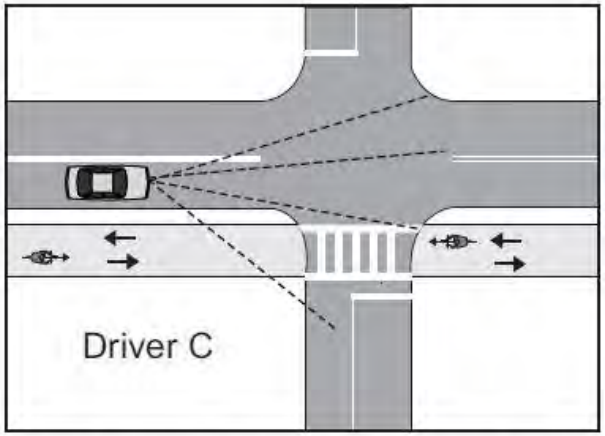
# Side Paths – Issues




Right turning Driver A is looking for traffic on the left. A contraflow bicyclist is not in the driver's main field of vision.

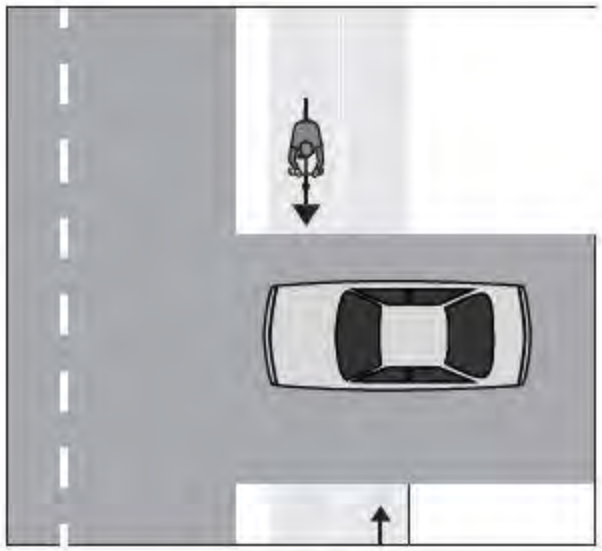



Left turning Driver B is looking for traffic ahead. A contraflow bicyclist is not in the driver's main field of vision.

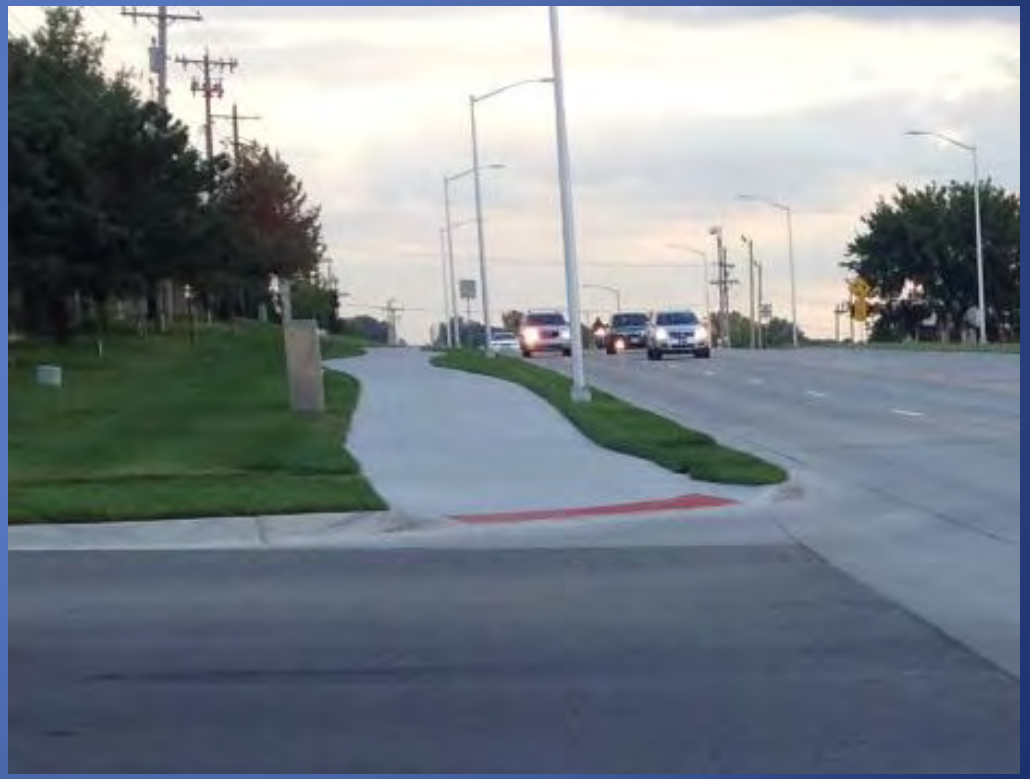



Right turning Driver C is looking for left turning traffic on the main road and traffic on the minor road. A bicyclist riding with traffic is not in the driver's main field of vision.

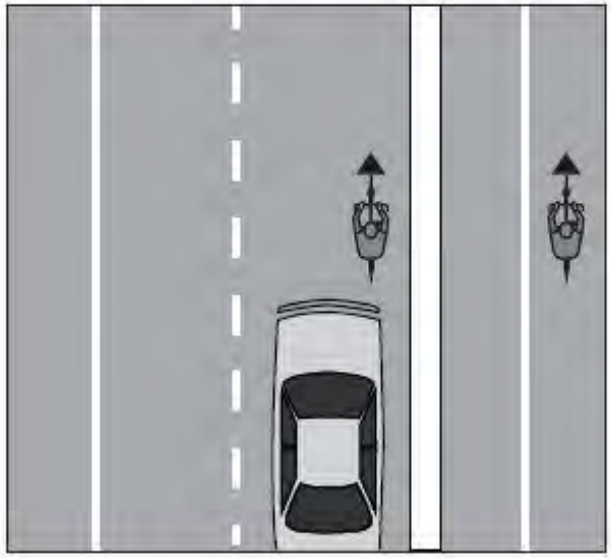
# Side Paths – Issues



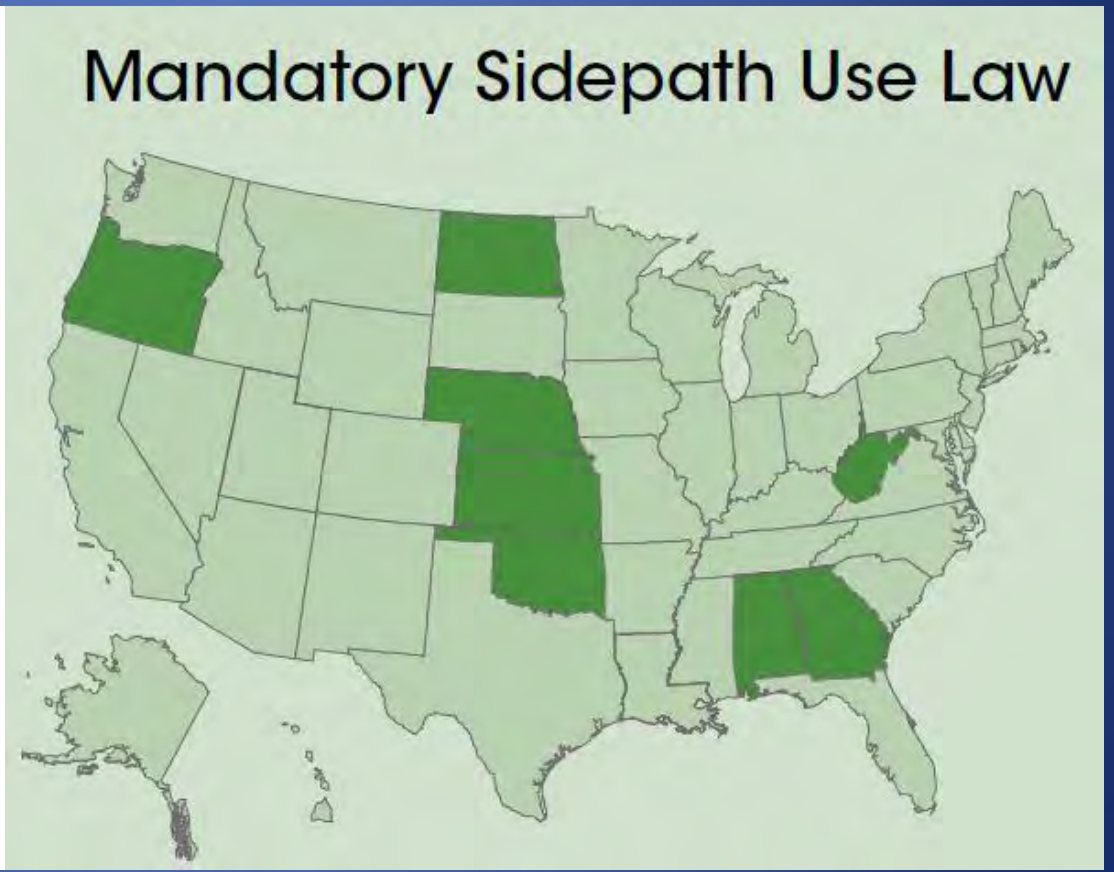
Stopped motor vehicles on side streets or driveways may block the path.



# Side Paths – Issues



Some bicyclists may find the road cleaner, safer, and more convenient. Motorists may believe bicyclists should use a sidepath.



# Shared Use Paths – Passing width

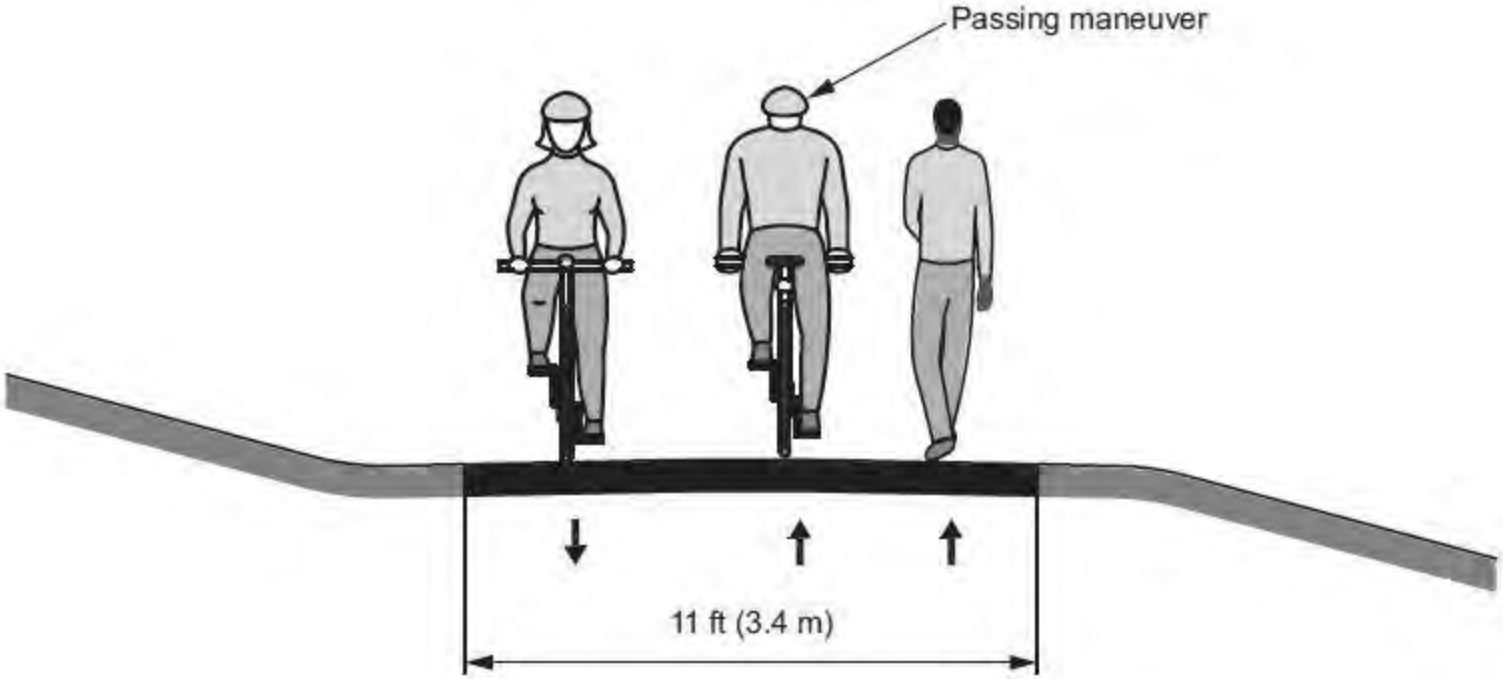
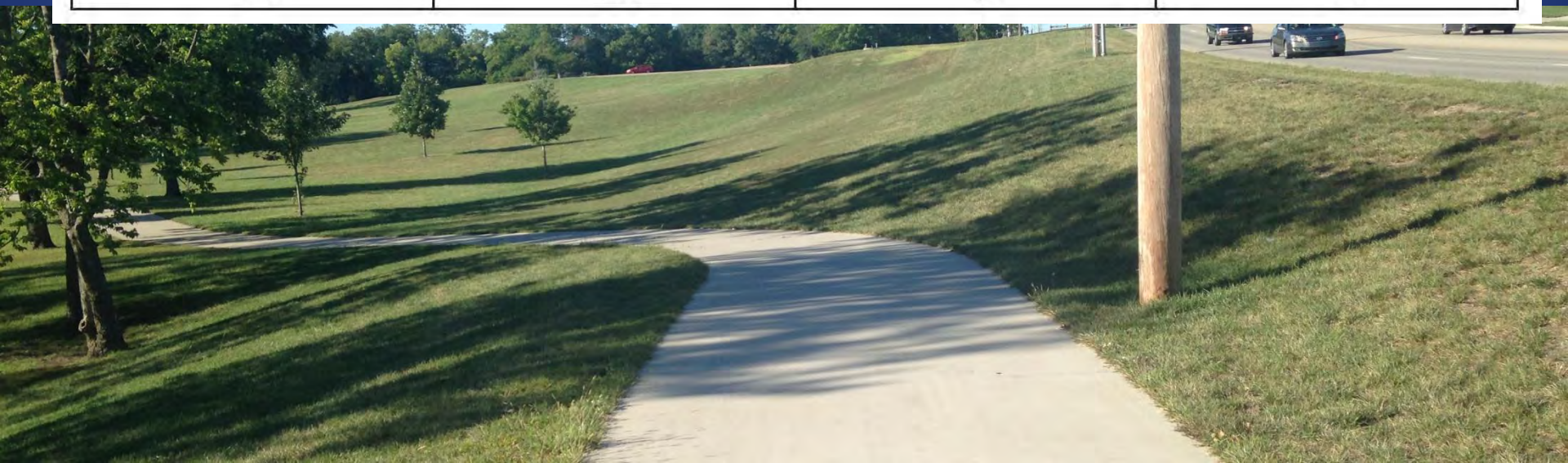



Figure 5-2. Minimum Width Needed to Facilitate Passing on a Shared Use Path

# Shared Use Paths – Design speed

Table 5-2. Minimum Radii for Horizontal Curves on Paved, Shared Use Paths at 20-Degree Lean Angle

| U.S. Customary | | Metric | |
|---|---|---|---|
| Design Speed (mph) | Minimum Radius (ft) | Design Speed (km/h) | Minimum Radius (m) |
| 12 | 27 | 19 | 8 |
| 14 | 36 | 23 | 11 |
| 16 | 47 | 26 | 15 |
| 18 | 60 | 29 | 18 |
| 20 | 74 | 32 | 22 |
| 25 | 115 | 40 | 35 |
| 30 | 166 | 48 | 50 |



# Shared Use Paths - Grades

# Shared Use Paths – Road Crossings

# Retrofitting Existing Streets for Bicycle Facilities (cont)

# Back to Why…


EXIT
365
TREK