PBIC Webinar

How to Create a Bicycle Safety Action Plan: Planning for Safety

Bill Schultheiss, Vice President, Toole Design

Peter Lagerwey, Regional Director, Toole Design

Oct. 2, 2014, 2 pm

Today's Presentation

- **Introduction and housekeeping**
- **Audio issues?**
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- **Questions at the end**

U.S. Department of Transportation
Federal Highway Administration

Pedestrian and Bicycle Information Center

How to Create a Bicycle Safety Action Plan

Planning for Safety

Presented by:

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Toole Design Group

and

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October 02, 2014

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Outcomes

At the end of this series, you will be able to:

- Recognize a bicycle-friendly network of roads and trails will increase cyclists' safety.
- Describe how planners and engineers develop bicycle plans that directly address safety.
- Recognize bicyclists are a diverse subset of travelers with wide ranging skill and tolerance of traffic stress.
- Identify good practices and effective solutions to enhance bicycle safety and accessibility.


October
2014
SUNDAY
MONDAY
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WEDNESDAY
THURSDAY
FRIDAY
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1: Planning for Bicycle Safety
2: On-Road Bicycle Facilities
3: Off-Road Facilities
1
2
3
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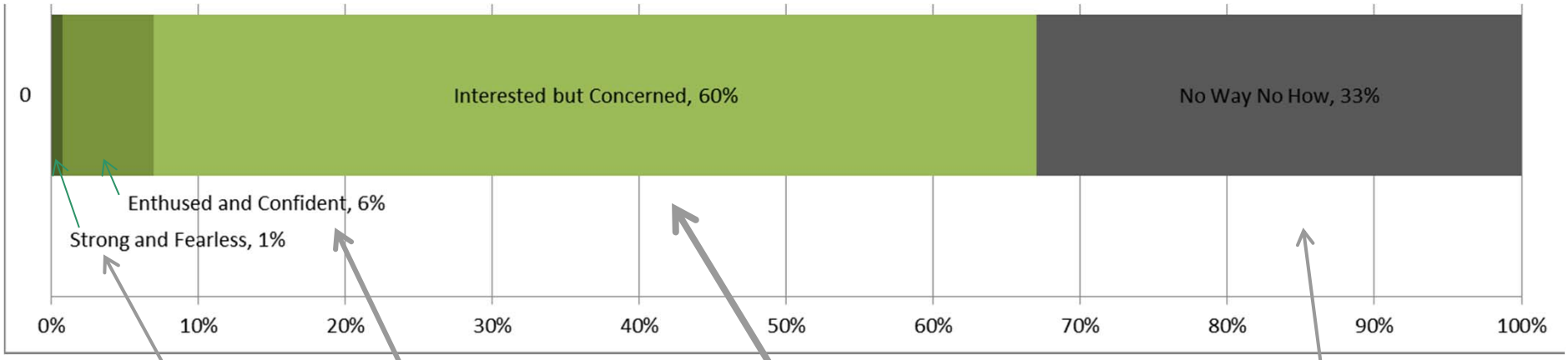
Bicycling Basics

Section 2

Types of Bicyclists

- 8 (children) to 80 (seniors)
- Experienced and Confident
- Casual and less Confident

Types of Bicyclists – City of Portland



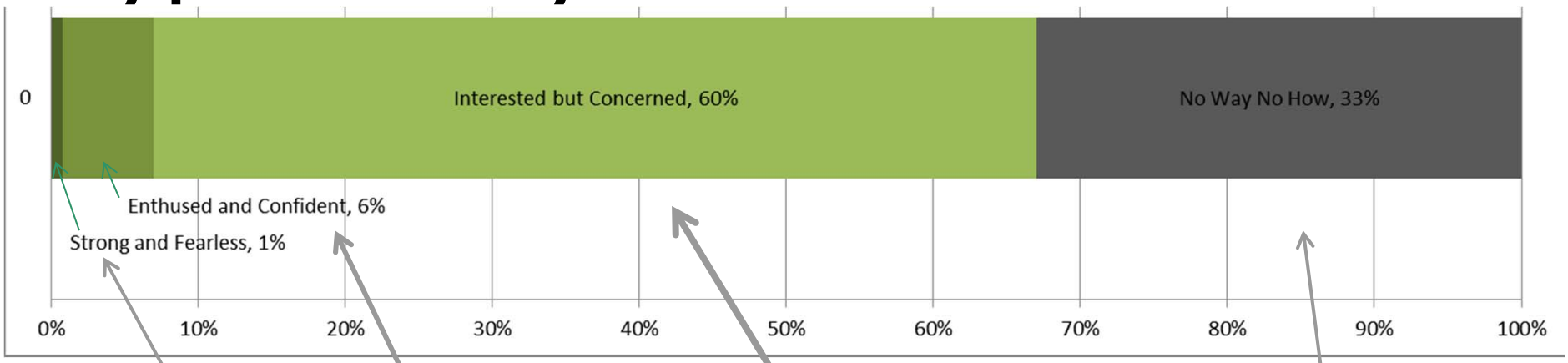
Strong & Fearless

Enthused & Confident

Interested, but Concerned

Not Interested

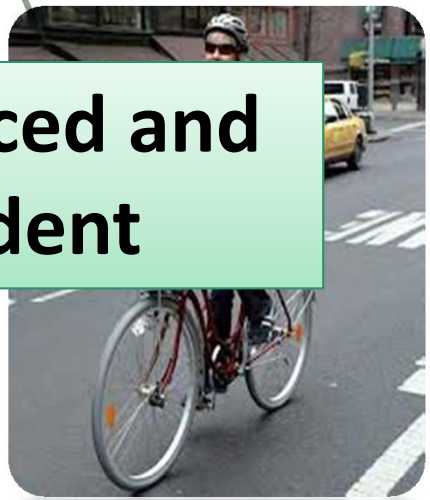
Types of Bicyclists - AASHTO



Experienced and Confident

Casual and Less Confident

Strong & Fearless



Enthused & Confident

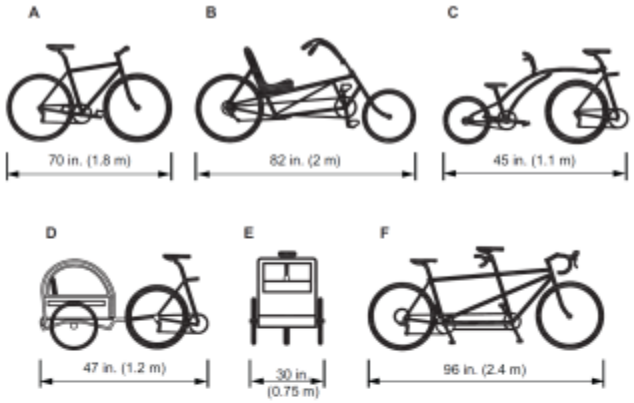
Interested, but Concerned

Not Interested

Types of Bicycles

- Design Vehicle
  - Typical bicycle dimensions
  - Key performance criteria

Types of Bicycles - AASHTO



A. Adult Typical Bicycle
B. Adult Single Recumbent Bicycle
C. Additional Length for Trailer Bike
D. Additional Length for Child Trailer
E. Width for Child Trailer
F. Adult Tandem Bicycle

Figure 3-2. Typical Bicyle Dimensions

Table 3-1. Key Dimensions

User Type	Feature	Dimension	
		U.S. Customary	Metric
Typical upright adult bicyclist	Physical width (95th percentile)	30 in.	0.75 m
	Physical length	70 in.	1.8 m
	Physical height of handlebars (typcial dimension)	44 in.	1.1 m
	Eye height	60 in.	1.5 m
	Center of gravity (approximate)	33–44 in.	0.8–10 m
	Operating width (minimum)	48 in.	1.2 m
	Operating width (preferred)	60 in.	1.5 m
	Operating height (minimum)	100 in.	2.5 m
	Operating height (preferred)	120 in.	3.0 m

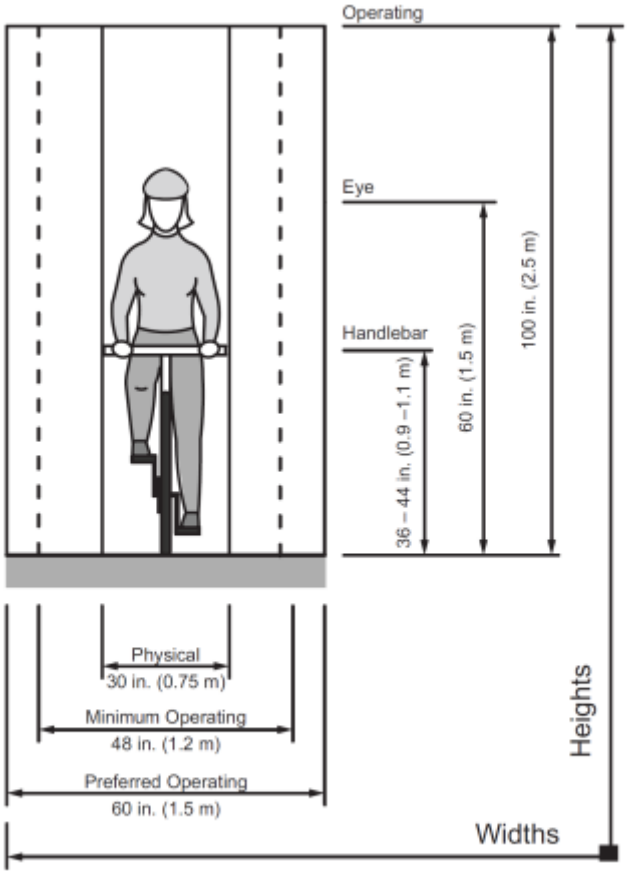


Figure 3-1. Bicyclist Operating Space

Types of Trips

- Utilitarian/ Nondiscretionary
  - Everyday trips; work, school, etc.
- Recreation/ Discretionary
  - Wide range of trips and riders

Bicycle Operations

Traffic Principles for Bicyclists

- Generally keep right
- Changing lanes
- Intersection approach
- Left turns

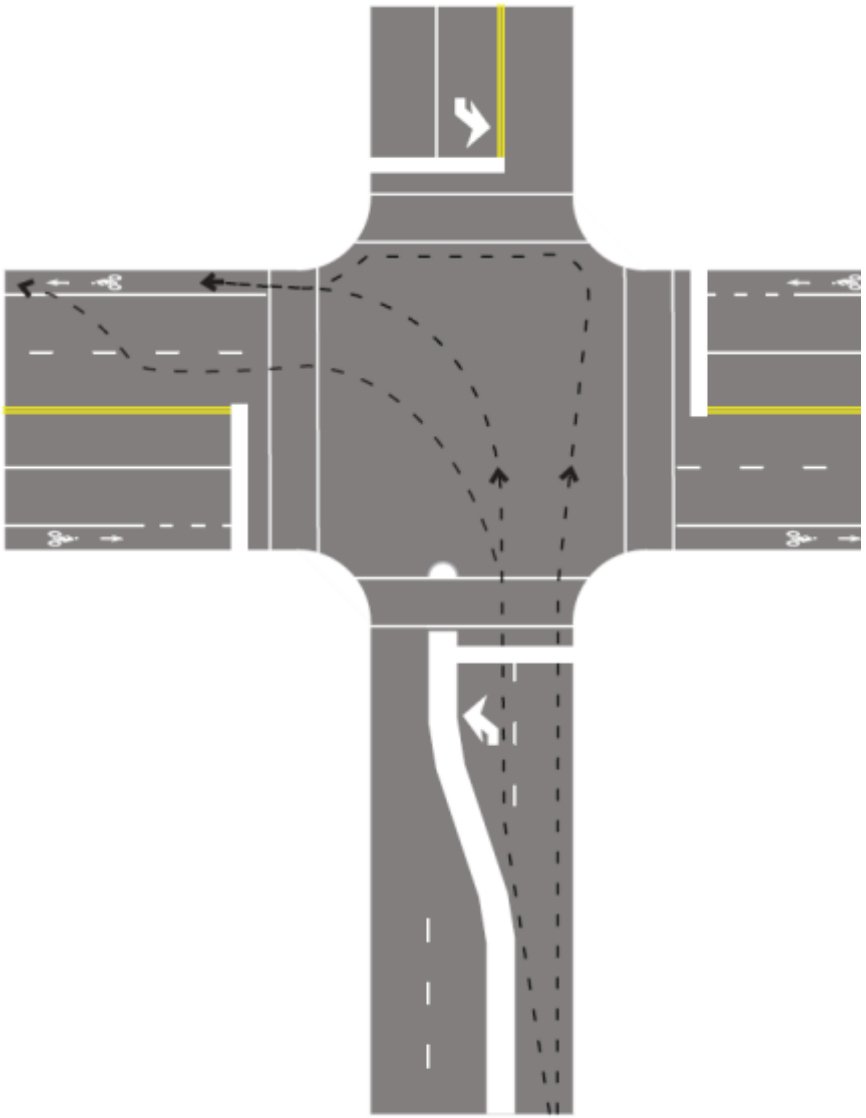


Figure 3-3. Common Maneuvers for Bicyclists Turning Left at an Intersection

Types of Bicycle Facilities

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Types of Bicycle Facilities

Types of Bicycle Facilities

Trails

- Shared with bicyclists and pedestrians
- Completely separated from vehicles

Types of Bicycle Facilities

Separated Bike Lanes (Cycle Track) Physical

- Separation of bikes from traffic and pedestrians
- Separation styles:
  - Flexible posts
  - Parked vehicles
  - Curb islands
  - Planters

Types of Bicycle Facilities

Bike Boulevards

Source: NACTO

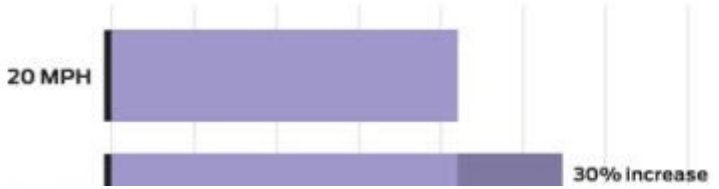
(10) Guidance for vertical traffic calming features:

- Slopes should not exceed 1:10 or be less steep than 1:25.
- Side slopes on tapers should be no greater than 1:6 to reduce the risk of bicyclists losing their balance.

Optional Features

(12) Speed management may be implemented on a trial basis to gauge residents' support prior to finalizing the design. Temporary speed humps, tables, and lumps are available. Temporary traffic calming should be used with caution as they can diminish residents' opinions due

Depending on motor vehicle speeds, a bicyclist will be passed by a car going the same direction this many times during a 10 minute trip:



Why Plan Accommodations for Bicycling?

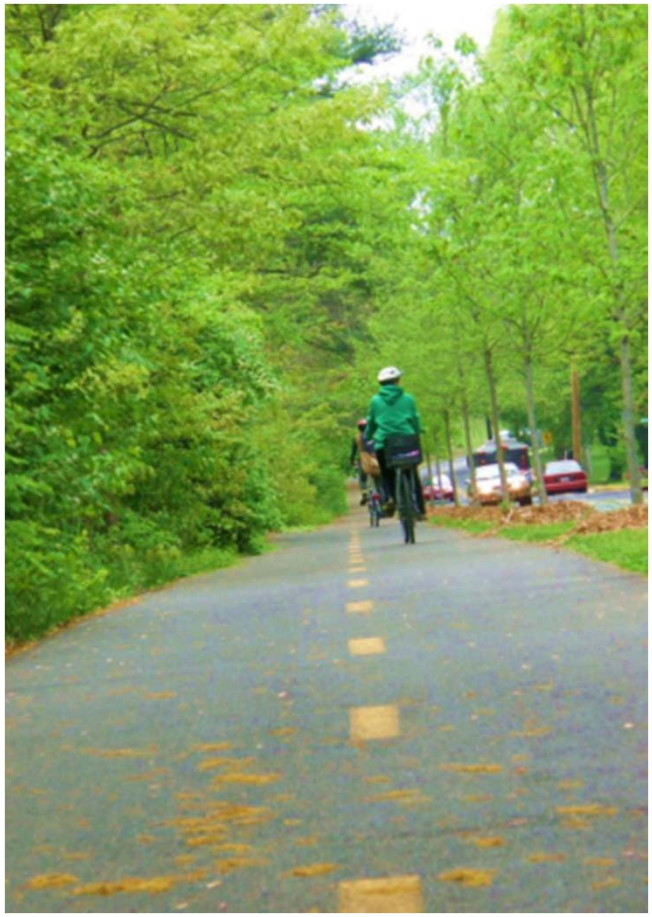
Section 3

Bicycling is on the Increase

- inexpensive
- convenient, fast and efficient for trips under 2-3 miles
- contributes to personal fitness
- provide mobility for those who can not drive
- combines well with other modes (transit)
- fun

Why Planning for Bicycling is Important for Society

1. contributes to a healthy public
2. reduces transportation-related environmental and energy impacts



Why Planning for Bicycling is Important for Society

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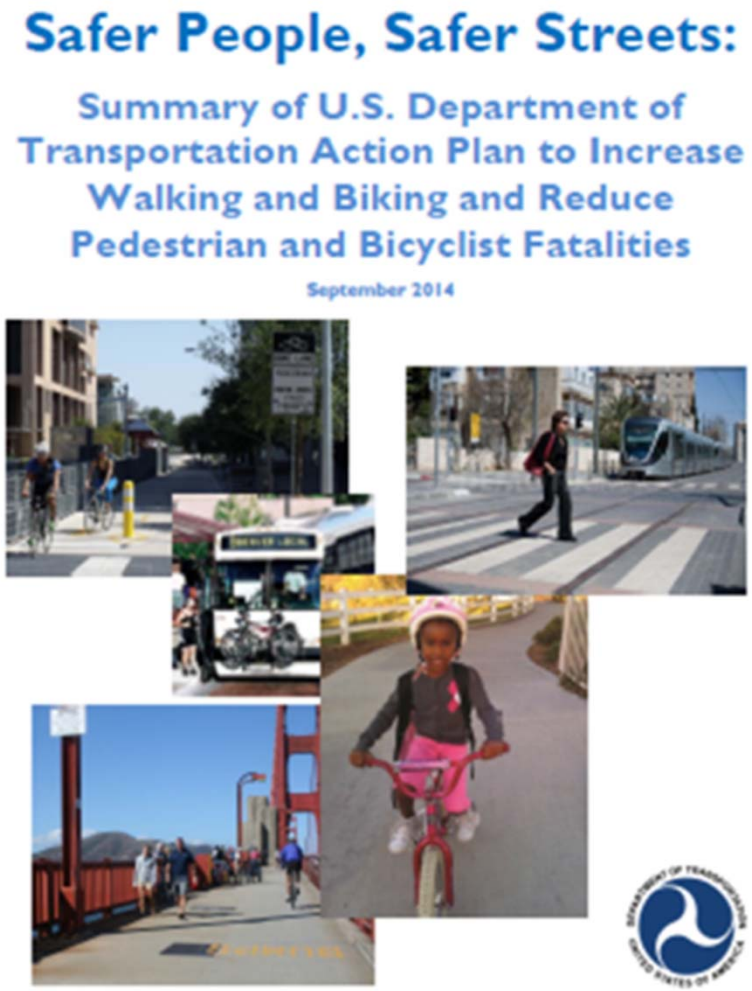
3. reduces traffic congestion
4. cheaper for citizens and cities

Why Planning for Bicycling is Important for Society

1. contributes to a healthy public
2. reduces transportation-related environmental and energy impacts
3. reduces traffic congestion
4. cheaper for citizens and cities
5. contributes to social cohesion and builds community
6. federal policy

It's Federal Policy



"The Department will promote the development of **multimodal networks** which include **interconnected** pedestrian/and or **bicycle** transportation **facilities** that allow people of **all ages and abilities** to safely and conveniently get where they want to go."

- USDOT, Sept 2014

http://www.dot.gov/sites/dot.gov/files/docs/safer_people_safer_streets_summary_doc_acc_v1-11-9.pdf

It's Central to Traffic Safety

It's Central to Traffic Safety

1. Cyclists are legal road users
2. Cyclists are vulnerable road users

It's Central to Traffic Safety

It's Central to Traffic Safety

1. **Bike facilities belong on streets**
2. **Cyclists must feel and be safe on facility**

It Reduces Liability

Myth: Accommodating bicyclists increases liability

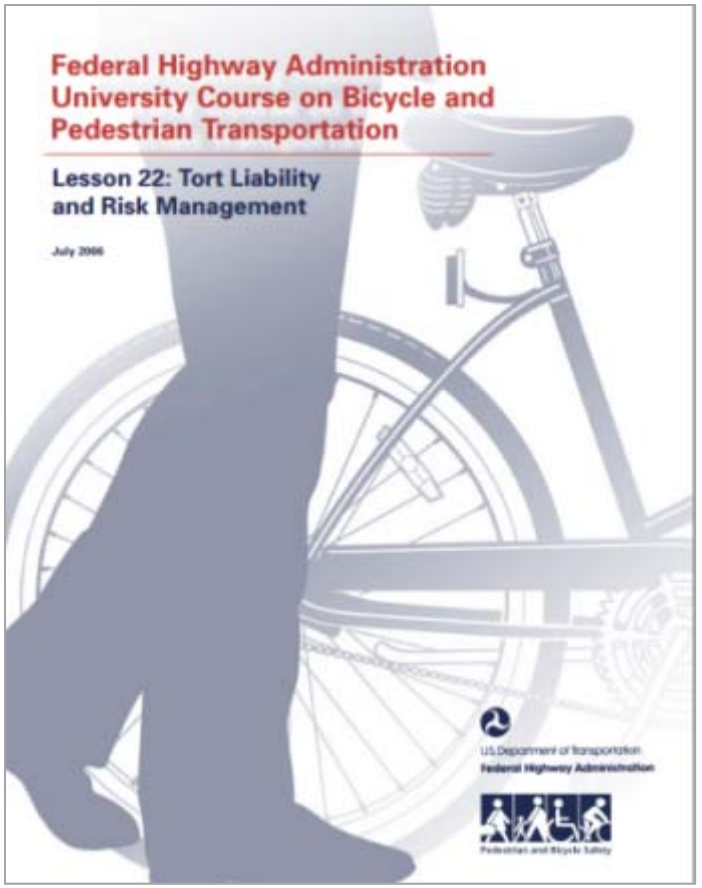
Fact: Ignoring the problem increases liability

Cases that lead to quick settlements ***against*** a government:

- Open drainage grates
- Paths that end suddenly at hazardous locations
- Long-term, severe surface issues
- Poor sight distance
- Roadway design, planning, operation, and maintenance that do not consider bicycle and pedestrian use.

It Reduces Liability

"It is no longer acceptable to plan, design, or build roadways that do not fully accommodate use by bicyclists and pedestrians… With every passing year, the courts become less and less sympathetic to agencies that have not understood the message: bicyclists and pedestrians are intended users of the roadway."



www.fhwa.dot.gov/publications/research/safety/pedbike/05085/pdf/lesson22lo.pdf

Economic Competitiveness

Recruiting workers requires "creating an image of a city and community that young people are attracted to."

Cycling is a big part of the attraction.

- Jack Berry, executive director of Venture Richmond (VA)

http://www.baconsrebellion.com/2013/03/bicycles-and-economic-development.html

Overview of Bicycle Safety Problem

Section 4

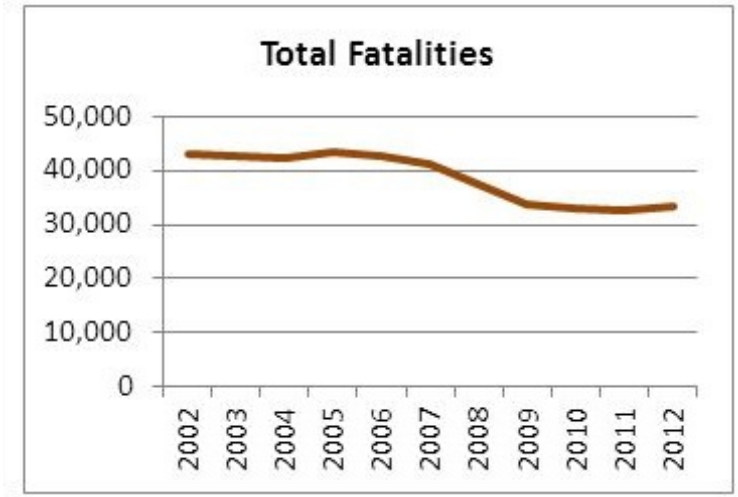
Overview of Bicycle Safety Problem

In 2012:

- 726 killed
- 49,000 injured
- Cyclist account for over 2% of all traffic deaths and injuries

...but are only 1% of all traffic

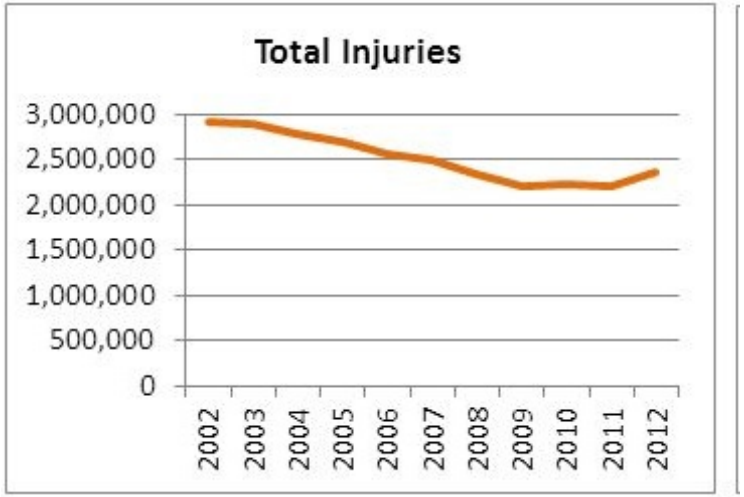
Bicycle Fatalities by Year



Between 2002 – 2012:

- Fatalities for all modes are declining
- Fatalities for bicyclists have remained relatively constant
  - 60% occur at non-intersection
  - 69% in urban areas
  - 50% are between 6pm and 6am

Bicycle Injuries by Year



Between 2002 – 2012:

- Injuries for all modes are generally declining
- Injuries for bicyclists have remained relatively constant
  - 31% occurred at non-intersection
  - 33% are between 6pm and 6am
  - 27% are between 3pm and 6pm

Elements of Bicycle Planning

Section 5

Types of Bicycle Planning

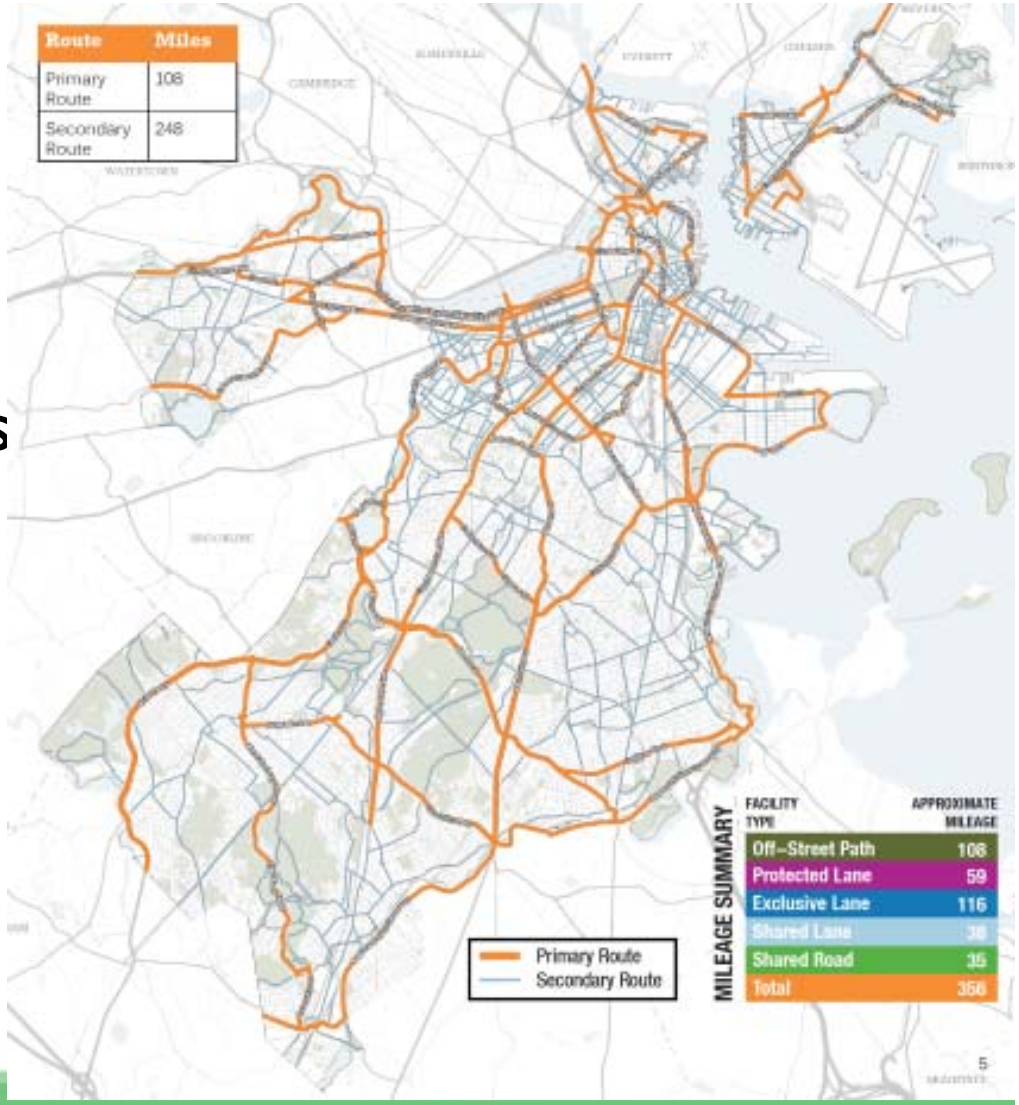
- Master Plans
- Bicycle Plans
- Transportation Impact Studies
- Small Area Plans
- Corridor Feasibility Studies

Typical Components of Bicycle Master Plans

- Vision, Goals and Objectives
- Public process
- 5 E's
  - Engineering
  - Education
  - Encouragement
  - Enforcement
  - Evaluation
- Policies
- Implementation

Connected Networks

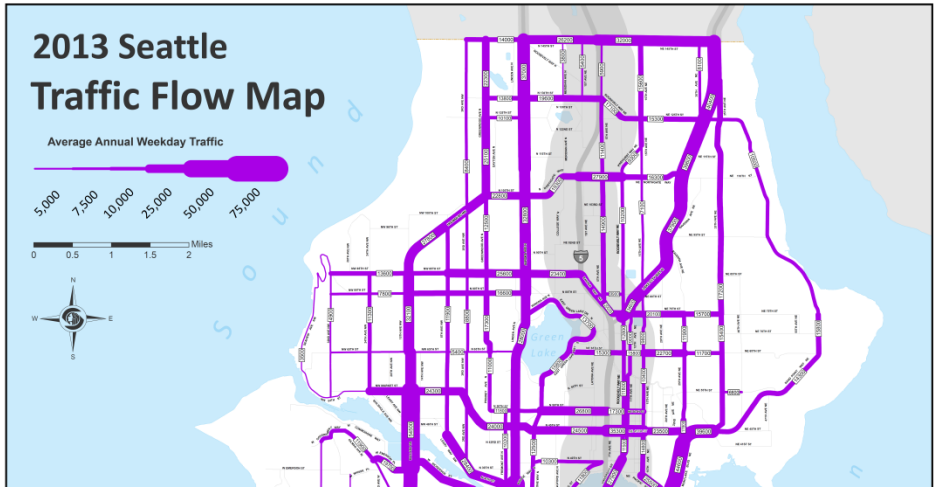
- Accommodate on all streets
- Integrate Off Street with On-Street
- Variety of bikeway types
- Address Barriers
- Address Intersections
- Connect to Neighboring Jurisdictions
- Implementation



Assessing Existing Conditions

Data collection

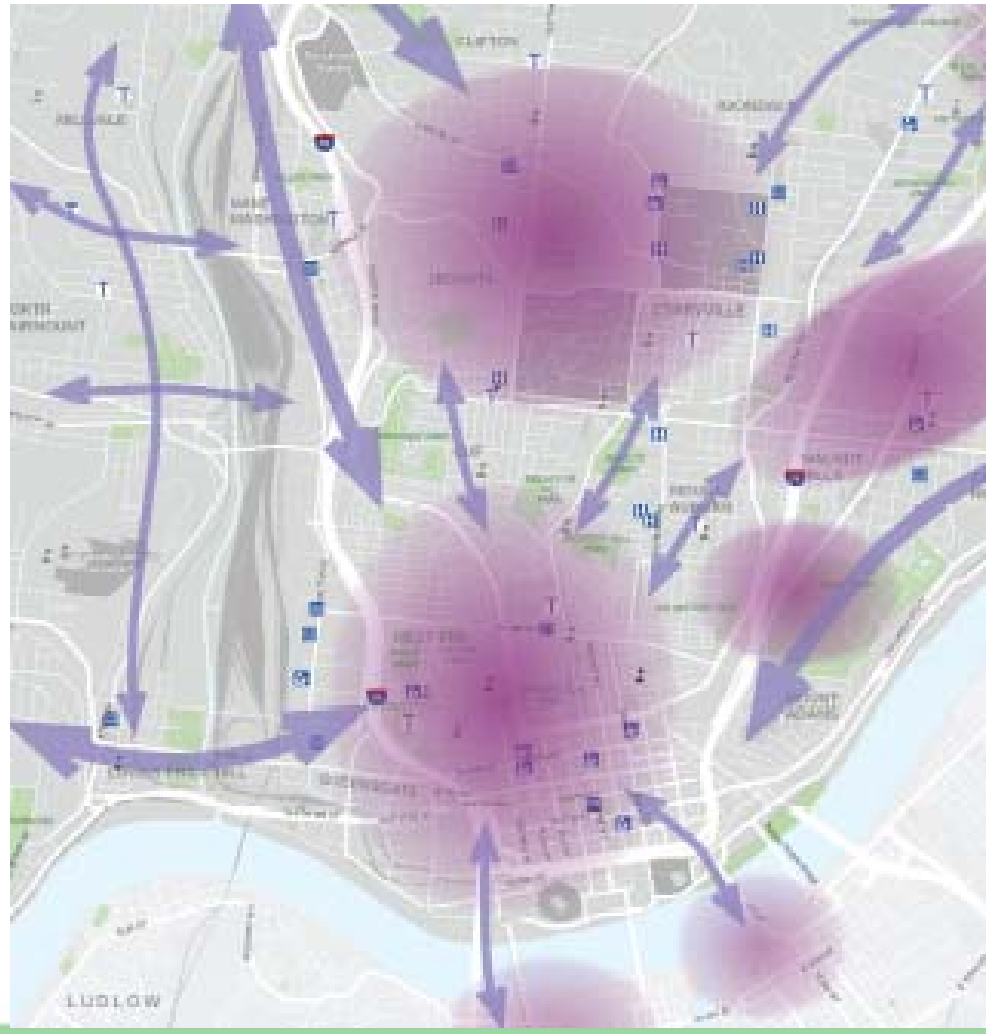
- Bicycle counts
- Reported crashes
- Street widths
- Traffic volume
- Speed limit
- Public input



Bicycle Travel Demand Analysis

Bicycle Demand

- Land use
- Bike facility type
- Traffic stress
- Terrain
- Origin/Destination
- Connectivity
- Barriers



Crash Data Analysis

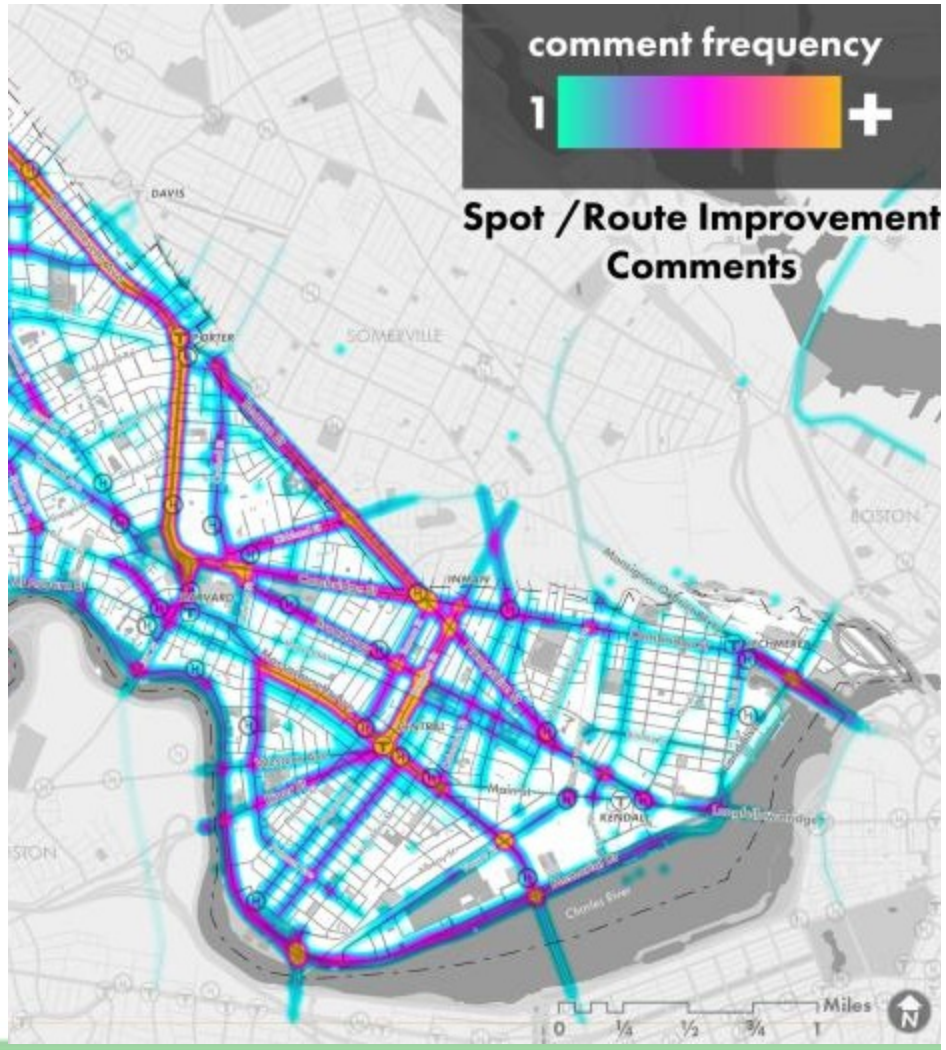
Crash data analysis can:

- Discover prevalent crash types and behaviors
- Target specific areas
- Inform selection of bicycle facility

Crash Data Analysis

Understand the limitations:

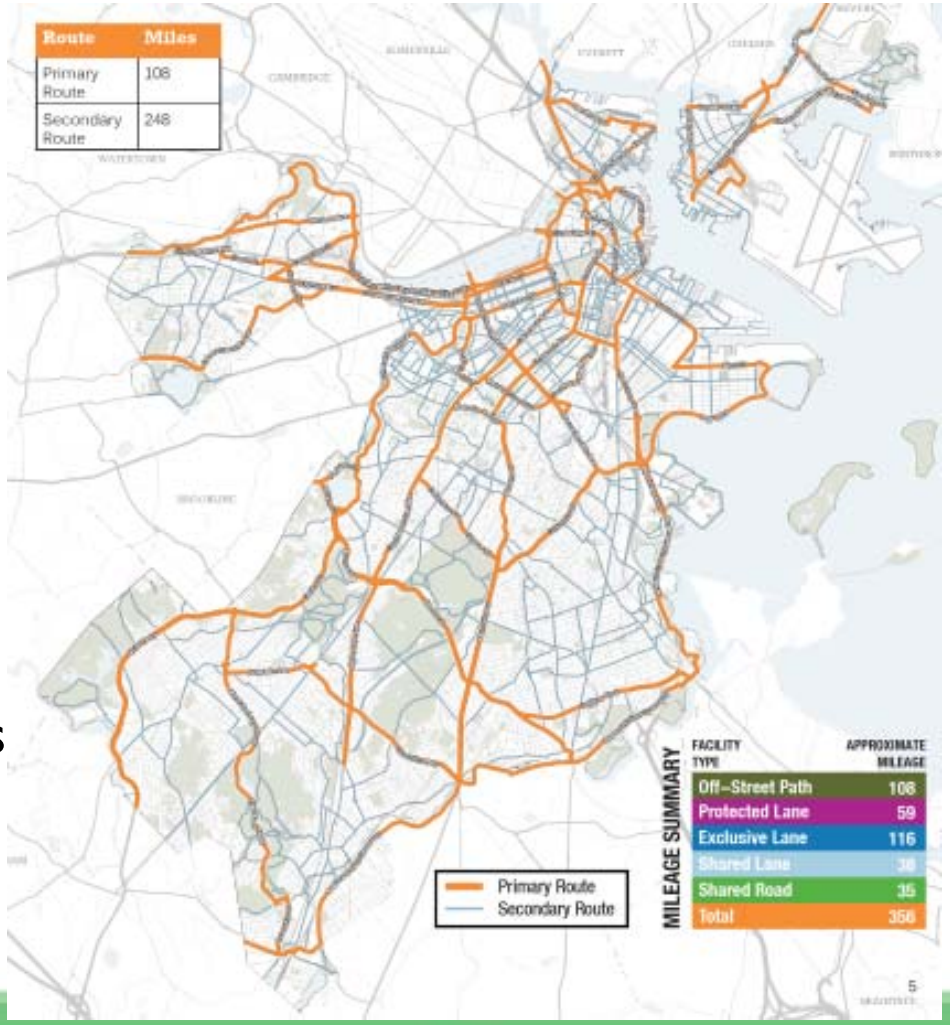
- crashes are usually dispersed
- Crash data does not include "near-misses"
- The public may perceive locations without crashes to be less safe
- Crash data may be incomplete or inaccurate



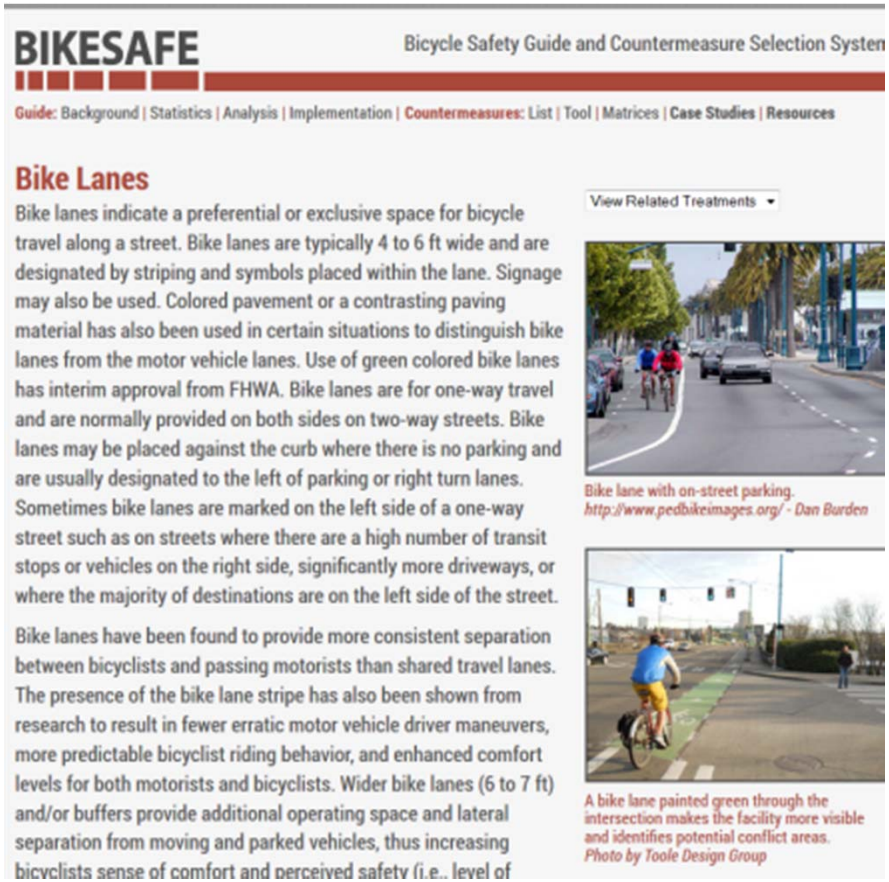
Deciding Where Improvements are Needed

Factors to Consider

- Safety
  - High Crash Locations
  - Intersections
- Connection to land uses (e.g. employment centers)
- Directness of route
- Demand
- Spacing or density of Bikeways
- Security
- Overall feasibility



Countermeasures



BIKESAFE

Bicycle Safety Guide and Countermeasure Selection System

Guide: Background | Statistics | Analysis | Implementation | Countermeasures: List | Tool | Matrices | Case Studies | Resources

Bike Lanes

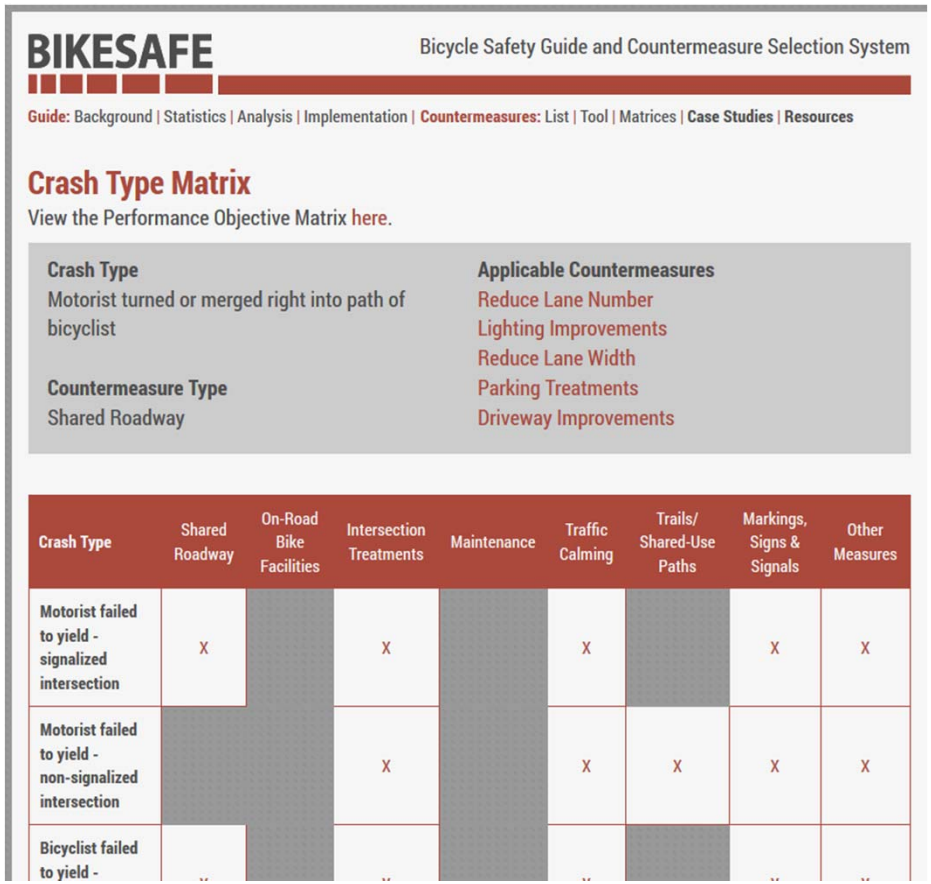
View Related Treatments

Bike lanes indicate a preferential or exclusive space for bicycle travel along a street. Bike lanes are typically 4 to 6 ft wide and are designated by striping and symbols placed within the lane. Signage may also be used. Colored pavement or a contrasting paving material has also been used in certain situations to distinguish bike lanes from the motor vehicle lanes. Use of green colored bike lanes has interim approval from FHWA. Bike lanes are for one-way travel and are normally provided on both sides on two-way streets. Bike lanes may be placed against the curb where there is no parking and are usually designated to the left of parking or right turn lanes. Sometimes bike lanes are marked on the left side of a one-way street such as on streets where there are a high number of transit stops or vehicles on the right side, significantly more driveways, or where the majority of destinations are on the left side of the street.

Bike lanes have been found to provide more consistent separation between bicyclists and passing motorists than shared travel lanes. The presence of the bike lane stripe has also been shown from research to result in fewer erratic motor vehicle driver maneuvers, more predictable bicyclist riding behavior, and enhanced comfort levels for both motorists and bicyclists. Wider bike lanes (6 to 7 ft) and/or buffers provide additional operating space and lateral separation from moving and parked vehicles, thus increasing bicyclists sense of comfort and perceived safety (i.e., level of

Bike lane with on-street parking.
http://www.pedbikeimages.org/ - Dan Burden

A bike lane painted green through the intersection makes the facility more visible and identifies potential conflict areas.
Photo by Toole Design Group



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Crash Type Matrix

View the Performance Objective Matrix here.

Crash Type
Motorist turned or merged right into path of bicyclist

Countermeasure Type
Shared Roadway

Applicable Countermeasures
Reduce Lane Number
Lighting Improvements
Reduce Lane Width
Parking Treatments
Driveway Improvements

Crash Type	Shared Roadway	On-Road Bike Facilities	Intersection Treatments	Maintenance	Traffic Calming	Trails/ Shared-Use Paths	Markings, Signs & Signals	Other Measures
Motorist failed to yield - signalized intersection	X		X		X		X	X
Motorist failed to yield - non-signalized intersection			X		X	X	X	X
Bicyclist failed to yield -								

http://www.pedbikesafe.org/BIKESAFE/index.cfm

Choosing an Appropriate facility type

FIGURE 29: GRAPHICAL REPRESENTATION OF LTS SCORES BY BIKEWAY TYPE

Choosing an Appropriate Facility Type

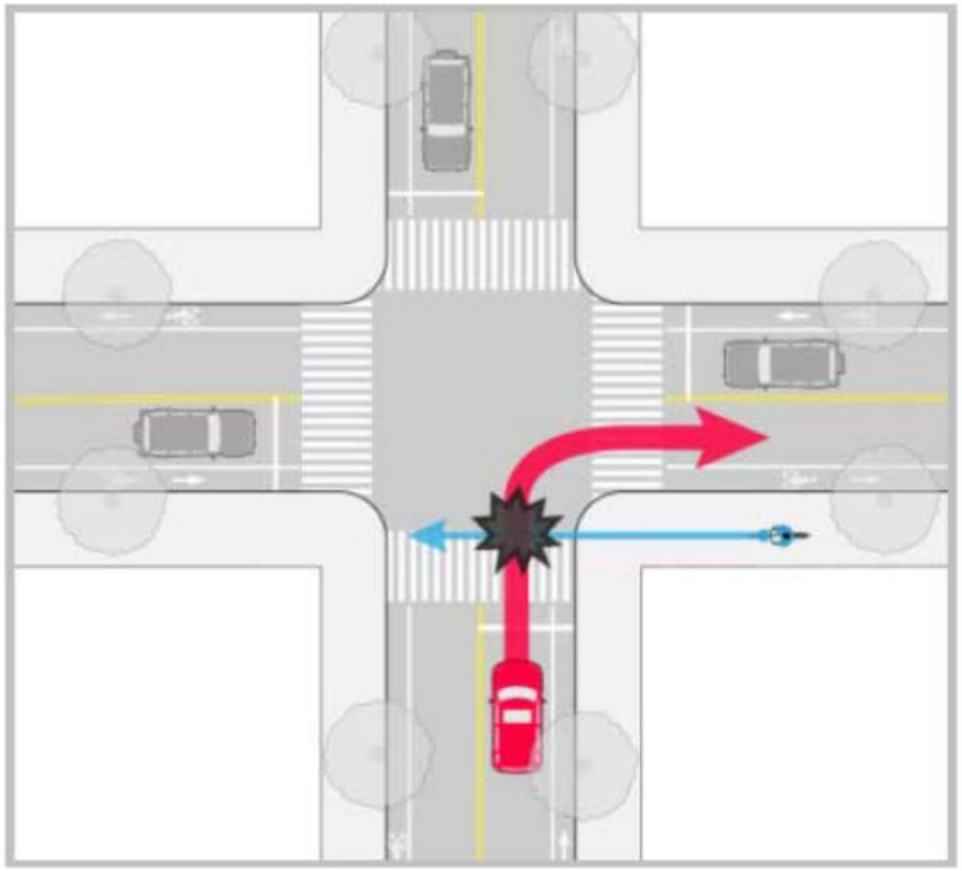
AASHTO Guide:

Type of bikeway	Best use	Motor vehicle design speed	Traffic volume	Classification or intended use	Other considerations
Paved shoulders	Rural highways that connect town centers and other major attractors	Typical posted rural highway speeds (generally 40-55 mph)	Variable. May be as low as 250 vehicles per day up to 4,000 vehicles per day or greater	Rural 2-lane roadways, inter-city highways	Provides more shoulder width for roadway stability. Shoulder width should be dependent on characteristics of the adjacent motor vehicle traffic, i.e. wider shoulders on higher speed roads
Bike lanes	Major streets that provide direct, convenient, quick access to major land-uses. Also can be used on collector roadways and busy urban streets with slower speeds	Use as the speed differential between bicyclists and motorists increases. Generally, any roadway where the design speed is more than 25 mph	Variable. Speed differential is generally a more important factor in the decision to provide bike lanes than traffic volumes	Arterials and collectors intended for major motor vehicle traffic movements	Where motor vehicles allowed to park adjacent to bike lane, ensure width of bike lane sufficient to reduce probability of conflicts due to opening vehicle doors and other hazards. Analyze intersections to reduce bicyclist/motor vehicle conflicts. Sometimes bike lanes are left “undesignated” (i.e. bicycle symbol and signs are not used) in urban areas as an interim measure

Bicycle Facility and Network Development Will Address Key Safety Issues

Most Common Crash Factors:

- Wrong-way riding
- Sidewalk riding
- "Dooring"
- Bicyclist struck from behind
- Bicyclist/motorist failing to yield at intersections



FHWA BIKESAFE: Bicycle Safety Guide and Countermeasure Selection System

Bicycle Facility and Network Development Will Address Key Safety Issues

Crash Type:

Wrong-Way Riding

- Solutions
  - Bicycle Lanes
  - Climbing Lanes
  - Cycletracks
  - Shared Lane Markings

Bicycle Facility and Network Development Will Address Key Safety Issues

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Bicycle Facility and Network Development Will Address Key Safety Issues

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Education and Enforcement
- Key to Some Bicycle Safety Issues

Crash Causes Related to Behavior *(2012 data)*

- 31% of injuries occur between 6 pm and 6 am *darkness is a factor*
- 28% of fatal cyclists had measurable BAC level *drinking is a factor*
- 20% of injury crashes involve children under 16 *age is a factor*

Plan for Implementation

- Setting Priorities
- Defining Projects
- Integration into Existing Routines
- Phasing over Time
- Funding
- Agency Responsibilities
- Ongoing Coordination


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Questions?

Thank You!

- **Archive at www.pedbikeinfo.org/webinars**
  - Downloadable and streaming recording, transcript, presentation slides
- **Questions?**
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  - **Peter Lagerwey**
    plagerwey@tooledesign.com