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

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Oct. 2, 2014, 2 pm
Today’s Presentation

- **Introduction and housekeeping**
- **Audio issues?**
  - Dial into the phone line instead of using “mic & speakers”
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- **Questions at the end**
How to Create a Bicycle Safety Action Plan

Planning for Safety

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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.
1: Planning for Bicycle Safety
2: On-Road Bicycle Facilities
3: Off-Road Facilities
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

- Interested but Concerned, 60%
- No Way No How, 33%
- Enthused and Confident, 6%
- Strong and Fearless, 1%

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Types of Bicyclists - AASHTO

- Enthused and Confident: 6%
- Strong and Fearless: 1%
- Interested but Concerned: 60%
- No Way No How: 33%

- 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

Figure 3-1. Bicyclist Operating Space

Table 3-1. Key Dimensions

<table>
<thead>
<tr>
<th>User Type</th>
<th>Feature</th>
<th>U.S. Customary</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical upright adult bike</td>
<td>Physical width (95th percentile)</td>
<td>30 in.</td>
<td>0.75 m</td>
</tr>
<tr>
<td></td>
<td>Physical length</td>
<td>70 in.</td>
<td>1.8 m</td>
</tr>
<tr>
<td></td>
<td>Physical height of handlebars (typical dimension)</td>
<td>44 in.</td>
<td>1.1 m</td>
</tr>
<tr>
<td></td>
<td>Eye height</td>
<td>60 in.</td>
<td>1.5 m</td>
</tr>
<tr>
<td></td>
<td>Center of gravity (approximate)</td>
<td>33-44 in.</td>
<td>0.8-1.1 m</td>
</tr>
<tr>
<td></td>
<td>Operating width (minimum)</td>
<td>48 in.</td>
<td>1.2 m</td>
</tr>
<tr>
<td></td>
<td>Operating width (preferred)</td>
<td>60 in.</td>
<td>1.5 m</td>
</tr>
<tr>
<td></td>
<td>Operating height (minimum)</td>
<td>100 in.</td>
<td>2.5 m</td>
</tr>
<tr>
<td></td>
<td>Operating height (preferred)</td>
<td>120 in.</td>
<td>3.0 m</td>
</tr>
</tbody>
</table>

Figure 3-2. Typical Bicycle Dimensions

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
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
Types of Bicycle Facilities
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

Guidance for vertical traffic calming features:

10. Slopes should not exceed 1:10 or be less steep than 1:25.
11. 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 to their temporary nature.

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:

- 20 MPH: 30% increase

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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

1. contributes to a healthy public
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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
“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

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.“

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 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

http://www.pedbikesafe.org/BIKESAFE/index.cfm
Choosing an Appropriate facility type

**Figure 29: Graphical representation of LTS scores by bikeway type**

- **Level of Traffic Stress**
  - 1. Low: ≤ 2K ADT ≤ 25 mph
  - 2. Moderate: 2K-4K ADT 30 mph
  - 3. High: 4K-6K ADT 35 mph
  - 4. Very High: > 6K ADT > 40 mph

- **Facility Types**
  - **Shared Lanes**
    - ≤ 2K ADT ≤ 25 mph
  - **Bike Lanes**
    - < 25 mph, 2-3 lanes
  - **Intersections**
    - Dutch style
  - **Trails**
    - Greenway
  - **Protected Bike Lanes**
    - Protected bike lane

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[www.pedbikeinfo.org](http://www.pedbikeinfo.org)
# Choosing an Appropriate Facility Type

**AASHTO Guide:**

<table>
<thead>
<tr>
<th>Type of bikeway</th>
<th>Best use</th>
<th>Motor vehicle design speed</th>
<th>Traffic volume</th>
<th>Classification or intended use</th>
<th>Other considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paved shoulders</strong></td>
<td>Rural highways that connect town centers and other major attractors</td>
<td>Typical posted rural highway speeds (generally 40-55 mph)</td>
<td>Variable. May be as low as 250 vehicles per day up to 4,000 vehicles per day or greater</td>
<td>Rural 2-lane roadways, inter-city highways</td>
<td>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</td>
</tr>
<tr>
<td><strong>Bike lanes</strong></td>
<td>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</td>
<td>Use as the speed differential between bicyclists and motorists increases. Generally, any roadway where the design speed is more than 25 mph</td>
<td>Variable. Speed differential is generally a more important factor in the decision to provide bike lanes than traffic volumes</td>
<td>Arterials and collectors intended for major motor vehicle traffic movements</td>
<td>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</td>
</tr>
</tbody>
</table>
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

Crash Type: Wrong-Way Riding

• Solutions
  – Bicycle Lanes
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Bicycle Facility and Network Development Will Address Key Safety Issues

Crash Type: Wrong-Way Riding

- Solutions
  - Bicycle Lanes
  - Climbing Lanes
  - Cycletracks
  - Shared Lane Markings
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, \textit{darkness is a factor}
- 28% of fatal cyclists had measurable BAC level, \textit{drinking is a factor}
- 20% of injury crashes involve children under 16, \textit{age is a factor}
Plan for Implementation

• Setting Priorities
• Defining Projects
• Integration into Existing Routines
• Phasing over Time
• Funding
• Agency Responsibilities
• Ongoing Coordination
1: Planning for Bicycle Safety
2: On-Road Bicycle Facilities
3: Off-Road Facilities
Questions?
Thank You!

Archive at www.pedbikeinfo.org/webinars
- Downloadable and streaming recording, transcript, presentation slides

Questions?
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