More than just a Stripe: Creating Inviting Bikeways

2014 ASC E-ASHE Statewide Conference
September 11, 2014
FOUR TYPES OF RIDERS

60%
INTERESTED BUT CONCERNED

33%
NO WAY, NO HOW

7%
ENTHUSED & CONFIDENT

<1%
STRONG & FEARLESS
WHO IS BIKING?

- One in 12 U.S. households does not own a automobile
- 13% of persons above age 15 do not drive
- There are nine million biking trips in the U.S. every day
- 73% Male/27% Female
- Less than 18% wear a helmet
- All generations are biking

TOP BIKING CITIES:
1. New York, NY
2. Portland, OR
3. Chicago, IL
4. Minneapolis, MN
5. Washington, DC

<table>
<thead>
<tr>
<th>REASON</th>
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<td>RECREATION</td>
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<tr>
<td>EXERCISE/HEALTH</td>
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<tr>
<td>ERRANDS</td>
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<tr>
<td>COMMUTE TO WORK</td>
<td>7%</td>
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<tr>
<td>COMMUTE TO SCHOOL</td>
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• BIKE LANES
  - Buffered  - Contra-Flow  - Left-Side
• CYCLE TRACKS
  - One-Way  - Two-Way  - Raised
• INTERSECTIONS
  - Bike Boxes  - Two-Stage Turn Queue Box  - Cycle Track Intersection
• SIGNALS
  - Bike Signal Heads  - Detection/Actuation  - Hybrid Beacon
• SIGNING & MARKING
  - Colored Bike Facilities  - Shared Lane Markings  - Route Wayfinding
• BICYCLE BOULEVARDS
  - Route Planning  - Speed Management  - Offset Intersections
CONVENTIONAL BIKE LANES

1. Desired width: 5 feet
2. Wherever possible, minimize parking lane width in favor of increased bike lane width.
3. 6- to 8-inch solid white line
4. 4 inch solid white line
5. BIKE LANE
6. BIKE LANE
7. BIKE LANE
8. BIKE LANE
9. BIKE LANE
10. BIKE LANE
11. BIKE LANE
BIKE LANE BENEFITS

• Creates separation between bikes and automobiles
• Increases predictability of bicyclist and motorist positioning and interaction
• Visually reminds motorists of bicyclists’ right to the street
BIKE LANES ARE MOST USEFUL WHEN:

- Streets have greater than 3,000 cars ADT
- Streets are posted speed at 25 mph or greater
- Streets with high transit volumes
SEPERATED BIKE LANES ARE SUGGESTED WHEN:

- High truck and/or traffic volumes
- High parking turnover
- Posted Speed over 35 mph
- Bikeways for young/old population
CITIES WITH BUFFERED BIKE Lanes: Austin, TX; Brooklyn, NY; Billings, MT; Cape Coral, FL; Los Angeles, CA; Marin County, CA; Minneapolis, MN; New York, NY; Portland, OR; Phoenix, AZ; San Francisco, CA; Seattle, WA; Tucson, AZ
BUFFERED BIKE LANES

- Greater Shy Distance
- Provides Passing Lane for Bicyclist
- Protects from door zone
- Appeals to wider range of bicycle users
ONE-WAY PROTECTED CYCLE TRACK

UBDG P. 32-33

**Design Guidance**

**One-Way Protected Cycle Tracks**

**Required Features**
1. A cycle track, like a bike lane, is a type of preferential lane as defined by the MUTCD. A cycle track may be placed in the neutral area of a protected cycle track and at periodic intervals along the facility based on engineering judgment.

**Recommended Features**
1. The minimum desired width for a cycle track should be 5 feet. Areas are high bicycle volumes or uphill sections, the minimum desired width should be 7 feet to allow for bicyclists passing each other.

2. Three feet is the desired width for a parking buffer to allow for passenger loading and to prevent door collisions.

3. Driveways and minor street crossings are a unique challenge to cycle track design. A review of existing facilities and design practice has shown that the following guidance may improve safety at crossings of driveways and minor intersections:
   - If the cycle track is protected, parking should be prohibited near the intersection to improve visibility. The desirable no-parking area is 30 feet from each side of the crossing.
   - For motor vehicles attempting to cross the cycle track from the side street or driveway, street and sidewalk furnishings and other features should accommodate a sight triangle of 20 feet to the cycle track from minor street crossings, and 10 feet from driveway crossings.
   - Color, yield lines, and “Yield to Bikes” signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic.

4. Motor vehicle traffic crossing the cycle track should be constrained or channelized to make turns at sharp angles to reduce travel speed prior to the crossing.

5. Gutter seams, drainage inlets, and utility covers should be configured so as not to impede bicycle travel and to facilitate run-off.

6. Sidewalk curbs and furnishings should be used to prevent pedestrian use of the cycle zone.

7. Larger in locations where the gutter seam extends more than 12 inches from the curb.

**Optional Features**

8. Tubular markers may be used to protect the cycle track from the adjacent travel lane. The color of the tubular markers shall be the same color as the pavement marking they supplement.

9. Cycle tracks may be shifted more closely to the travel lanes on minor intersection approaches to put bicyclists clearly in the field of view of motorists. See Cycle Track Intersection Approach for other methods of transitioning a cycle track to an intersection.

10. A raised median, bus bulb, or curb extension may be configured in the cycle track buffer area to accommodate transit stops. Bicyclists should yield to pedestrians crossing the roadway at these points to reach the transit stop.

11. At transit stops, consider wrapping the cycle track behind the transit stop zone to reduce conflicts with transit vehicles and passengers. Bicyclists should yield to pedestrians in these areas. At intersection bus stops, an extended crossing zone may be provided with signage directing bicyclists to yield to buses and loading passengers.
Dedicates & protects space for bicyclist in order to improve perceived comfort and safety.

Eliminates risk and fear of collisions with overtaking vehicles.

Prevents double parking.

More attractive for bicyclists of all levels and ages.

Alternate Protection Strategies

12 Tubular Markers

7 Movable Planters

16 Raised Curb
RAISED CYCLE TRACKS
UBDG P. 38-39

**Recommended Features**

3. Desirable one-way raised cycle track travel surface width is 6.5 feet to allow side-by-side riding or passing. Desired minimum width is 5 feet at intersections and pinch points. Additional width may be needed for protection from traffic or parking and/or shy distance to sidewalks or furnishings.30

6. When configured next to a parking lane, 3 feet is the minimum desired width for a parking buffer to allow for passenger loading and to prevent dooring collisions. The buffer can be at street level or at the level of the cycle track.30

7. When configured next to a motor vehicle travel lane, the desired minimum width of a mountable curb is 1 foot, depending on elevation. Raised curbs may require additional width for added shy distance from the curb edge. Raised curb buffer minimum width should be increased to 3 feet or greater when buffer space is used to locate lamp posts, bollards, street furniture, low vegetation, and/or trees.30

9. Vertical separation between the cycle track and the sidewalk should be between 0 (flush with the sidewalk surface) and 5 inches. A separation of 3 inches or greater discourages conflicts with pedestrians.35

10. If curb or median separated, careful consideration should be given to the curb design. Curb of 6 inches can be hazards to bicyclists by interfering with the space needed for pedaling, but can be more effective deterrents to illegal parking or loading. Consider the use of alternative bicycle-friendly curb profiles where possible.35

**Required Features**

1. The cycle track shall be vertically separated from the street at an intermediate or sidewalk level.

2. Bicycle lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed at the beginning of a cycle track and at periodic intervals along the facility based on engineering judgment.

3. A raised cycle track shall be protected from the adjacent motor vehicle travel lane. Protection strategies may include a raised or mountable curb, street furnishing, low vegetation or a parking lane.

4. If used, the mountable curb should have 4:1 slope edge without any seams or lips to interfere with bike tires to allow for safe entry and exit of the roadway. This curb should not be considered a rideable surface when determining cycle track width.35

5. When placed adjacent to a travel lane, one-way raised cycle tracks may be configured with a mountable curb. If used, the mountable curb should have 4:1 slope edge.
BENEFITS:

• Dedicates & protects space for bicyclists in order to improve perceived comfort and safety
• Encourage bike lane riding vs. sidewalk riding
• May be more cost effective than a buffered bike lane
TWO-WAY CYCLE TRACKS
UBDG P. 44-45

Design Guidance
Two-Way Cycle Track

Required Features
1. Bicycle lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed at the beginning of a cycle track and at periodic intervals along the facility to define the bike lane direction and designate that portion of the street for preferential use by bicyclists.

2. If configured on a one-way street, a "ONE WAY" sign (MUTCD R6-1 R6-2) with "Exempt Bikes" plaque shall be posted along the facility and at intersecting streets, alleys, and driveways informing motorists to expect two-way traffic.

3. A "DO NOT ENTER" sign (MUTCD R5-3) with "EXCEPT BIKES" plaque shall be posted along the facility to only permit use by bicyclists.

4. Intersection traffic controls along the street (e.g., stop signs and traffic signals) shall also be installed and oriented toward bicyclists traveling in the contra-flow direction.

Recommended Features
5. The desirable two-way cycle track width is 12 feet. Minimum width in constrained conditions is 8 feet.

6. When protected by a parking lane, 3 feet is the desired width for a parking buffer to allow for passenger loading and to prevent dooring collisions.

7. A dashed yellow centerline should be used to separate two-way bicycle traffic and to help distinguish the cycle track from any adjacent pedestrian area.

8. Driveways and minor street crossings are a unique challenge to cycle track design. A review of existing facilities and design practice has shown that the following guidance may improve safety at crossings of driveways and minor intersections:
   - If the cycle track is parking protected, parking should be prohibited near the intersection to improve visibility. The desirable no-parking area is 50 feet from each side of the crossing.
   - For motor vehicles attempting to cross the cycle track from the side street or driveway, street and sidewalk furnishings and/or other features should accommodate a sight triangle of 20 feet to the cycle track from minor street crossings, and 10 feet from driveway crossings.
   - Color yield lines, and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic.

9. Parking should be near the intersection to improve visibility.

Intersection Configuration Alternatives
See the Cycle Track Intersection Approach and Bicycle Signals sections for details on design strategies at intersections.

Bicycle Signal Phase
A dedicated bicycle signal phase can eliminate conflict between turning automobiles and bicyclists.

"Bend In" Crossing
Using a curb extension or painted buffer, the cycle track may be bent in to promote visibility of bicyclists in advance of the intersection.
TWO-WAY CYCLE TRACK BENEFITS

- Dedicates & protects space for bicyclists by improving safety & comfort.
- Eliminates risk of overtaking vehicles.
- More attractive to a wide range of bicyclists at all ages and levels.
HOUSTON, TX
Gaye Fisher, a nearby resident, said she had been the bike lane project's "biggest skeptic" when she heard about it, believing it would always be unsafe for elementary schoolers to bike on these streets. But after the lanes were installed last weekend, she said, she changed her mind. "The posts that divide the bike lanes from the major traffic, they tell people to slow down and respect the space," she said in an interview Thursday. "It looks great."
• Safety Improved for all modes
• Improved travel times for all modes
• Increased retail sales
• 110 trees planted
COLORED BIKE FACILITIES

• Promotes multi-modal nature of corridor
• Increases visibility of bicyclists
• Discourages illegal parking in bike lane

PHOENIX, AZ
COLORED BIKE FACILITIES

PAINT
DURABLE LIQUID PAVEMENT MARKINGS/ EPOXY
THERMOPLASTIC
COLORED ASPHALT
BIKE BOULEVARDS

DESIGN ELEMENTS

• Route Planning
• Signs & Pavement Markings
• Speed Management
• Volume Management
• Street Crossings
• Green infrastructure

MADISON, WI
HOW CAN YOU IMPLEMENT?

• Go to NACTO.org: Purchase the UBDG
• Utilize innovative bikeway design considerations to invite “concern but interested” to your bikeway
• To stay inspired - Join ProWalk/ProBike, Green Lane Project, NACTO, People for Bikes
• Consider a temporary “chalk” project with your community leaders
Betterblock.org
Teambetterblock.com
Wichita, KS
San Antonio, TX
Dallas, TX
Saint Paul, MN
Observations

Safe for all age groups and skill levels. Reduced door zone issues. May require removing parking to improve site lines.
<table>
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<th>Safety:</th>
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<th>During</th>
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<td>Locals</td>
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CHRISTINE W. FANCHI, PE
CITY TRANSPORTATION PLANNER
CITY OF AVONDALE
ARIZONA LIASION TO NACTO
cfanchi@avondale.org

www.nacto.org

DESIGNING CITIES
SAN FRANCISCO
OCTOBER 22-25, 2014