Building Modern Bikeways
The National Association of City Transportation Officials’ Guide
and National Experience

Morning Schedule

• 9:00-12:00  An Overview of the Urban Bikeway Design Guide

• 9:00-9:30  Bike Lanes and Cycle Tracks  Ryan Russo, NYCDOT
• 9:30-10:00  Intersections  Jim Sebastian, DDOT
• 10:00-10:30  Signals  Peter Koonce, City of Portland
• 10:30-11:00  Signing & Marking  Seleta Reynolds, SFMTA
• 11:00-11:30  Q & A
• 11:30-12:00  Module II Preview  David Vega-Barachowitz, NACTO
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Afternoon Schedule

• 1:00-2:30  Implementation and Case Studies
    Ryan Russo, NYCDOT
    Peter Koonce, City of Portland
    Seleta Reynolds, SFMTA
    Jim Sebastian, DDOT
    Cara Seiderman, City of Cambridge

• 2:30-2:45  Break

• 2:45-4:00  The Politics of Implementation
    The Honorable Ralph Becker, Mayor, Salt Lake City
    Stephen Buckley, City of Philadelphia
    Vineet Gupta, Boston Transportation Department
BIKE LANES
Bike Lanes

Conventional Bike Lanes

Buffered Bike Lanes

Contra-Flow Bike Lane

Left-Side Bike Lane
CONVENTIONAL BIKE Lanes

Required Features

The usable width of the bike lane should be at least 4.5 feet. A bicycle lane with a width of 5 feet or wider should be considered. For more information, see "Bicycle Lanes - Right Turn Bays" (Section 9-101).

When used adjacent to a parking lane, the bike lane should be separated from the curb by a physical barrier such as a curb or a median strip. Additional guidance for designing bike lanes is found in "Bicycle Lanes - General Design" (Section 9-110).

Recommended Features

Bike lanes should be made wider than minimum width, wherever possible to provide space for bicyclists to ride side-by-side and in comfort. Minimum bike lane width is ordered to ensure a minimum of 5 feet. In some cases, wider bike lanes may encourage illegal parking or motor vehicle use of the bike lane.

When used adjacent to a parking lane, a solid white stripe in the bike lane should be included to prevent conflicts with parked vehicles. This guidance is found in "Bicycle Lanes - Right Turn Bays" (Section 9-101).
CONVENTIONAL BIKE LANES

- Comfort on Busy Streets
- Separation from moving autos
- Can increase street capacity
- Visual reminder of cyclist right to street

Conventional Bike Lane
NEW YORK CITY
CLARENDON ROAD, BROOKLYN, NY

Conventional Bike Lane
4-to-3 Road Diet with Bike Lanes

Cross-section

- Existing
  - 19' Combined Parking/Moving Lane
  - 11' Moving Lane
  - 11' Moving Lane
  - 19' Combined Parking/Moving Lane
  - Total width: 60'

- Proposed
  - 9' Parking/Loading Lane
  - 5' Moving Lane
  - 11' Turn Bay/Flush Median/Island
  - 11' Moving Lane
  - 5' Parking
  - 9' West Sidewalk

Vanderbilt Ave, Brooklyn
BUFFERED BIKE LANES

Design Guidance

Buffered Bike Lane

Buffered bike lanes are used to separate bicycle and motor vehicle traffic. The buffered bike lane is a separate, channelized lane for bicyclists. It is marked with a buffer (a solid white line) and a bike lane (a dashed white line) to provide a clear, continuous path for bicyclists.

Required Features

- Bike lane word and symbol and arrow markings (MUTCD Figure 9-2-3) shall be used to define the bike lane and designate that portion of the road for preferred use by bicyclists.
- The buffer shall be marked with a solid white line with diagonal hatching.
- The minimum buffer width is 3 feet. For travel side buffer lane, a 5-foot minimum width is recommended to ensure no obstacle is placed outside of the curb zone.
- The combined width of the buffer and bike lane should be considered "bike lane width" with respect to guidance given in other documents that don't recognize the existence of a buffer. Where buffers are used, bike lane width is measured.

Recommended Features

- The combined width of the buffer and bike lane should be considered "bike lane width" with respect to guidance given in other documents that don't recognize the existence of a buffer. Where buffers are used, bike lane width is measured.

Optional Features

- Color may be used at the beginning of each block to discourage materials from moving in the buffer zone. On other blocks, color in buffered bike lanes can be colored blue to be visible.

Buffered Bike Lane

- 3 feet buffer
- 4 feet buffer
- 5 feet buffer

MUTCD 9-2-3

MUTCD 9-2-4

MUTCD 9-2-6

MUTCD 9-2-8

MUTCD 9-2-10

MUTCD 9-2-12

MUTCD 9-2-14

MUTCD 9-2-16

MUTCD 9-2-18

MUTCD 9-2-20

MUTCD 9-2-22

MUTCD 9-2-24

MUTCD 9-2-26

MUTCD 9-2-28

MUTCD 9-2-30

MUTCD 9-2-32

MUTCD 9-2-34

MUTCD 9-2-36

MUTCD 9-2-38

MUTCD 9-2-40

MUTCD 9-2-42

MUTCD 9-2-44

MUTCD 9-2-46

MUTCD 9-2-48

MUTCD 9-2-50

MUTCD 9-2-52

MUTCD 9-2-54

MUTCD 9-2-56

MUTCD 9-2-58

MUTCD 9-2-60

MUTCD 9-2-62

MUTCD 9-2-64

MUTCD 9-2-66

MUTCD 9-2-68

MUTCD 9-2-70

MUTCD 9-2-72
BUFFERED BIKE LANES

• Greater shy distance

• Cyclist passing room

• Added comfort appeals to wider cross-section

• Higher perception of safety

SEATTLE
DEKALB AVENUE, BROOKLYN, NY
Buffered Bike Lane
CONTRA-FLOW BIKE LANES

Recommended Features

- Bike lane signs, arrows, and arrow markings ( MUTCD Figure 6C-3) shall be used to define the bike lane in motion and delineate the portion of the street for pedestrian use by bicyclists.
A “One-Way” sign (MUTCD Section 6G-1, 6G-2) with “Except Bikes” plaque shall be posted along the facility and at intersecting streets, sidewalks, and alleys at informing motorists to expect two-way traffic.

- Intersection traffic controls (signs, signals, and traffic signals) shall also be installed and phased toward bikers in the contra-flow lane.

- When configured without parking, a solid white line marking should be used to separate opposing motor vehicle traffic (from the contra-flow bicycle lane).

- A “Do Not Enter” sign (MUTCD Section 6C-12), or a modified “Two Way” sign (MUTCD Section 6G-2), or a “One Way Except Bikes” sign (MUTCD Section 6G-1) on cross streets to minimize potential conflicts with turning vehicles. Cross street traffic may not look for or anticipate contra-flow bicycle travel.

- Where there is room, bike lanes should be used on both sides.

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- It’s sufficient space exists, a buffered bike lane design should be used.

- Contra-flow bike lane markings shall be extended across the intersection, especially for contra-flow lanes against the curb, as a way of starting cross street traffic to look for contra-flow bicyclists.

Optimal Features

- Warning signs such as a modified “Two Way” sign (MUTCD Section 6G-2) may be posted along the facility to inform motorists to expect two-way traffic.

- Colored pavement may be used along the facility to draw attention to the use of the contra-flow bicycle lane, or in areas with cross traffic, such as at intersections, to increase visibility of bicyclists.

- Small versions of “Do not enter” signs (10 x 18 inches) and other regulatory signage may be used to inform motorists of the contra-flow bicycle lane at intersections and at other locations.

- A solid double yellow line (no passing lane) shall be used to separate contra-flow bike lanes from opposite traffic.

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- An urban raised medians may be used to separate contra-flow bike lanes from opposite traffic.

- Roadway improvements may be used to separate contra-flow bike lanes from opposite traffic.

- A curb or a raised median may be used in place of double yellow striping to separate the contra-flow bike lane from opposite traffic.

- Such facilities become a contra-flow protected cycle track.
CHICAGO CONTRAFLOW BIKE LANES

- Connectivity & access
- Reduces wrong-way & sidewalk riding
- Decreases trip distance
- Allows use of less trafficked streets
OCEAN PARKWAY, BROOKLYN, NY
Contraflow Bike Lane
Contra Flow Bike Lane
OLYMPIA, WA
**Design Guidance**

**Left-Side Bike Lanes**

**Required Features**
- Design guidance for conventional bike lanes applies to this treatment.

**Recommended Features**
- Signage should accompany left-side bicycle lanes to clarify their use by bicyclists and may be effective in reducing wrong-way riding.
- Modified MUTCD R4-6a series sign shown.

Bicycle through lanes should be provided to the right of vehicles left turning to reduce conflicts at intersections. This is important for through bicyclists as well as left turning bicyclists as left-turning vehicles will cross paths with a left-turning bicyclist. Additional guidance can be found in through bicycle lanes in this guide.

**Guardrail/Concrete Separation**
- Guardrails or concrete curbs should be flush with the ground and oriented to prevent conflicts with bicycle trips.

**Design Guidance**
- Where bicyclist demand is high and street space permits, a buffered bike lane configuration or wider than minimum dimensions should be used to allow bicyclists to pass one another without weaving upon the adjacent travel lane.

**Intersection Treatments**
- Intersection designs such as bike lanes and bike signals should be considered to assist in the transition from left-side bike lanes to right-side bike lanes.

A “Yield to Bikes” message should be post-mounted on the advance of and on approach with a left-turn lane to reinforce that bicyclists have the right-of-way going through the intersection.
LEFT SIDE BIKE LANE

- Avoids bus conflicts
- Minimizes door conflicts
- Improved overtaking by motorists
Greenwich Street
Left Side Bike Lane

EXISTING

PROPOSED

Combined Parking/ Moving Lanes

9' Parking Lane  11' Moving Lane  5'  9' Parking Lane
Left Side Bike Lane

BOSTON, MA
CYCLE TRACKS
Cycle Tracks

One-Way Protected Cycle Tracks

Raised Cycle Tracks

Two-way Cycle Tracks
ONE WAY PROTECTED CYCLE TRACK

**Recommended Features**

A bicycle lane, like a bike lane, is a type of protected lane as defined by the MUTCD. Blockline-wide, symbol, and/or snow markings (MUTCD Fig. 3C-3) shall be placed on the beginning of a cycle track and at intervals along the facility based on engineering judgment.

**Pavement markings** used to separate motor vehicle and parking lanes from the preferred bicycle lane should be painted in the right-hand lane for signal phases. See MUTCD Section 3C.2.1. Dedicated lanes for bicycles or other vehicles can also provide physical separation to the cycle track.

**Recommended Features**

The desired width for a cycle track should be 5 feet. In areas with high pedestrian volumes or signal phases, the desired width should be 7 feet to allow for successful passing each other.

They shall be painted within the bike lane area and used to separate motor vehicle and bicycle lanes. The desired width should be 7 feet to allow for smooth passing without collision.

When using a pavement marking buffer, dedicated parking and buffer combined within a 7-foot zone to discourage motor vehicle and pedestrian entry into the zone.

**Design Guidance**

**One Way Protected Cycle Tracks**

- **Driveway and main street closings**: concerned with the length of the closing, the following guidance may improve safety at crossings. Driveway and main street closings should be used in the right-hand lane for signal phases.

**Other Features**

- High visibility and visibility of bicycles and other vehicles can provide physical separation to the cycle track.

**Cyclist Warning Signs**

- Cyclist warning signs should be used to identify the conflict area and make clear that the cycle track has priority over entering and exiting traffic.

**Motor Vehicle Traffic Crossing**

- Motor vehicle traffic crossing the cycle track should be controlled at signalized or non-signalized intersections.

**Gutter Seams, Driveway and Utility Closes**

- Gutter seams, driveway and utility closes should be configured to separate motor vehicle and bicycle traffic and to facilitate turning-in-out.

**Sidewalk Cuts and Runnings**

- Sidewalk cuts and runnings should be used to prevent pedestrian use of the cycle zone.

**Buffer Guidance**

- If pavement markings are used to separate bicycle lanes, they should be placed at the beginning of the conflict area to inform cyclists about the conflict.

**General Considerations**

- Colored pavement may be used to indicate the bike lane and conflict area.

*“Bike Only” sign (MUTCD 3C.6) may be used to designate the portion of the road for pedestrian use by bicyclists. A supplemental “No Cars” sign may be used for further clarification.*
ONE WAY PROTECTED CYCLE TRACK

- Protected space for greater comfort
- Eliminated fear of over-taking crashes
- Double parking and parking maneuvers don’t occur in bike lane
- Attracts cyclists of all ages and levels

One way cycle track
Long Beach, CA

Credit: Bikeable Communities
FIRST AVENUE, NEW YORK, NY

Conventional Bike Lane
8th Avenue
W 23rd – W 34th St
Manhattan, 2010
Grand Street
Parking Protected
Bicycle Path Pilot
Manhattan, 2008
RAISED CYCLE TRACK

Design Guidance

**Raised Cycle Track with Parking Buffer**

- The cycle track shall be very high-quality finished with one or more cycles and should be separated from the adjacent bicycle lane.

- Designers may consider using a standard cycle lane width of 3 to 4 feet, with a 2-foot buffer on either side.

- The cycle track should be separated from the adjacent bicycle lane by a 2-foot buffer.

**Raised Cycle Track with Motorized Curb**

- The cycle track should be at least 5 feet wide for two-way traffic.

- The buffer should be at least 3 feet wide for two-way traffic.

**Raised Cycle Track with Motorized Curb**

- The buffer should be at least 3 feet wide for two-way traffic.

- The buffer should be at least 3 feet wide for two-way traffic.

**Raised Cycle Track with Motorized Curb**

- The buffer should be at least 3 feet wide for two-way traffic.

- The buffer should be at least 3 feet wide for two-way traffic.
SANDS STREET, BROOKLYN, NY
Raised Cycle Track (Centerline)
SANDS STREET, BROOKLYN, NY
Raised Cycle Track (Centerline)
Raised (Contraflow) Cycle Track
DENVER, CO
TWO-WAY CYCLE TRACK

**Required Features**

- Bicycle lane word, symbol, and/or arrow markings (MUTCD Figure 6C-3), should be placed at the beginning of a cycle track and at periodic intervals along the facility to define the bike lane direction and designated portion of the street for preferential use by bicycles.

- If configured on a one-way street, a "ONE WAY" sign (MUTCD FGuide-1, Fig. 3) with "EXCEPT BIKES" people should be placed along the facility, at all interacting streets, alleys, and driveways informing motorists to expect two-way traffic.

- A "DO NOT ENTER" sign (MUTCD R3-15) with "EXCEPT BIKES" people should be placed along the facility to only permit use by bicycles.

**Recommended Features**

- Intersection traffic controls along the street (e.g., stop signs and traffic signals) should also be installed and oriented to facilitate turning bicycles traveling in the contraflow direction.

- The desirable two-way cycle track, 12 feet minimum width in conjunction with 6 feet minimum width in the opposite direction.

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

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

- New way and minor street crossings are a unique challenge for cycle track design. A review of existing facilities and design practice has shown that the following design features improve the safety at crossings of driveways and minor intersections:
  - If the cycle track is parking protected, parking discouragement helped to improve visibility. The desirable no-parking zone is 15 feet from each side of the crossing.
  - For motor vehicles attempting to cross the cycle track from the sidewalk, driveways, and side streets, plantings and/or other features should be accommodated.

**Design Guidance**

**Two-Way Cycle Track**

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

- The cycle track should be marked with "bike" word or symbol on the bike lane and in the opposite direction.

- A "Yield to Bikers" sign should be used to identify the importance of giving way to cyclists.

- Cycle tracks should be designed with a speed limit of 20 miles per hour.

**Two-Way Protected Cycle Track with Parking Buffer**

- The cycle track is parking protected, and the 6 feet minimum width in the opposite direction is within the 6 feet minimum width in the opposite direction.

**Optional Features**

- Cycle tracks may be shifted more closely to the final form or minor intersection approaches, but curb extensions can be added to the opposite side of the street.

- Cycle tracks may be designed as a raised cycle track.

- Cycle tracks may be designed as a raised cycle track.
TWO-WAY CYCLE TRACK

• Edges

• Where intersections are at a minimum

Kent Avenue
Brooklyn
PROSPECT PARK WEST, BROOKLYN, NY

Two-way Cycle Track
Grand Army Plaza
Brooklyn

Two-way Cycle Track
KENT AVENUE, BROOKLYN, NY
Two-way Cycle Track
Two-way Cycle Track
WASHINGTON DC
Allen & Pike Streets
Pedestrian & Bicycle Improvements
Manhattan, 2009