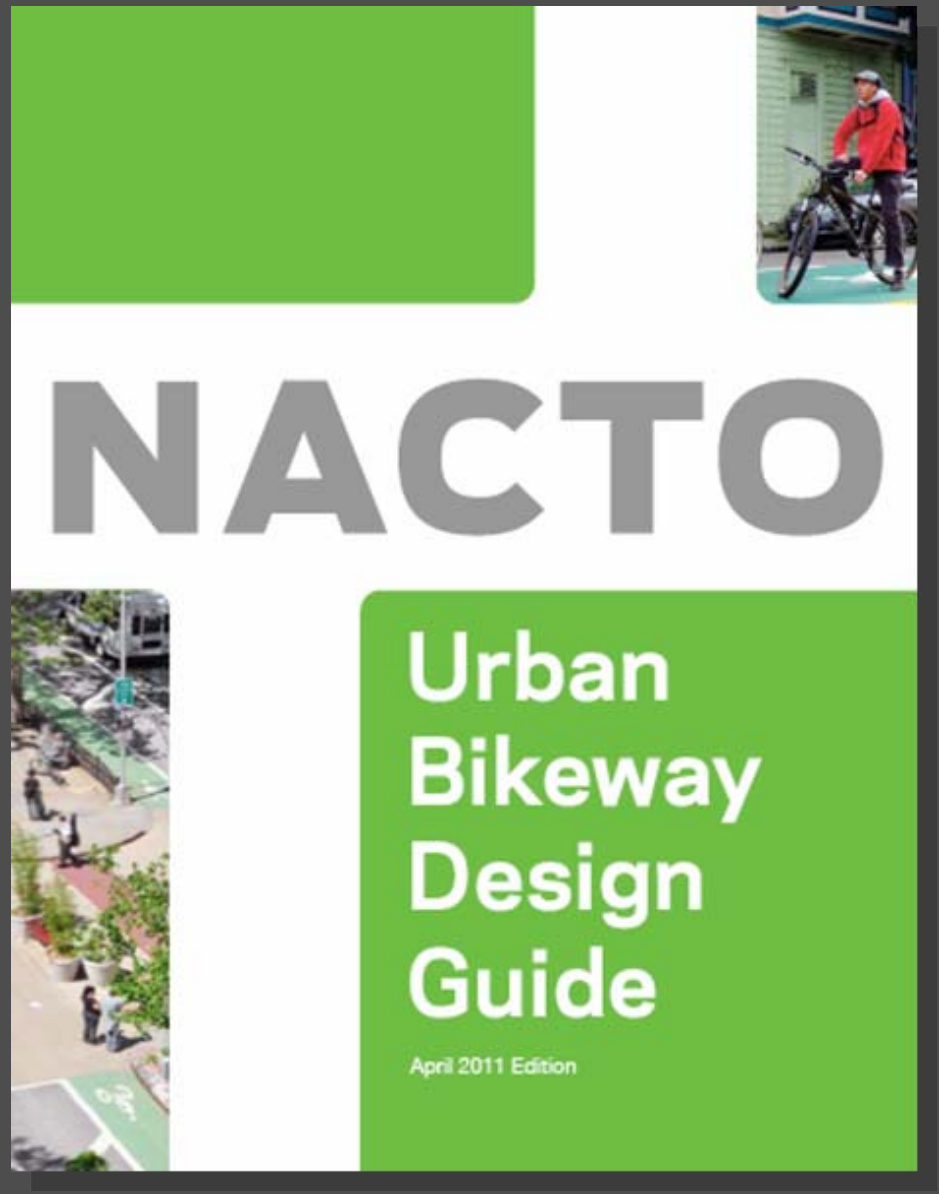
# Protected Bikeway Design
# NACTO Urban Bikeway Design Guide


Chicago, Oct. 2011

**21**
Treatments

**5**
Categories

Bike Lanes
Cycle Tracks
Intersections
Signals
Signing & Marking



# Bikeway Design Treatments

## BIKE LANES
-Conventional Bike Lanes
-Left-side Bike Lanes
-Contra-Flow Bike Lanes
-Buffered Bike Lanes

## CYCLE TRACKS
-One-way Protected Cycle Tracks
-Raised Cycle Tracks
-Two-way Cycle Tracks

## SIGNING & MARKING
-Bike Route Wayfinding Signage and Markings System
-Colored Bike Facilities
-Shared Lane Markings

## SIGNALS
-Bicycle Signal Heads
-Signal Acuation and Detection
-Active Warning Beacon for Bike Route at Unsignalized Intersection
-Hybrid Signal for Bike Route Crossing of Major Street

## INTERSECTIONS
-Bike Boxes
-Intersection Crossing Markings
-Two-stage Turn Queue Boxes
-Median Refuge Island
-Through Bike Lanes
-Combined Bike Lane
-Cycle Track Intersection Approach

# Online Guide & Slideshow

## One-Way Protected Cycle Tracks


Urban Bikeway Design Guide

- Bike Lanes
- Cycle Tracks
  - One-Way Protected Cycle Tracks
  - Raised Cycle Tracks
  - Two-Way Cycle Tracks
- Intersections
- Signals
- Signing & Marking
- City Projects
- Master Reference Matrix

# Print & PDF Guide

# CYCLE TRACKS

A cycle track is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane.

A cycle track is physically separated from motor traffic and distinct from the sidewalk. Cycle tracks have different forms but all share common elements—they provide space that is intended to be exclusively or primarily used for bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. In situations where on-street parking is allowed cycle tracks are located to the curb-side of the parking (in contrast to bike lanes).

Cycle tracks may be one-way or two-way, and may be at street level, at sidewalk level, or at an intermediate level. If at sidewalk level, a curb or median separates them from motor traffic, while different pavement color/texture separates the cycle track from the sidewalk. If at street level, they can be separated from motor traffic by raised medians, on-street parking, or bollards. By separating cyclists from motor traffic, cycle tracks can offer a higher level of security than bike lanes and are attractive to a wider spectrum of the public.



## RECOMMENDED (CONTINUED)

When configured next to a motor vehicle travel lane, 1.5 feet is the desired minimum width for a buffer to provide safety and comfort for bicyclists in the cycle track. The buffer areas should exist as either a raised or mountable curb or be suitable for street furniture, low vegetation, and/or trees.

| | Desirable minimum width (m) (see note 1) | Absolute minimum width (m) (see note 1) | Safety strip to carriageway kerb edge minimum width (m) (see note 2) |
|---|---|---|---|
| One Way | 2.0 | 1.5 | 0.5 |
| Two Way | 3.0 | 2.0 | 0.5 |

Notes:
1. 0.5m should be added for each side of the track that is bounded (e.g. by a wall, railings fence or hedge)
2. Safety strip to carriageway kerb edge minimum width should be 1.0m adjacent to frequently accessed parked cars

Transport for London. (2006). London Cycling Design Standards.

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 30 feet from each side of the crossing.

> *Parking must be banned along the street with the bike path for a distance long enough to ensure adequate stopping sight distances for motorists crossing the path.*
>
> Velo Quebec. (2003). Technical handbook of bikeway design. 2nd ed. Quebec: Ministere des Transport du Quebec and the Secretariat au Loisir et au Sport.

- 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 crossing.

NACTO

# CYCLE TRACKS

# One-way Cycle Track

Long Beach, CA

Credit: Bikeable Communities

# Raised Cycle Track

Cambridge, MA

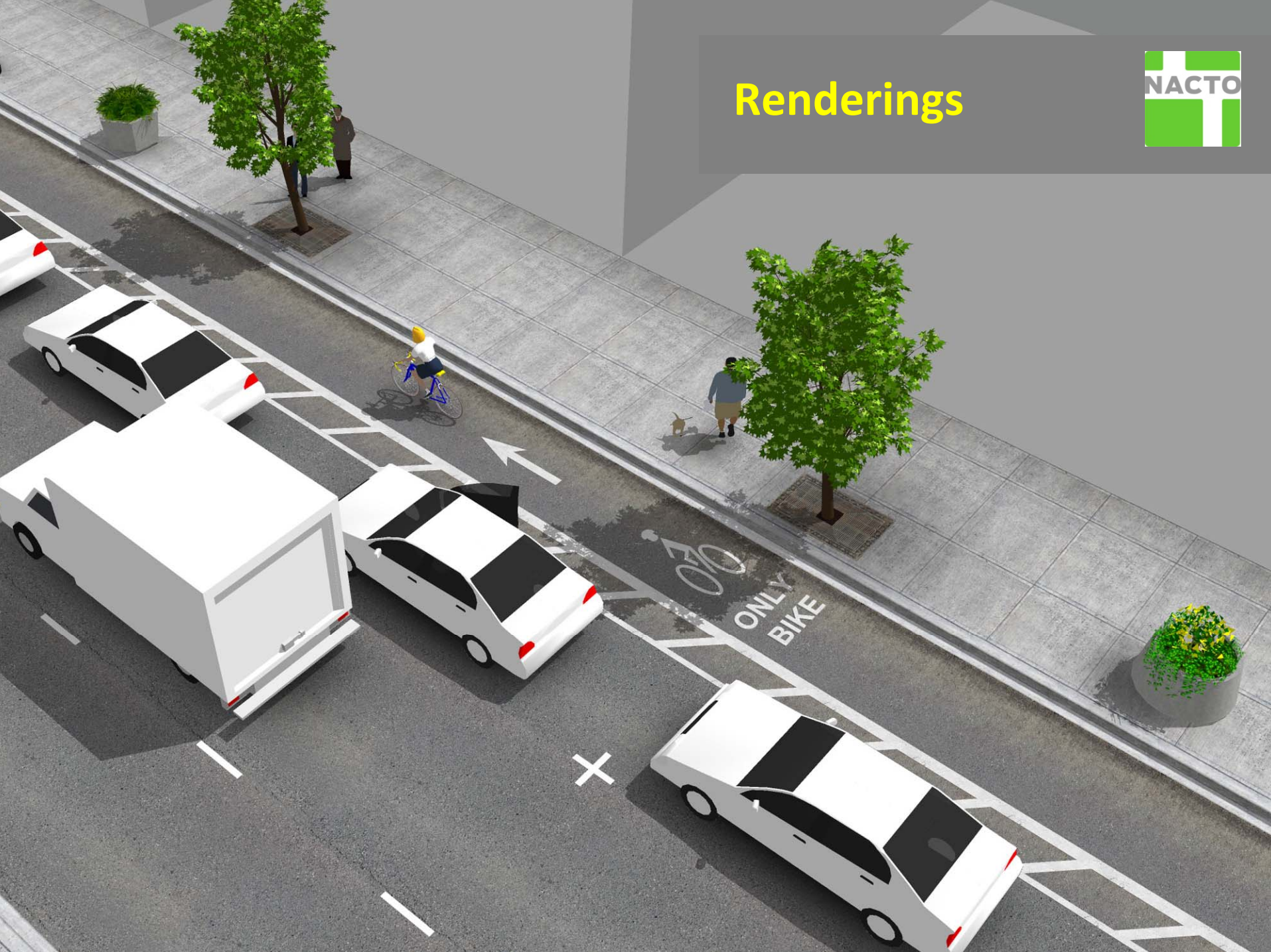

# Two-way Cycle Track

Montreal, Quebec


**Two-way Cycle Track**
New York, NY


# One –Way Protected Cycle Tracks

# Renderings



NACTO
BIKE ONLY
BIKE ONLY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BIKE


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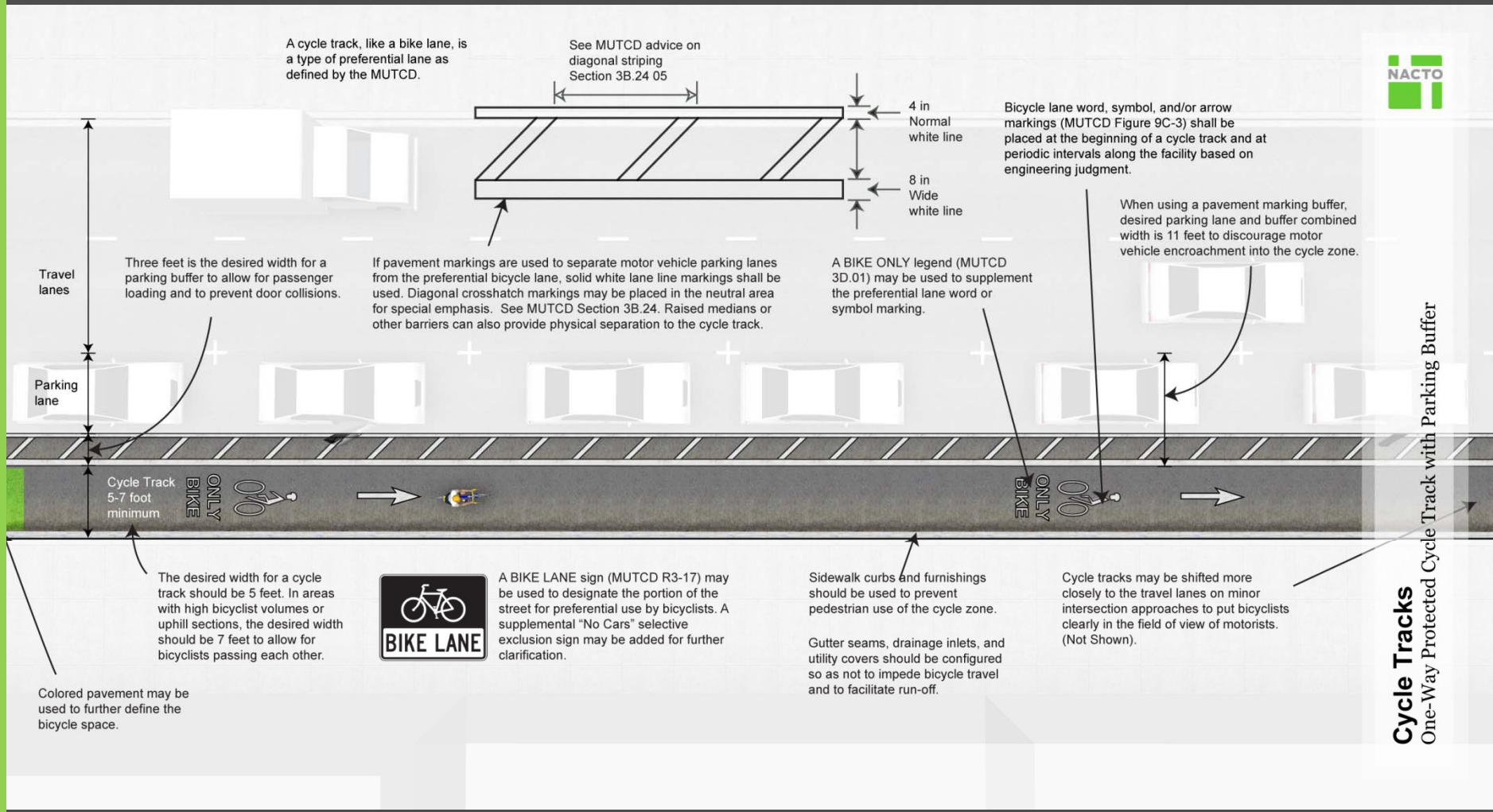
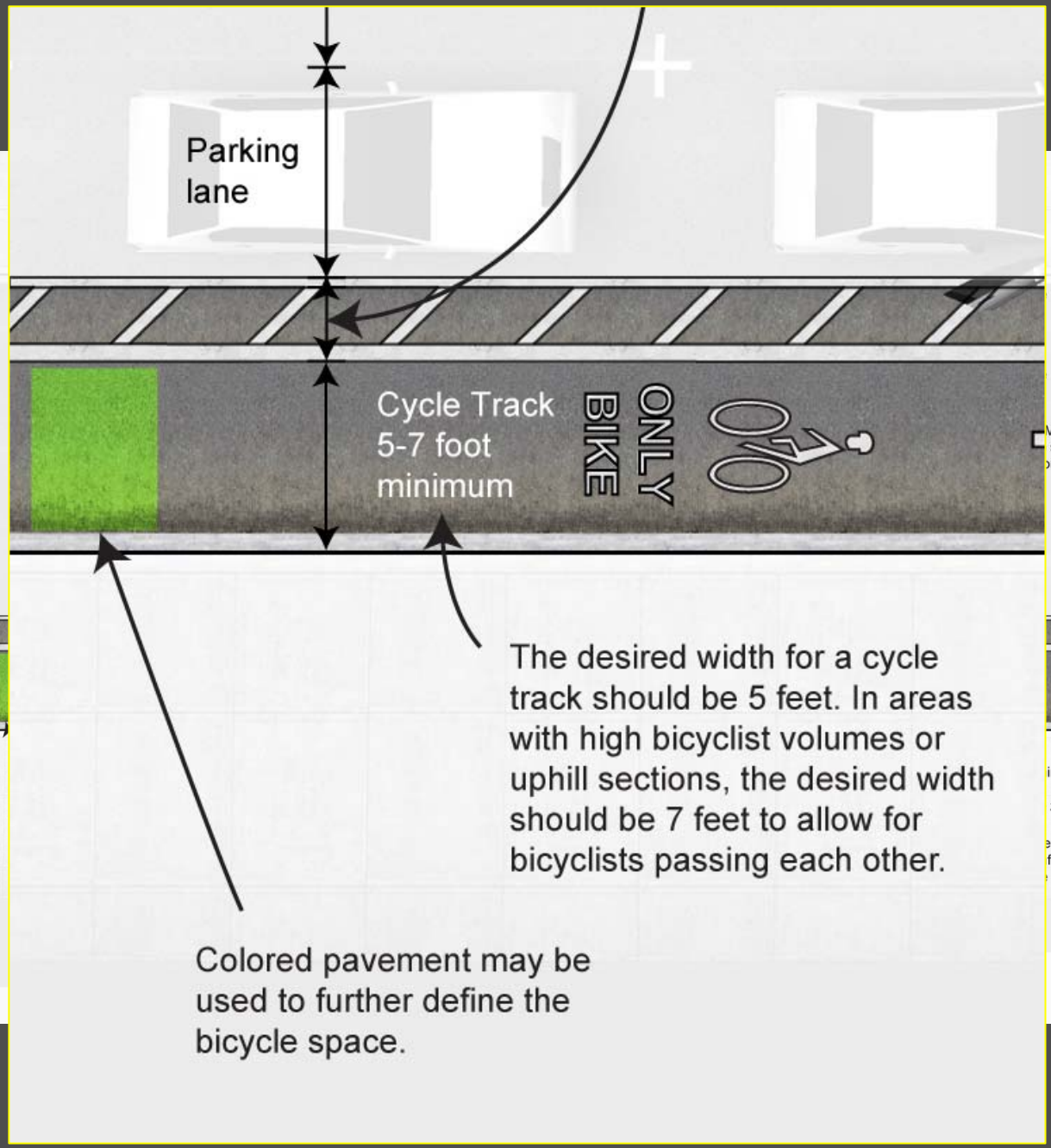
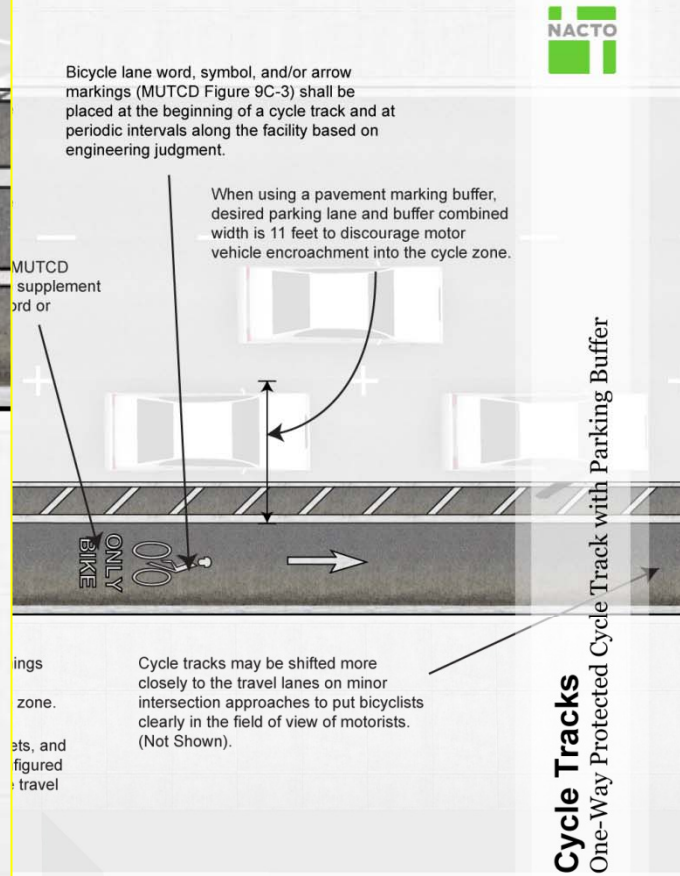
ONLY

# Technical Guidance





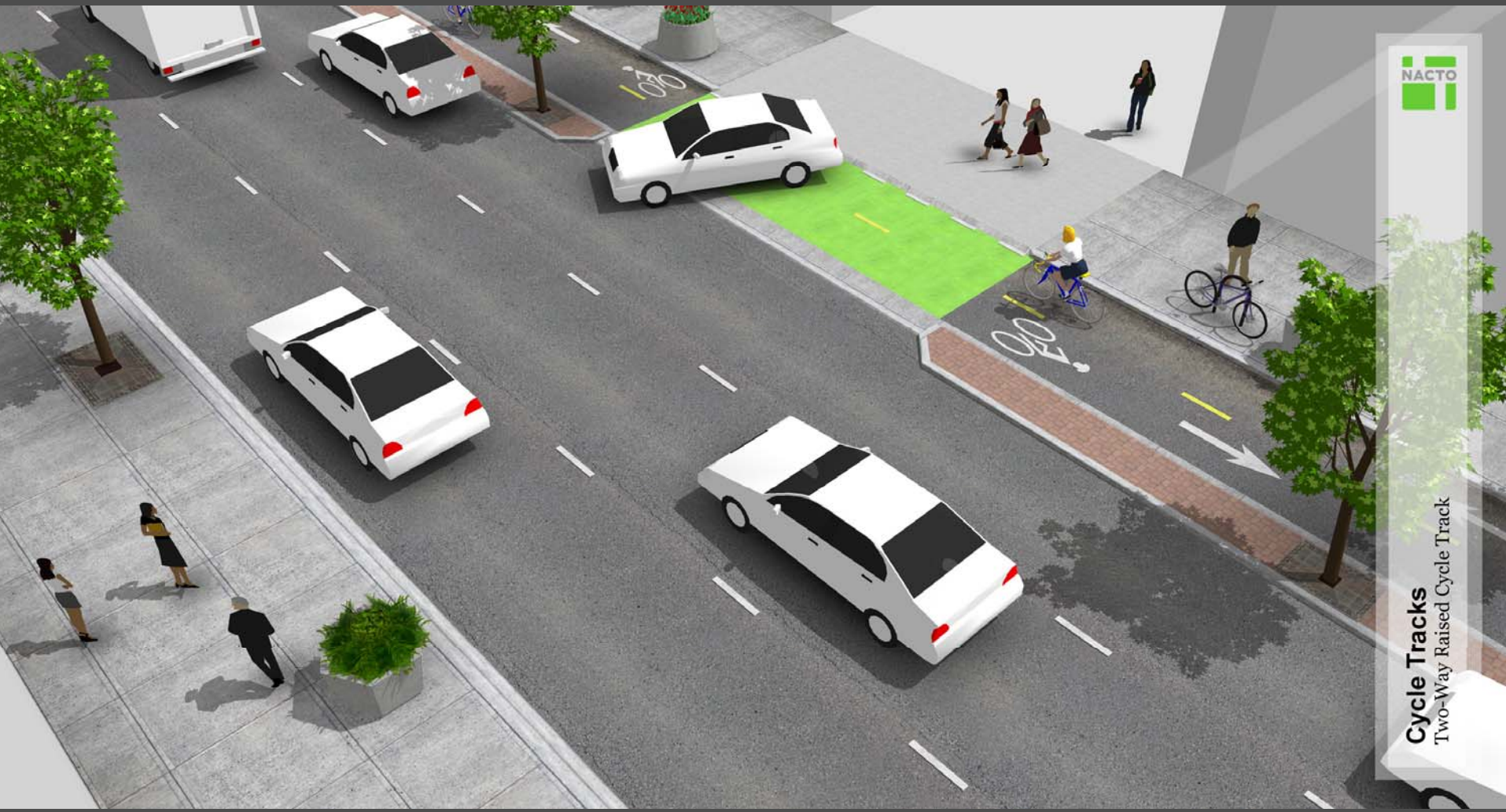

**Cycle Tracks**
One-Way Protected Cycle Track with Parking Buffer

# Two-way Cycle Tracks

# Two-Way Protected Cycle Track with Parking Buffer

# Two-Way Cycle Track

# Two-Way Cycle Track With Raised Median

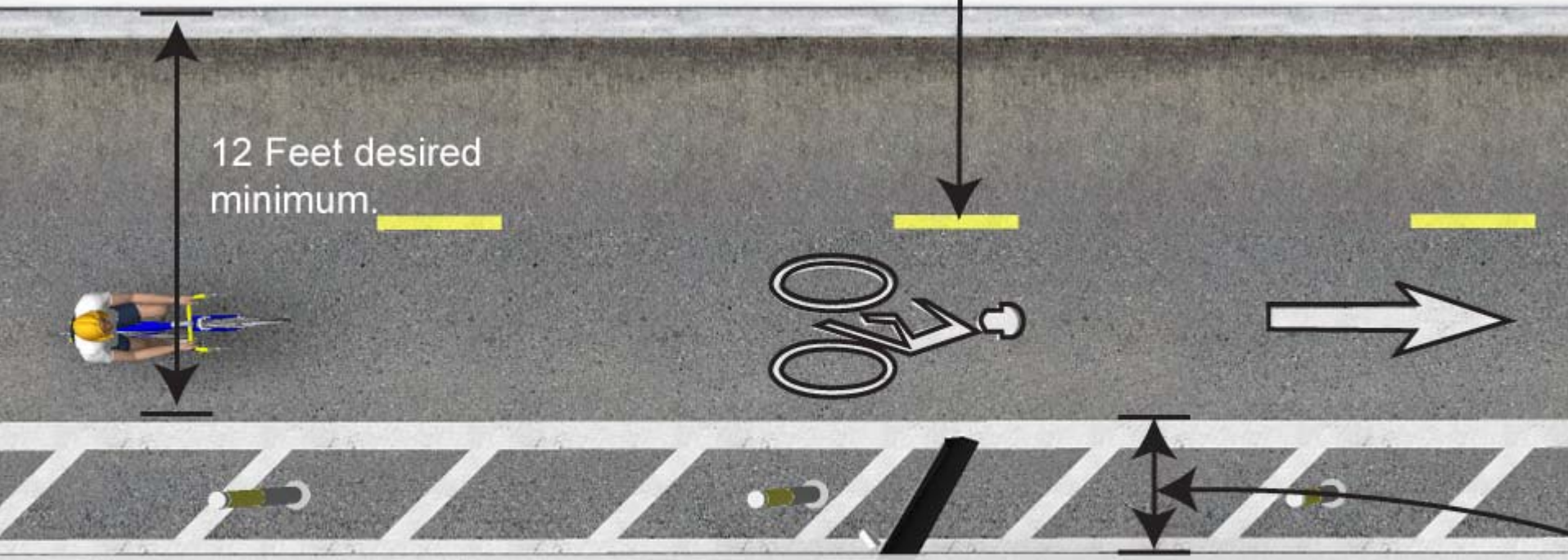


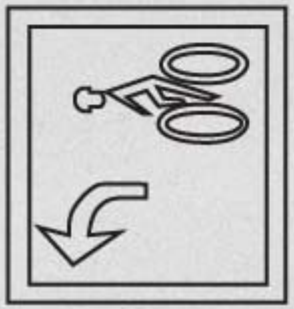
# Two-Way Cycle Track With Parking Buffer

# Two-Way Cycle Track with Barrier

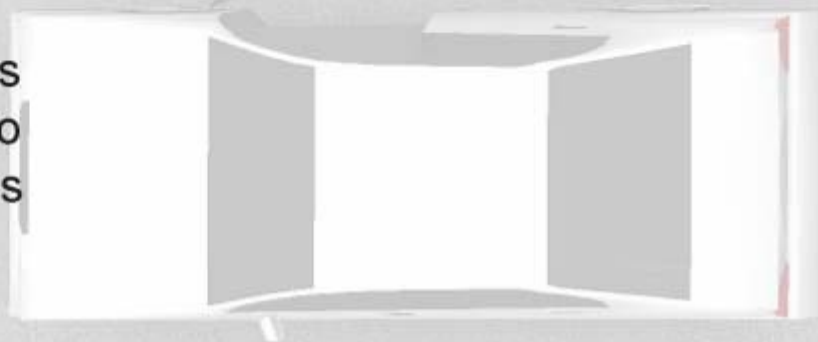
The desirable two-way cycle track width is 12 feet. Minimum width in constrained locations is 8 feet.

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

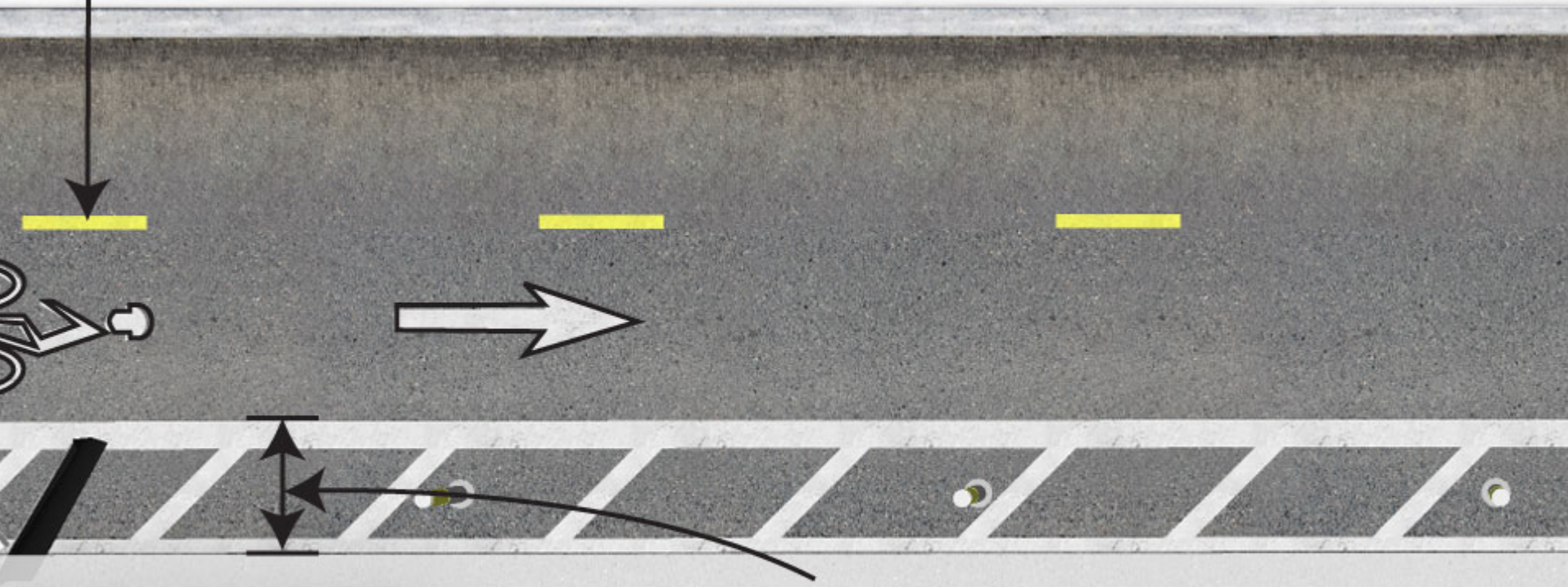


Two-stage turn boxes should be provided to assist in making turns from the cycle track facility.

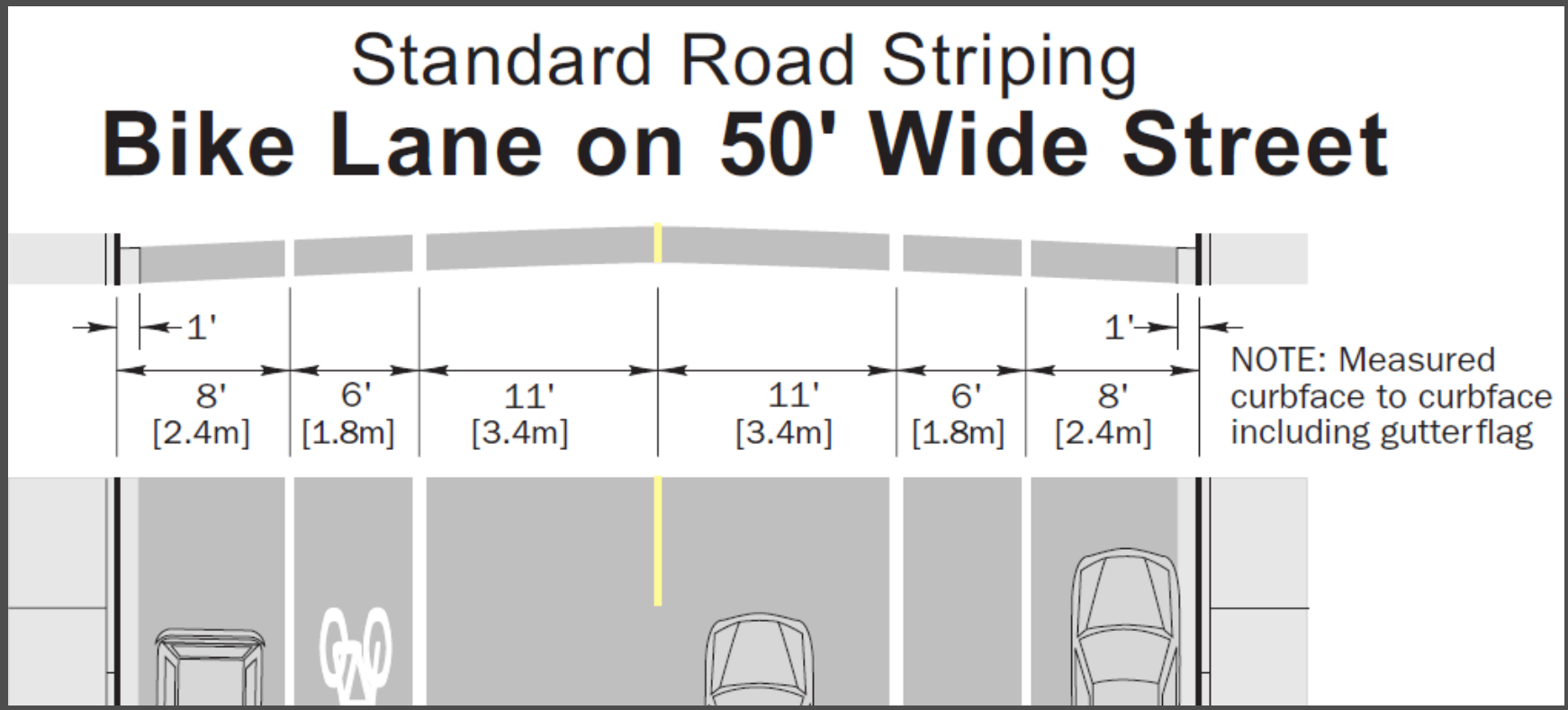


A dashed yellow line should be used to separate two-way bicycle traffic and to help distinguish the cycle track from any adjacent pedestrian area.

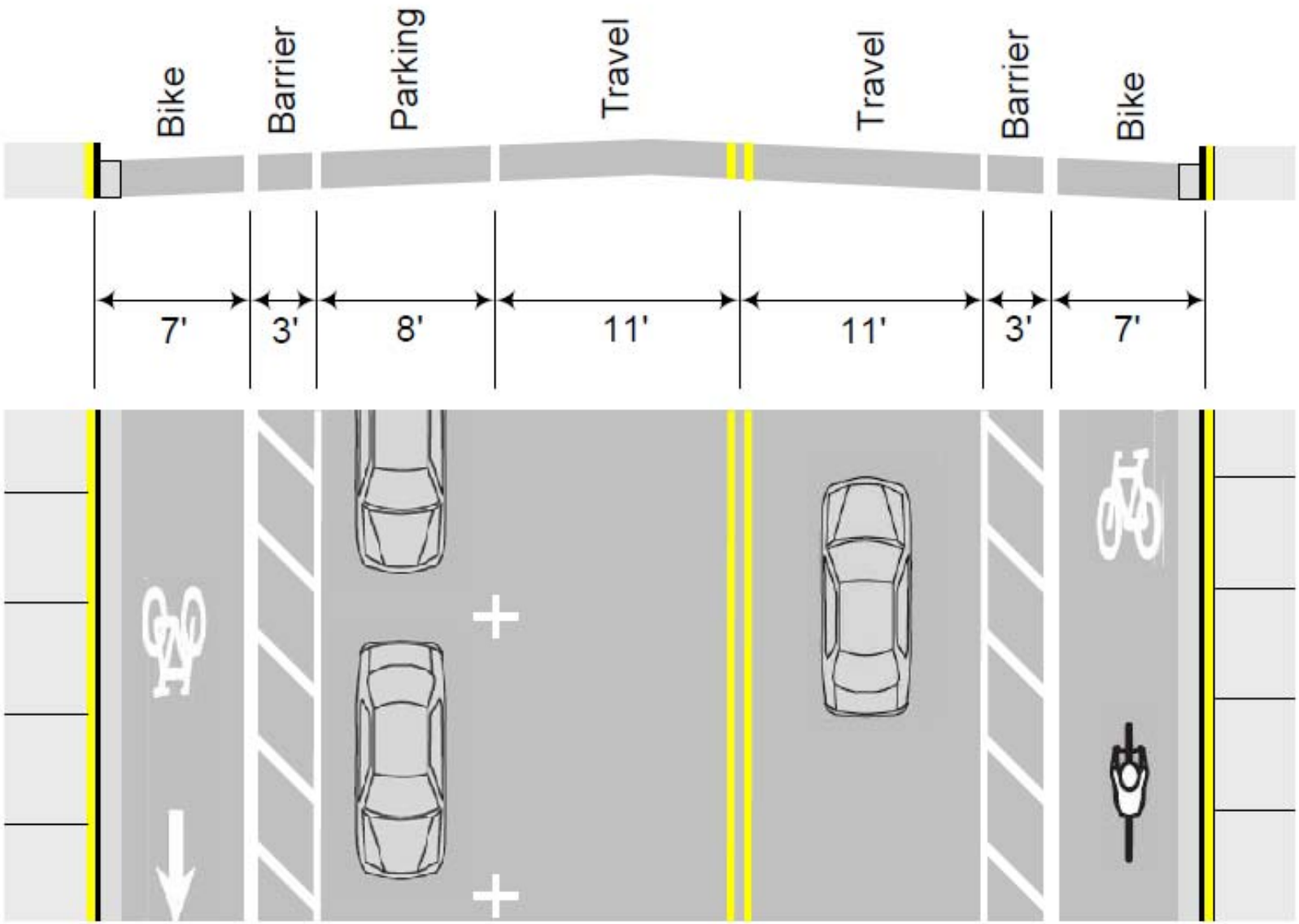


When protected by a parking lane, 3 feet is the desired width for a parking buffer to allow for passenger loading and to prevent dooring collisions.

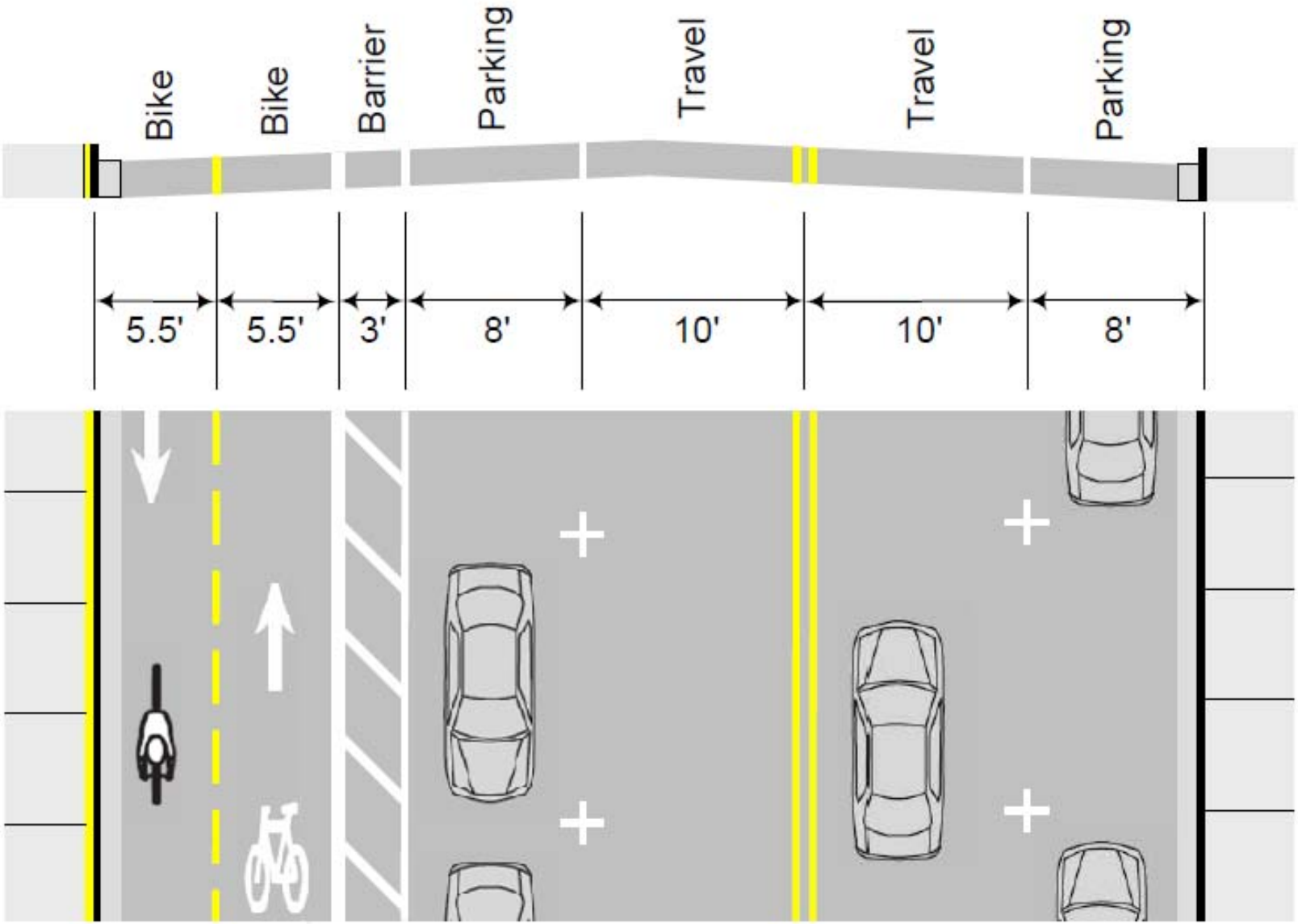
# Cross Section Design



# One-way Cycle Track
# 50' Wide Two-way Two-lane Street

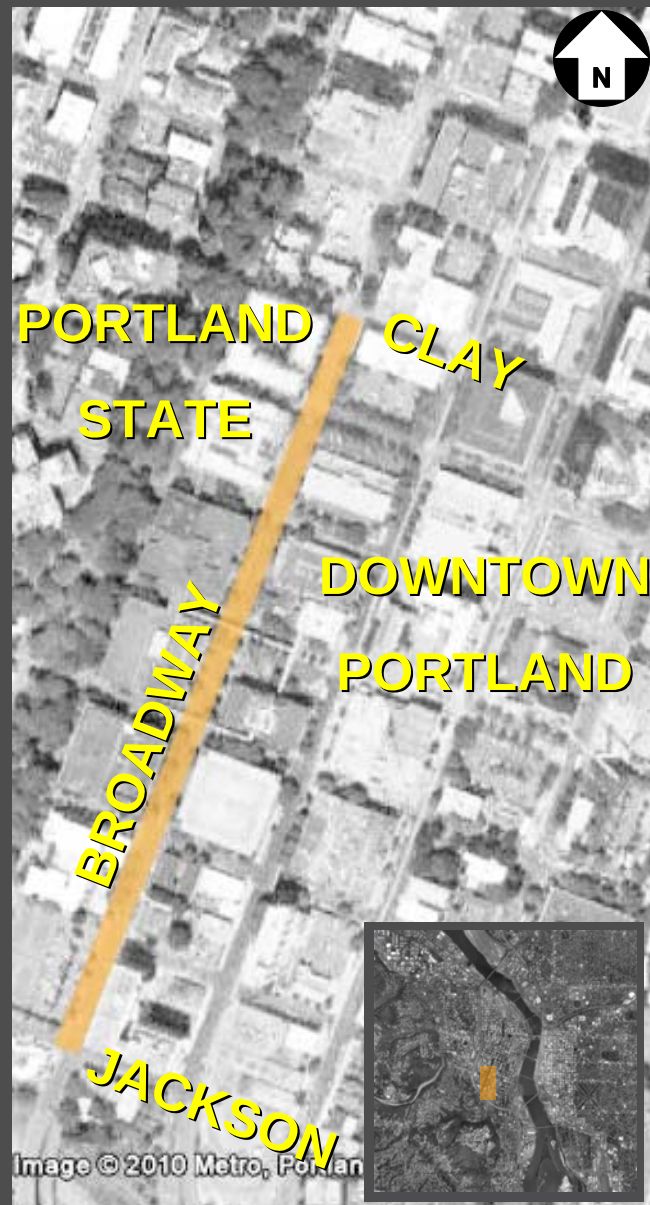


# Two-way Cycle Track
# 50' Wide Two-way Two-lane Street



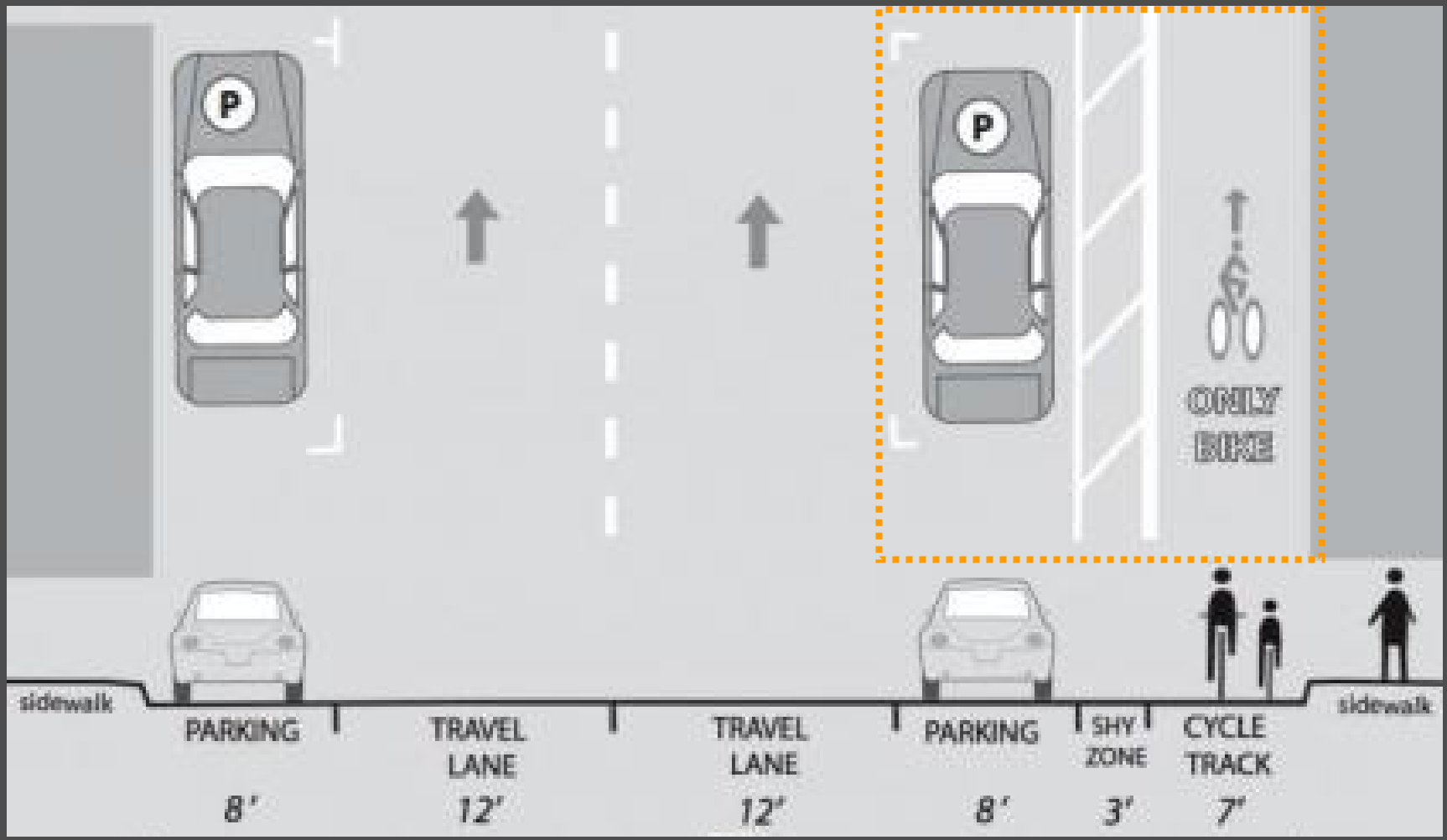
# Portland Case Study

- Cycle track project stretches seven blocks along SW Broadway on the PSU campus
- Originally 3 lanes one-way southbound with bike lane and parking on both sides
- Outside southbound lane converted to on-street parking
- Seven foot wide bike lane at curbside
- Three foot shy zones separate cycle track from parking stalls

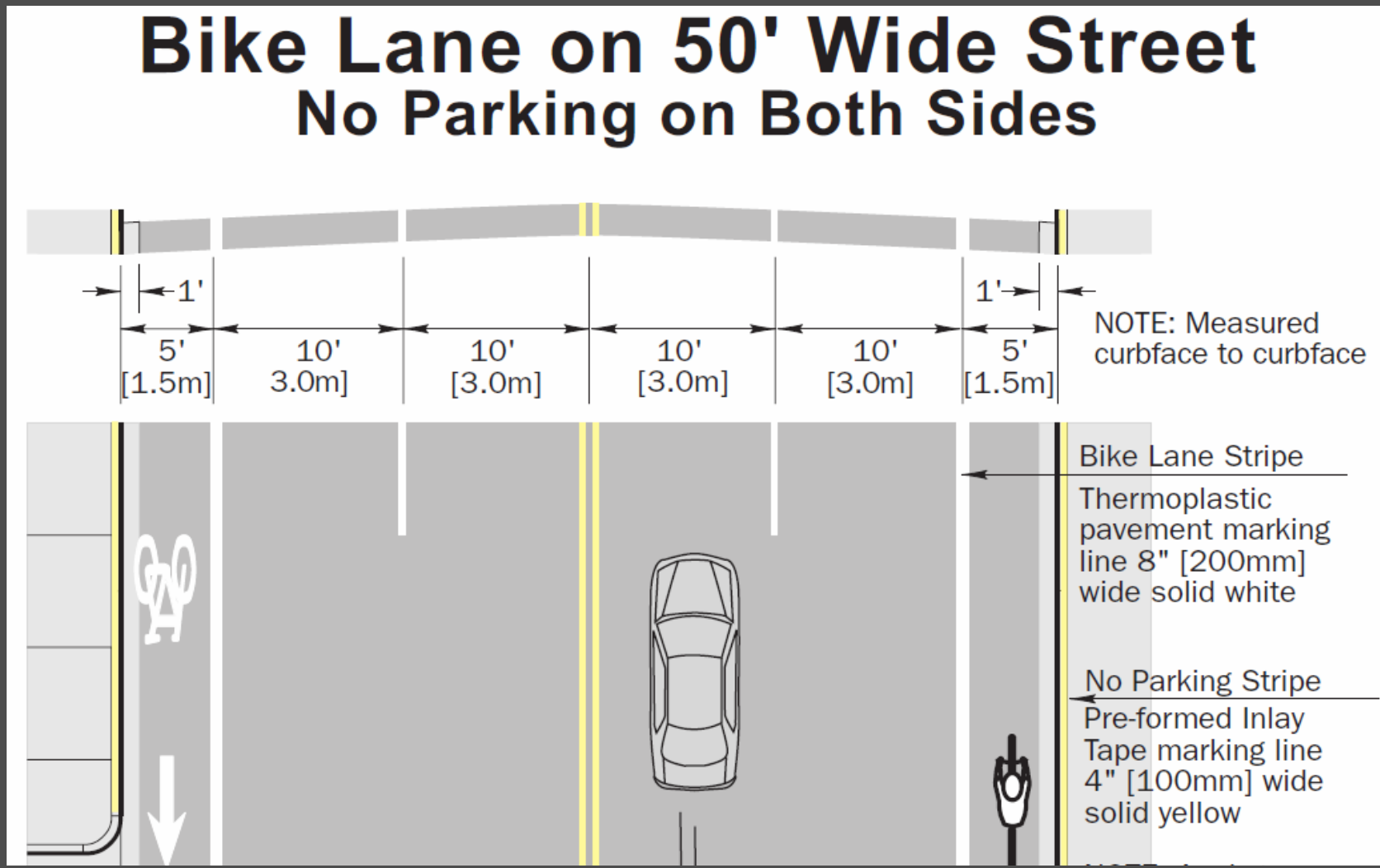


# Broadway Cycle Track CROSS SECTION

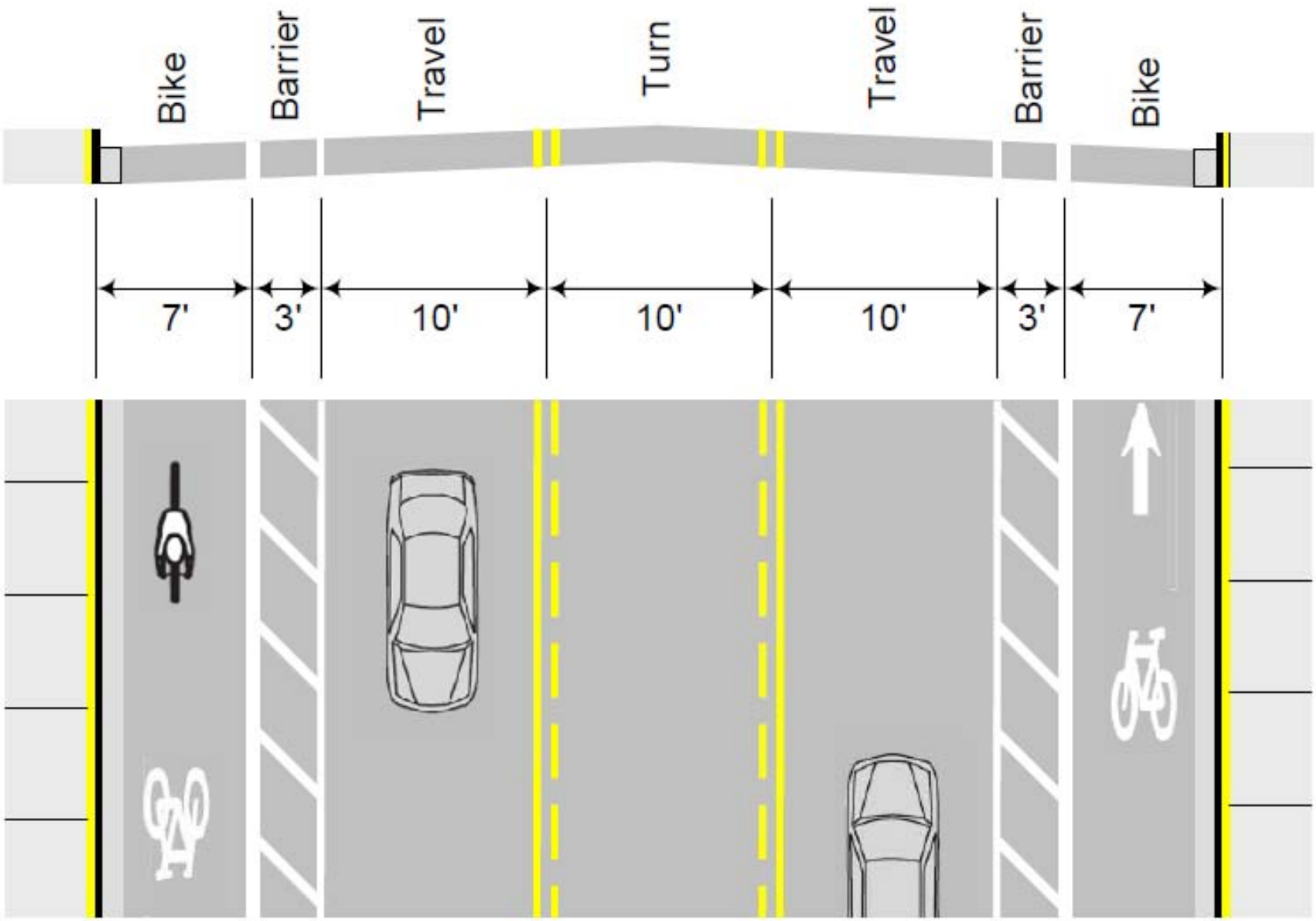
## SW Broadway Cycle Track – Portland, Oregon



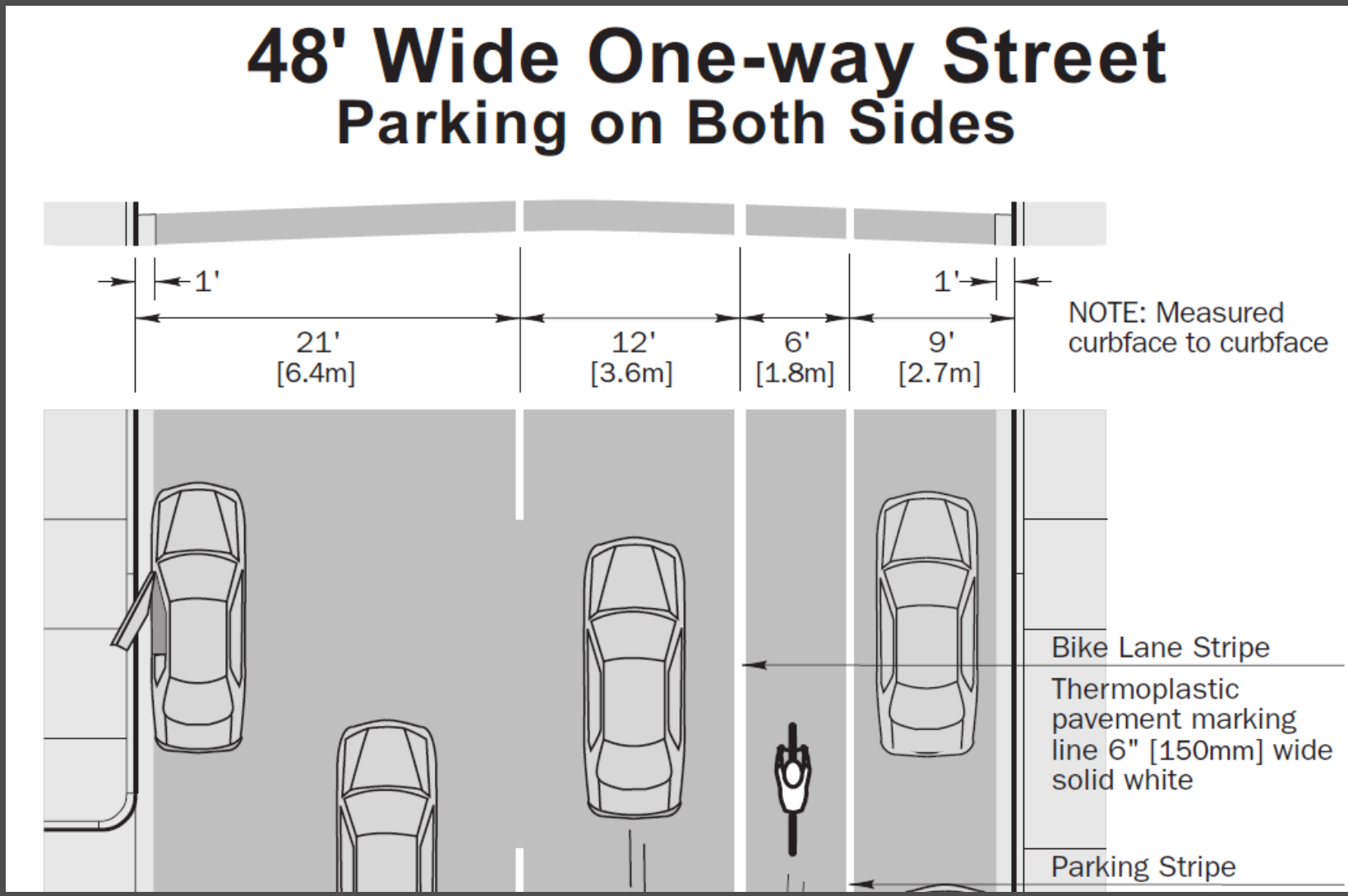
# Cross Section Design



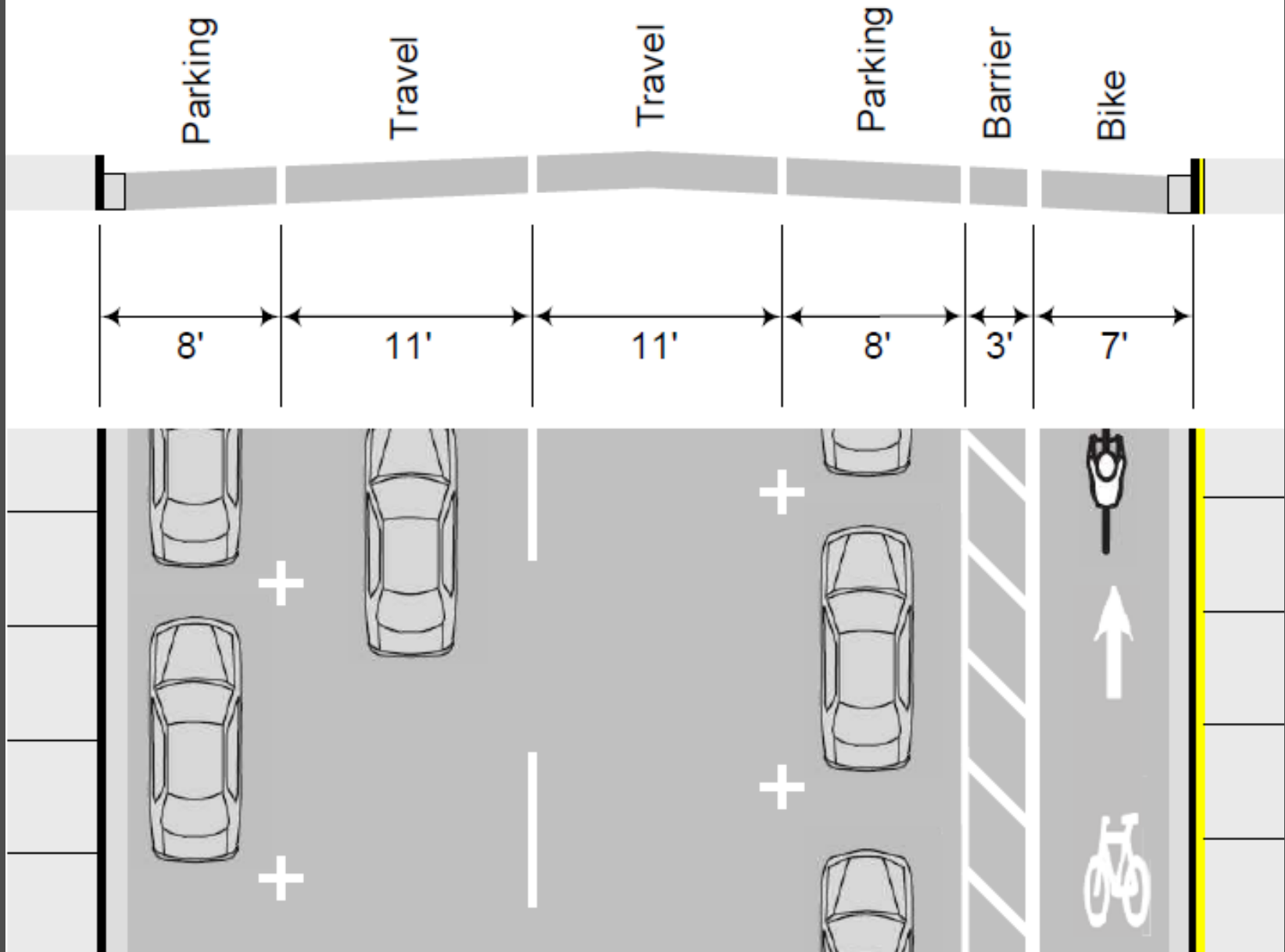
# One-way Cycle Track
# 50' Wide Two-way Street (No Parking Both Sides)



# Cross Section Design



# One-way Cycle Track
## 48' Wide One-way Street (Parking on Both Sides)



# INTERSECTIONS

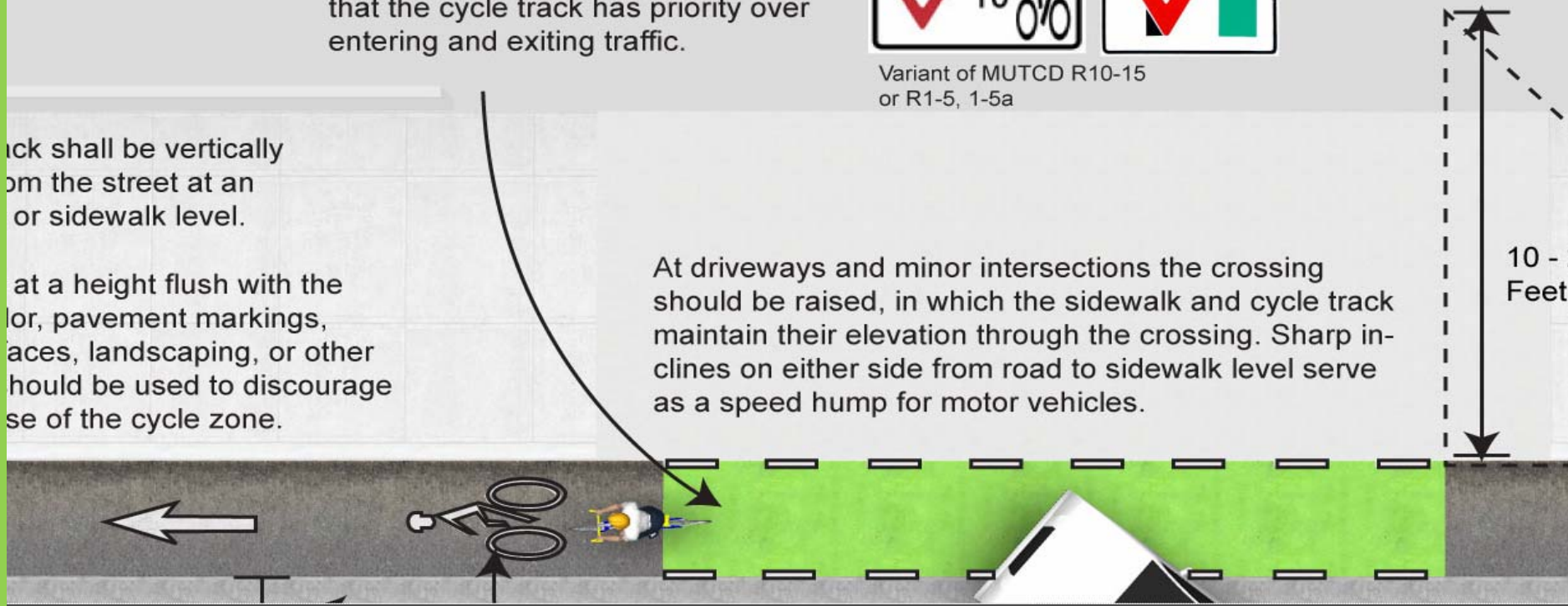

At driveways and minor intersections, color, yield lines, and “Yield to Bikes” signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic.


Variant of MUTCD R10-15
or R1-5, 1-5a

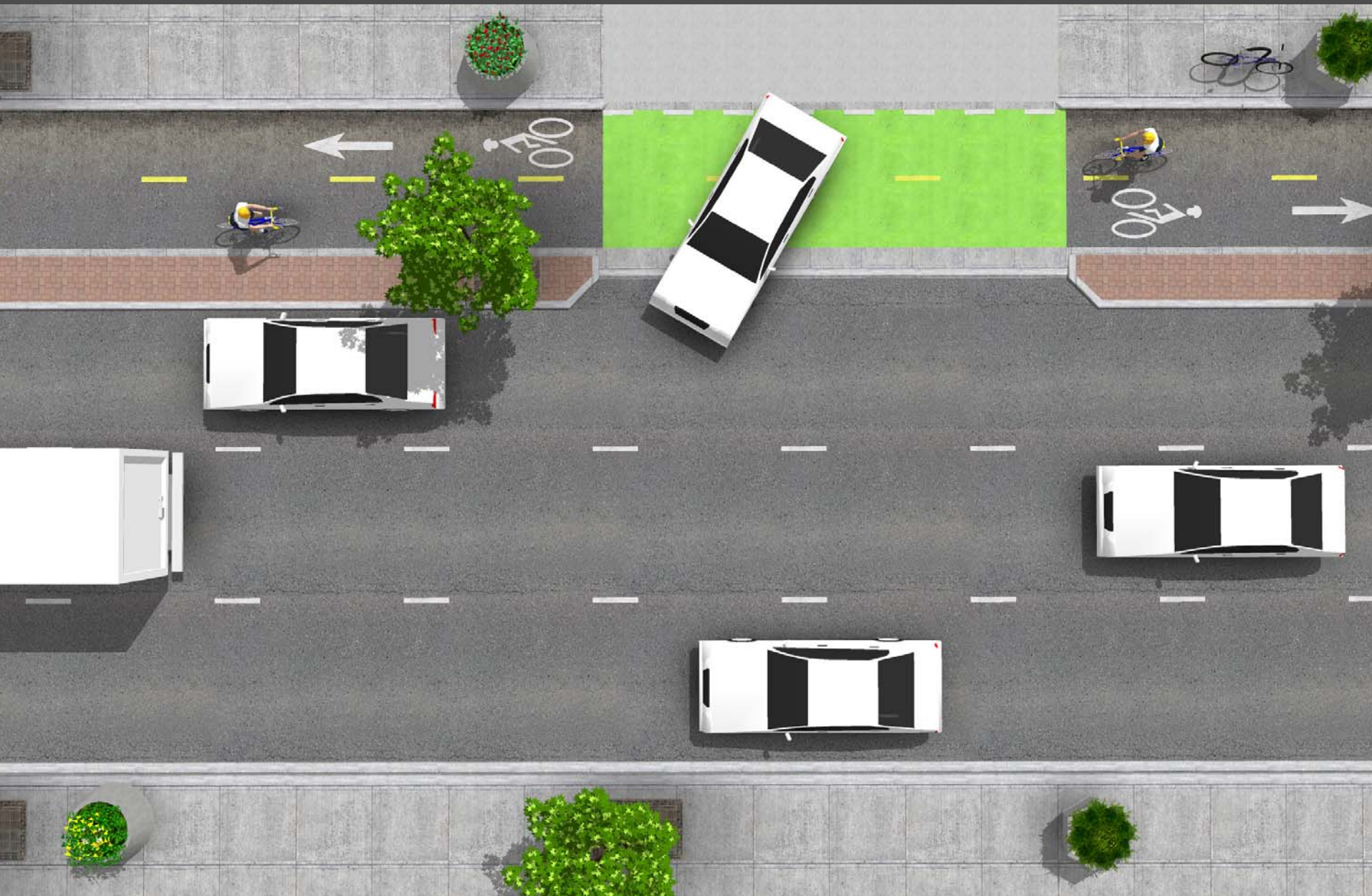
ıck shall be vertically
ɔm the street at an
or sidewalk level.

at a height flush with the
lor, pavement markings,
aces, landscaping, or other
hould be used to discourage
se of the cycle zone.

At driveways and minor intersections the crossing should be raised, in which the sidewalk and cycle track maintain their elevation through the crossing. Sharp inclines on either side from road to sidewalk level serve as a speed hump for motor vehicles.



# Driveway Crossing Treatment



## Driveway Conflict Areas

- In this Portland example we used bicycle symbols rather than color to mark the conflict area.

# Sight Triangle for Vehicle Approach

intersections,
Yield to Bikes"
d to identify
ake it clear
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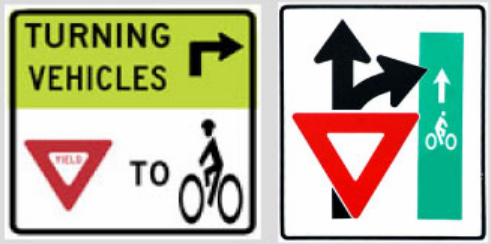
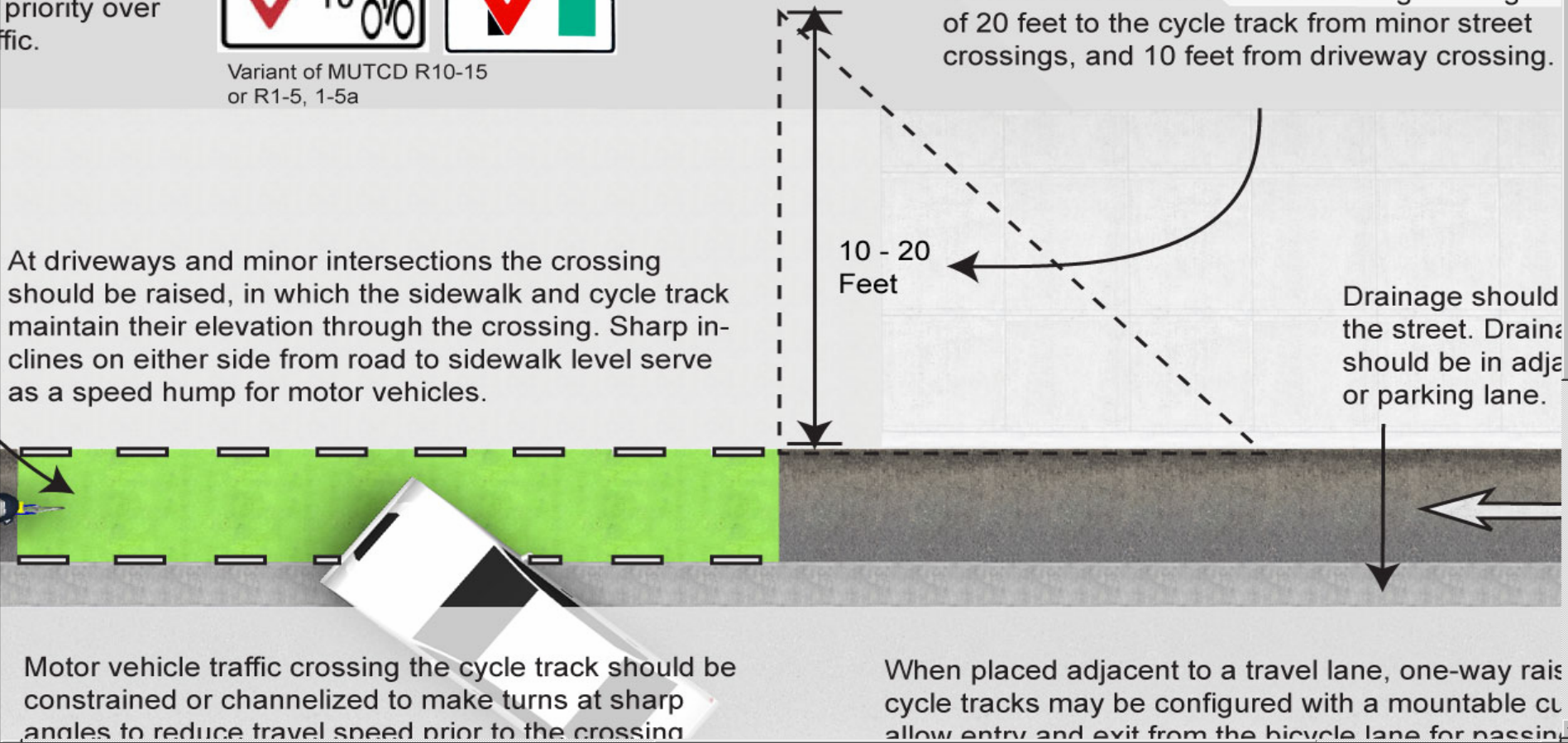
ffic.




Variant of MUTCD R10-15
or R1-5, 1-5a

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 crossing.



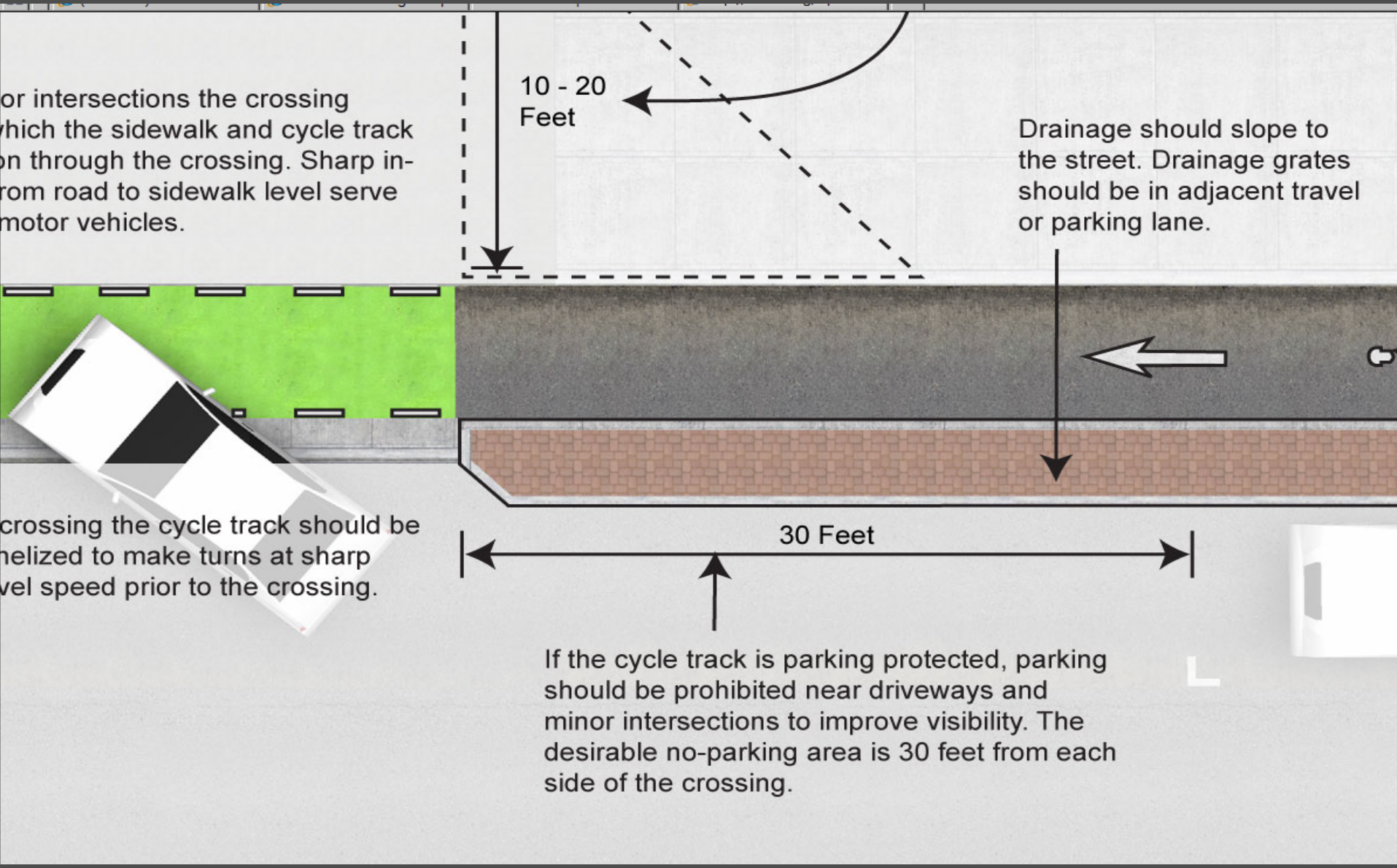

At driveways and minor intersections the crossing should be raised, in which the sidewalk and cycle track maintain their elevation through the crossing. Sharp inclines on either side from road to sidewalk level serve as a speed hump for motor vehicles.

Drainage should
the street. Draina
should be in adja
or parking lane.

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

When placed adjacent to a travel lane, one-way rais
cycle tracks may be configured with a mountable cu
allow entry and exit from the bicycle lane for passin

# No Parking Area for  Visibility



# Two-Stage Turn Queue Boxes

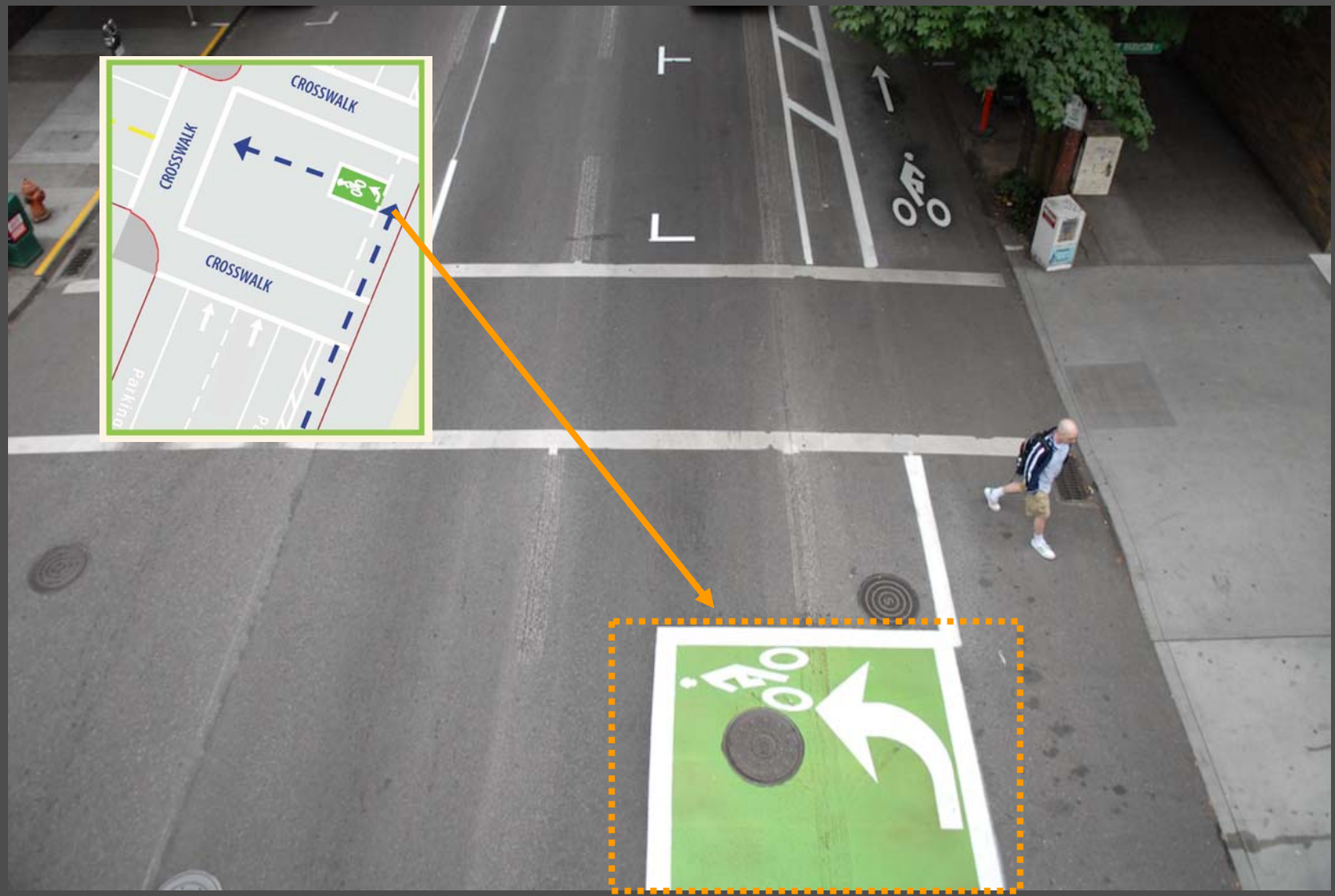

## Description

Two-stage turn queue boxes offer bicyclists a safe way make left turns at multi-lane signalized intersections from a right side cycle track or bike lane, or right turns from a left side cycle track or bike lane.

# Two-Stage Turn Queue Box

- Provides for safe bicycle turn movement that does not require cyclists to merge with overtaking traffic

# Two-Stage Turn Queue Box



# Transition to Bike Lane

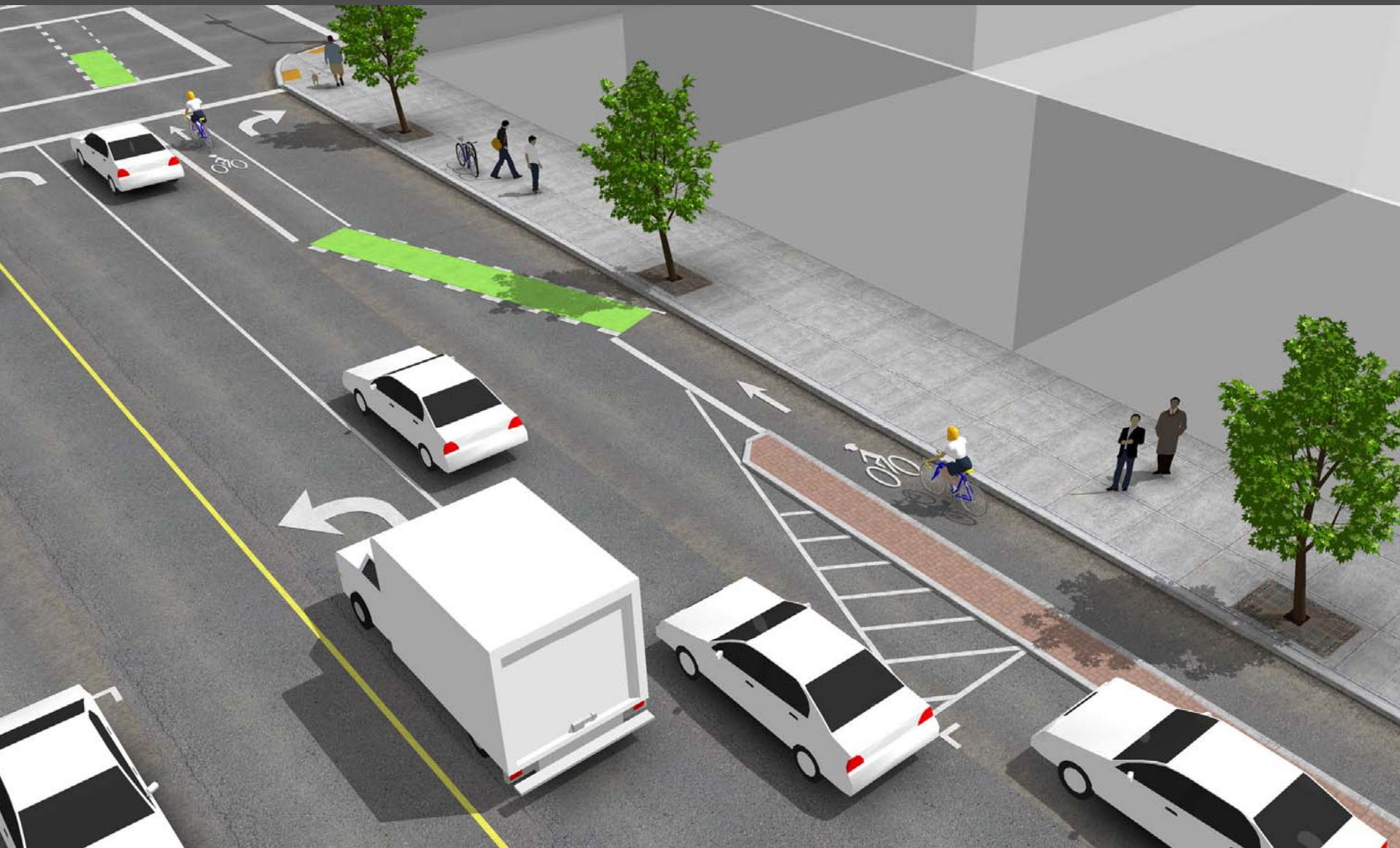
# Transition to Bike Lane with Bike Box

# Bike Box

San Francisco, CA

Credit: Joe Linton

# Transition to Turn Lane

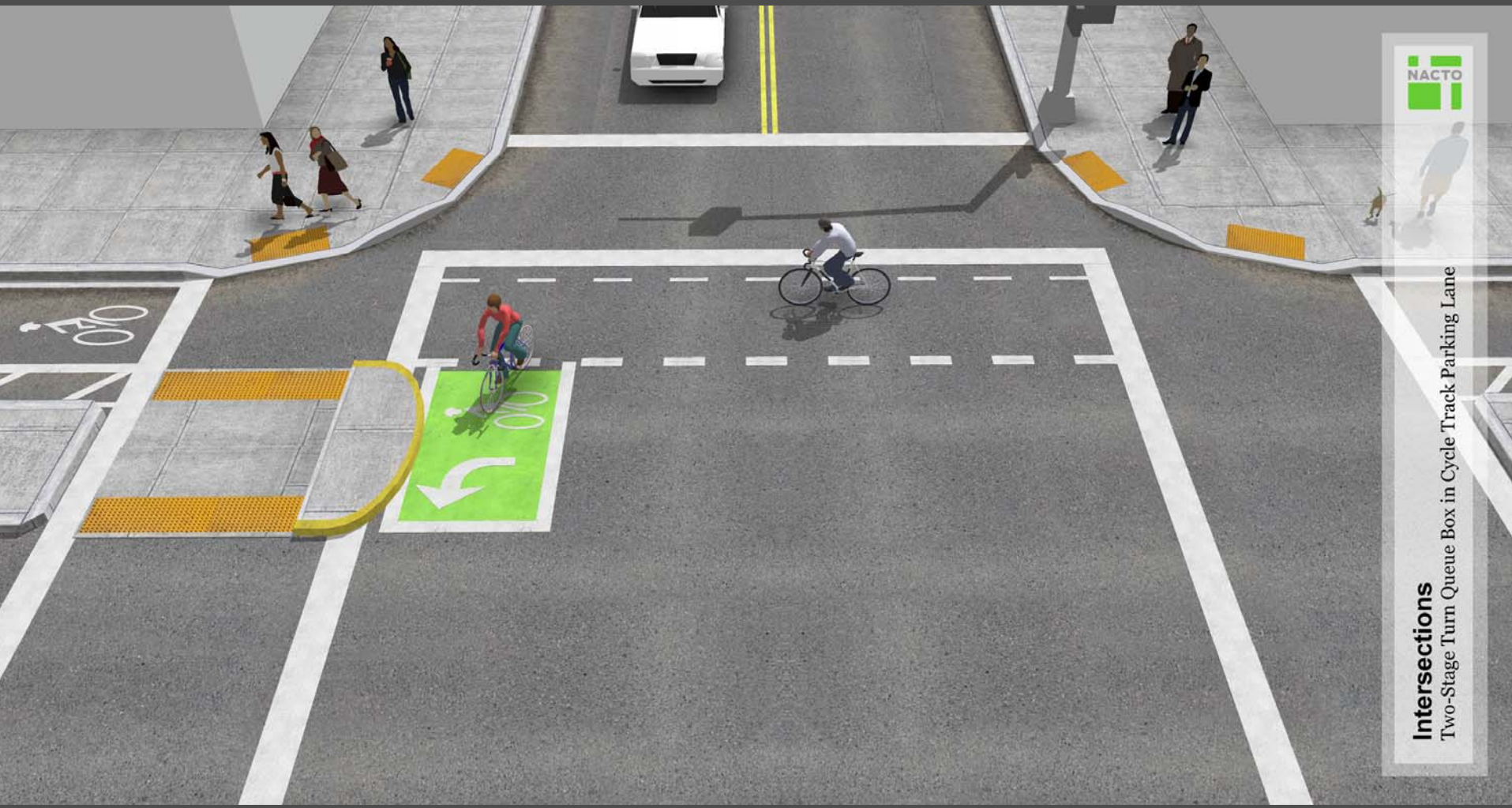


# Merging Area


# Cycle Track Intersection Approach—Merging Area

New York City

# Two- Stage Queue Box with Median



# Two-Way Cycle Track Turning Treatment



Turning treatments

# Bicycle Signal Control

**Bicycle Signal Head**

New York, NY

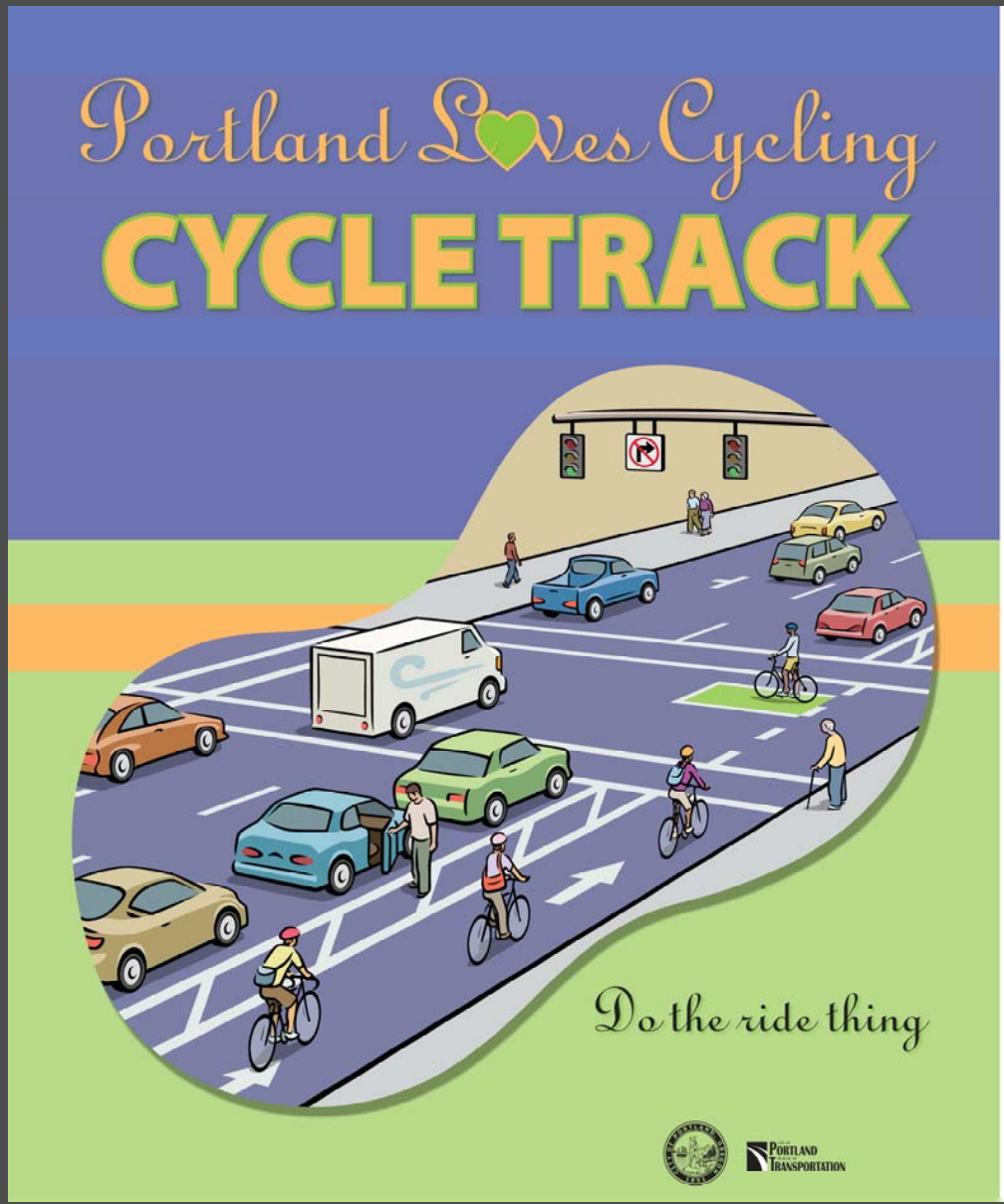
# Broadway Cycle Track MARKINGS


Typical mid-block marking


Looking south from SW Montgomery

Looking north from SW Clay

# Broadway Cycle Track PUBLIC OUTREACH




# Broadway Cycle Track CHALLENGES

- Parking Enforcement
  - Pay Stations
  - Enforcement Officers use buffer area when placing citation
  - Temporary parking removal using magnetic base flexible posts
- Street Cleaning
  - Cycle Track plus buffer is wide enough to accommodate a street sweeper
  - Leaf fall is heavy in autumn-extra cleaning needed
- Wheel Chair User Access
  - Concerns from users regarding wheelchair van loading
  - Cycle Track may be used by wheelchairs
- Transit Stops???

# Q and A

Rob Burchfield

City Traffic Engineer; Portland OR