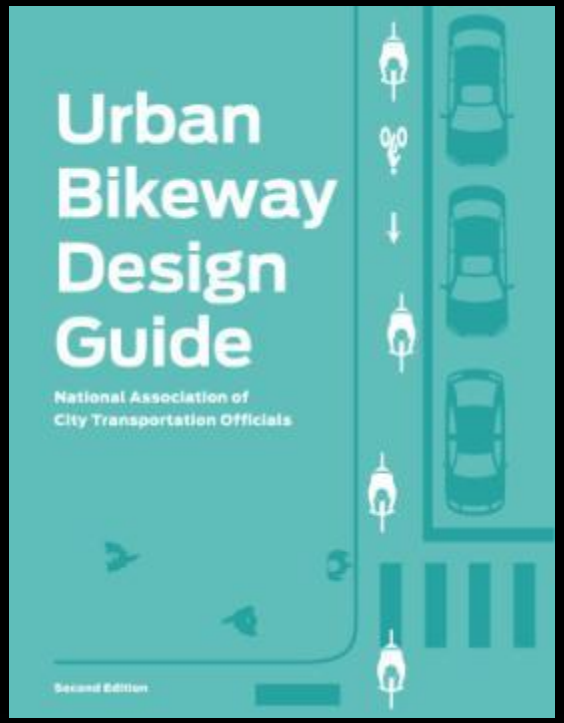
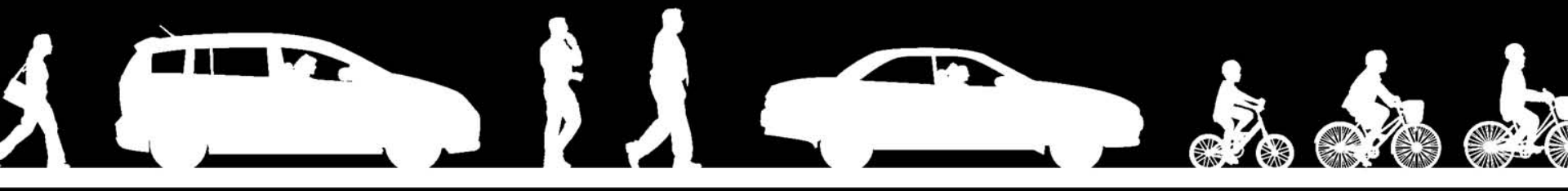


Designing Safe Streets for Cyclists

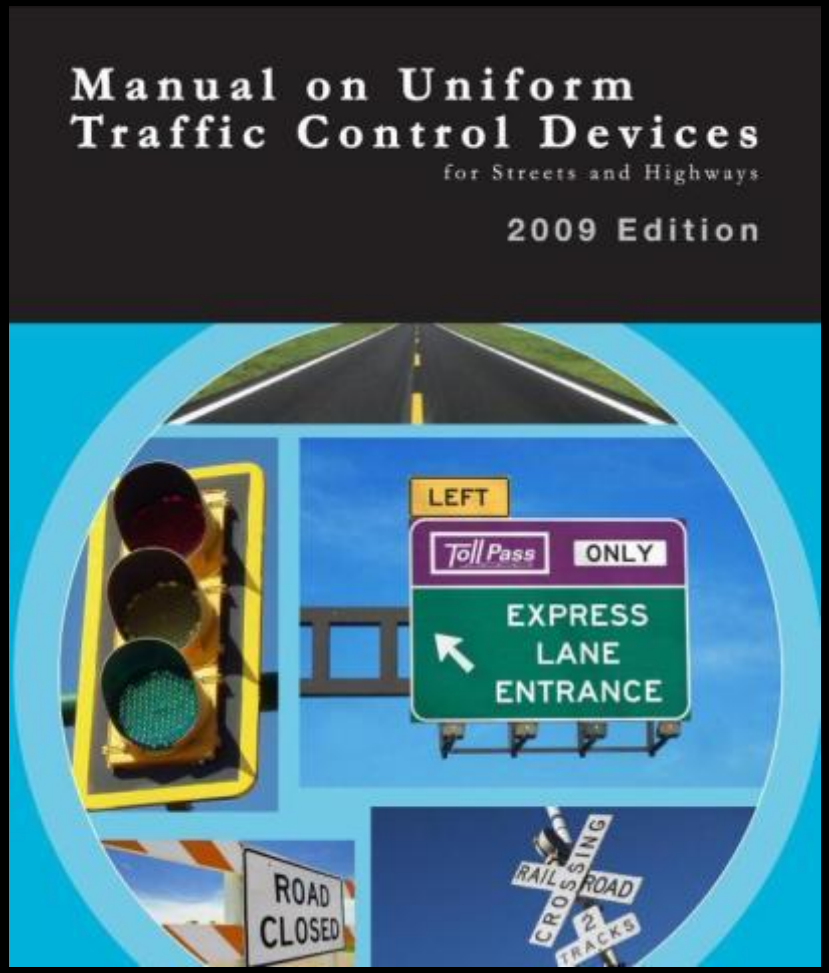
San Mateo Training

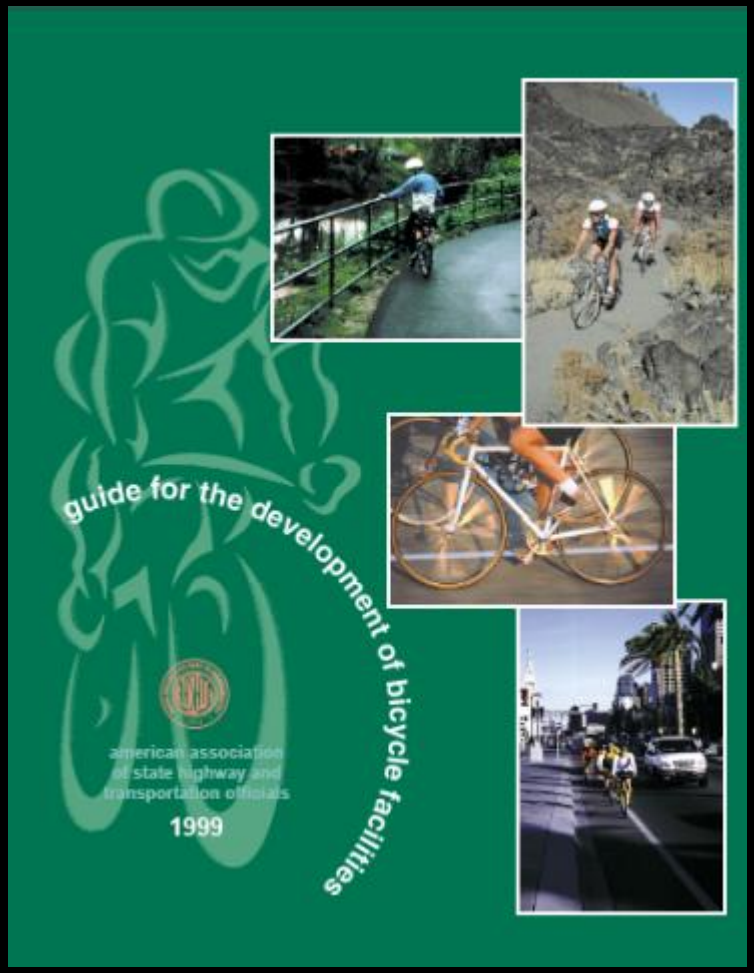
May 13, 2014

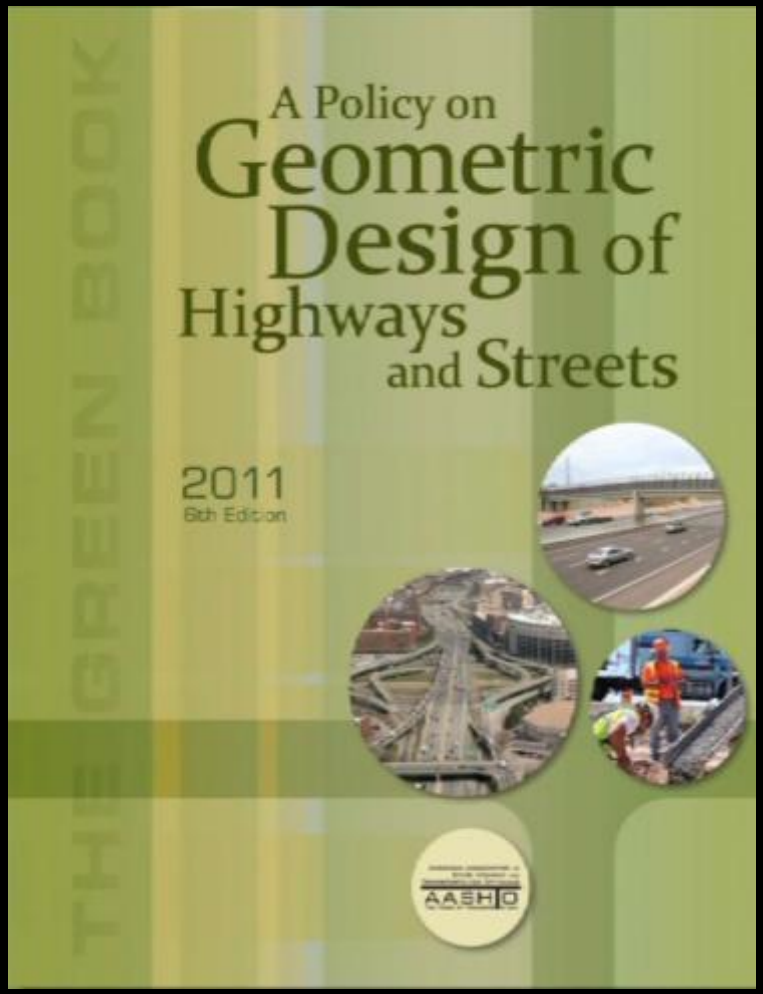



163
WATERFORD
ALLOVARDS

The Old Standards







"The bicycle has become an important element for consideration in the highway design process. ***Fortunately, the existing street and highway system provides most of the mileage needed for bicycle travel."***

- *900 pages of guidance*
- *Less than 1 page on bicycles*


STAPLES
259 0329
IOS V19

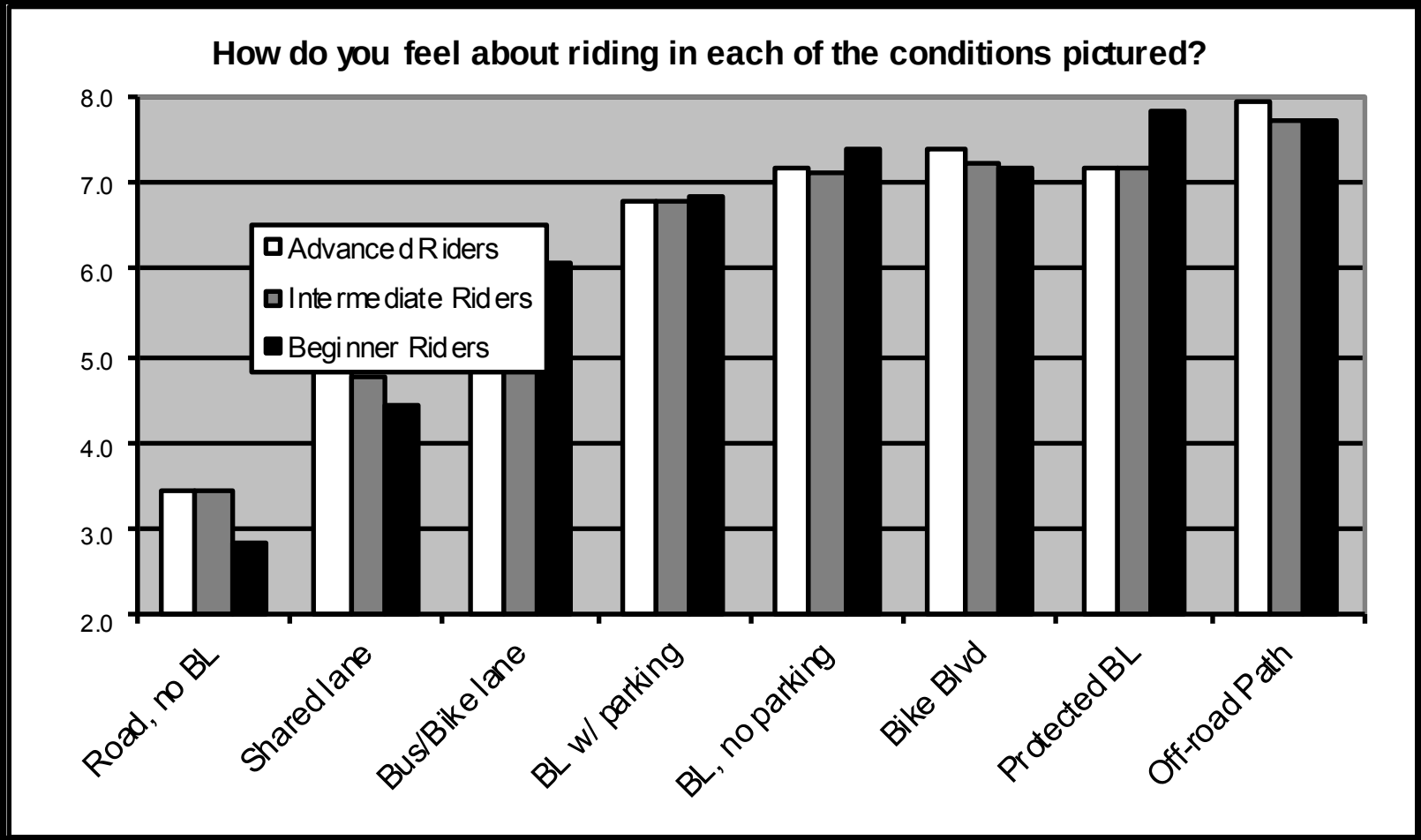

EQUINOX.COM
IT'S NOT FITNESS. IT'S LIFE.
EQUINOX

SHARED LANES

PROTECTED BIKE LANES & SHARED USE PATHS

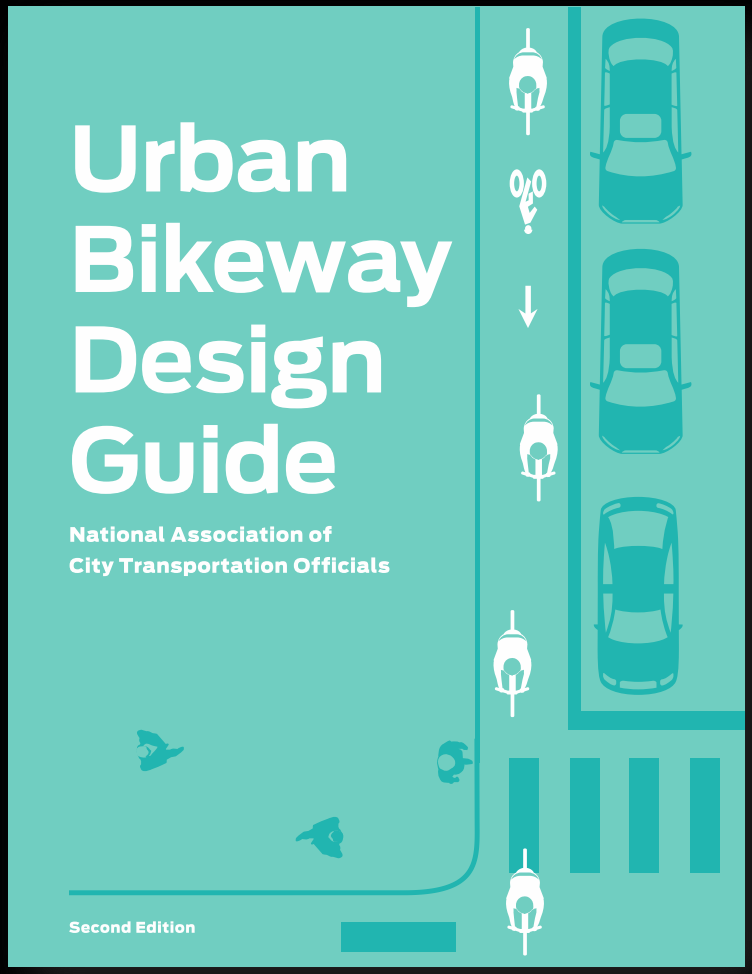
CONVENTIONAL BIKE LANES

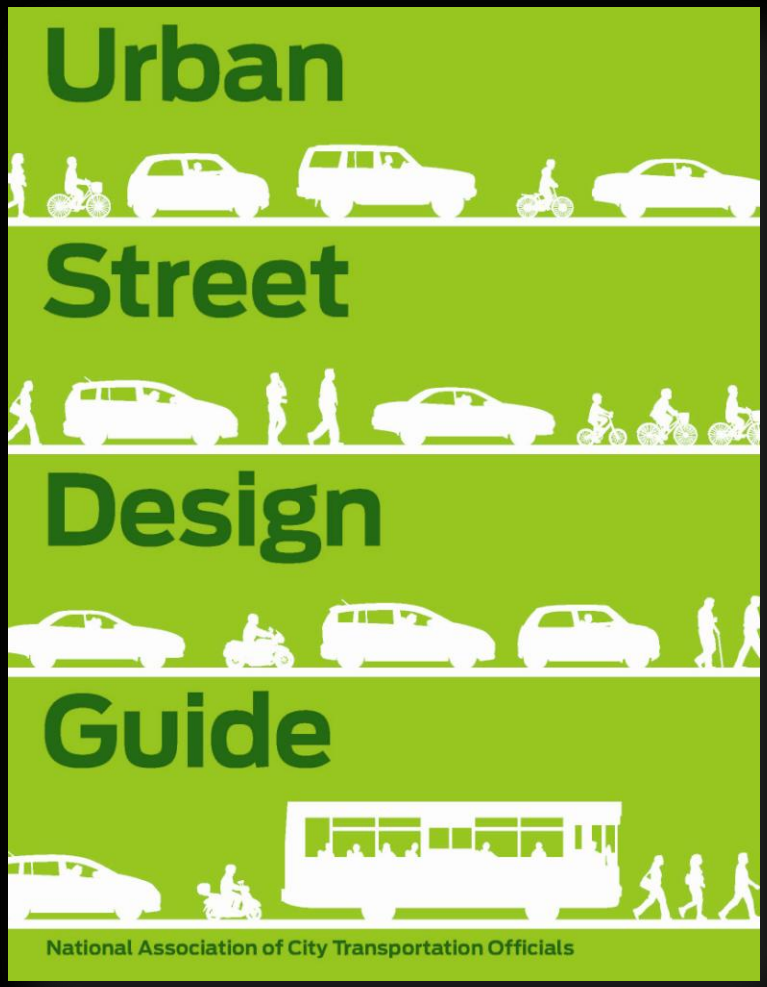
Do you want separation from traffic?



Credit: Nicole Freedman, Boston

Emerging Guidelines






SPEED
LIMIT
45

FHWA Status of Existing Bikeway Treatments

Description of Bicycle Facilities	Status in the FHWA's Manual on Uniform Traffic Control Devices (MUTCD)	Are FHWA Experiments in Progress?
Signs and Markings		
Bike Lanes		
Conventional bike lanes	Can be implemented at present time	
Continuation of bike lanes up to intersections	Can be implemented at present time	
Dashed bike lanes through intersections	Can be implemented at present time	
Use of green pavement markings for bike lanes and cycle tracks within intersections	Interim approval has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10	Yes
Green bike lanes at conflict points such as heavy turning and merging locations	Interim approval has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10	Yes


Design
Guidanc
Urban
Bikeway
Design
Guide
Urban
Bikeway
Design
Guide

The Bike Guide: An Overview

The Bike Guide: An Overview

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

CYCLE TRACKS
- One-way
- Two-way
- Raised

INTERSECTIONS
- Cycle Track Intersections

SIGNALS
- Bicycle Signals

SIGNS & MARKINGS
- Shared Lane Markings
- Green Color

BICYCLE BOULEVARDS

Design Guidance

Two-Stage Turn Queue Box

Required Features

1. An area shall be designated to hold queuing bicyclists and formalize two-stage turn maneuvers.

2. Pavement markings shall include a bicycle stencil and a turn arrow to clearly indicate proper bicycle direction and positioning.

SALT LAKE CITY, UT (PHOTO: SALT LAKE CITY PUBLIC WORKS)

VANCOUVER, CANADA (PHOTO: [illegible])

3. The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or between the bicycle lane and the pedestrian crossing.

4. In cities that permit right turns on red signal indications, a "No Turn on Red" sign shall be installed overhead to prevent vehicles from entering the queuing area. (MUTCD Section 2B.54)

Recommended Features

5. In cases where a constrained roadway geometry or right of way prevents the creation of a dedicated two-stage turn queue box in a protected location:

- The pedestrian crosswalk may be adjusted or realigned to enable space for a queue box.
- A bike box may be provided behind the pedestrian crossing to serve the same purpose. This configuration should only be considered if pedestrian volumes are low, as bicyclists must yield to pedestrians in the crosswalk before entering the queue.

6. The queue box should be positioned laterally in the cross street, to promote visibility of bicyclists.

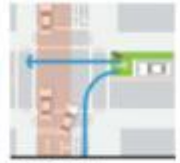
7. Colored paving inside of the queuing area should be used to further define the bicycle space.

8. Markings across intersections should be used to define through bicyclist positioning.

Cycle Track Buffer Configuration

Parking Lane Configuration

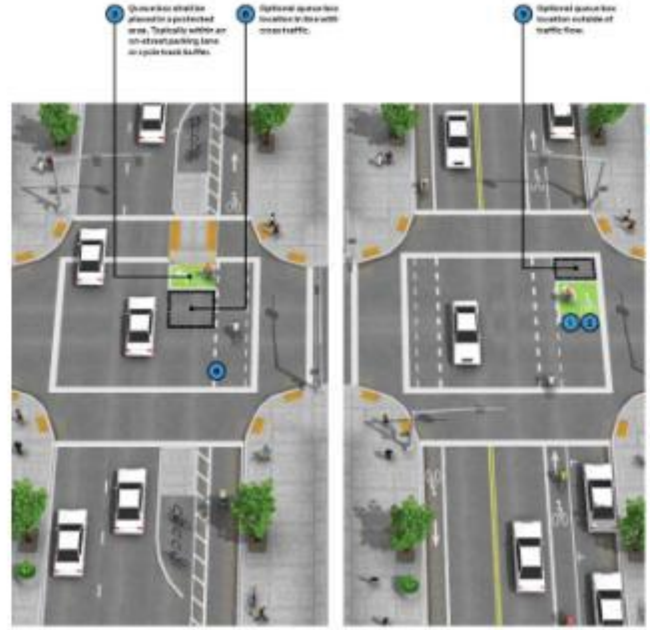
Crosswalk Setback Configuration
Wider crosswalk, set back pedestrian crossing, and/or narrower sidewalk space provides opportunity for queue box.



Bike Box Configuration
Bicyclists yield to pedestrians. Not recommended for areas with high pedestrian volumes.

T-intersection Parking Lane Configuration

T-intersection "Jughandle" Sidewalk Configuration



Optional Features

9. The queue box may be positioned laterally in the cross street parking lane rather than in front of the travel lane. This may require bicyclists to weave into the travel lane to resume through movement if no dedicated bicycle facility is present since the parking lane ahead will be occupied.

10. At midblock turning locations, the queue box may be integrated into the sidewalk space. This configuration is also known as a "jughandle." Consider the use of some form of signalization at these locations.

11. Signage may be used to define proper positioning and improve visibility of the queue box.

12. A bicycle signal, with leading bicycle interval, may be installed in conjunction with the two-stage turn queue box.

13. Guide lines, pavement symbols, and/or colored pavement may be used to lead bicyclists into the queue box.

Design Guidance

Median Refuge Island

Required Features

1. The desirable width of the median refuge is 10 feet or greater. The absolute minimum width is 6 feet.

2. When applied on a two-way street, the median refuge shall be placed along the centerline of the roadway between the opposing directions of travel.

3. Pavement markings on the approach to the refuge island shall follow the guidance provided in Section 3B.10 of the MUTCD.

4. The approach edge of the raised median shall be outlined in retroreflective white or yellow material.

5. In areas with snow accumulation, reflective delineators shall be used to mark the island for increased visibility to snow plow crews.

Recommended Features

6. The length of the refuge island should be greater than 6 feet.

7. Reflective markers should be used on the approach to the nose of the island's curb.

8. The height of the island should be curb level, 6 inches high. When used as an exclusive bicycle facility it may be desirable to keep the refuge area at street level.

9. An angled cut-through (45 degrees) should be provided to position bicyclists to face oncoming traffic. If the cut-through is to be shared with pedestrians, the 45-degree angle of the curb should transition back to being perpendicular to the street to provide proper directional cues for the blind.

10. The refuge area should be wide enough to accommodate two-way bicycle traffic.

Optional Features

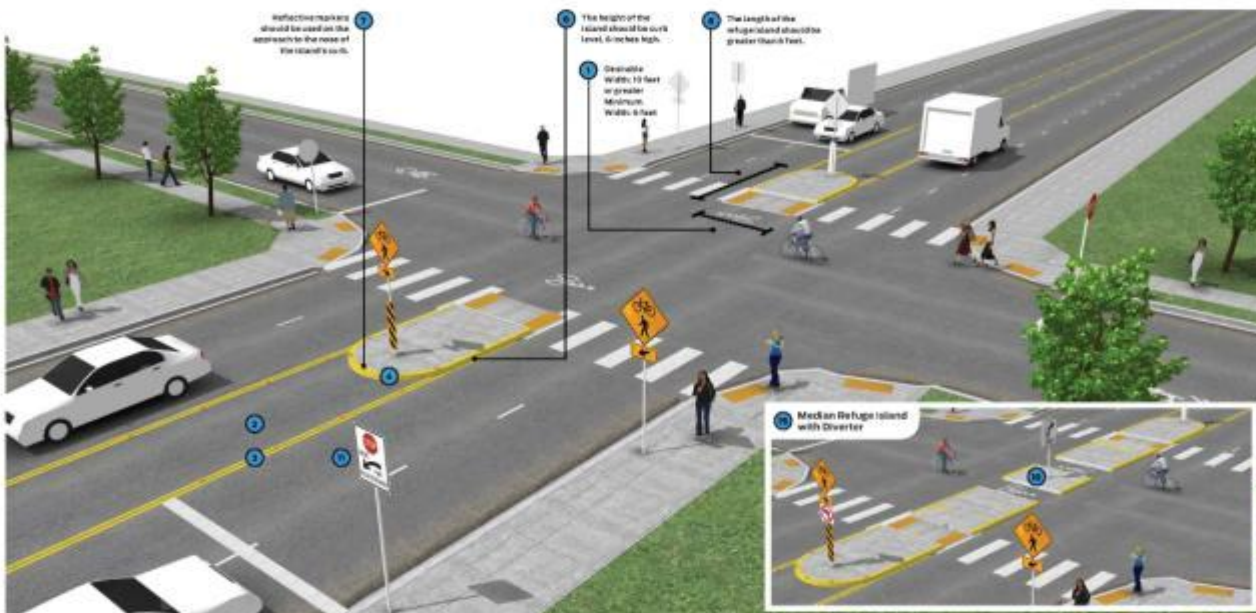
11. "Advanced Stop" signs and markings for motorists may be included.

12. Landscaping may be provided in the median, but it should not compromise visibility.

13. Lighting may be installed for improving visibility of the facility at night.

14. At signalized intersections, push buttons or other detection methods may be provided to actuate the signal head.

15. The median refuge can be carried across the entire cross street approach to act as a diverter to prevent cut-through traffic on a bicycle route.

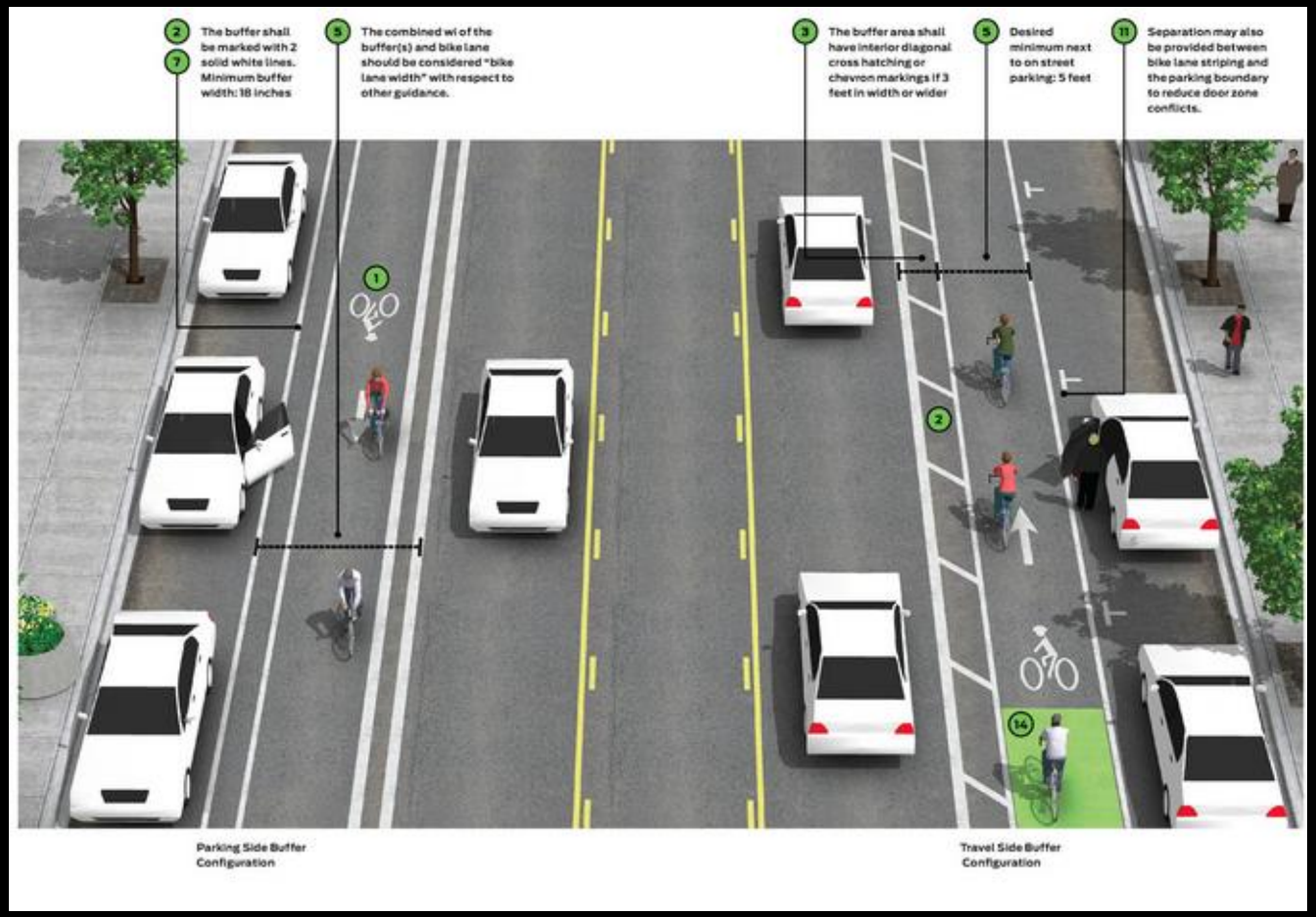


Guide Structure

Required
(Shall)

Recommended
(Should)

Optional
(May)



Defining Success

Comfortable/Safe
Separation is key

Cohesive & Connected
No bike lanes to nowhere

Intuitive
Bicyclists are window shoppers too

Direct
Avoid circuitous routing

Attractive
Commute = Recreation

Design for Every Mode

Bikeway Design = Complete Street Design

Don’t trade the sidewalk for the gutter

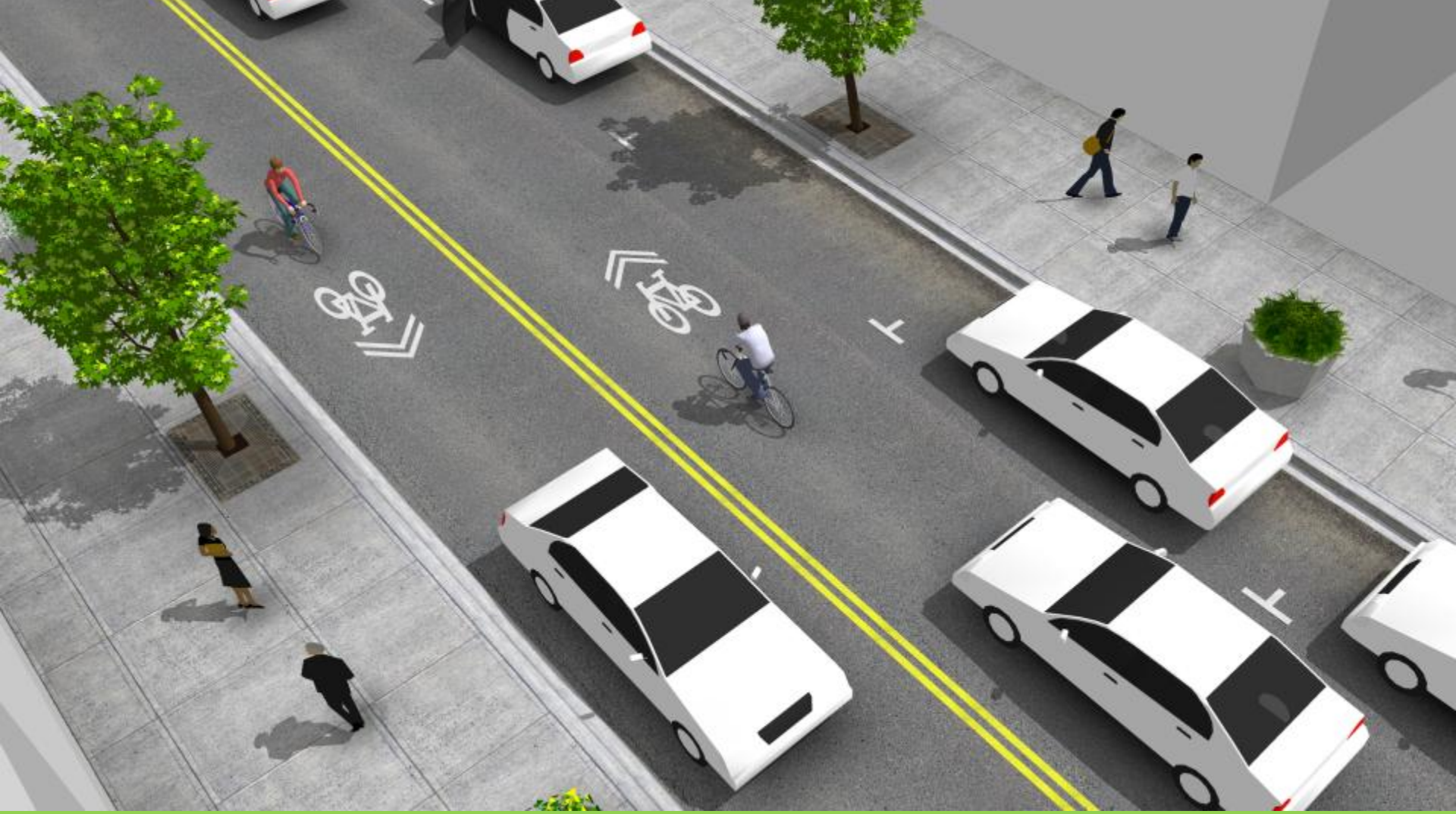
Elevation Matters

Avoid cluttered markings

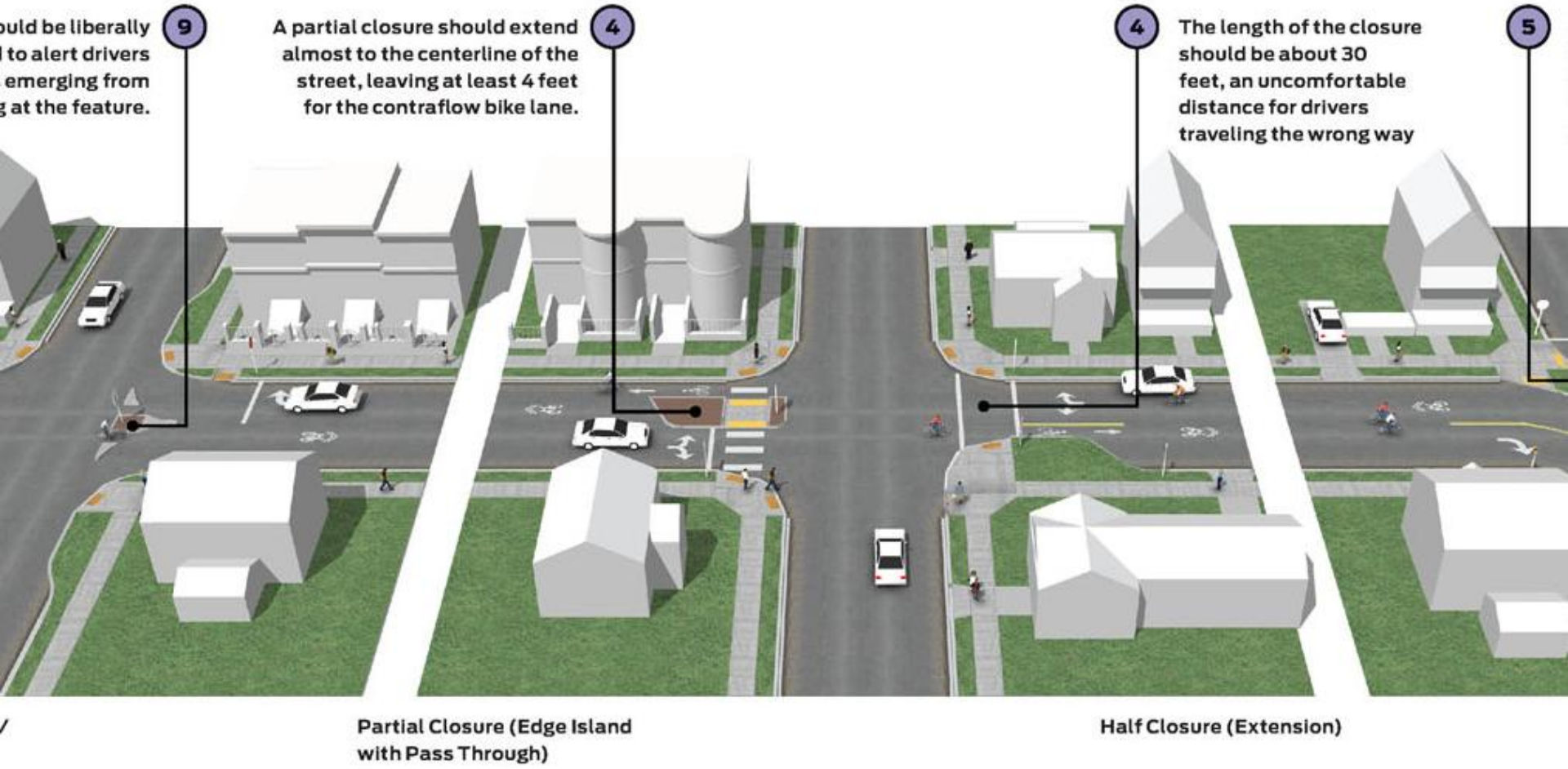
Keep it simple

Design for Loading and Maintenance

An Overview of Bikeway Types
in the NACTO Guide



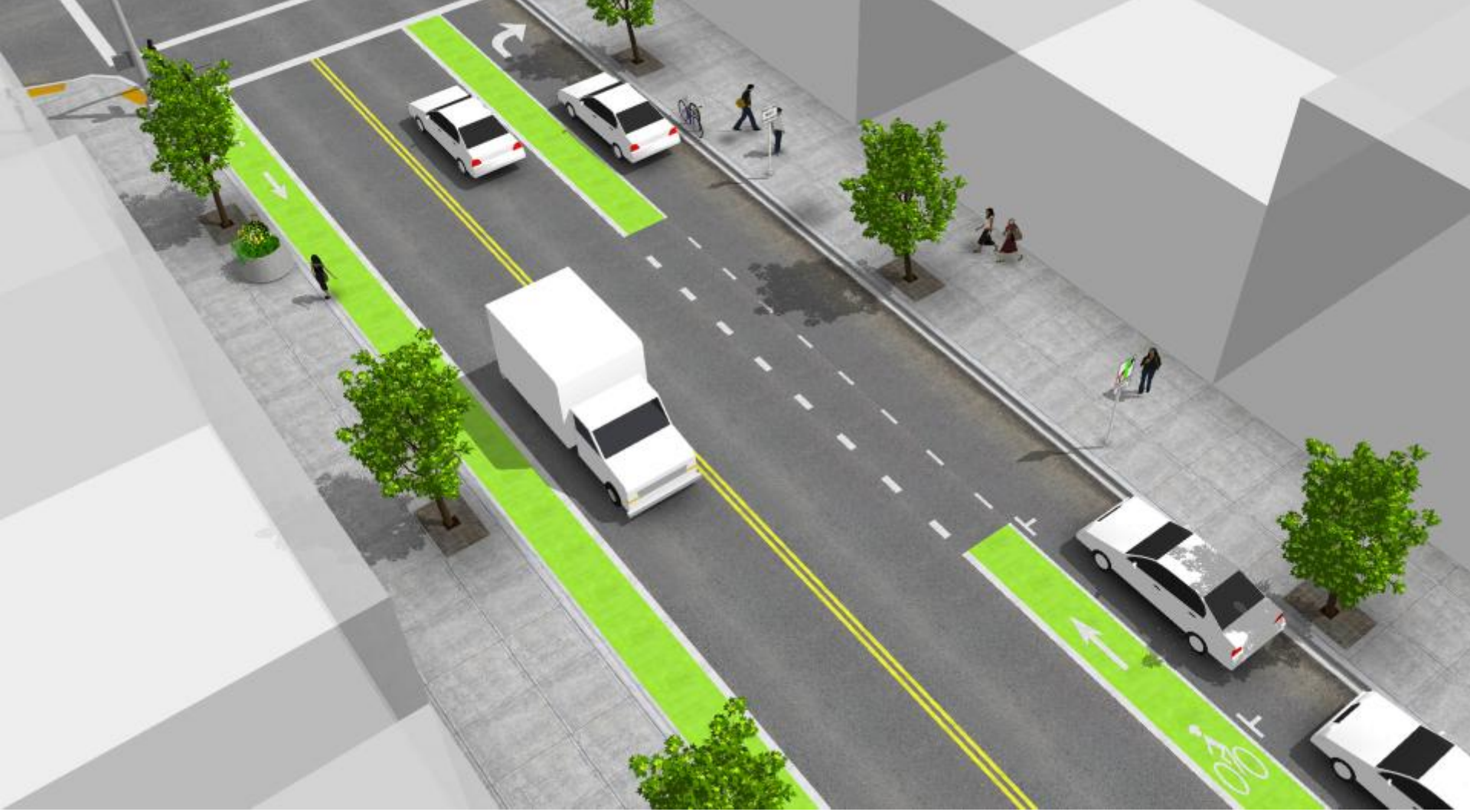
Shared Lane Markings



Bicycle Boulevards

Bicycle Boulevards

Conventional Bike Lanes



Green Bike Lanes

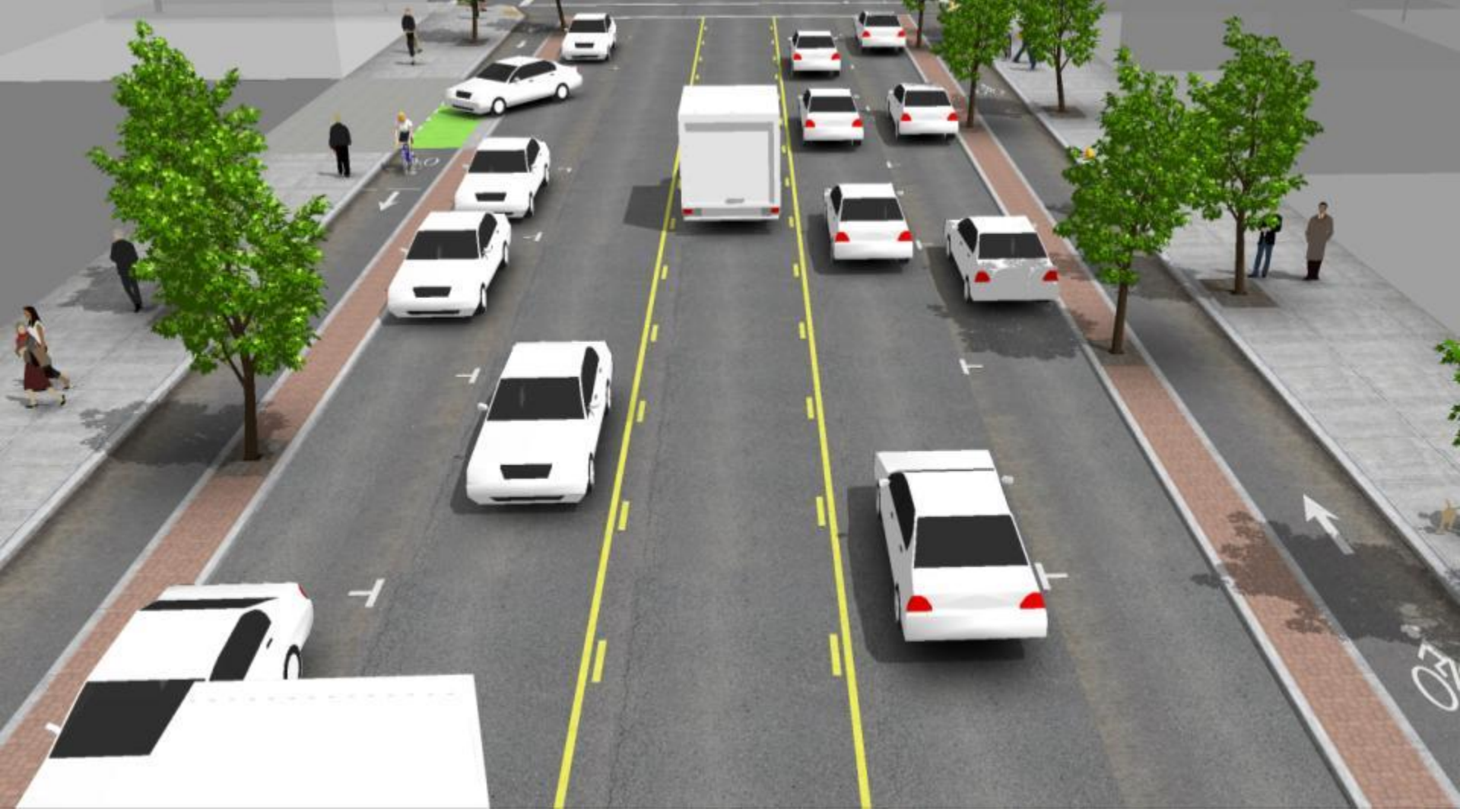
Buffered Bike Lanes

Contra-Flow Bike Lanes

One-way Cycle Track

One-way Cycle Track

Austin, TX



Raised Cycle Track

Raised Cycle Track (two-way)

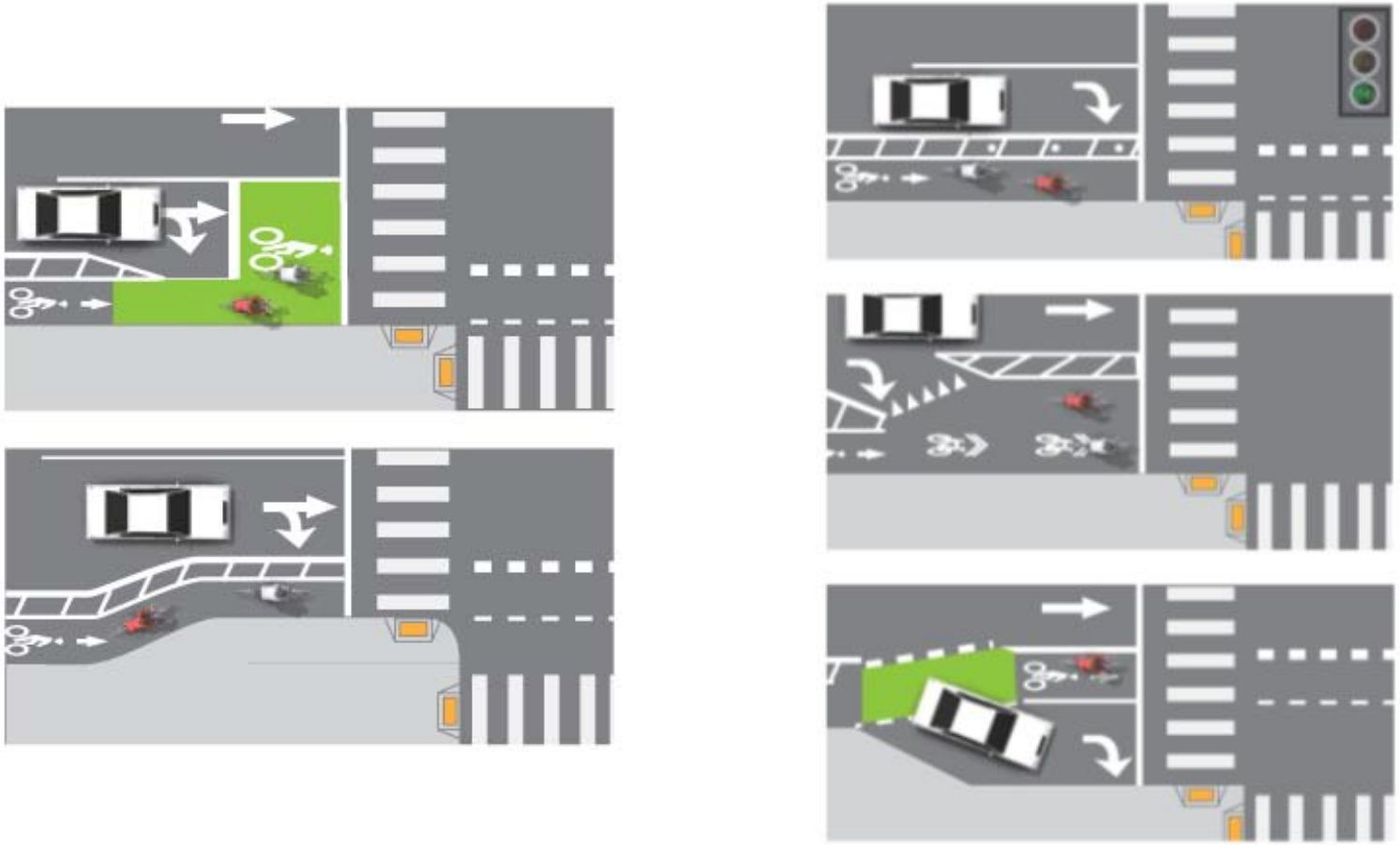
Indianapolis, IN

Two-way Cycle Track

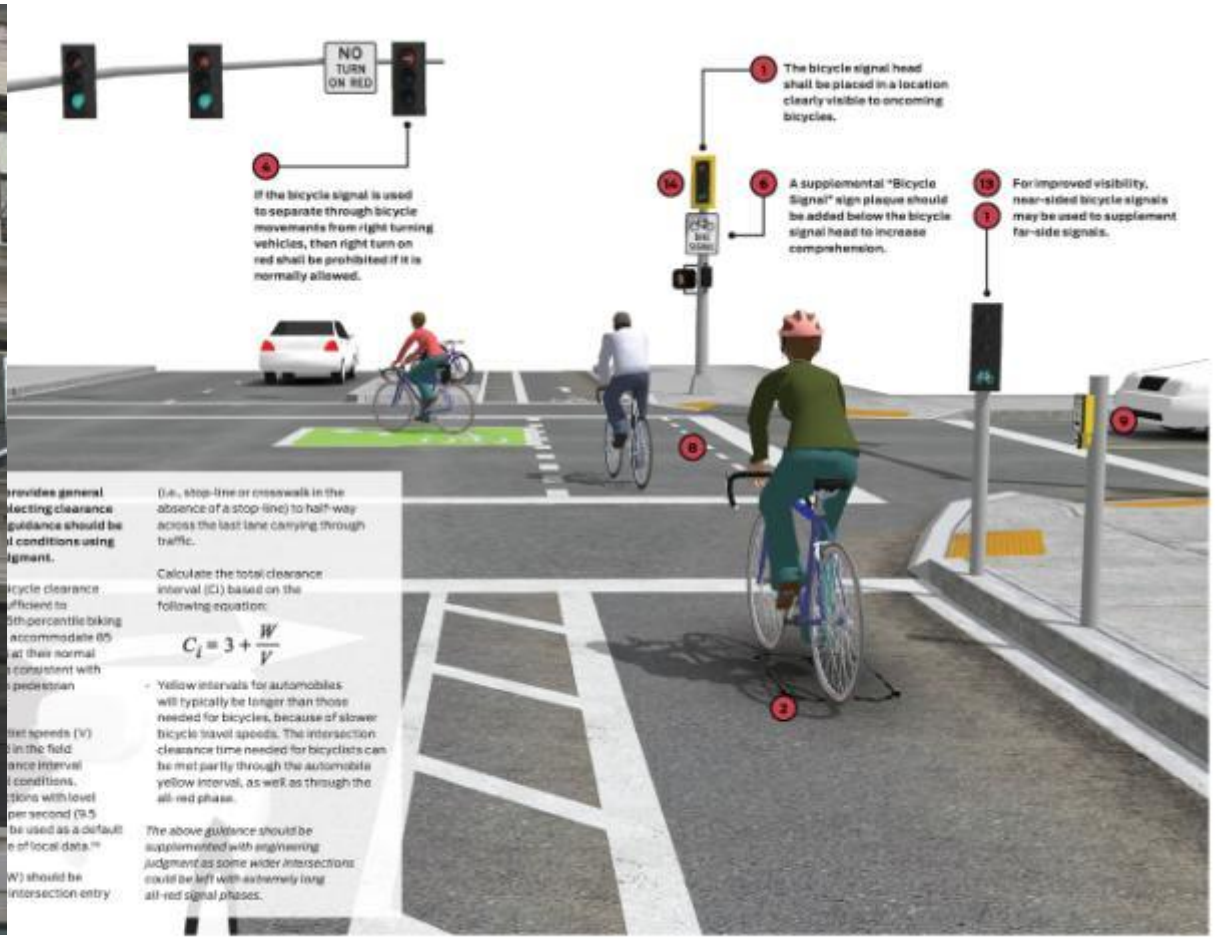
Mixing Zone

Mixing Zone

New York, NY



Cycle Track Intersection Approach Strategies



Bicycle Signals

Intersection Crossing and Two-stage Turn

Chicago, IL

David Vega-Barachowitz
Director, Designing Cities Initiative
david@nacto.org

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Designing Safe Streets for Bicyclists

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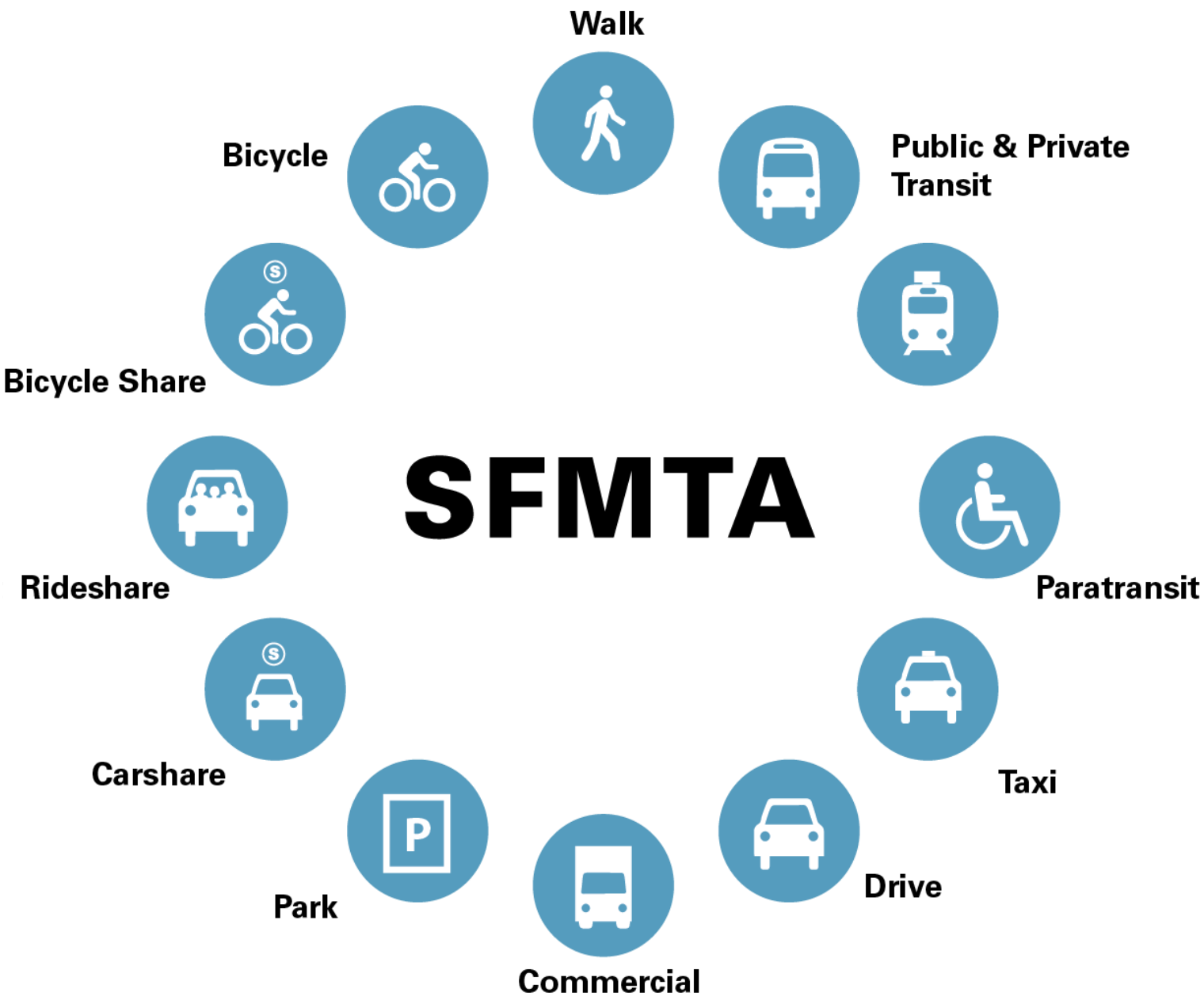
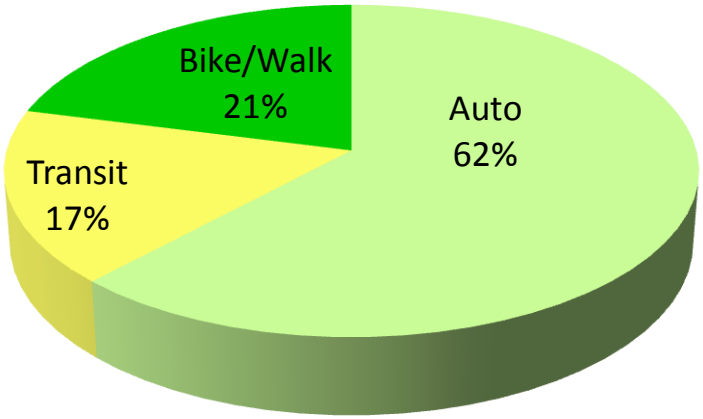
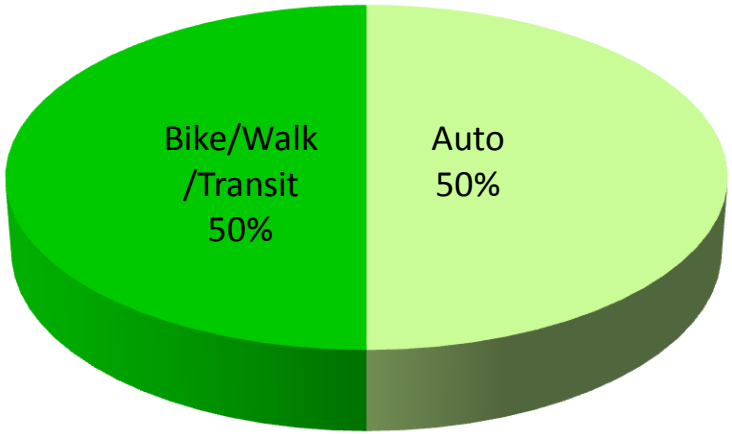


GOAL 2: Make transit, walking, bicycling, taxi, ridesharing and carsharing the preferred means of travel

2012



2018




5,400 people on bikes on Market Street daily


160 miles
3.5 % bikeshare
40 % own a bike


65% of cyclists bike year round


28% are women

Bicycle Strategy Vision:
Bicycling is part of everyday transportation

Create bikeways that are…

- Safe
- Comfortable
- Continuous
- Convenient
- Welcoming
- Delightful

Design Vehicle

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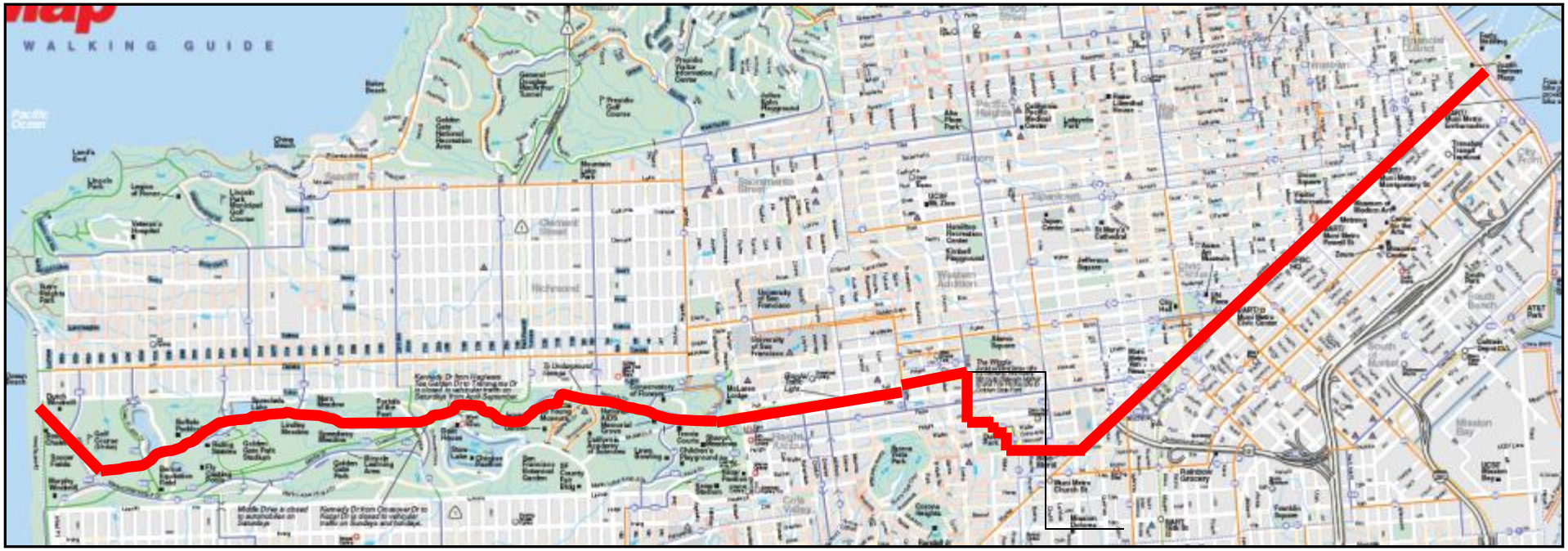
What have we been doing?



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Bikeshare!

Photo: Frank Chan

Embarcadero

Market Street

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Market Street

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The Wiggle

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The Wiggle

Oak/Fell

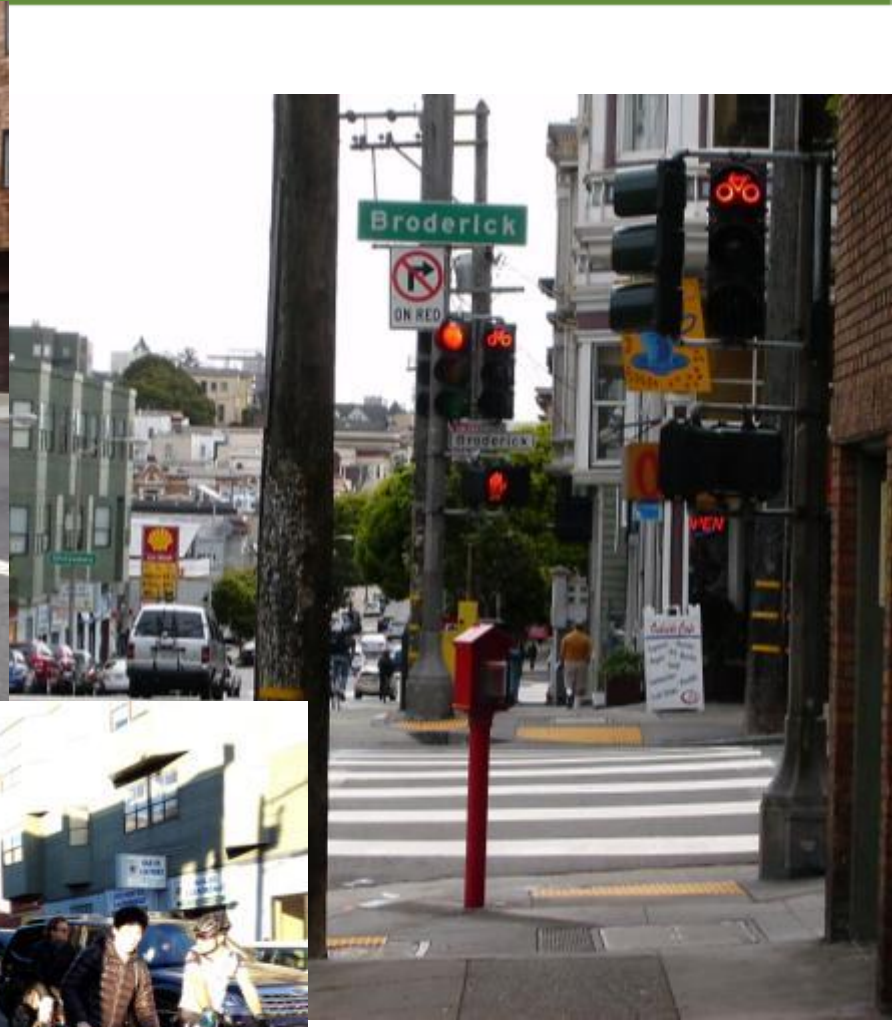

Photo: San Francisco Bicycle Coalition

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Muni's Challenges

Integrate Transit Into Streetscape Design

Make System-wide Investments

Build a Rapid Network (TEP)

Integrate Transit Into Other Projects

Minimize Transit Impacts From Other Projects

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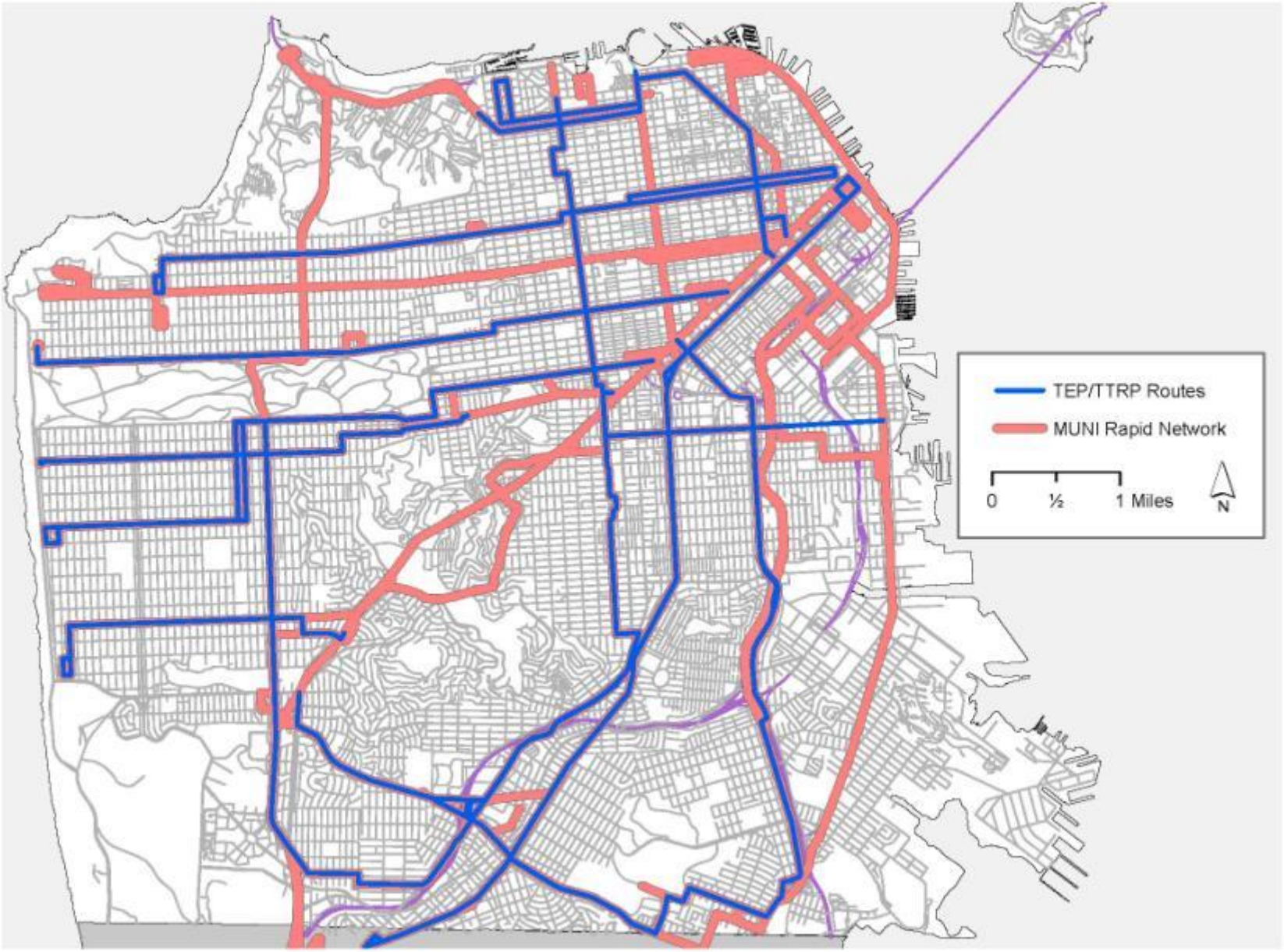
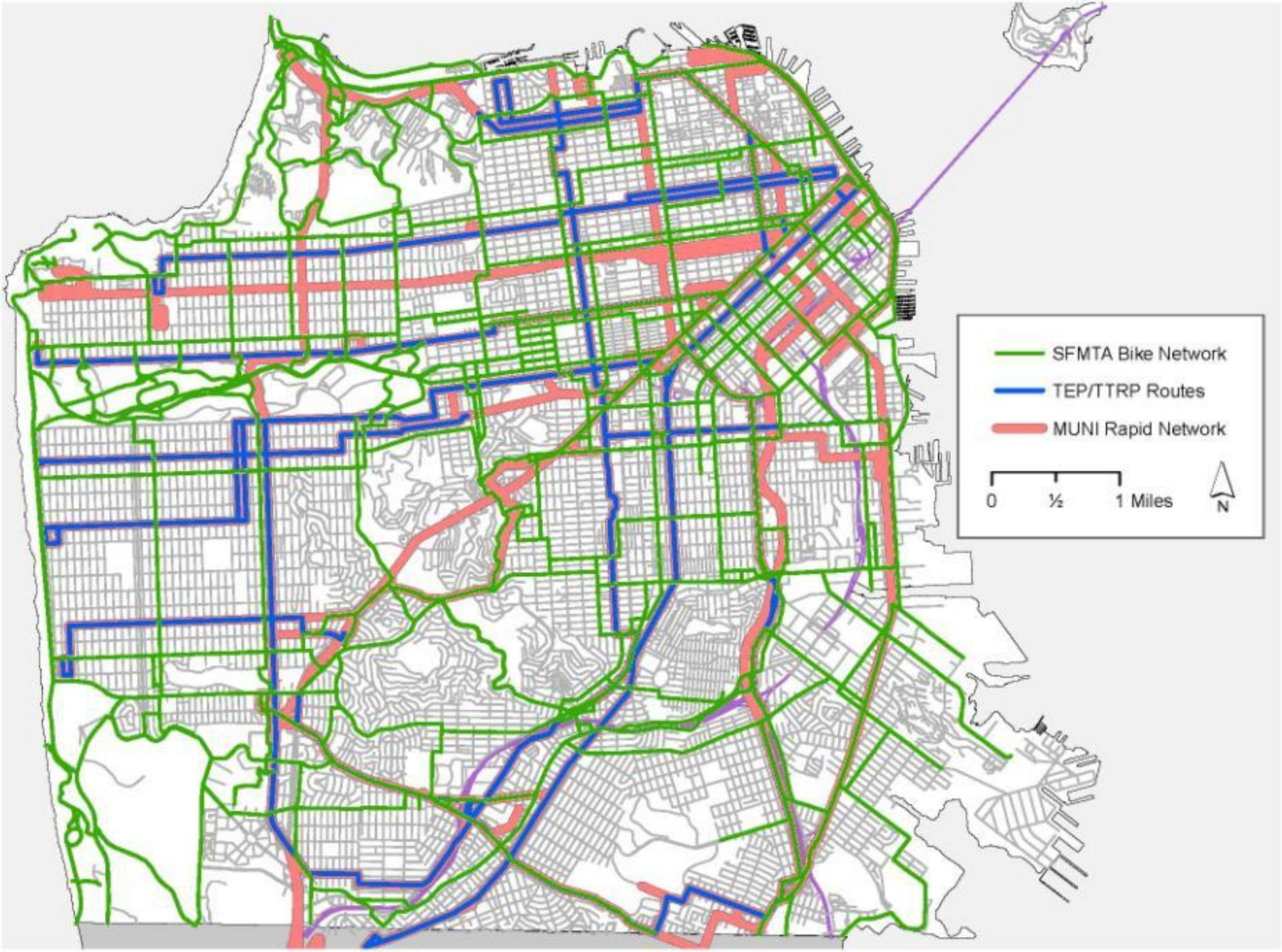
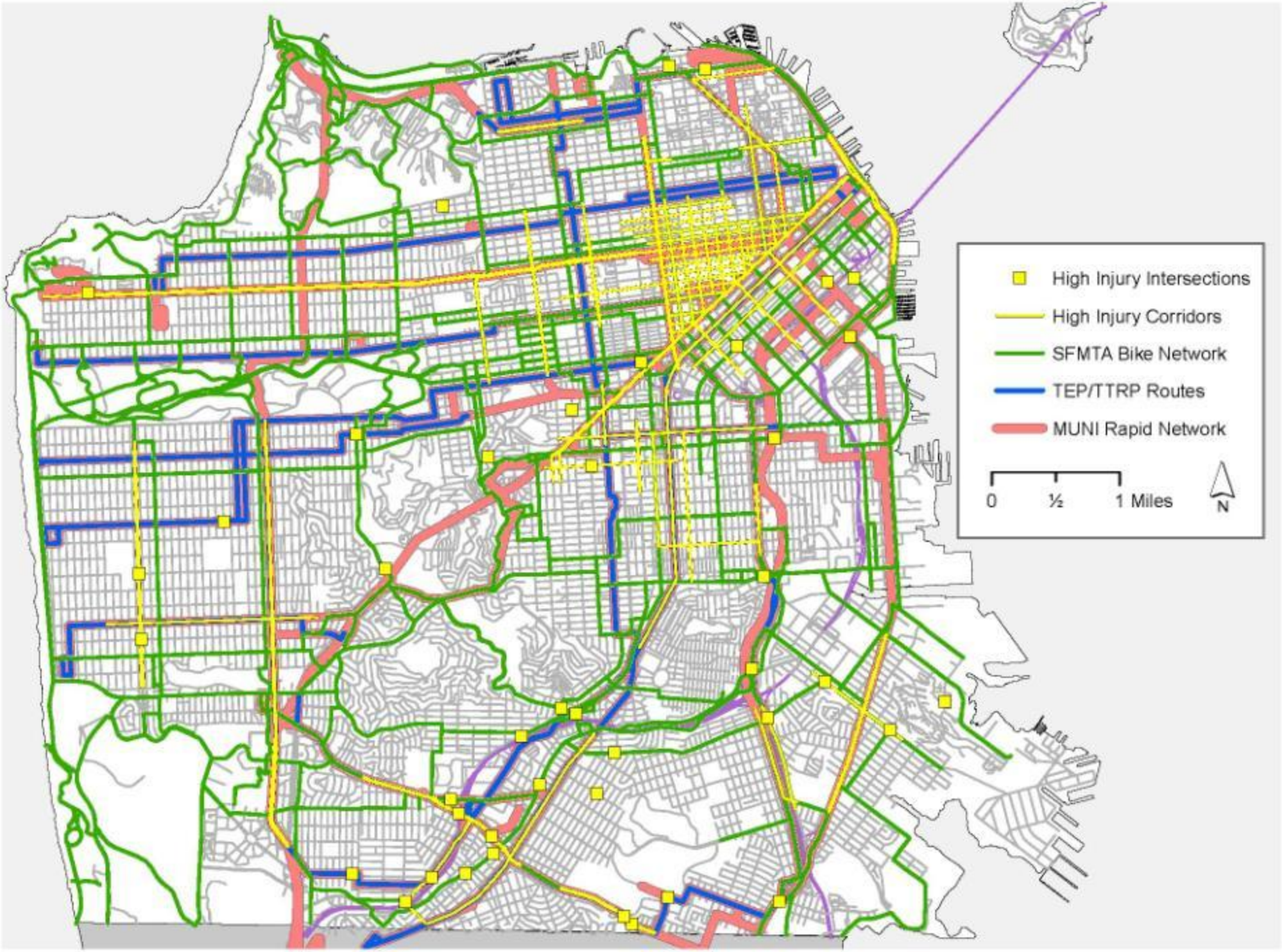
TEP/Rapid Network




SFMTA Bike Network
TEP/TTRP Routes
MUNI Rapid Network
0
½
1 Miles
N


High Injury Intersections
High Injury Corridors
SFMTA Bike Network
TEP/TTRP Routes
MUNI Rapid Network
0
½
1 Miles
N

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Transportation
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Lesson 1: Document + Evaluate

Photo: Frank Chan

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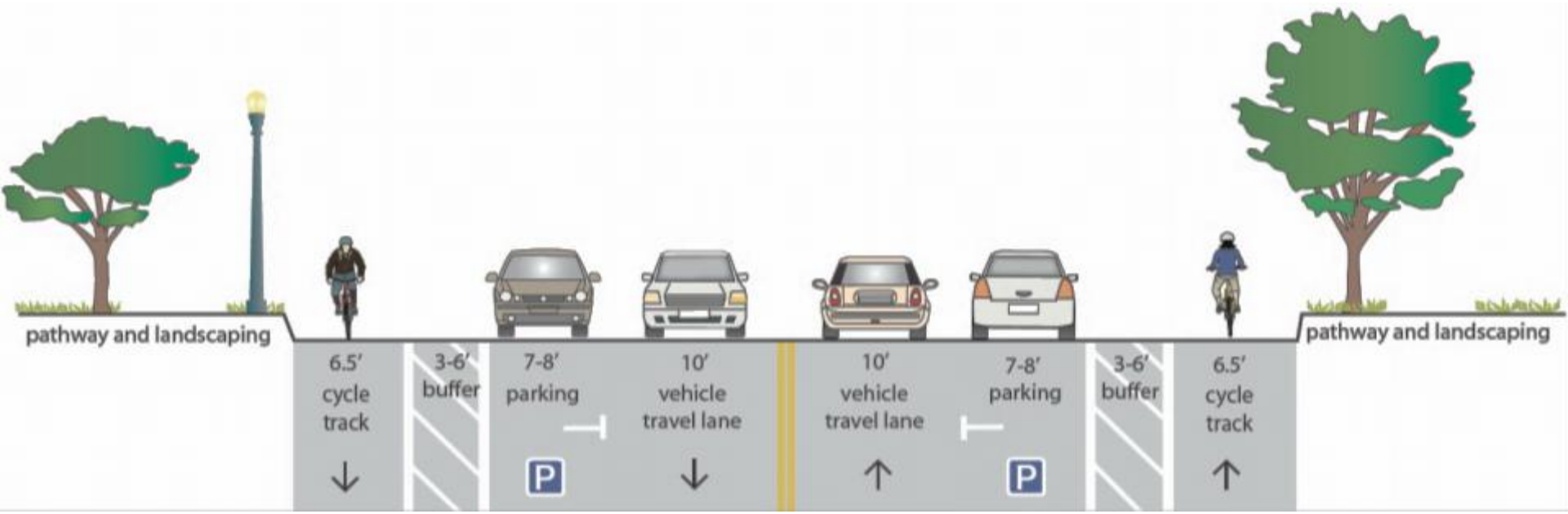
This'll be a breeze!

1.5 miles of Cabrillo (Arguello-25th) – 24 intersections and 250 driveways

1.5 miles of JFK – 9 intersections within proposed project area

Proposed Design

Proposed cross-section: 53-61 feet
(e.g. near Stow Lake Drive)



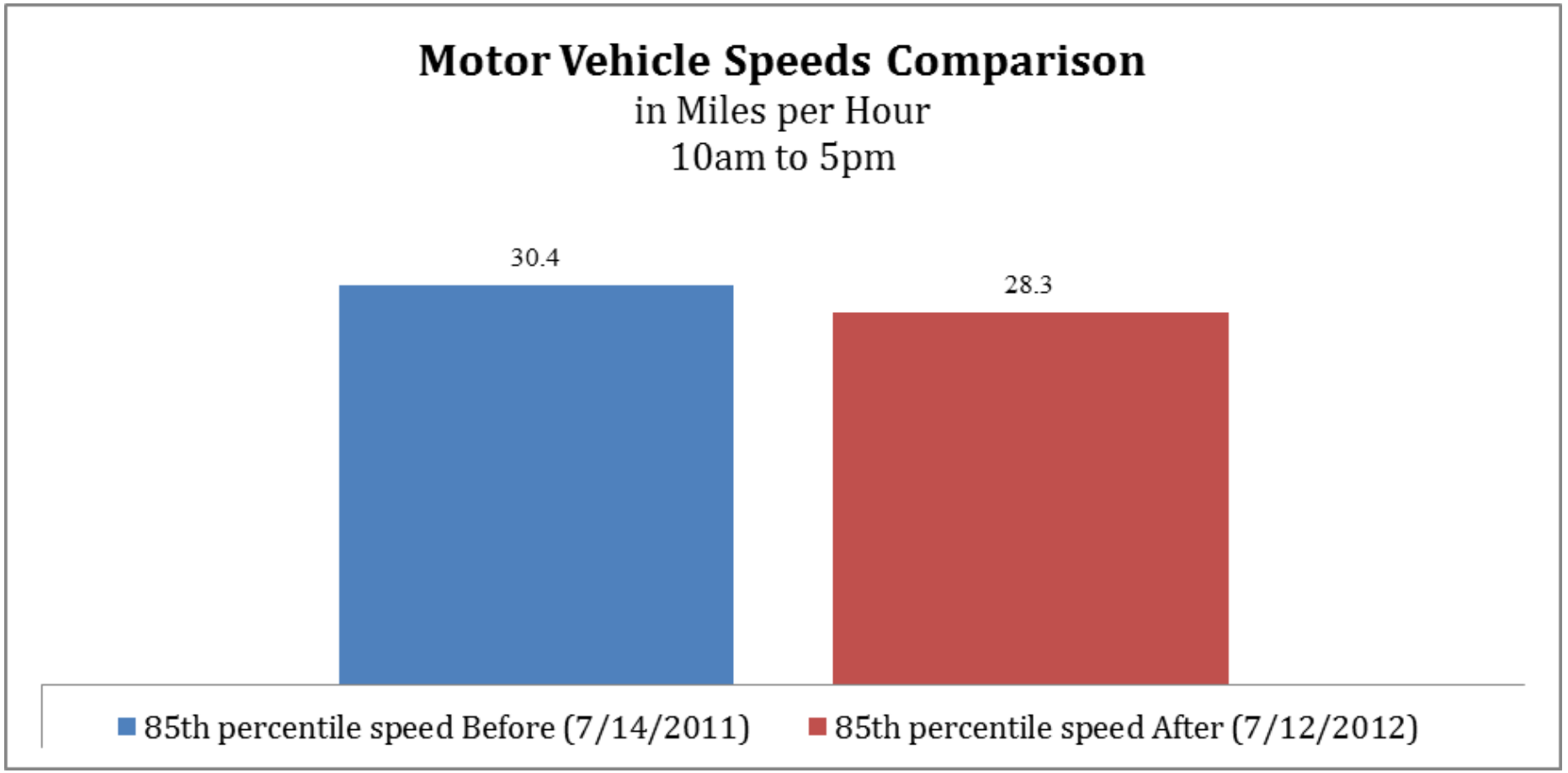
Do people understand it?

Budget for outreach

Design for driver error

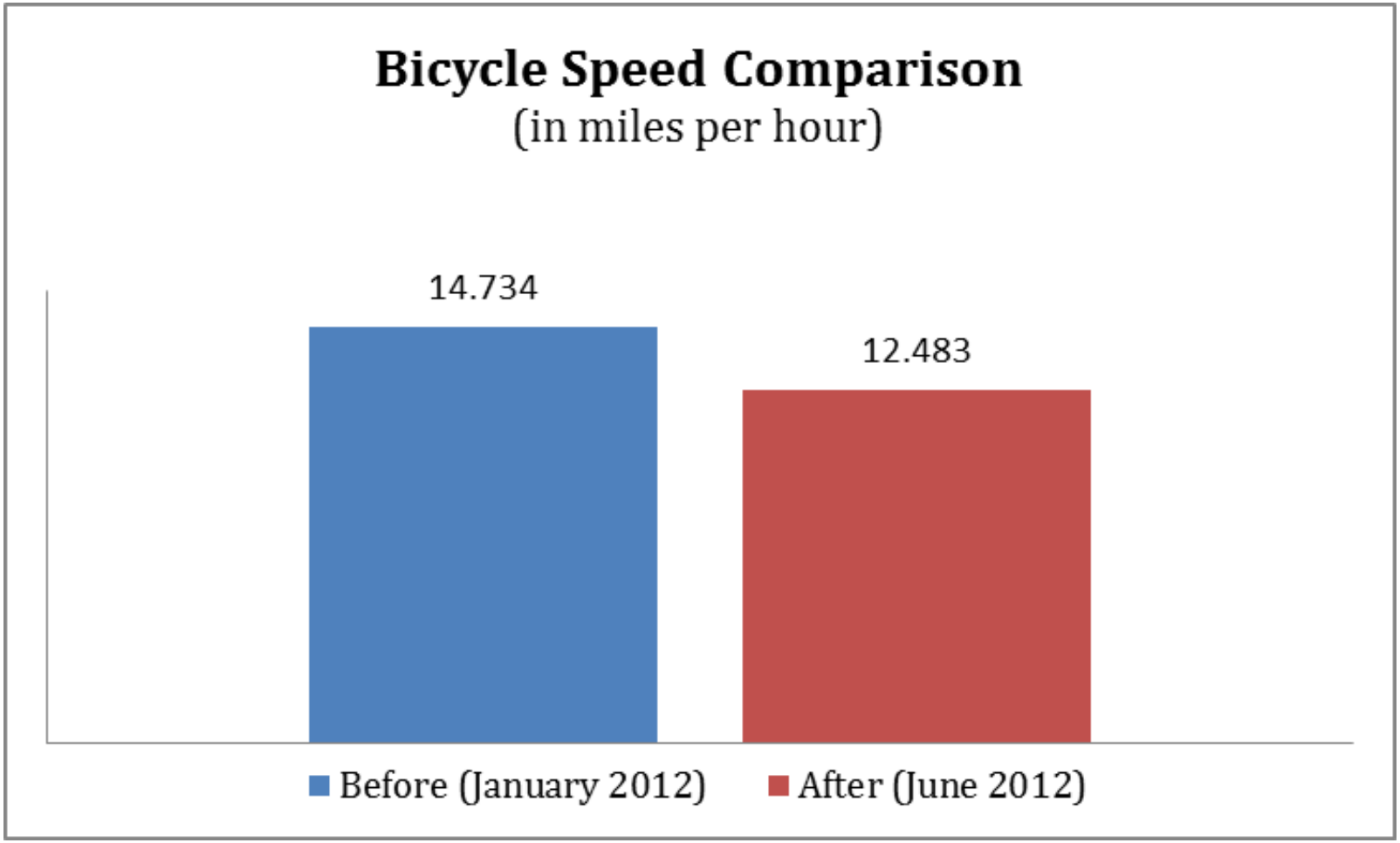
Be mindful of ADA

Vehicle Speeds Went Down



www.sfmta.com/news/project-updates/jfk-drive-bikeway-final-evaluation

Bicycle Speeds Went Down



www.sfmta.com/news/project-updates/jfk-drive-bikeway-final-evaluation

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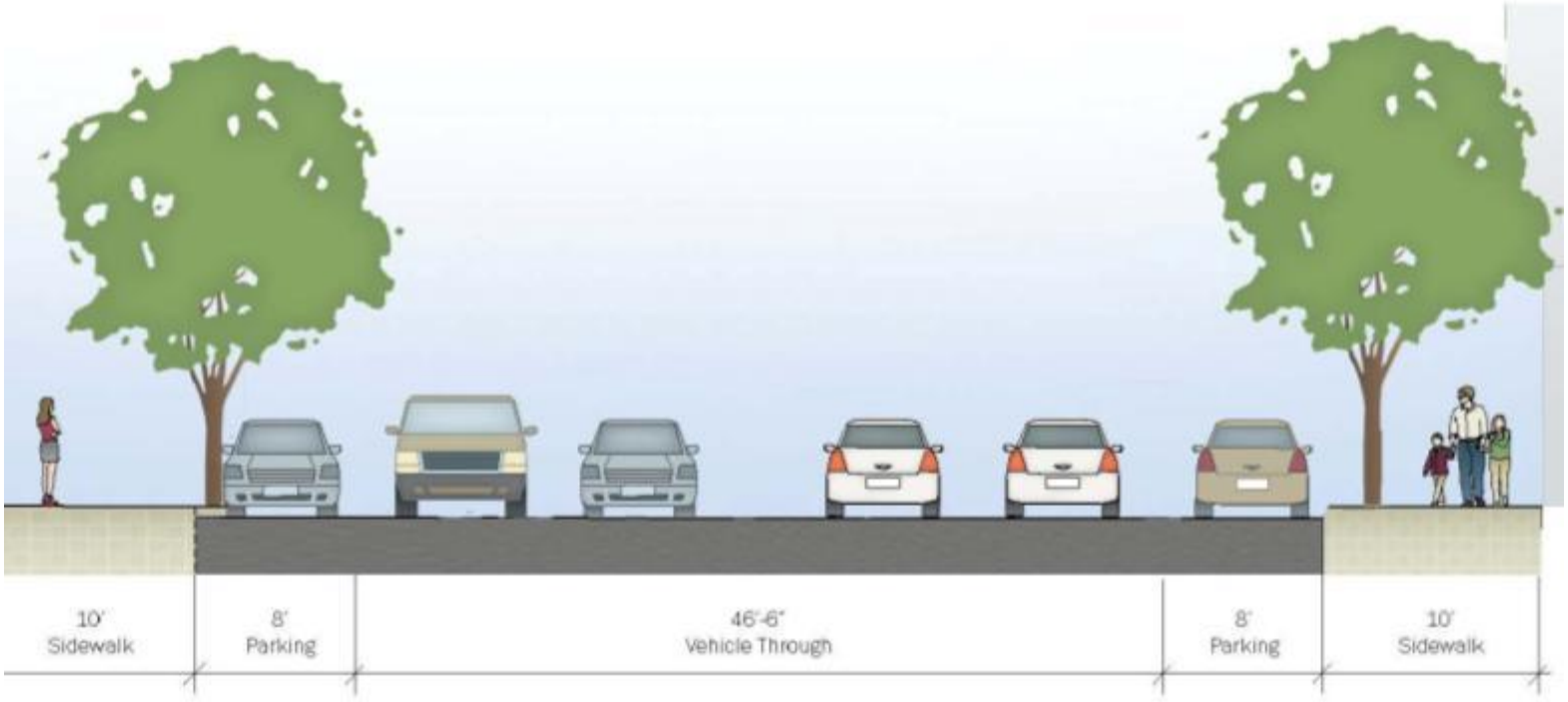
Lesson 2: Patience

Existing Conditions



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Existing Conditions

The Saga of 2nd Street

2009

2011

2012

May 2, 2012

November 28, 2012

Before

Second Street at Tehama Looking South

After

Second Street at South Park Looking North

Before

Second Street at South Park Looking North

After

Second Street at Townsend Looking South

Before

Second Street at Townsend Looking South

After

Second Street at Tehama Looking South

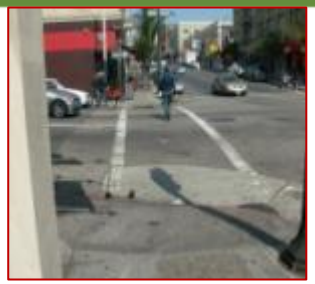
Lesson 3: Detailed design precedes concept design

On Your Fiets!

+ Safety: reduces dooring, lowers speeds and reduces parking conflicts
+ Accommodates existing traffic volumes
+ Greater level of comfort for people new to bicycling
+ Improves pedestrian experience and enhances transit access
+ Flexible and modular
+ Possible to implement in 2013 with planned road re-surfacing


OPTICAL

Lower Polk





Two Cycle Tracks

Bikin g D S, S S, W

Wide lanes substantially separated from vehicles.

Walki ng B I, I, P

Remove bus shelters from sidewalk, other intersection upgrades. No parklets.

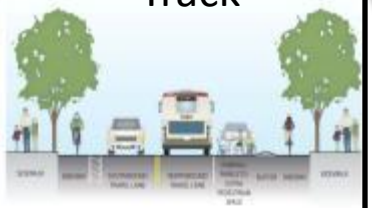
Parki ng O S, B S

Parking removed fully from both sides.

Trans it B I

Bus boarding islands would reduce delay and provide additional waiting area.

Uphill Cycle Track



Bikin g D S, S S, W

Significant separation and wide lanes.

Walki ng P, I, B I

Potential parklets, other intersection upgrades, prevent future shelters on sidewalk.

Parki ng O S, S P

Parking removed fully from one side and partially from the other.

Trans it B I

Future boarding islands would reduce delay and provide additional waiting area.

One-way

Bikin g D S, T S, W

Total separation and wide lanes.

Walki ng P, B I, I

Potential parklets, remove shelters from sidewalk, other intersection upgrades.

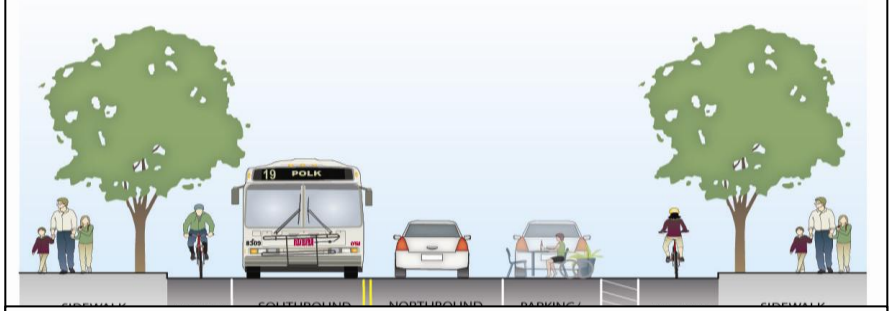
Parki ng O S, S P

Parking removed fully from one side and partially from the other.

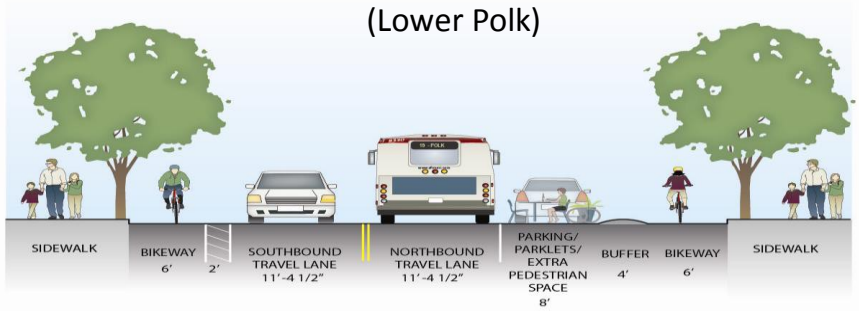
Trans it R C, B I

Bus and traffic diversions to nearby streets. Boarding islands would reduce delay.

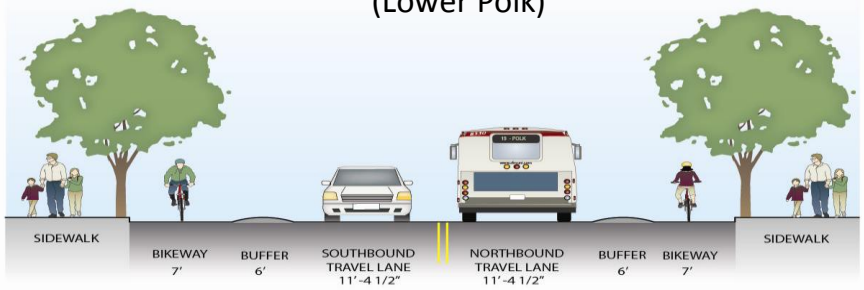
Curbside bikeways (Upper/Middle Polk)

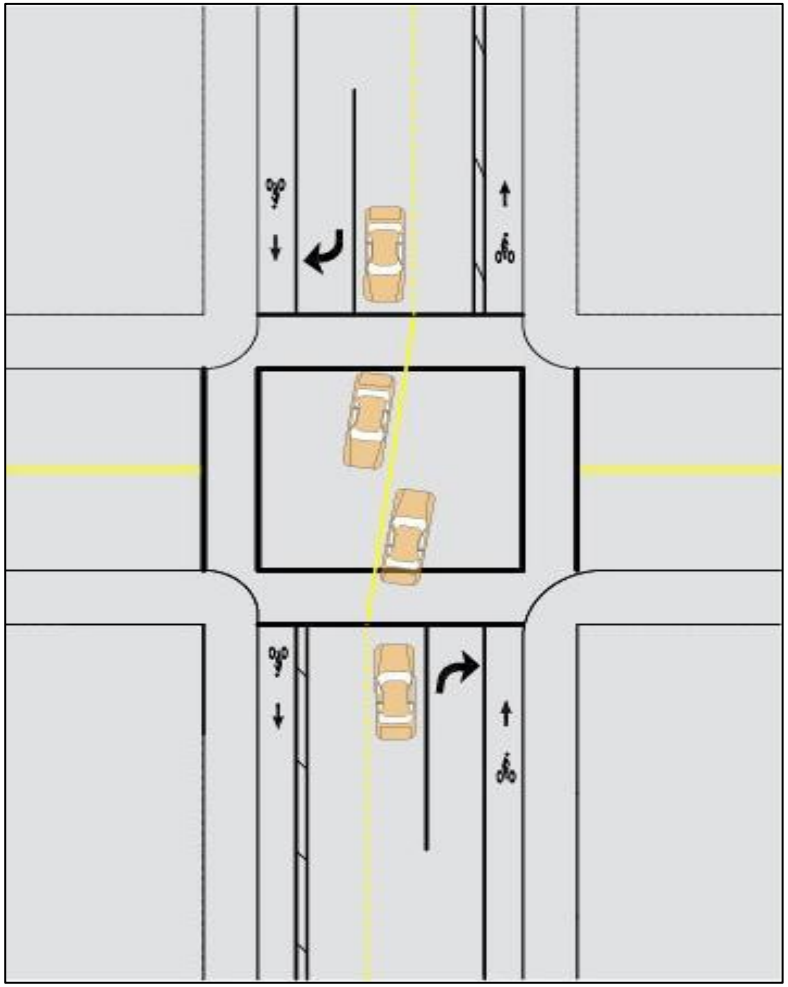


Uphill cycle track (Lower Polk)



Two cycle tracks (Lower Polk)





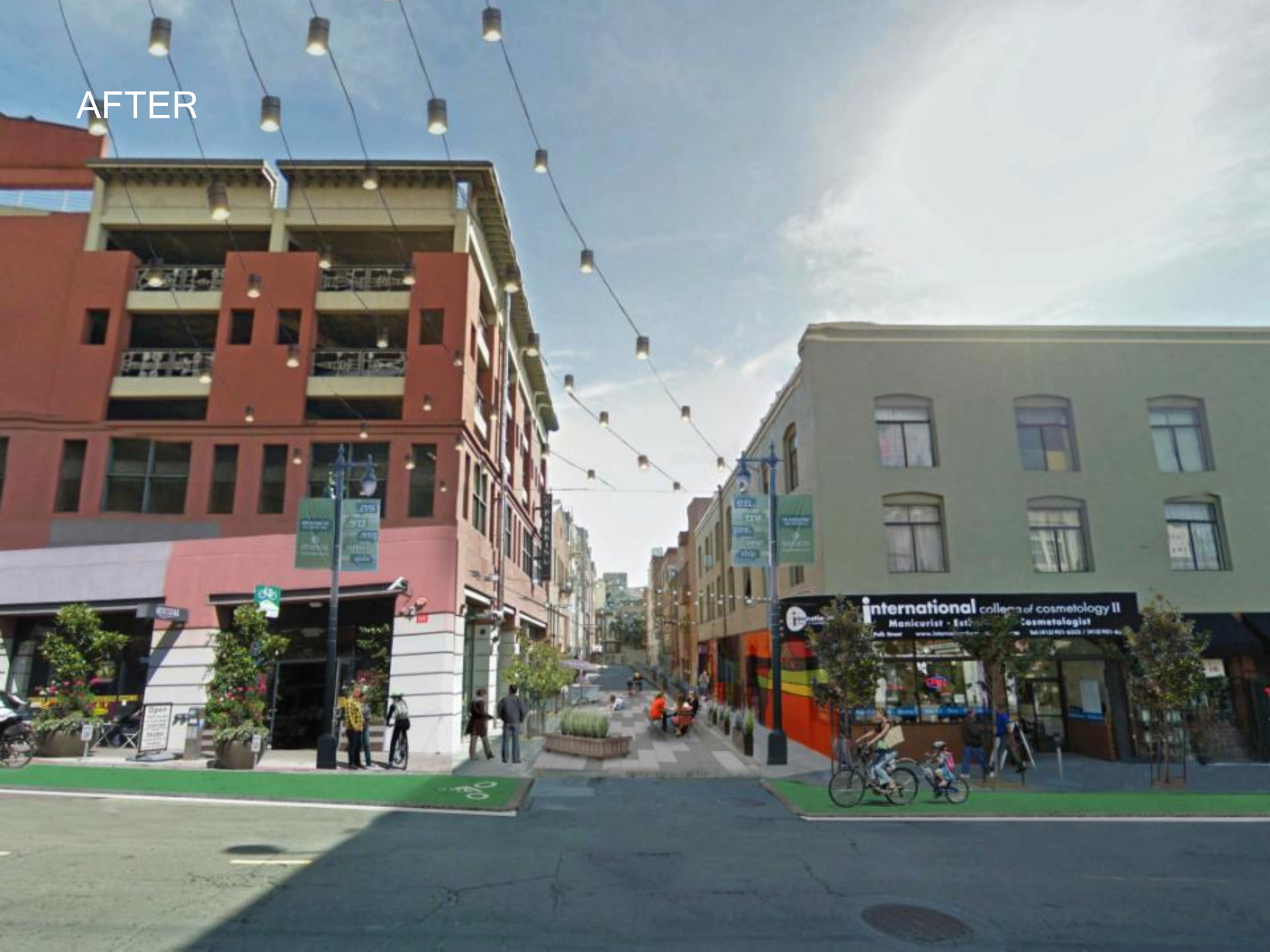

The Brew
Andy's Chinese
Leopold's
UNION ST
Tonic
Alhambra
(Crunch Fitness)
La Boulange
fl!p
GREEN ST


BEFORE


AFTER

CYCLE TRACK (NORTHBOUND)


BEFORE
international college of cosmetology II


AFTER
international college of cosmetology II

Lessons Learned

- Invest in evaluation and outreach during construction and afterwards
- Patience pays off
- Sometimes you have to understand the details before you can make conceptual decisions