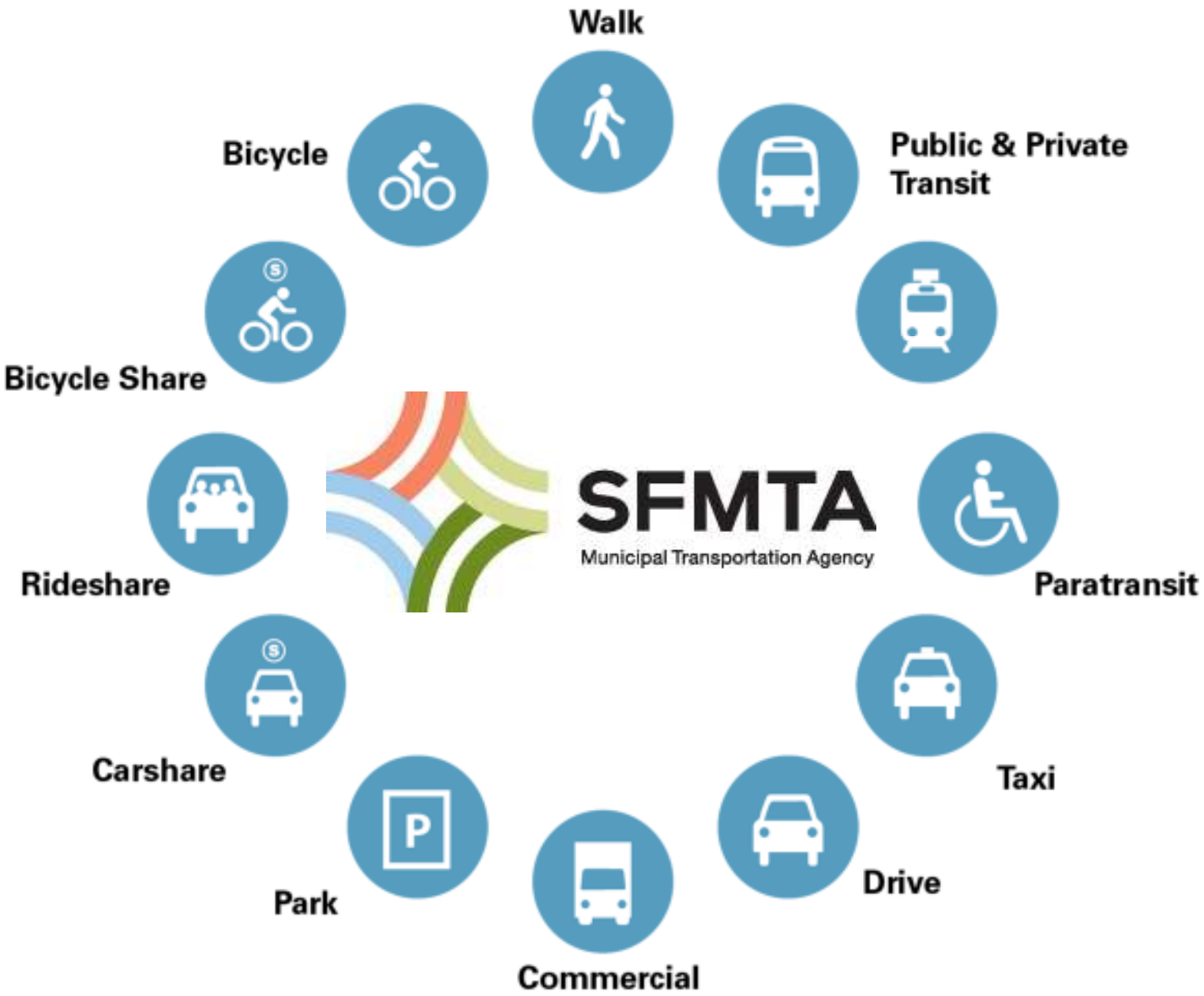
SFMTA
Municipal Transportation Agency

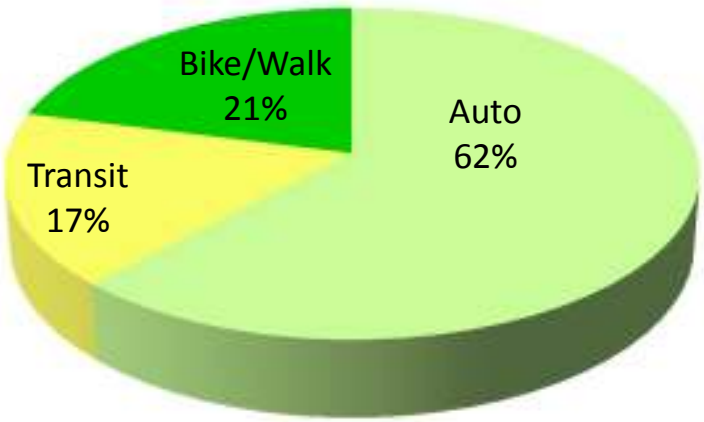
NACTO

# October 24, 2012
# Designing Cities Conference

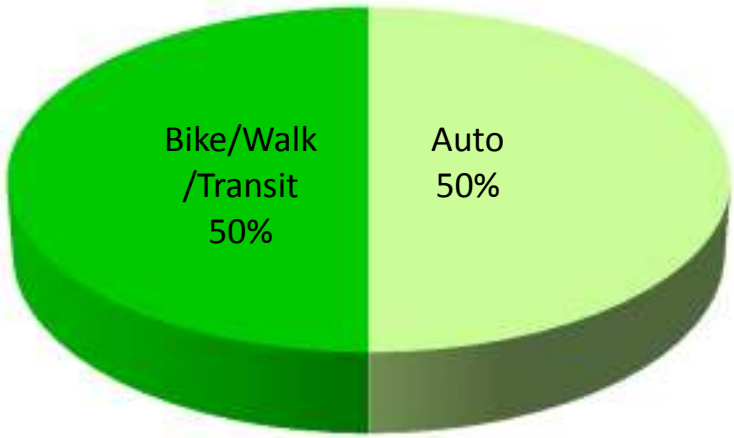

Walk
Bicycle
Public & Private Transit
Bicycle Share
SFMTA
Municipal Transportation Agency
Rideshare
Paratransit
Carshare
Taxi
Park
Drive
Commercial

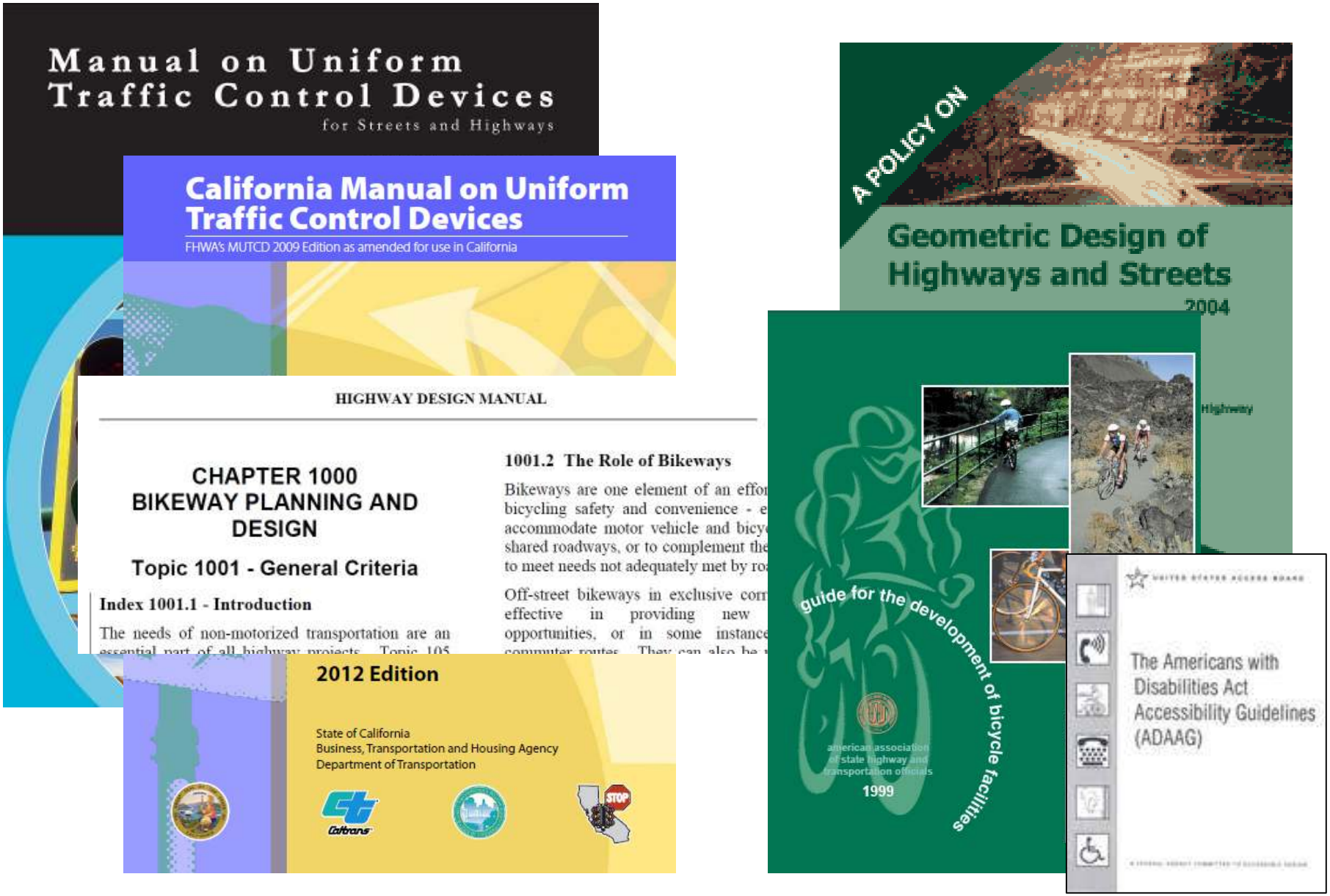
GOAL 2: Make transit, walking, bicycling, taxi, ridesharing and carsharing the preferred means of travel

**2012**




**2018**



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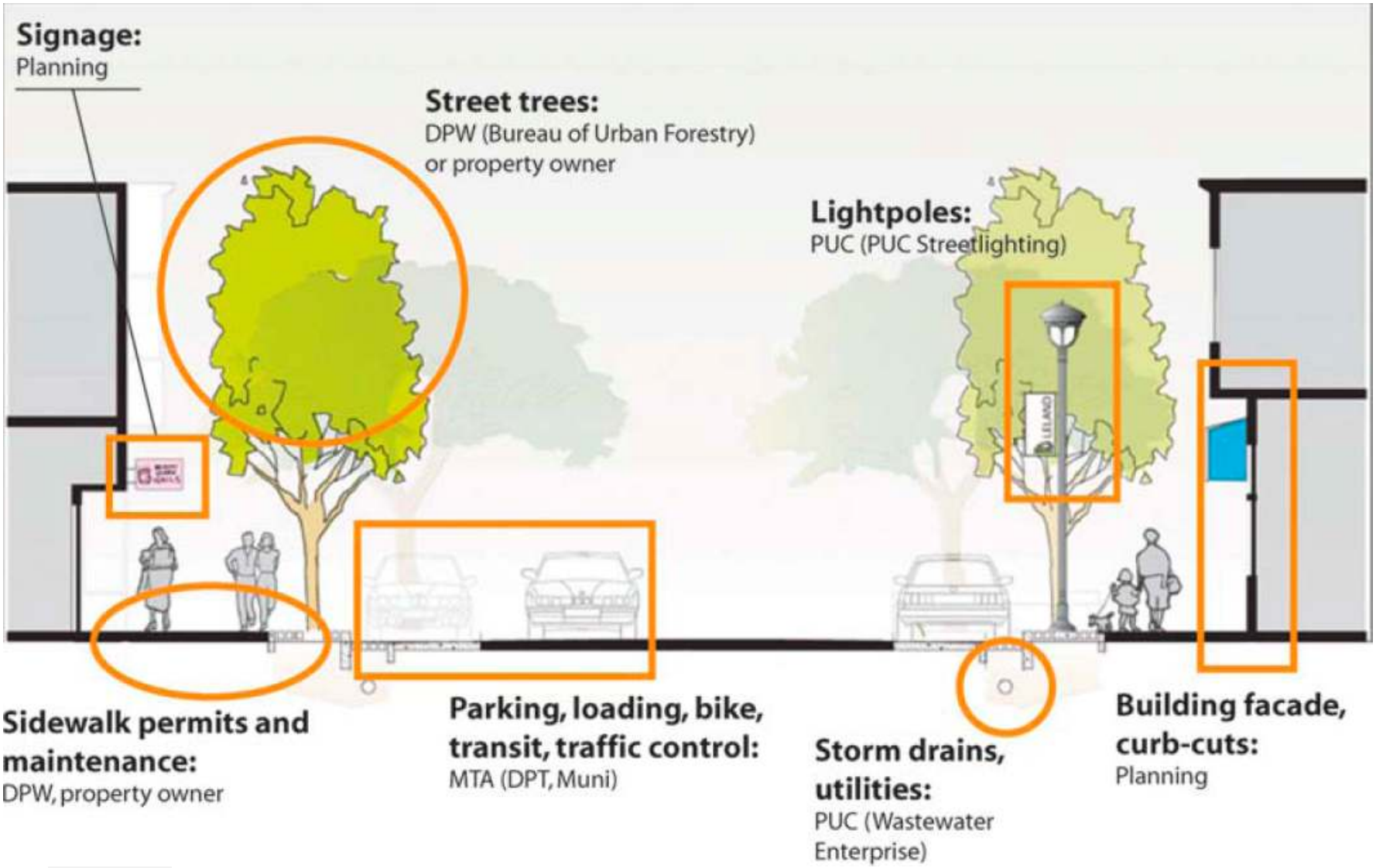
## Design Guidance

- Better Streets Plan
  - Standards for street design & maintenance
  - Framework for implementation
  - Citywide ‘cookbook’ for use by all agencies






- Need for Agency Coordination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## BSP Before

# Redesign of a Neighborhood Street


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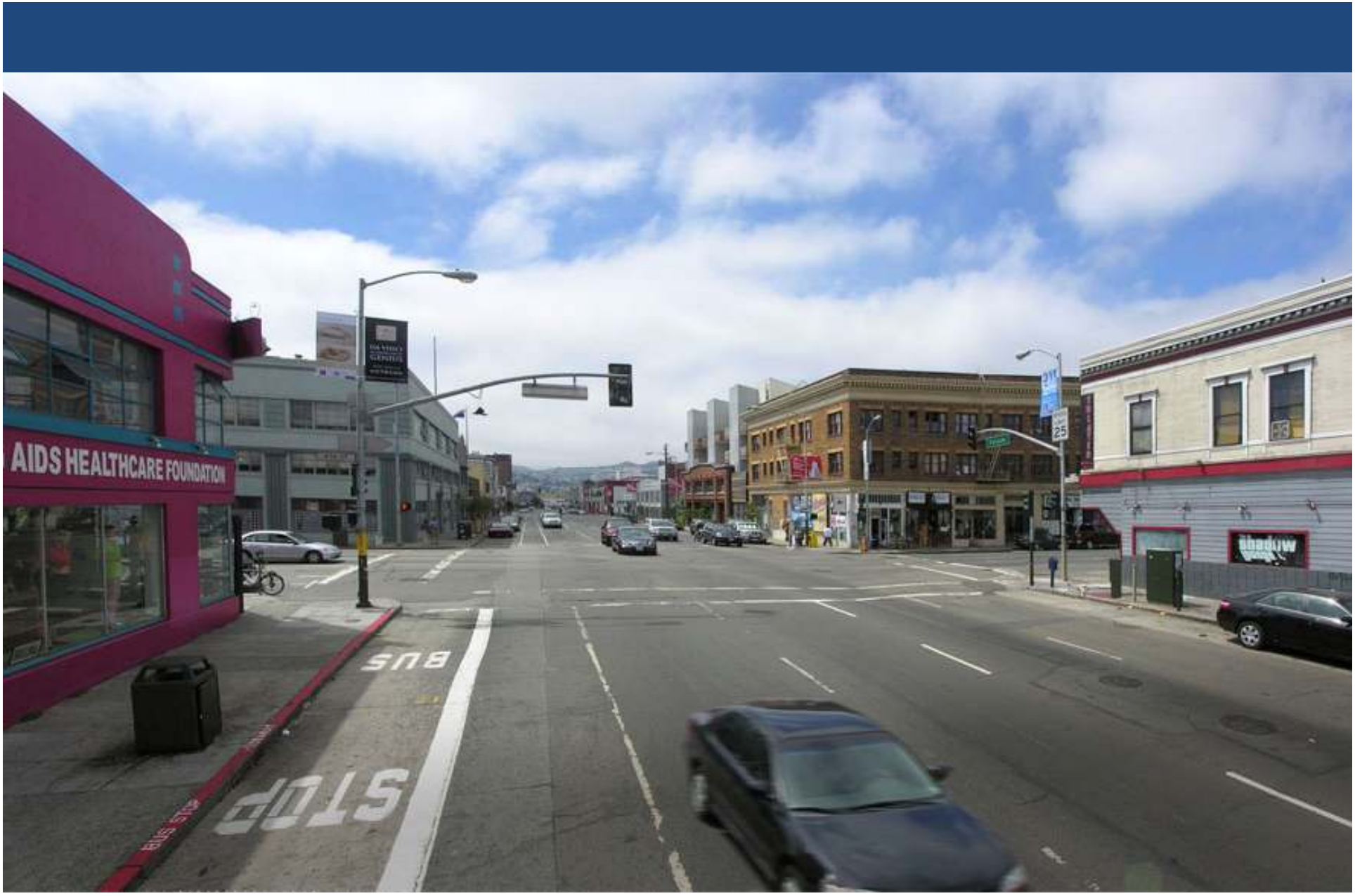
**BSP After (Credit: CD+A)**

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# Making a “Greener” Complete Street


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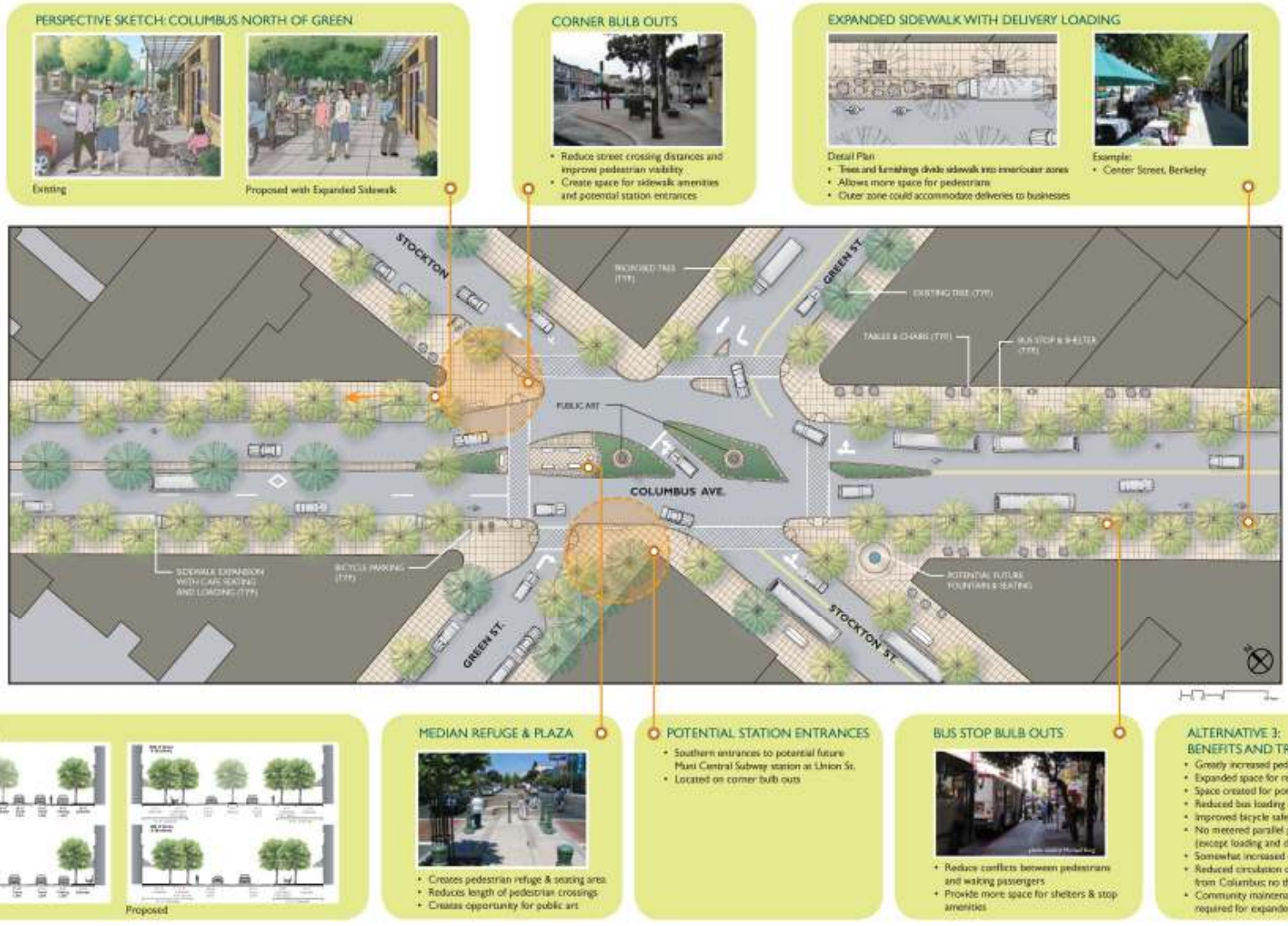
Credit: CD+A

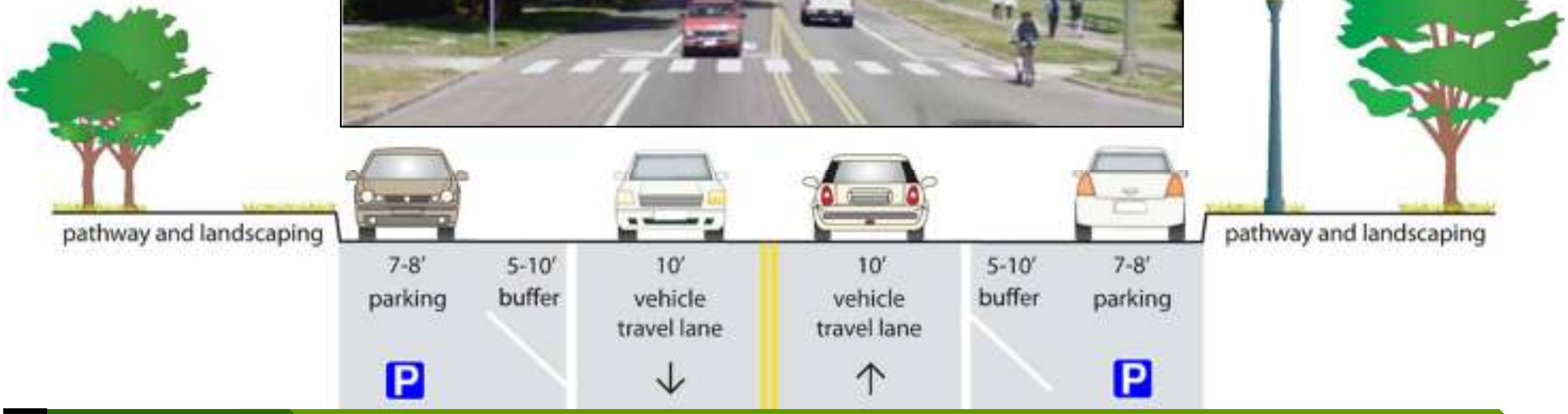

SFMTA

Credit: CD+A

# PSR Implementation



# Innovation Case Study:  JFK Drive

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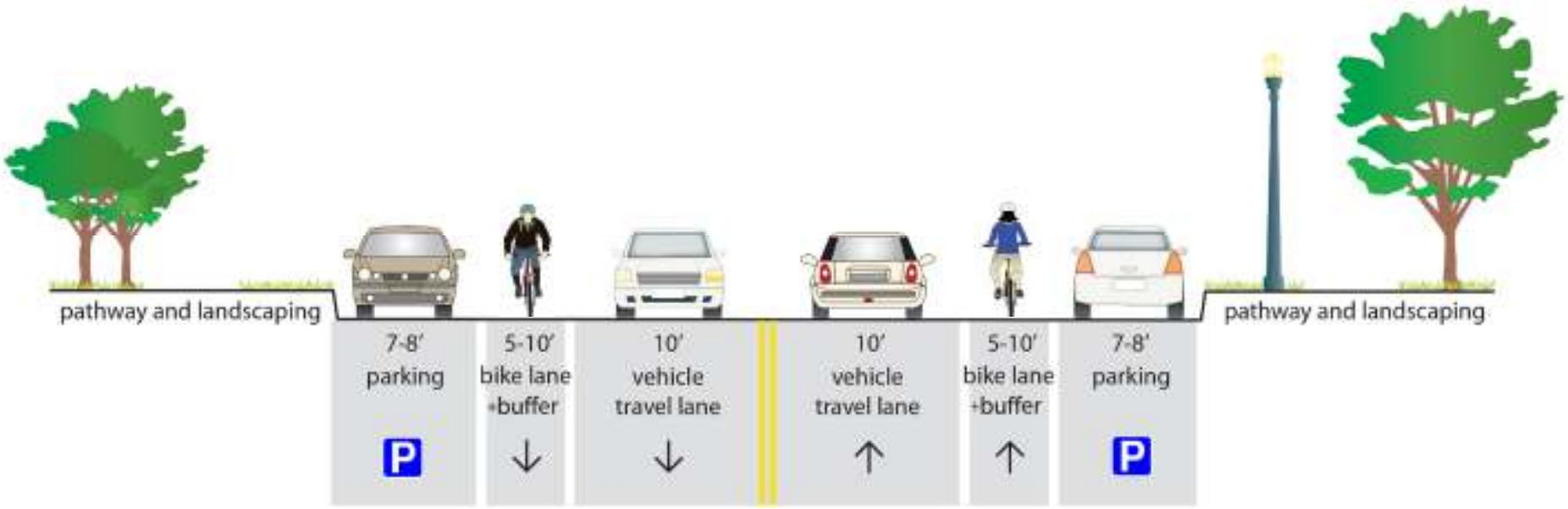
**Existing Conditions**

# Original Bike Lane Proposal

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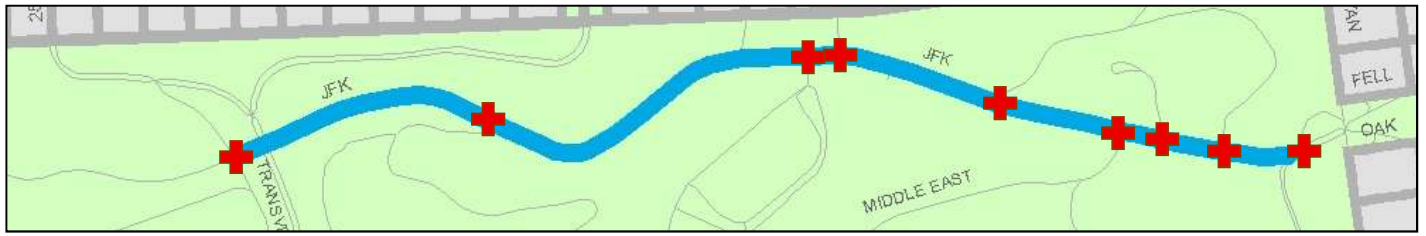
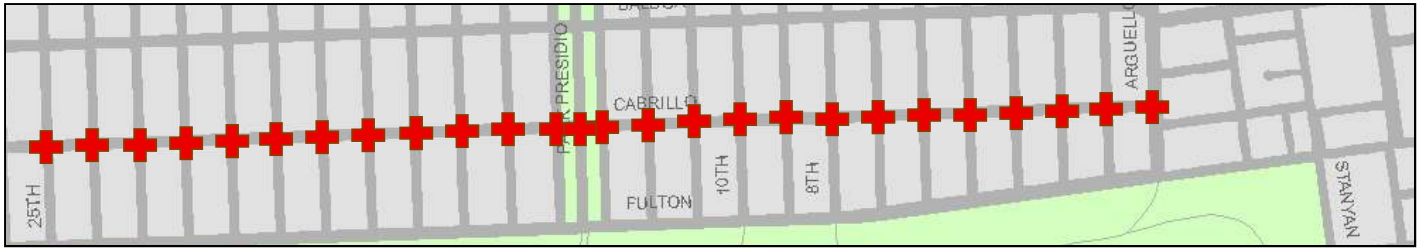
**Typical Bike Lane Next to Narrow Travel and Parking Lanes**

# What should we do differently?

# Why a Cycle Track on JFK?

1.5 miles of JFK – 9 intersections within proposed project area




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

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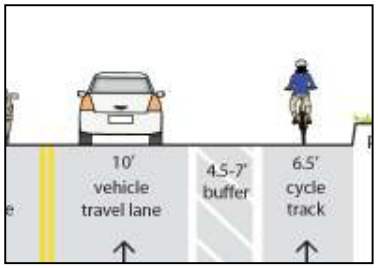
Image credit:  San Francisco Bicycle Coalition

# Project Design Goals

3 design goals emerged from stakeholder and community input:



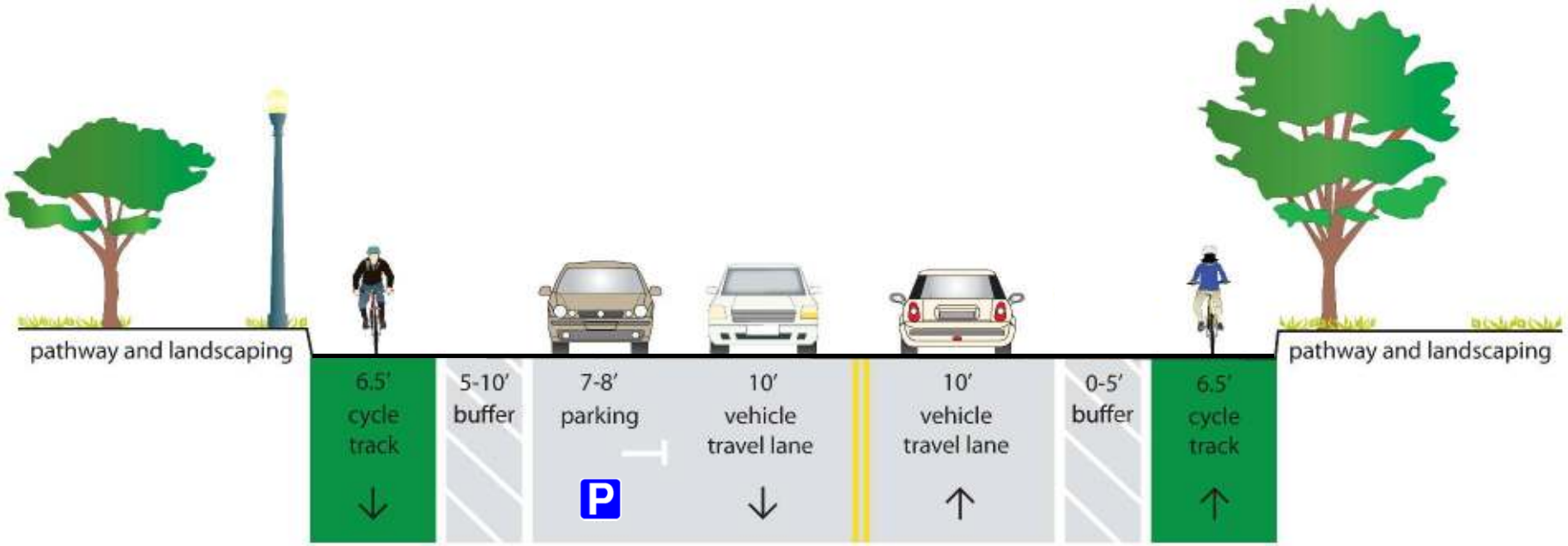

Provide continuous buffer between moving vehicles and cycle track
(Survey Results & Comments)


Maintain blue zones
(Accessibility Community)

Maintain parking near major institutions
(Park Institutions)

# One-Way Cycle Tracks

Potential cross-section

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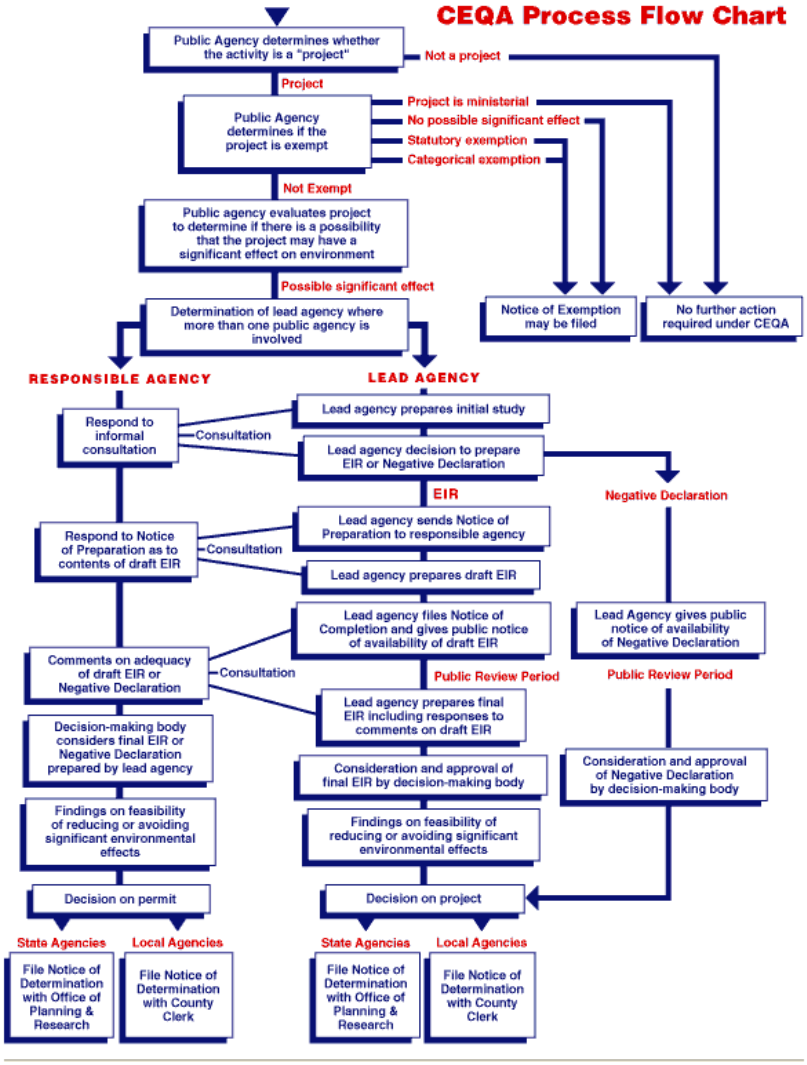
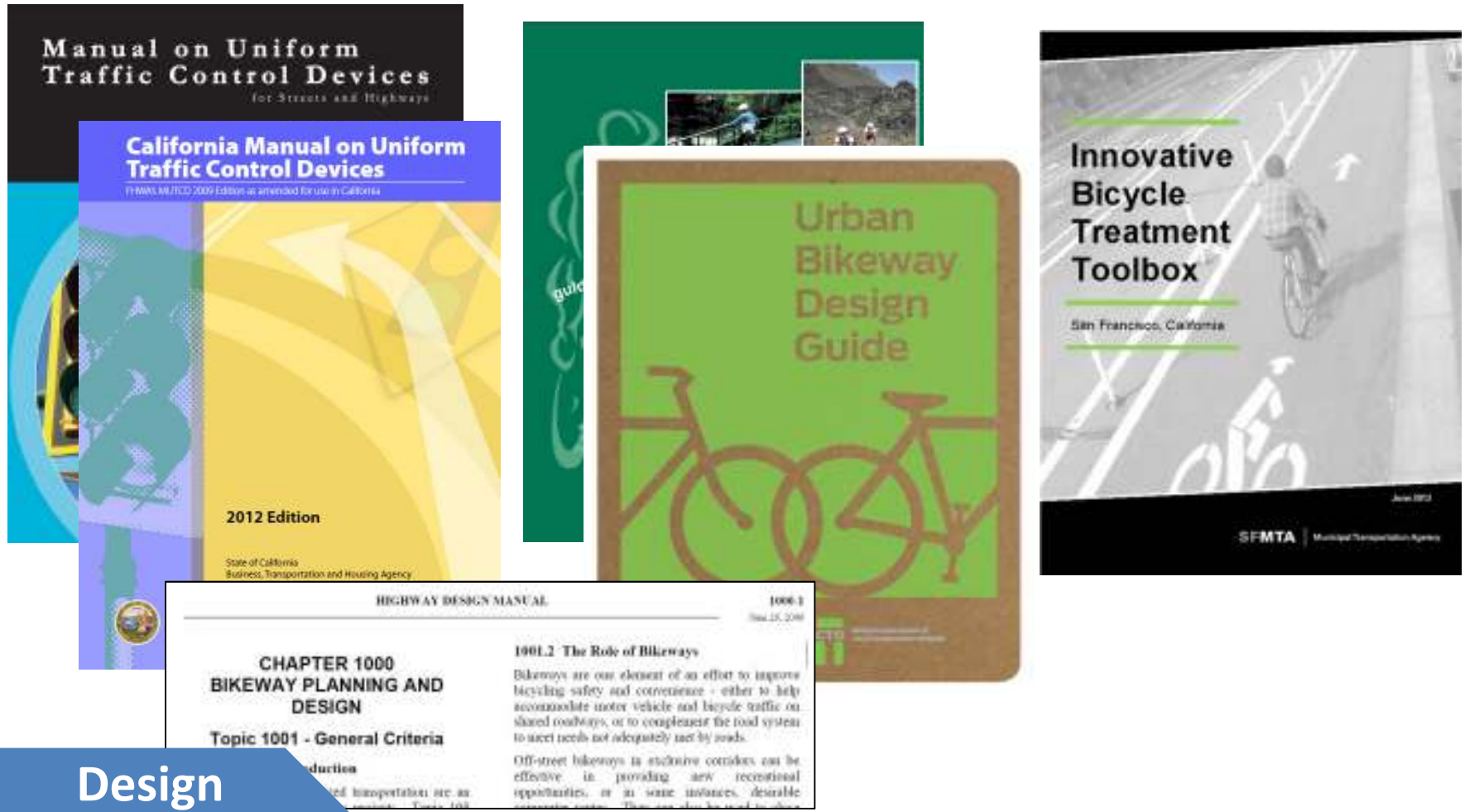
# Public Process

# Challenges:
# State Environmental Review

California Environmental Quality Act (CEQA): requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

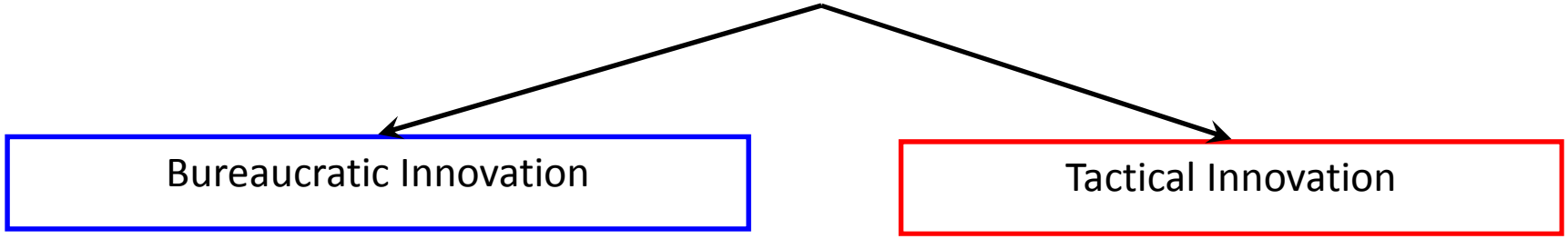


# Current Bikeway Design Guidance




SFMTA **Design Process**

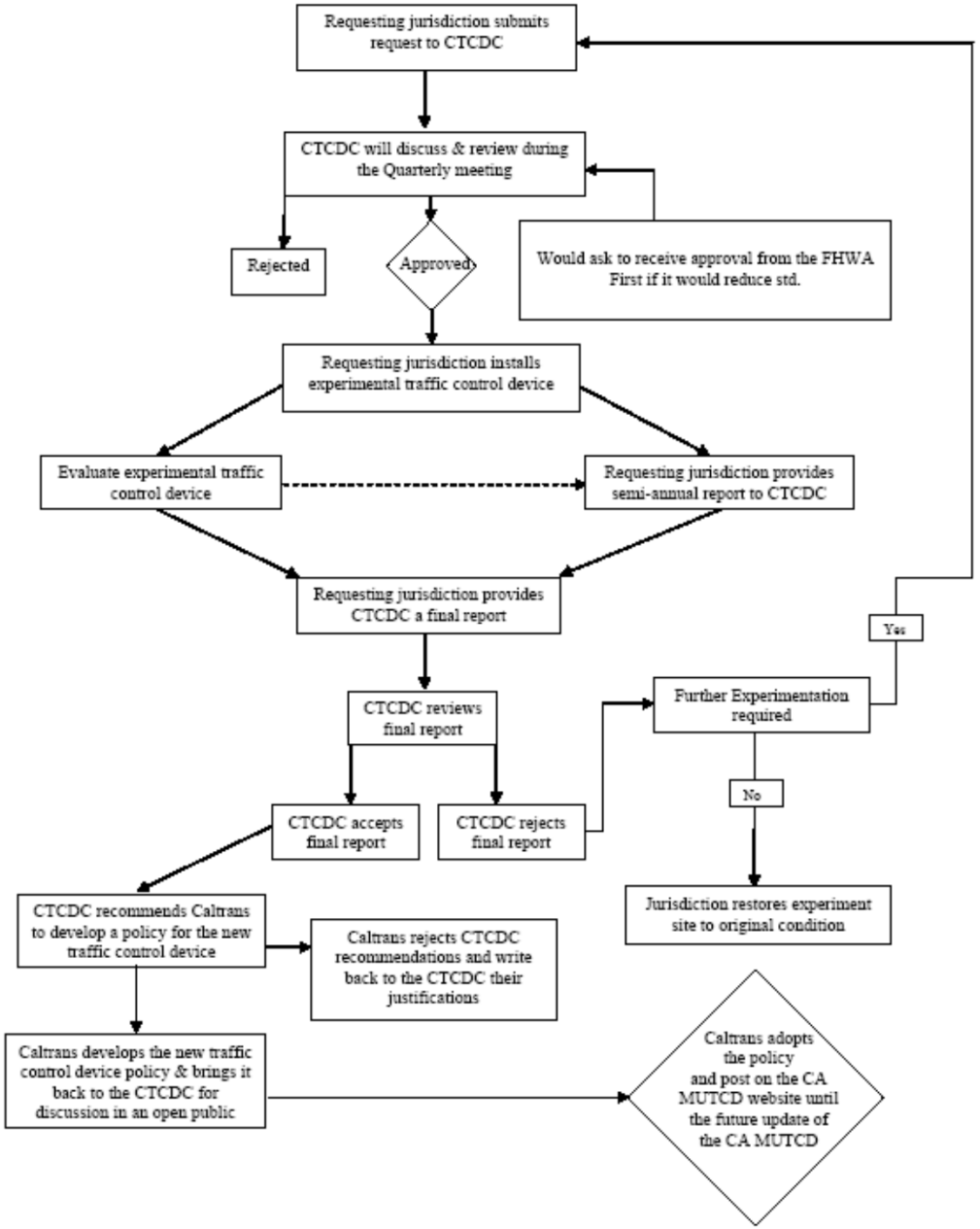
# Strategies for Innovation




- Formal, regimented process
- Outcome unknown
- Benefits:
  - Philanthropy
  - Liability
  - Scope Control

- Work around existing standards
- Quicker
- Pave the way for changing the standards in the future
- Useful when lots of other cities are already doing similar work

State Process for requesting and conducting experimentations for new traffic control devices…



State Process for requesting and conducting experimentations for geometric designs…

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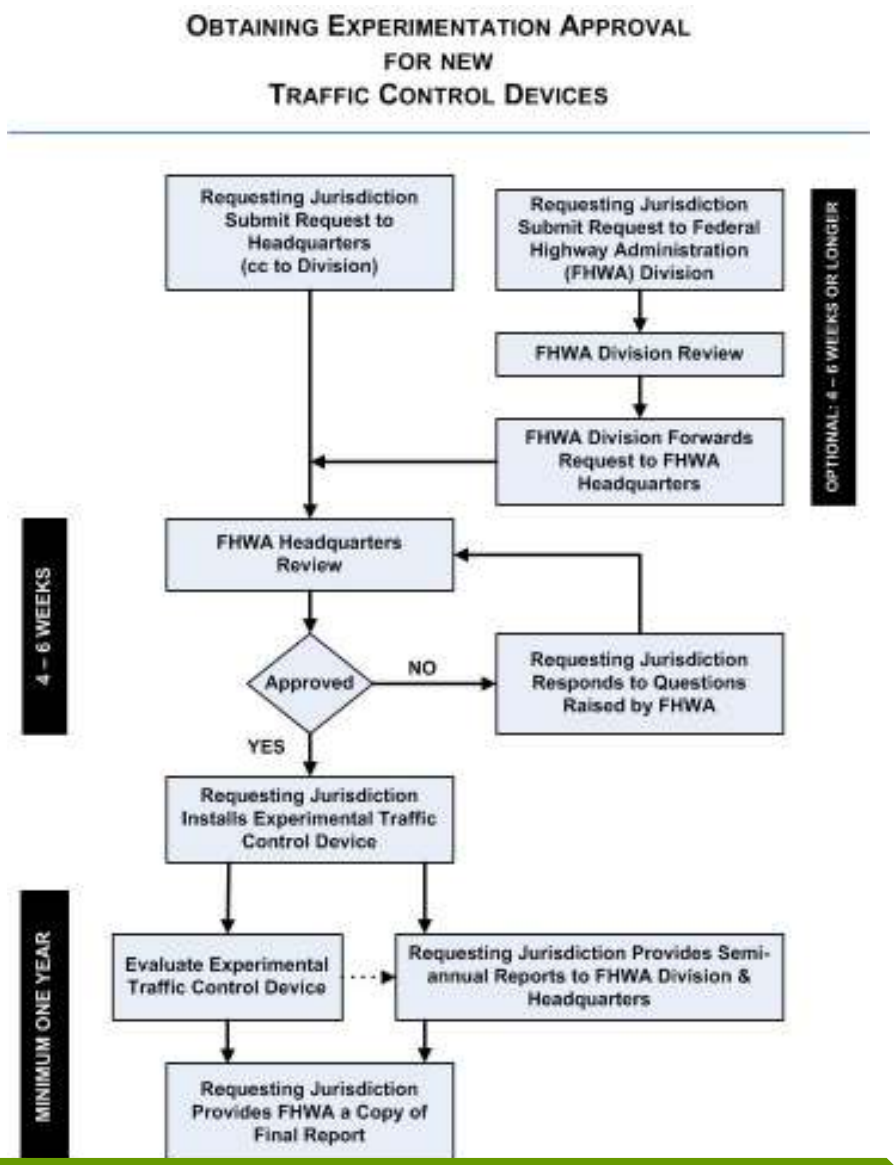
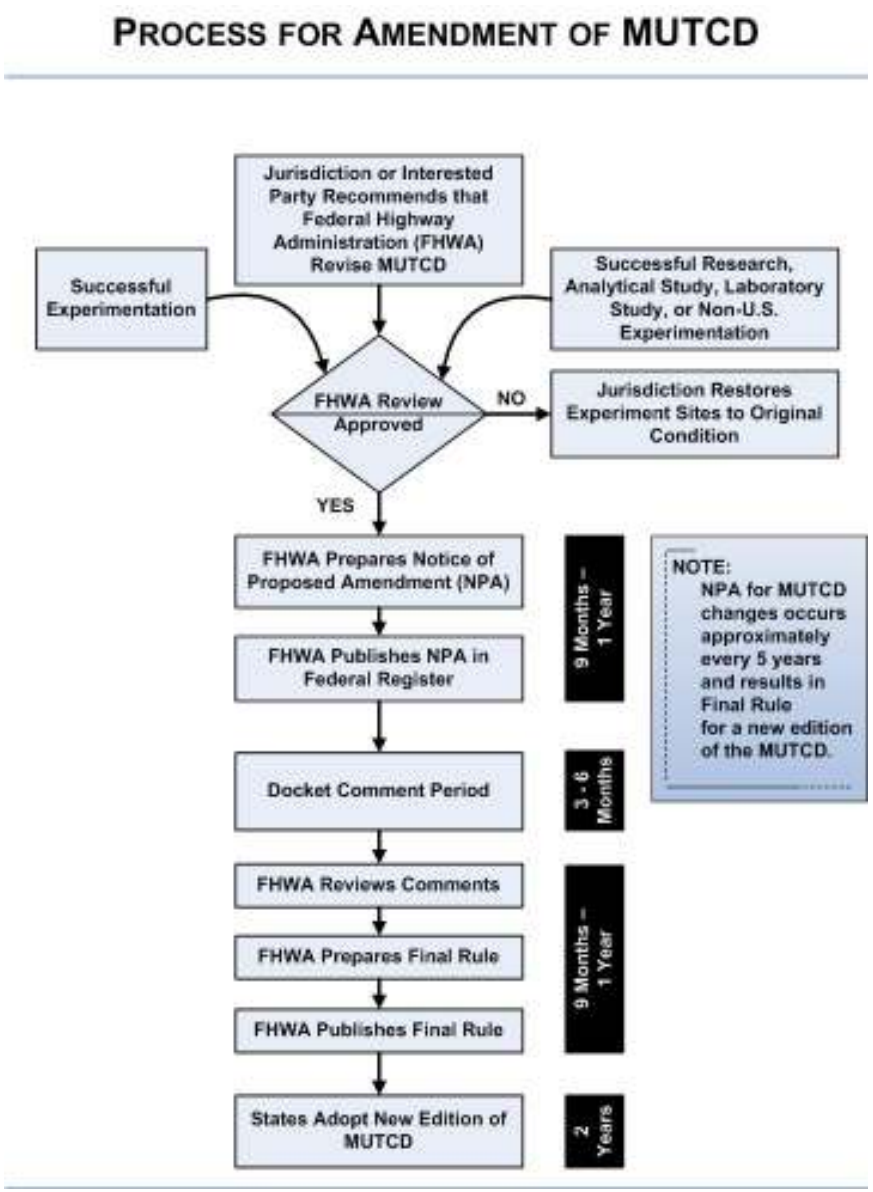
New legislation will establish new process

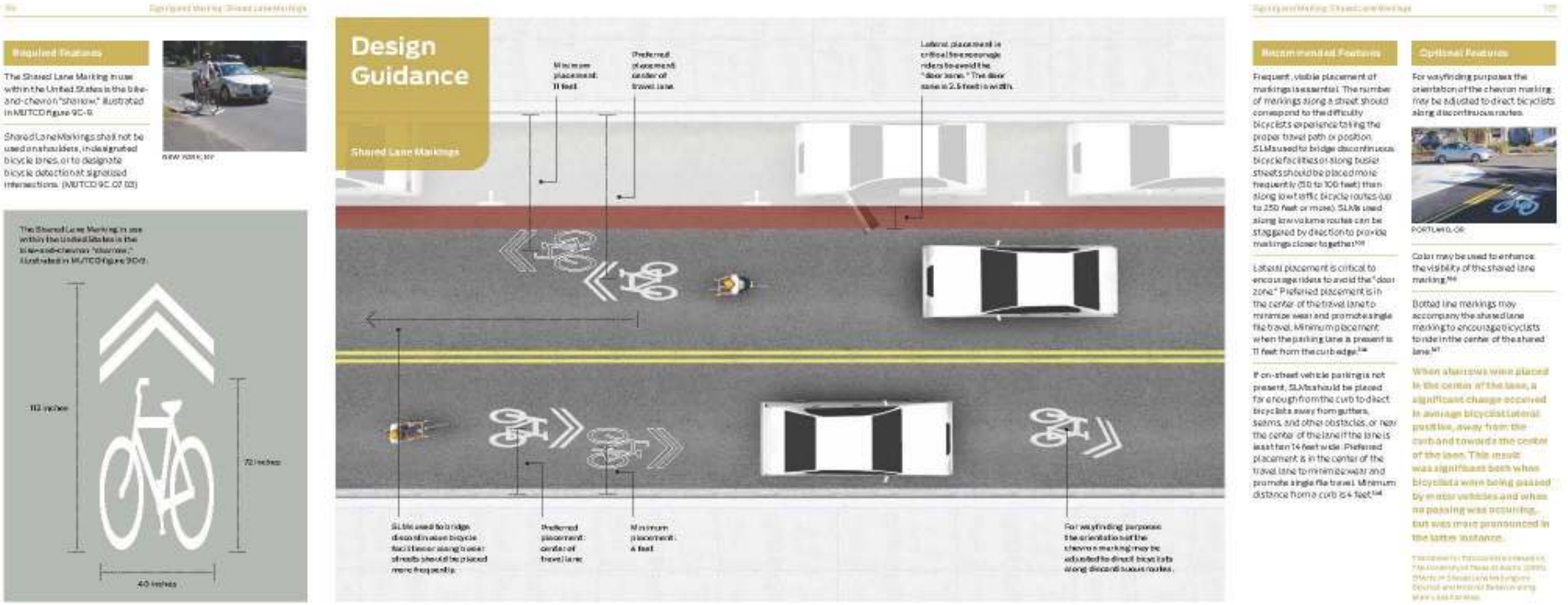
Federal process for requesting and conducting experimentations for new traffic control devices…



# Process for Amendment of MUTCD…



# SHARED LANE MARKINGS




**Cost: $300K plus another $250K in staff time**

Tactical approach…

- Research
- Engineering Judgment
- Memo to file
- Before/After Studies
- Develop Local Guidelines
- (Share Experience)

# Innovative Bicycle Treatment Toolbox

San Francisco, California

June 2012

SFMTA | Municipal Transportation Agency

## DOOR ZONE TREATMENTS

**Locations:** Mid-Block Section

**Problem:** Cyclists riding in the "door zone"

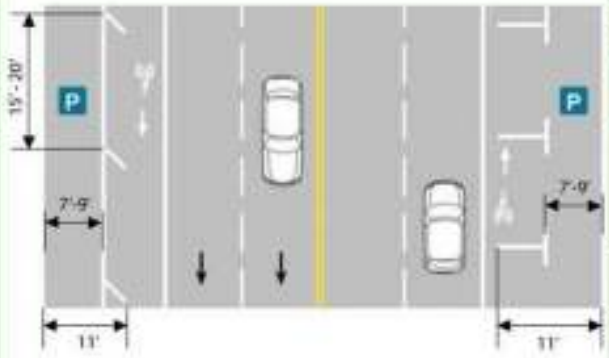
### Purpose of treatment

These treatments can potentially reduce collisions between cyclists and the opening doors of parked cars by passively encouraging cyclists to ride in the portion of the bike lane that is furthest from parked cars.

### Prioritization

Extended parking Ts can be added to streets where a bike lane is adjacent to parking that is delineated by parking Ts. Cross hatching can be added where a bike lane is adjacent to undelineated parking. Priority should be given to streets where the parking lane is less than 9' in width, where there is high parking turnover or where large vehicles are expected. Collision data should be used to further prioritize locations with historical doorings.

### Sample Diagram




### Design Features

Door Zone Cross Hatching (use where parking is not delineated):

- Cross Hatching should be installed at the edge of the parking lane, roughly 7'-9' from the curb.
- The cross hatching marks should be 4' thick, extending at a 45 degree angle into the bicycle lane. The end of the cross hatch should be 11' from the curb, regardless of the width of the parking lane.
- The hatch marks can be 15'-20' apart where there is parking.

Extended Parking Ts (use where parking is delineated):

- Parking Ts should be installed at the edge of the parking lane, roughly 7'-9' from the curb.
- The stem of the parking T which extends into the bike lane should end 11' from the curb, regardless of the width of the parking lane.

### Design References and Discussion

- Section 22517 of the California Vehicle Code states that "No person shall open the door of a vehicle on the side available to moving traffic unless it is reasonably safe to do so and can be done without interfering with the movement of such traffic." While illegal, "dooring" still poses a significant threat to cyclists and is the third leading cause of bicycle injury collisions in San Francisco.
- A study conducted by the SFMTA in 2006 found that only 14% of cyclists ride within the door zone when 4' extended parking T's are present, compared to 24% of cyclists riding in the door zone when parking T's were the standard length of 2'.
- This treatment is recommended by the American Association of State Highway and Transportation Officials in its 2010 Draft Guide for the

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**Cost: $97K**

| Necessary Approvals | Obstacles to implementation |
|---|---|
| • Applying extended parking Ts or crosshatching requires internal review within the SFMTA. | • No significant obstacles to implementation. |

| Relative Cost of implementation | Maintenance considerations |
|---|---|
| • Very low cost of implementation, particularly if paired with new or restriped bike lane or parking Ts. | • Maintenance requirements on par with bicycle lanes and other striping. |

**References**


- Bike Lanes and Car Doors, Details for Designers. SFMTA Presentation at Pro Walk/ Pro Bike, 2008.
- 2008 Bicycle Collision Report. SFMTA, 2008.
- Draft Guide for the planning, Design and Operation of Bicycle facilities, American Association of State Highway and Transportation Officials, 2010.
- California Vehicle Code, Section 22517.
- SFMTA Door Zone Study, 2012 (Currently in draft form)


Example of a crosshatch application on Polk Street in San Francisco, California

**Example Cities**

- San Francisco, California
- Minneapolis, Minnesota

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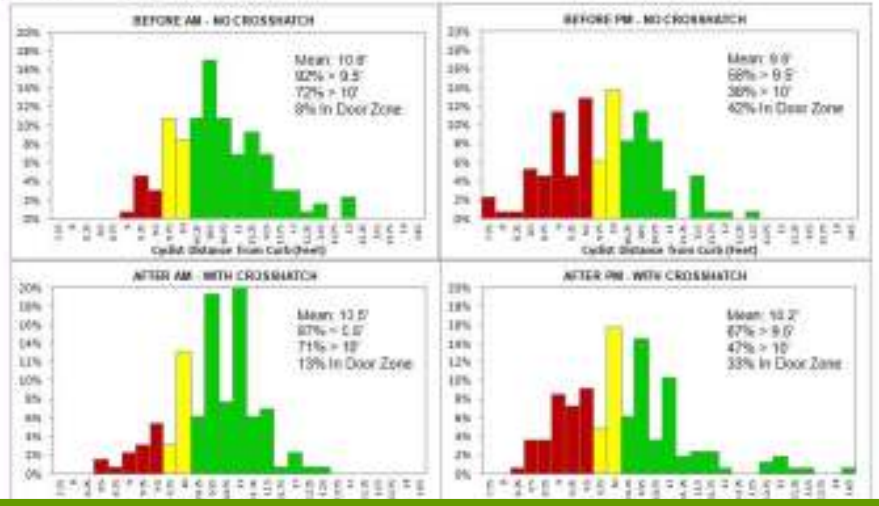
# Door zone treatments

| DOOR ZONE TREATMENTS: CASE STUDY | Location: 17th Street from Dolores Street to Guerrero Street |
|---|---|
| | Year Completed: 2011 |

| Project Description | |
|---|---|
| Crosshatch markings were installed on one block of bike lanes on 17th street between Dolores Street and Guerrero Street as a trial. | |
| **Size** | **Public Outreach** |
| One-eighth mile, both sides of the street | No public outreach was conducted either in selecting the site or rolling out the changes. |
| **Cost of Implementation** | **Environmental Clearance** |
| Estimate: $800 | No environmental clearance was needed. |

**Evaluation**

Before and after data was collected on cyclist position (number of feet from the curb) to assess this trial installation. SFMTA staff marked off six-inch increments and took photographs of passing bicyclists in each direction, before and after installation. Before the treatment was installed, 42% of observed bicyclists rode in the door zone in the uphill direction (westbound/PM direction) and 8% of observed bicyclists rode in the door zone in the downhill direction (eastbound/AM direction). After the treatment was installed, fewer bicyclists rode in the door zone in the uphill direction – only 33%. Slightly more bicyclists rode in the door zone in the downhill direction, however, the result in the downhill direction was a minor change and was not statistically significant. The graphs below show a more detailed analysis.



Before Photo

After Photo

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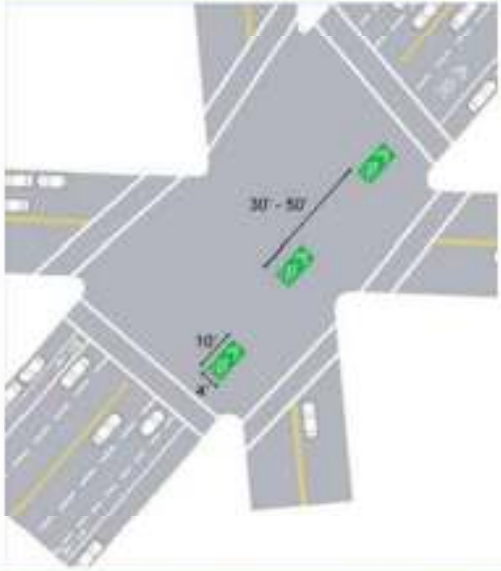
# Door zone treatments

# Dooring Treatments and Intersection Designs

| INTERSECTION GUIDE MARKINGS | **Locations:** Intersections |
|---|---|
| | **Problem:** Conflicting intersection movements |

| Purpose of Treatment | Prioritization |
|---|---|
| This treatment uses pavement markings to provide positioning and wayfinding guidance to cyclists who may not know the best way across the intersection or along their route. This treatment also makes cyclists' positioning in an intersection more consistent and predictable for all road users. | Guide markings may be used at intersections along the bike route network with unique geometry, and where there are conflicting intersection movements such as complex merges and weaves, or to indicate where a bicycle route continues. |

## Sample Diagram




## Design Feature

- This treatment consists of pavement markings placed across an intersection within the cyclists' path of travel.
- Green-backed sharrows are used through the intersection to show cyclists where to position themselves to reach the bicycle lane or bicycle route across the intersection.
- Green-backed sharrows are made of green thermoplastic with a white methacrylate shared roadway symbol, as shown. The green backing is 4 feet by 10 feet.
- Green-backed sharrows can be spaced every 30 to 50 feet, depending on the size and complexity of the intersection.
- Bicycle guide markings should not infringe on the pedestrian crosswalk.

Note: For some large or offset intersections, the level of guidance provided by green-backed sharrows may be more than is required. When there are no merges or weaves between bike lanes and vehicle lanes, engineers should first consider using a Detail 40 or an 8" solid white line as a guideline to aid cyclists and motorists through the intersection.

## Design References and Discussion

- This treatment is not explicitly described in the California MUTCD nor the Highway Design Manual. However, shared roadway markings are approved traffic control devices, which are used to "assist bicyclists with lateral positioning" (CA MUTCD 2012, Section 9C.07). The SFMTA believes that the treatment is within the spirit and intent of these guidelines.
- Section 3.4.3 of the AASHTO 2010 Draft Guide recommends measures which can help positioning and conspicuity of bicyclists at intersections to mitigate potential conflicts between cyclists

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# Green-backed sharrows

| Necessary Approvals | Obstacles to Implementation |
|---|---|
| • Installation of intersection guide markings will require internal SFMTA review to examine potential impacts to transit and other street users.<br>• Review by other city departments via the Transportation Advisory Staff Committee (TASC) may also be required, as determined by the City Traffic Engineer. | • Existing intersection lane guide markings and light rail vehicle tracks may complicate the addition of bicycle intersection guide markings in some cases. |

| Relative Cost of Implementation | Maintenance Considerations |
|---|---|
| • Because of the use of green thermoplastic, intersection markings are more expensive than markings using paint only. However, this treatment is inexpensive compared to treatments that involve changes to the curbs. | • The placement of guide markings within an intersection makes them very susceptible to wear. Placement outside of the automobile wheel base could extend the life of pavement markings within an intersection. |

## References


- City of Minneapolis Bicycle Facility Manual; Minneapolis; 2009.
- AASHTO, Guide for the Planning, Design, and Operation of Bicycle Facilities, 2010 Draft.
- National Association of City Transportation Officials Urban Bikeway Design Guide; 2011.


Intersection guide markings at Market Street and Van Ness Avenue in San Francisco, California showcyclists where to position themselves to cross the vehicle path of travel to the center running bicycle lane on the far side of the intersection.

## Example Cities

- San Francisco, California
- Washington DC
- Montréal, Canada
- Paris, France
- Berlin, Germany
- Tokyo, Japan

Intersection guide markings at the intersection of Steiner Street and Water Street in San Francisco, California guide cyclists along the

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# Green-backed sharrows

## INTERSECTION GUIDE MARKINGS: CASE STUDY

**Location:** Market Street between South Van Ness Avenue and 11th Street

**Year Completed:** June, 2011

### Project Description

This treatment was installed on eastbound Market Street between South Van Ness Avenue and 11th Street to help guide bicyclists through a merge, enhance the visibility of existing shared lane markings, and increase the predictability of bicycle positioning. Seven standard sharrows were painted along this conflict zone in March 2010. In June 2011, the SFMTA replaced the seven sharrows with sharrows painted over green retroreflective thermoplastic.

### Public Outreach

No public outreach was conducted either in selecting the site or rolling out the changes.

### Size

400 Feet; 40 square feet per sharrow (4' by 10')

### Environmental Clearance

SFMTA Staff submitted a Project Evaluation Form and Abbreviated CEQA Checklist to the San Francisco Planning Department.

### Cost of Implementation

| Costs | Unit Cost* | Number of Green-Backed Sharrows | Total Cost |
|---|---|---|---|
| Materials | ~$260 | 7 | ~$1,820 |
| Labor | ~$568 | 7 | ~$3,976 |
| Total | ~$828 | | ~$5,796 |

*Note: The unit costs are based on a more recent installation of green sharrows.

### Evaluation

Cyclist positioning was observed before and after the installation and green-backed sharrows were found to effectively modify bicyclists' behavior. Data collected at eastbound Market Street at South Van Ness Avenue show that bicyclists position themselves closer to green-backed sharrows than they did when the intersection featured standard sharrow markings. The percentage of bicyclists riding over the center sharrow increased after preexisting sharrows at this intersection were replaced by green-backed sharrows.

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# Green-backed sharrows

Before Photo

After Photo

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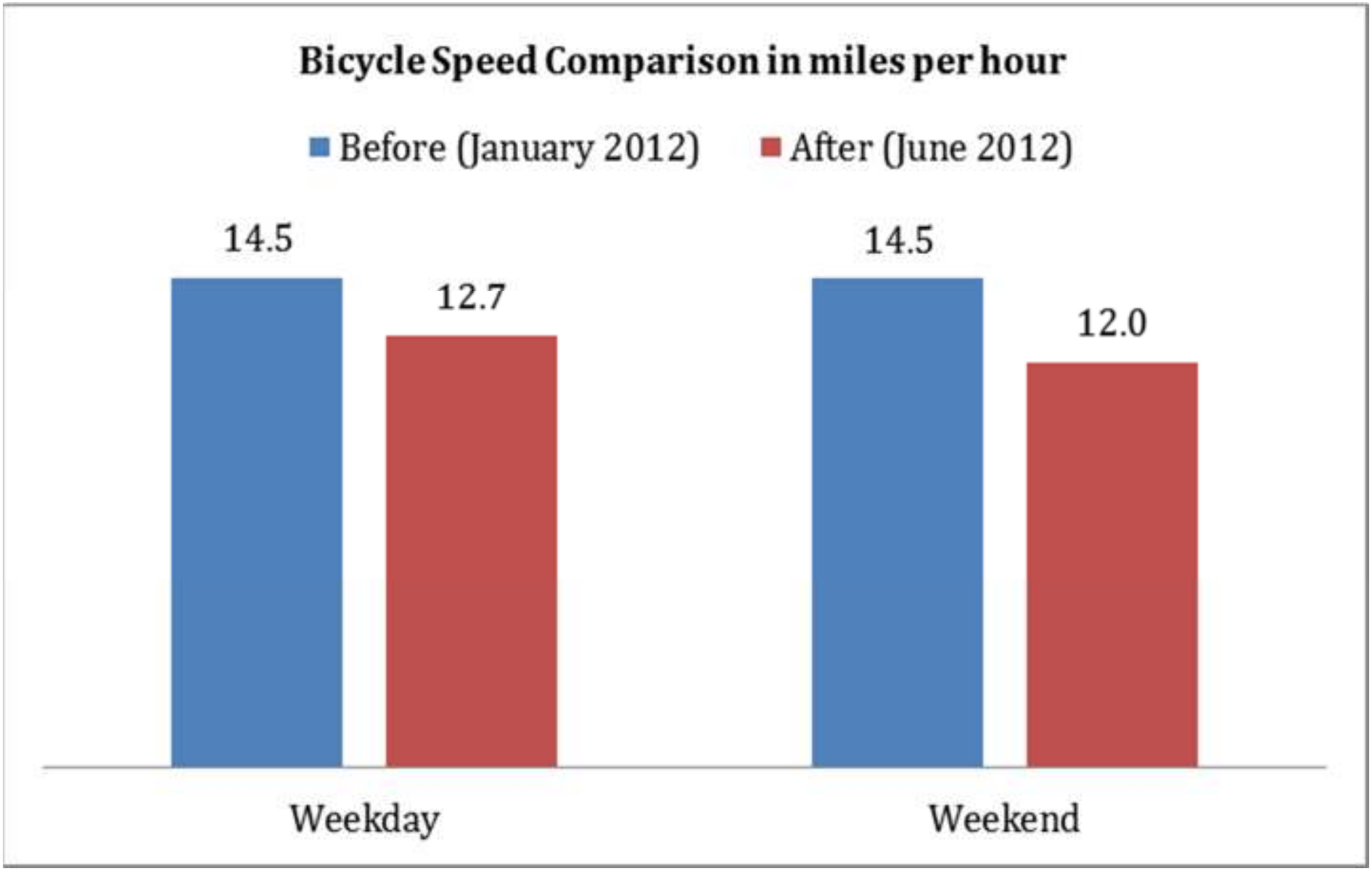
## Green-backed sharrows

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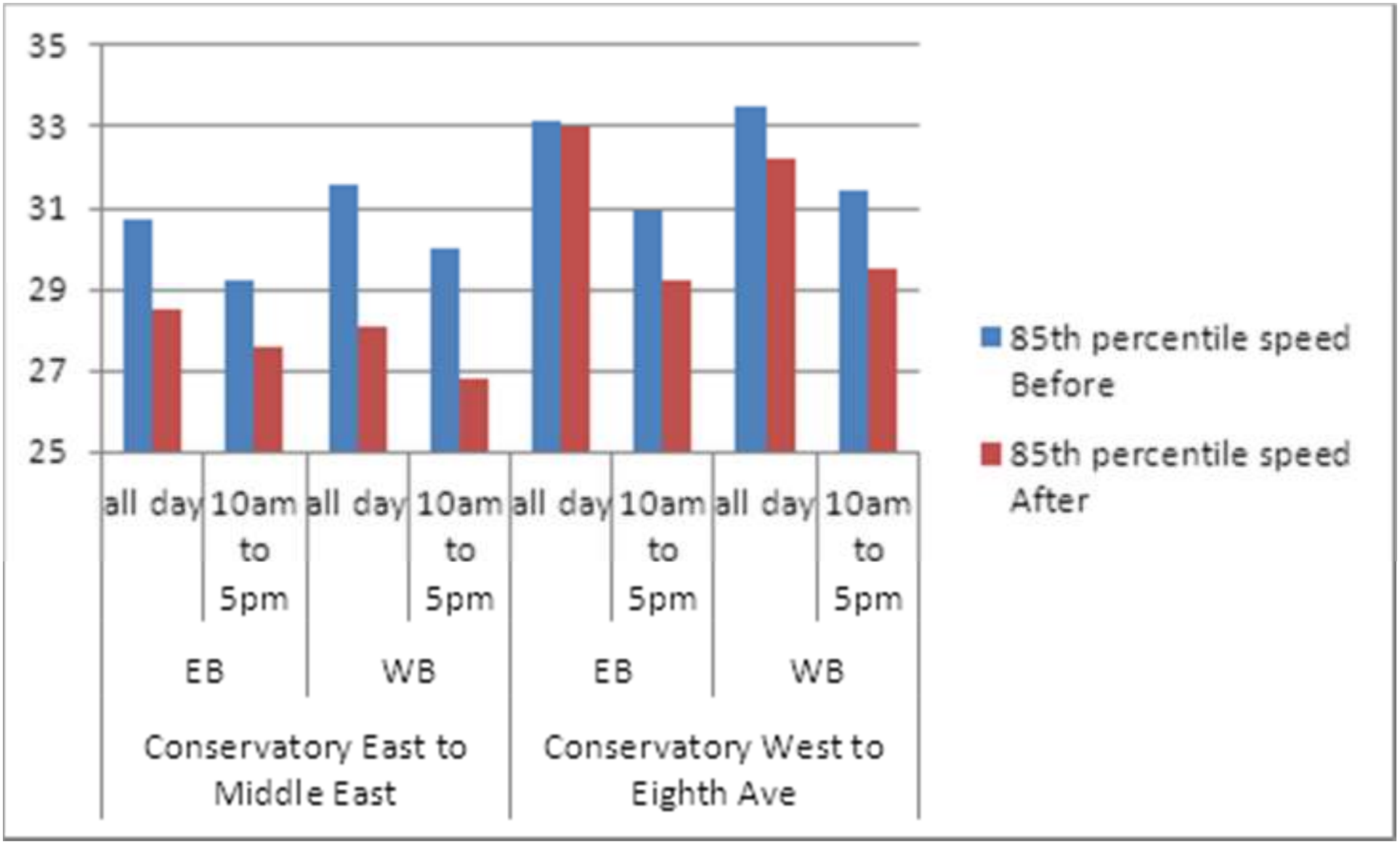
# JFK Drive: Evaluation

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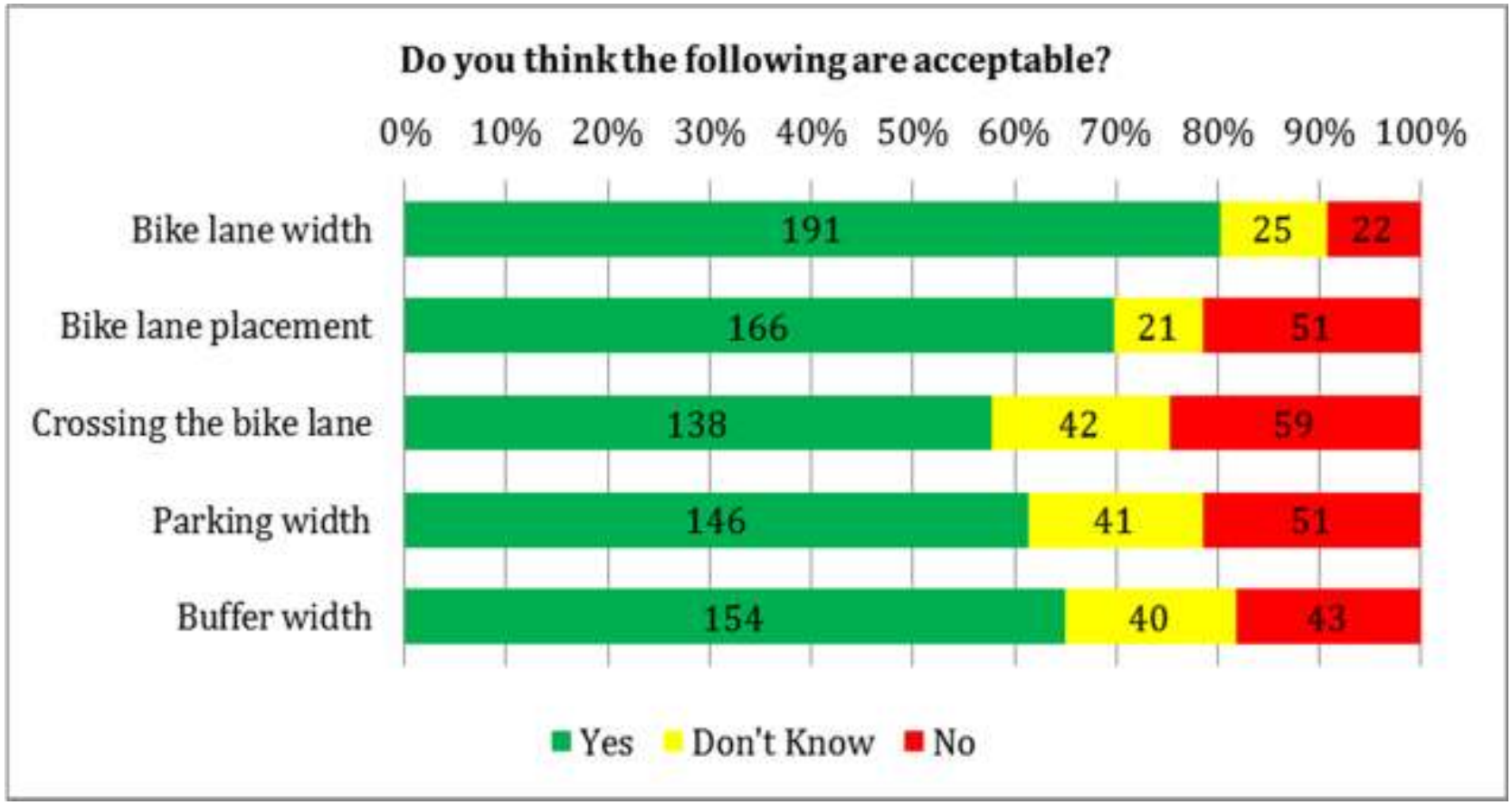
## Conclusion

**Speeds: Both bike and vehicle speeds dropped an average of 2-3 miles per hour**

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# JFK Drive: Evaluation