

DATE 3/6/18



INNOVATIONS IN PROTECTED INTERSECTIONS

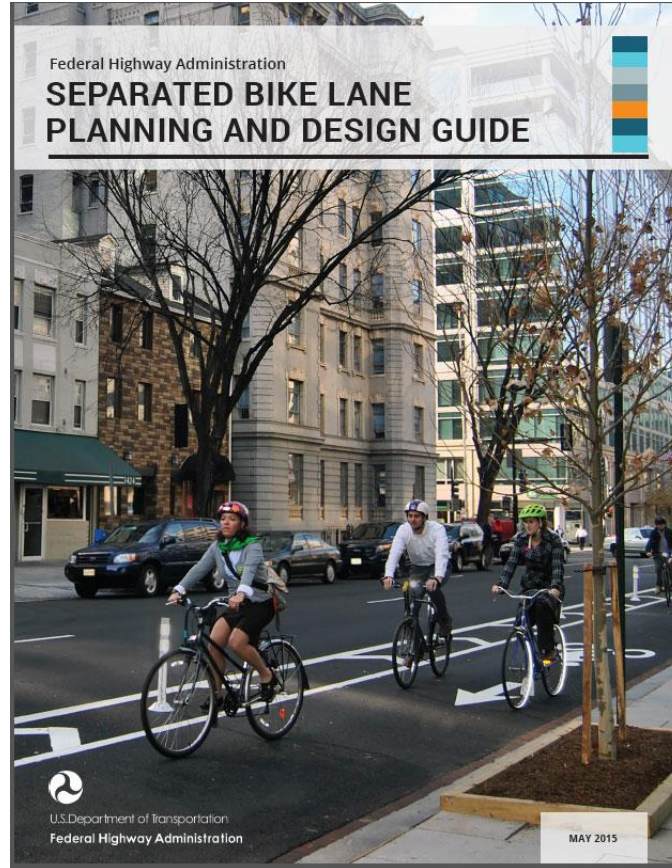
PURDUE ROAD SCHOOL TRANSPORTATION AND CONFERENCE AND EXPO

CONOR SEMLER
KITTELSON & ASSOCIATES, INC
BOSTON, MA

 **KITTELSON**
& ASSOCIATES



Recent Industry-Wide Bicycle Practice



Treating Bikes at Intersections

Figure 25

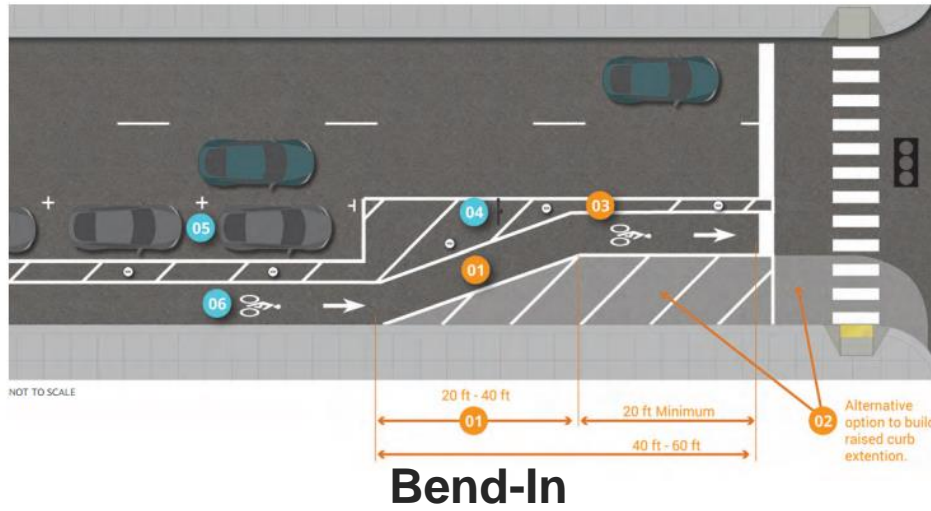
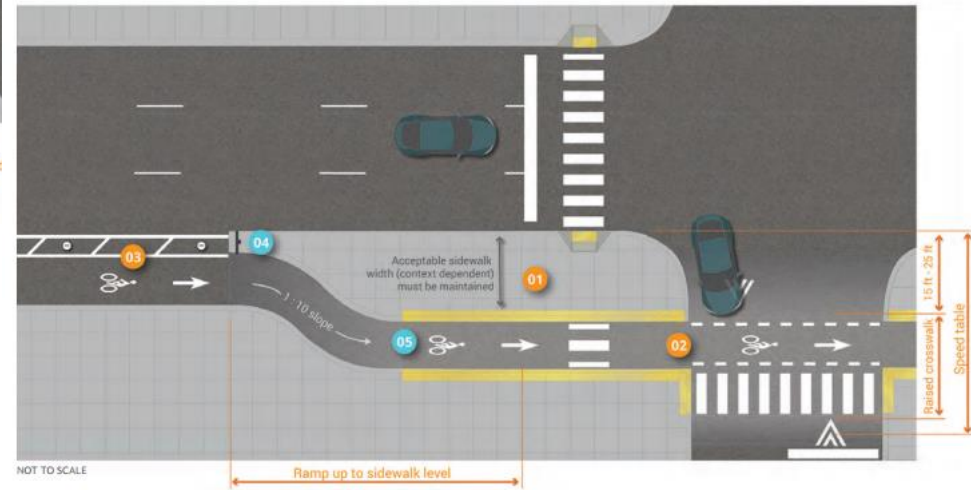
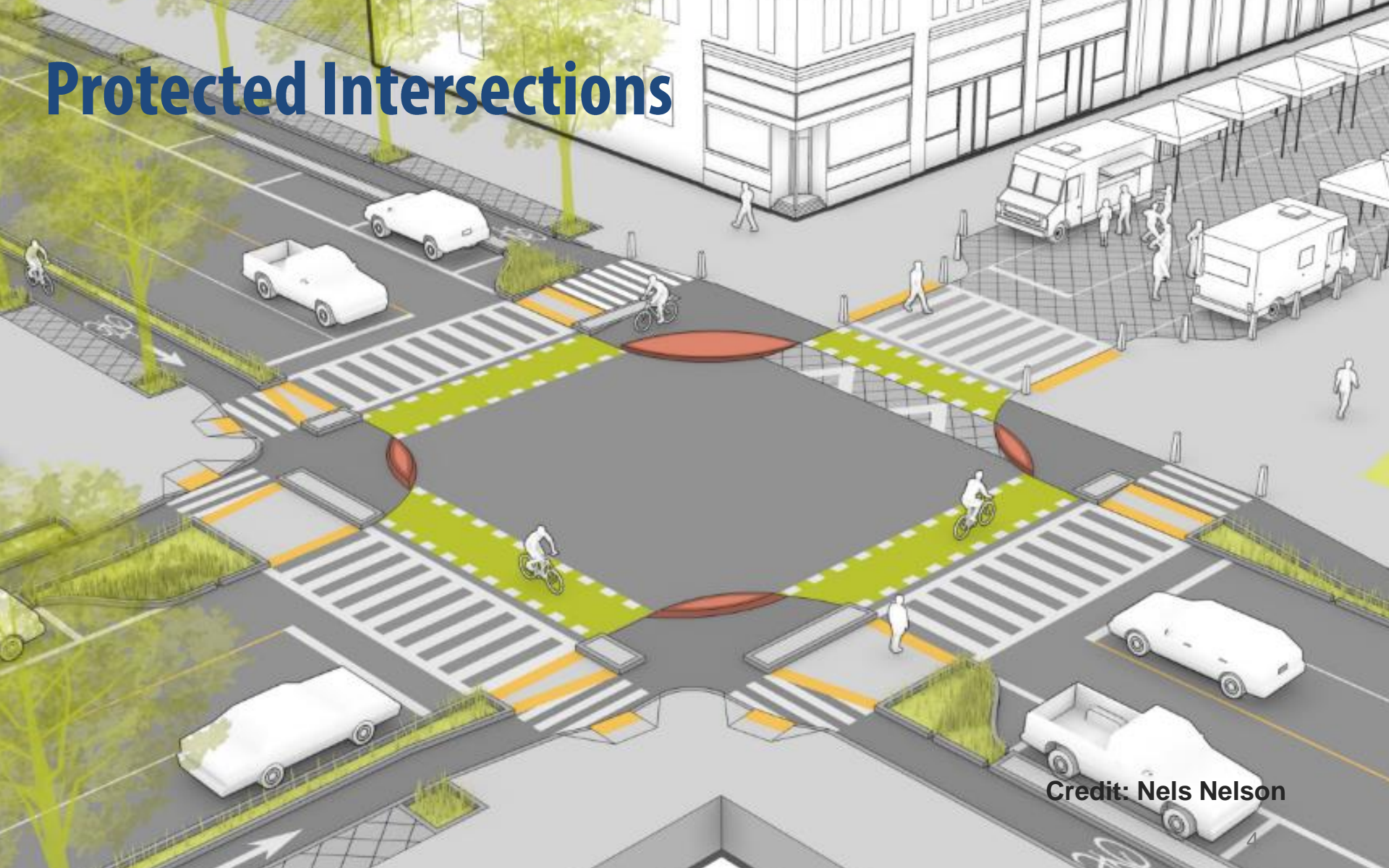


Figure 26



Protected Intersections



Credit: Nels Nelson

Requested by
ASSEMBLY CONCURRENT RESOLUTION NO. 26
1971 REGULAR SESSION

STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

BIKEWAY PLANNING CRITERIA AND GUIDELINES

April 1972

Prepared by
INSTITUTE OF TRANSPORTATION
AND
TRAFFIC ENGINEERING

SCHOOL OF ENGINEERING AND APPLIED SCIENCE
UNIVERSITY OF CALIFORNIA, LOS ANGELES
UCLA-ENG-7224

Reprinted November 1972 by the Federal
Highway Administration, U. S. Department
of Transportation, Washington, D. C.

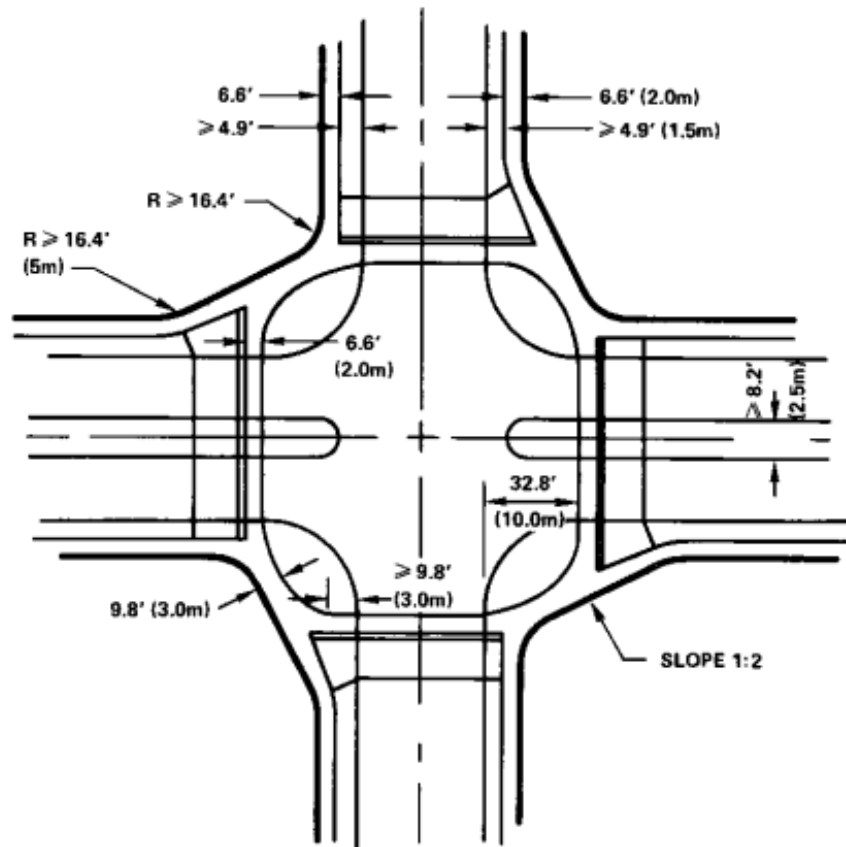
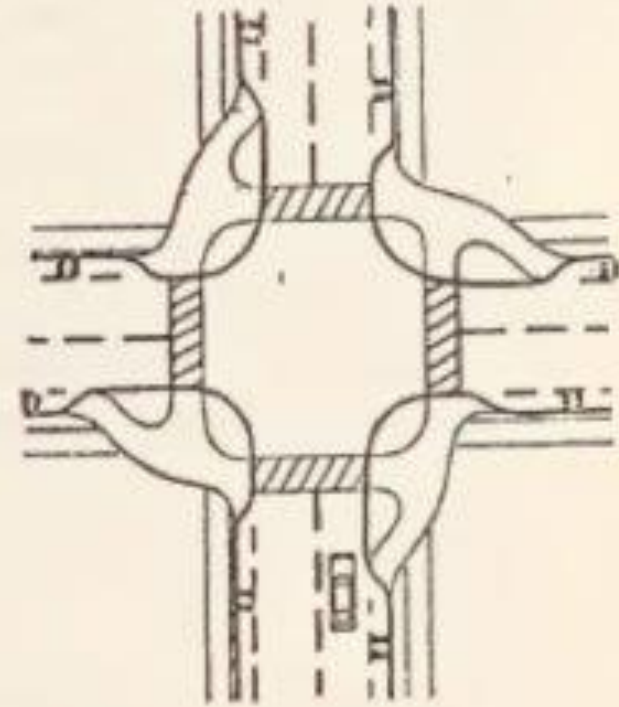


Figure 3.8.14. Recommended Intersection Design for Intersecting Arterial Roads with Bikeways on Each Road. Intersection is Asymmetrically Designed to Provide Bicycle Queue Areas at the Entrance to the Crossings. (Reference 26, p. 23)



- Offset Crossings -- Bicyclists are channeled onto the sidewalk area and to crossings of the intersecting streets just outside (farther from the center of the intersection) the normal pedestrian crosswalk area. In effect, a bikeway ring around the intersection is created.



1976 FHWA "Safety and Location Criteria for Bicycle Facilities"



0:39 / 2:21

Credit: BicycleDutch







0:50 / 2:21

Credit: BicycleDutch







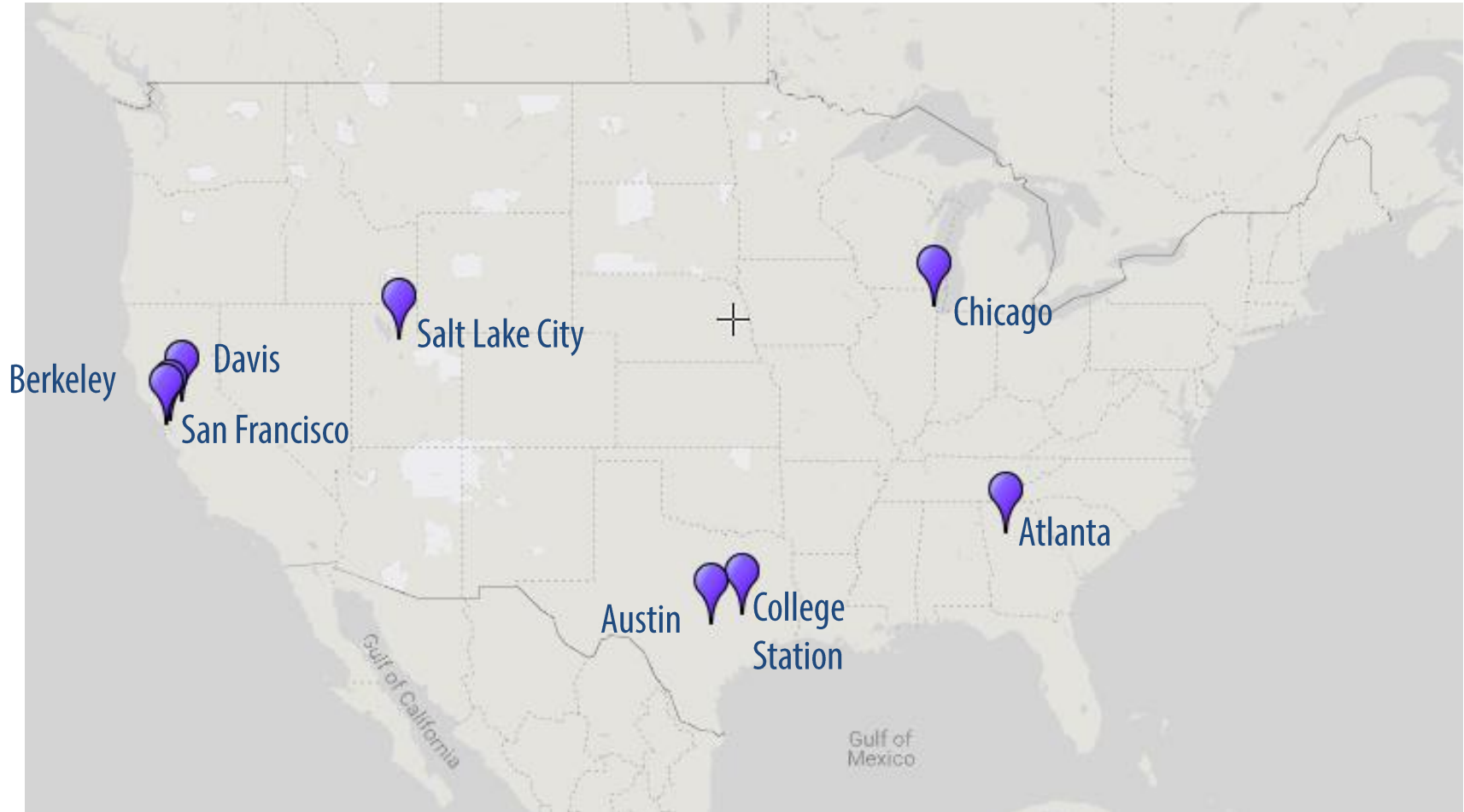
1:05 / 2:21

Credit: BicycleDutch





Protected Intersections in the US





9th Street/Division Street Protected Intersection



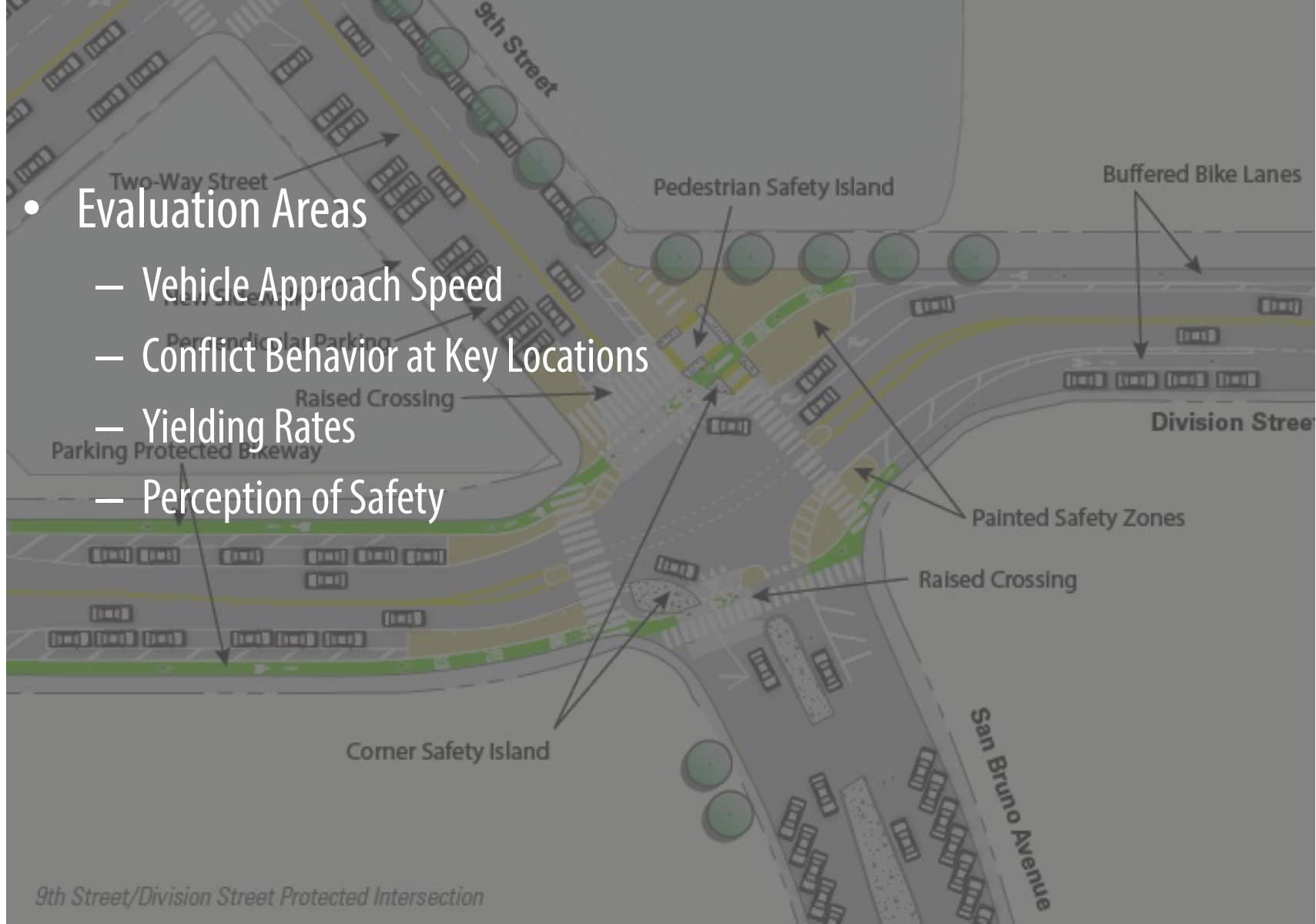


Credit: SFMTA



Credit: SFMTA

- Evaluation Areas
 - Vehicle Approach Speed
 - Conflict Behavior at Key Locations
 - Yielding Rates
 - Perception of Safety



9th Street/Division Street Protected Intersection



Key Findings

The background image shows a city street scene. In the foreground, a pedestrian is crossing a crosswalk. A cyclist is riding a bicycle on a green-painted bike lane. The street has white crosswalk markings and a green bike lane. In the background, there is a multi-story building with a red facade and a sign that says "FITNESS". An elevated walkway or bridge structure is visible in the distance.

- Vehicle Approach Speeds
 - **Target:** 25mph vehicle speeds
 - **Outcome:** 22mph average vehicle speeds
- Vehicle Turning Speeds
 - **Target:** 25mph turning speeds
 - **Outcome:** 98% of vehicles turn slower than 25mph

Key Findings

- Conflict Behavior
 - **Target:** Vehicle Angle of Approach for Bicyclist Crossing at or near 90°
 - **Outcome:** Most vehicles approach *well below* 90 degrees



Key Findings



- Yielding Behavior at Intersections

- 96% of drivers yielded to bicyclists

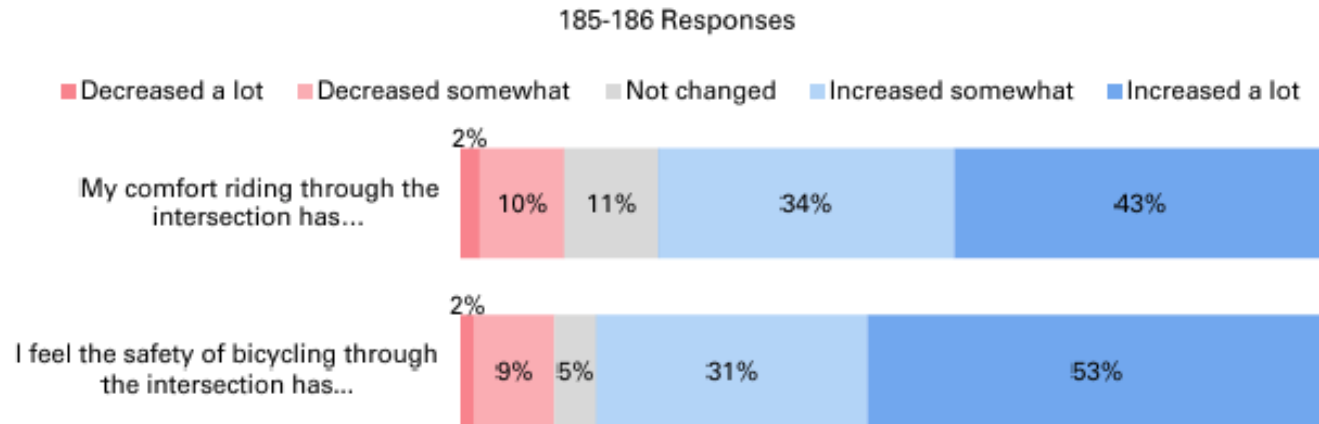
- Nearly 100% of drivers yielded to pedestrians

- Pedestrians yielded to bicyclists most of the time (despite pedestrians having the right-of-way)

Key Findings

- Perception of Safety
 - Bicyclists and pedestrians felt increase in comfort and safety
 - Drivers felt increases to a lesser extent

Figure 11: Survey Response from Bicyclists: Because of the changes to the intersection...



What's next?

- Protected
- More stu
- Opportun
- Light-we



Credit: Alta Planning + Design

What's next?

- Protected intersections can increase comfort and safety for all users
- More study needed (NCHRP 15-63)
- Opportunities exist within right-of-way
- Light-weight/tactical implementation

Thank you!

Conor Semler | Kittelson & Associates, Inc. | csemler@kittelson.com