Toole Design Group

EVALUATION OF INNOVATIVE BICYCLE FACILITIES IN WASHINGTON, DC

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Background

One-way section—Corcoran St to R St

In recent years, Washington, D.C. has emerged as one of the foremost cities for bicycling in the United States. Bicycling in the District has grown considerably as the District Department of Transportation (DDOT) has actively pursued construction of bicycle facilities on its roadways. One reason for this success is DDOT's willingness to try new and innovative bicycle treatments.

Bicycle infrastructure has been shown to increase cycling rates and cyclist safety. Cycle tracks and buffered bicycle lanes are shown to be particularly effective at attracting and improving safety for cyclists. The facilities are relatively new additions to most U.S. cities, and more study is needed to understand their impacts. This project looked at 2 facilities in Washington, DC.

In 2010, DDOT installed a cycle track on 15th Street NW and buffered median bicycle lanes on Pennsylvania Avenue NW. The facilities provide safe travel into and through the downtown area. Their installation supported the District's Bicycle Master Plan and also set the stage for the launch of the region's bicycle sharing program, Capital Bikeshare.

After installation, DDOT sought to understand how well they work for cyclists, motorists, and pedestrians in several regards, and to provide recommendations for these and future facility designs.

K 15th Street Northwest Cycle Track

Typical cycle track adjacent to one-way traffic with left turns (north of Massachusetts Ave

Cross section of two-way section (south of Massachusetts Ave)

Conflicts with turning cars on 15th St cycle track 15th St cyclists use pedestrian signal indications

Methodology

• Bicycle volumes, before and after

 Motor vehicle volumes, before and after > **Efficient Operations**

Levels of service (LOS) for all modes:

 Multimodal Level of Service (MMLOS)—analysis for bicyclists, pedestrians, and motor vehicles using the Highway Capacity Manual 2010 method. The model includes motor vehicle, bicycle, and pedestrian counts; speed data; lane geometry and cross-section information.

Danish Bicycle LOS— Predicts 6 levels of satisfaction along road segments and LOS based on the splits; calibrated using data from Denmark. Factors applied include motor vehicle volumes, average speeds, land use types, cross-section dimensions, presence of sidewalks, medians, bus stops, vegetation, number of travel lanes, pedestrian and bike volumes, and number of

vey respondents' ranking of importance of indicator values for bicycle quality. The model includes the presence of a marked bicycle facility and width, connectivity, driveway cuts, traffic calming, bicycle signs, lighting, vegetation, bicycle parking, pavement type, posted speed, motorized vehicle volumes and cross-section, line-of-sight, land use information.

Convenience

Cycle track in two-way section at T intersection

Cycle track intersection approach in one-way section

 Corridor travel times and progression for bicyclists. No corresponding thresholds have been defined for bicycles, therefore LOS was assessed using free-flow speed thresholds for motor vehicles on two-lane highways. • Corridor travel and stoppage time for motor vehicles on 15th Street.

department reports. 4 years of before data, 1 year Video analysis to determine bicyclist, pedestrian,

trol devices, and interactions between modes

• Bicycle Environment Quality Index (BEQI)—Scores are out of a maximum of Survey of users, pedestrians, motorists, and neighboring residents and busi-100, broken into quintiles rated from poor to highest quality. Based on sur- nesses to understand experiences, behaviors, attitudes, and perceptions.

> -Users—online survey via intercept (45% response rate) -Pedestrians—intercept survey

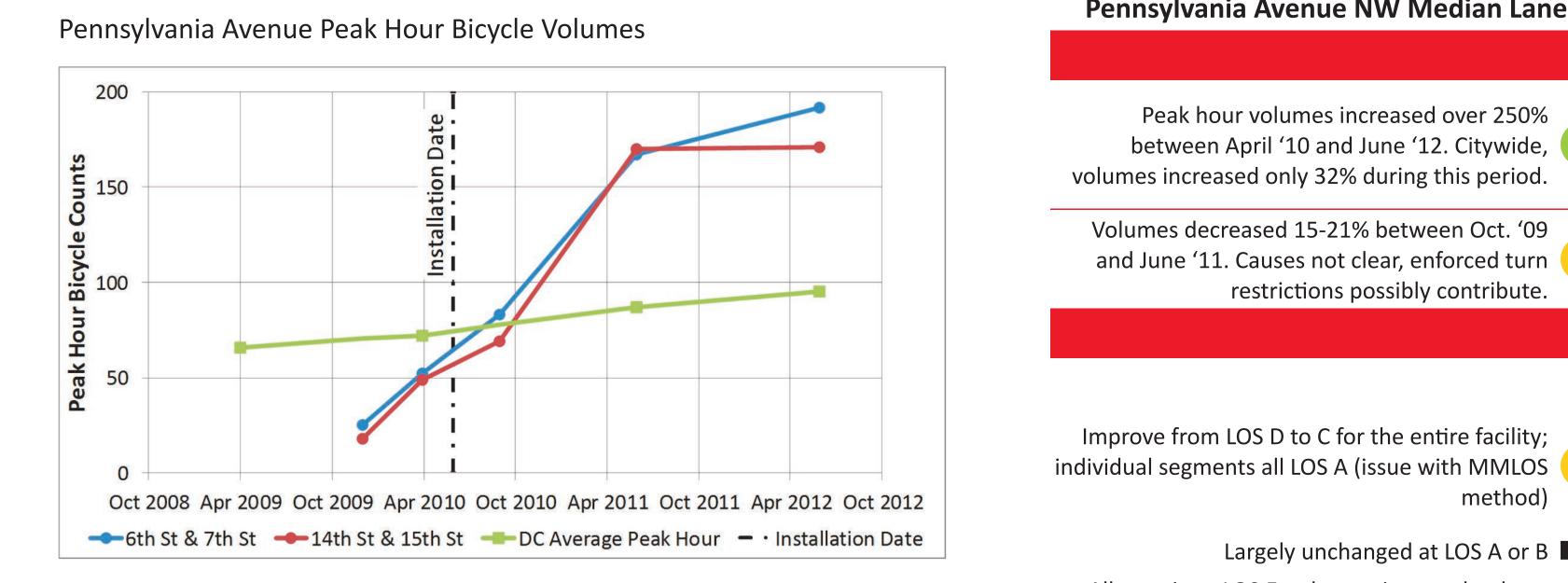
-Residents—mail survey (18-26%

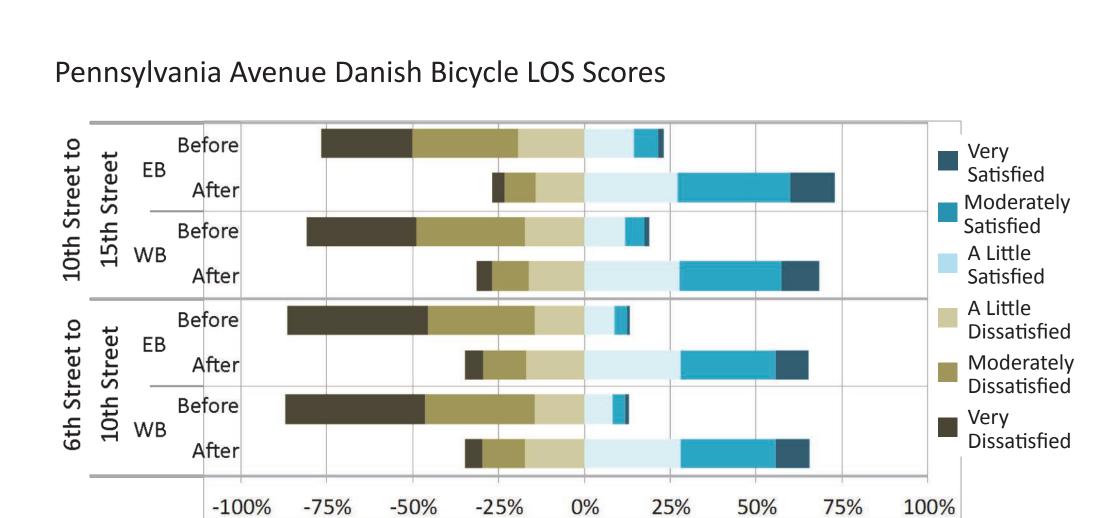
owned vehicles

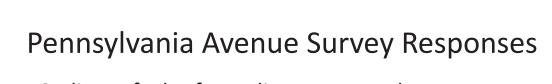
Businesses—online survey via business improvement district (37% response rate) -Motorists—from resident sur-

vey, considered only those who

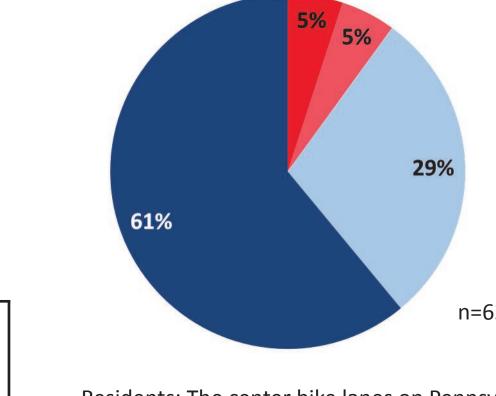
Outcomes



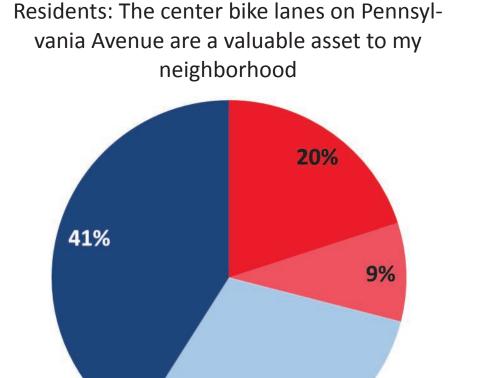




Cyclists: I feel safer cycling on Pennsylva-

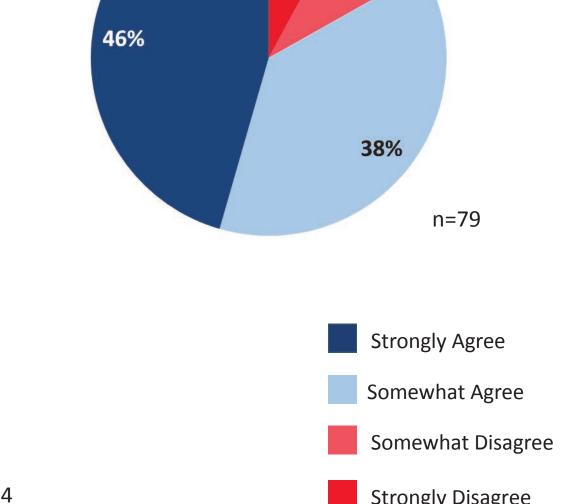


separated from the motor vehicle traffic

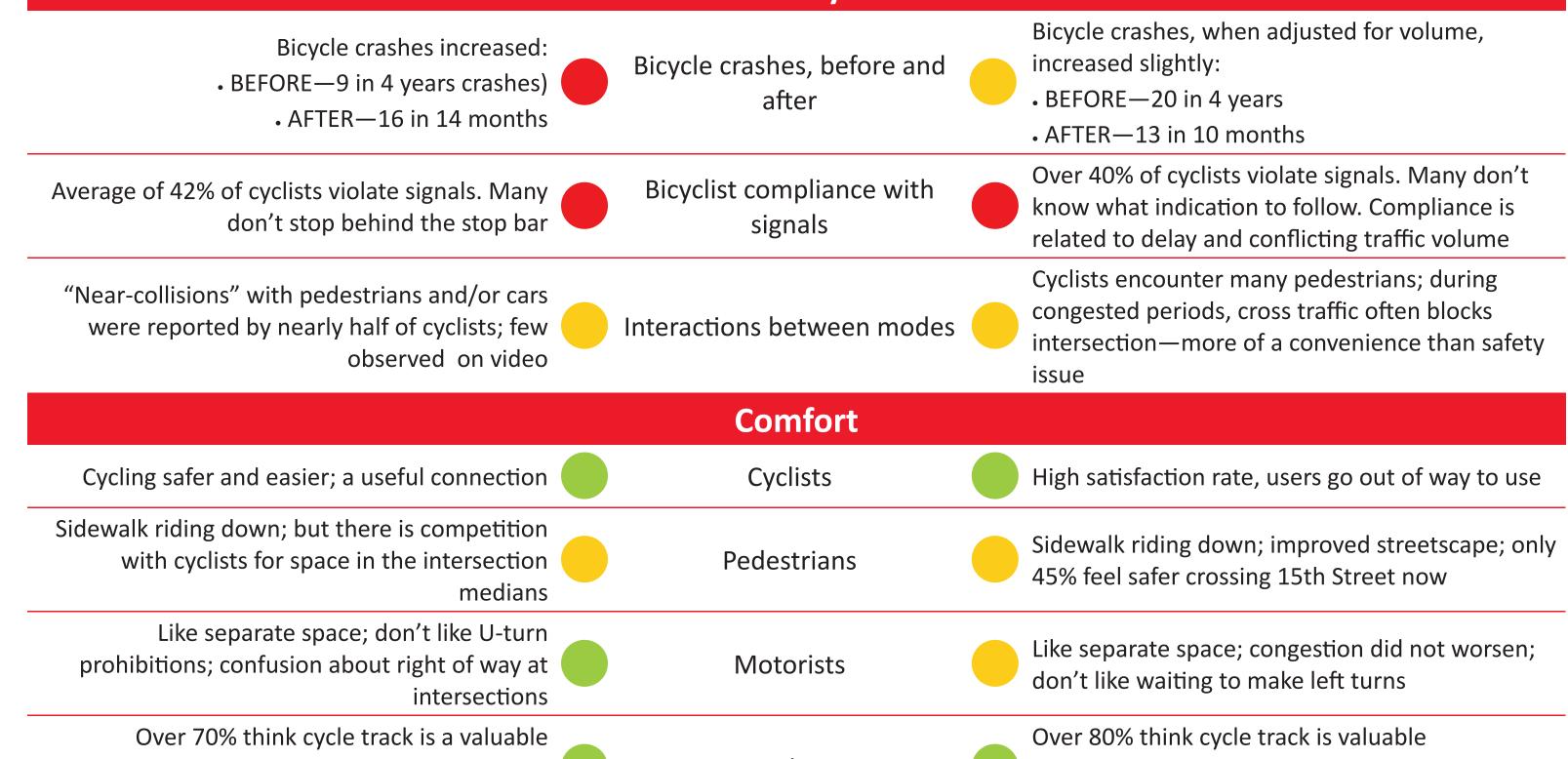


Recommendations

Include cyclist progression as a factor in future signal re-timing



Motorists: Overall, I like that bicycles are



Key Improved Mixed results Worsened Relatively unchanged, neither negative nor positive

10th to 15th Streets: LOS A to D <a> < Western half of corridor

Corridor progression for bicyclists

Southern third of corridor> E to I Streets: LOS D or better

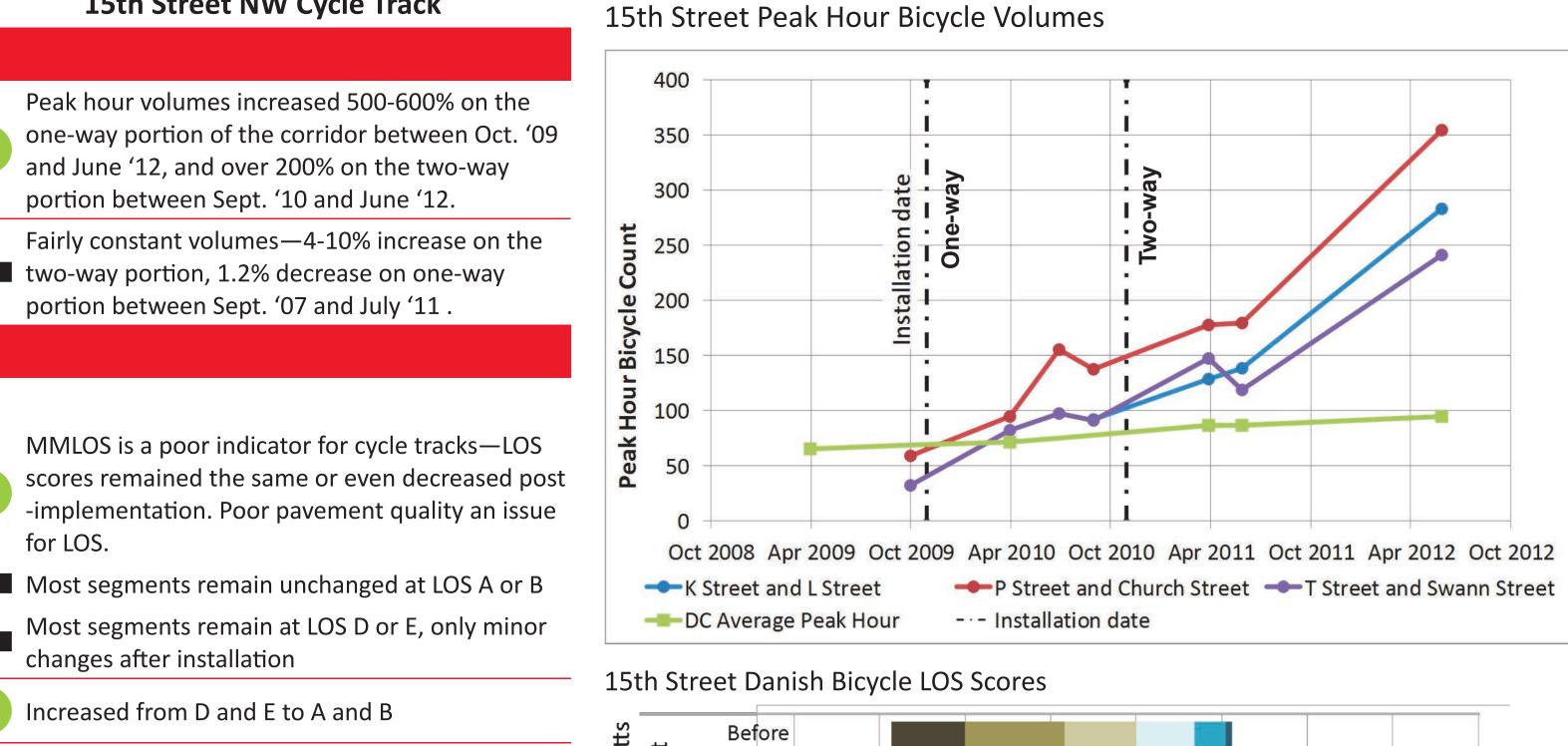
Northern two-thirds of ____ I to U : LOS E or worse. Northbound signal

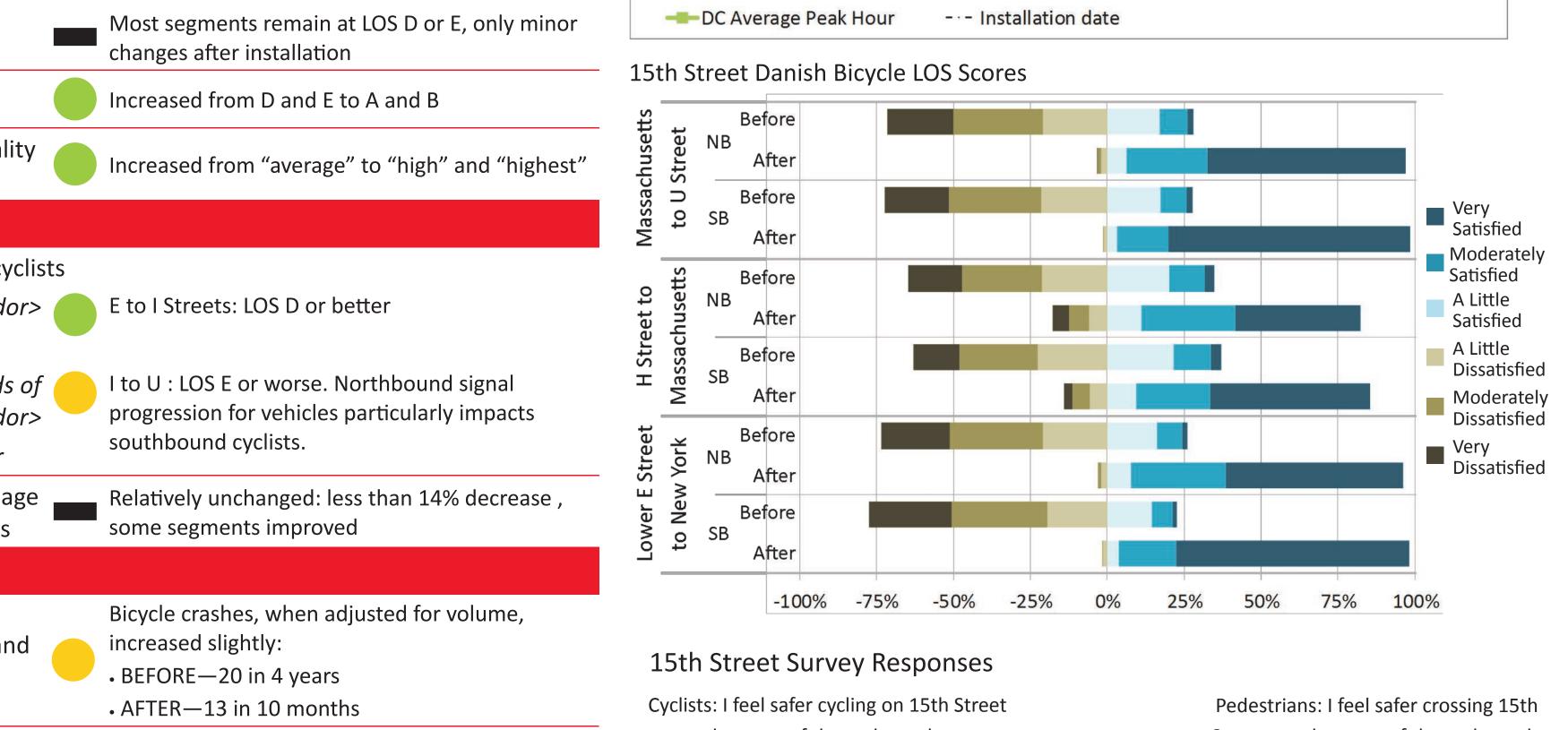
Improve from LOS D to C for the entire facility;

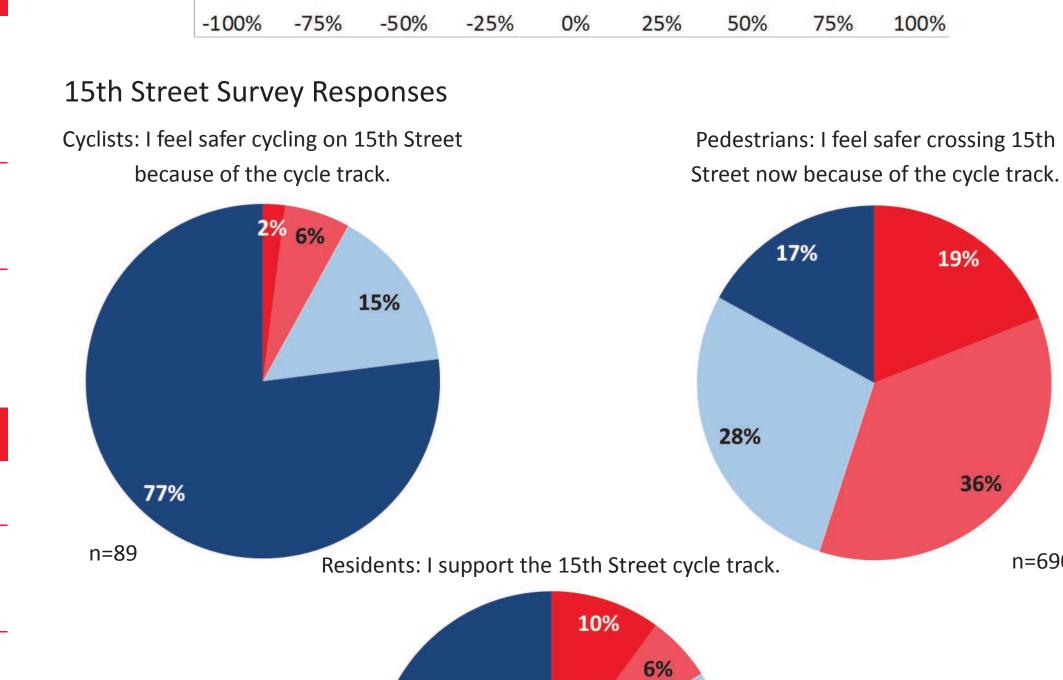
All remain at LOS E or better, in part thanks to For motor vehicles

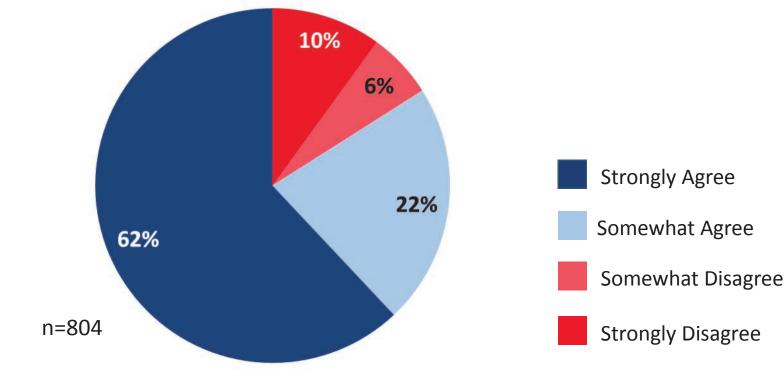
prior extensive signal retiming.

(Not collected due to missing before data)















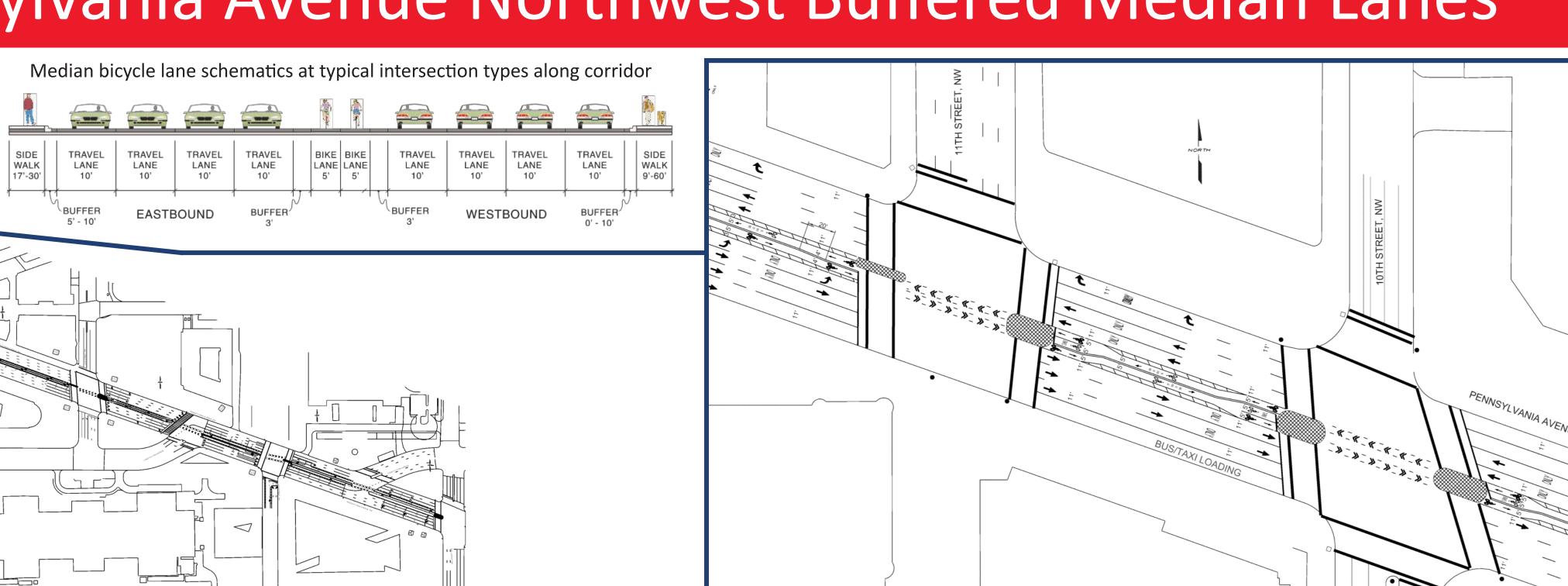


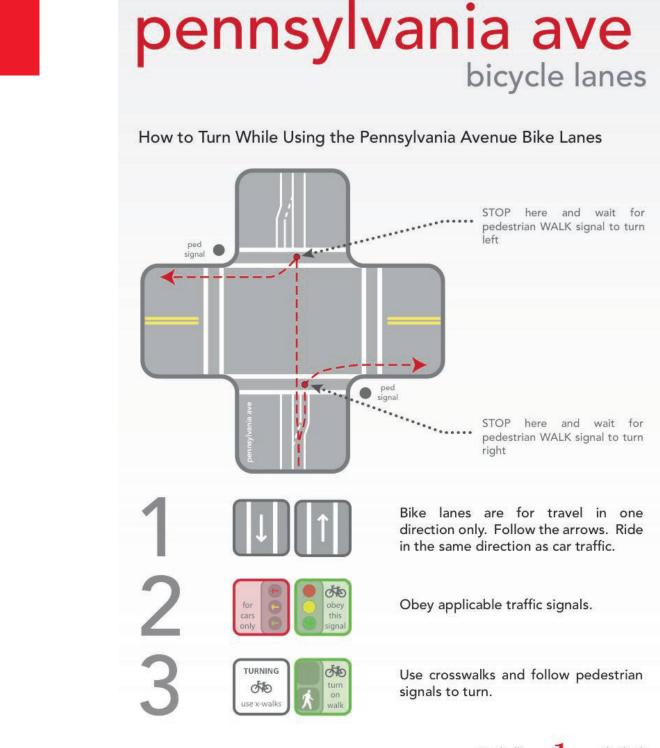
business community.

DDOT is already using the results of this study to improve the design of existing and future facilities. Safety data will continue to be monitored and over time hopefully will show more improvement.

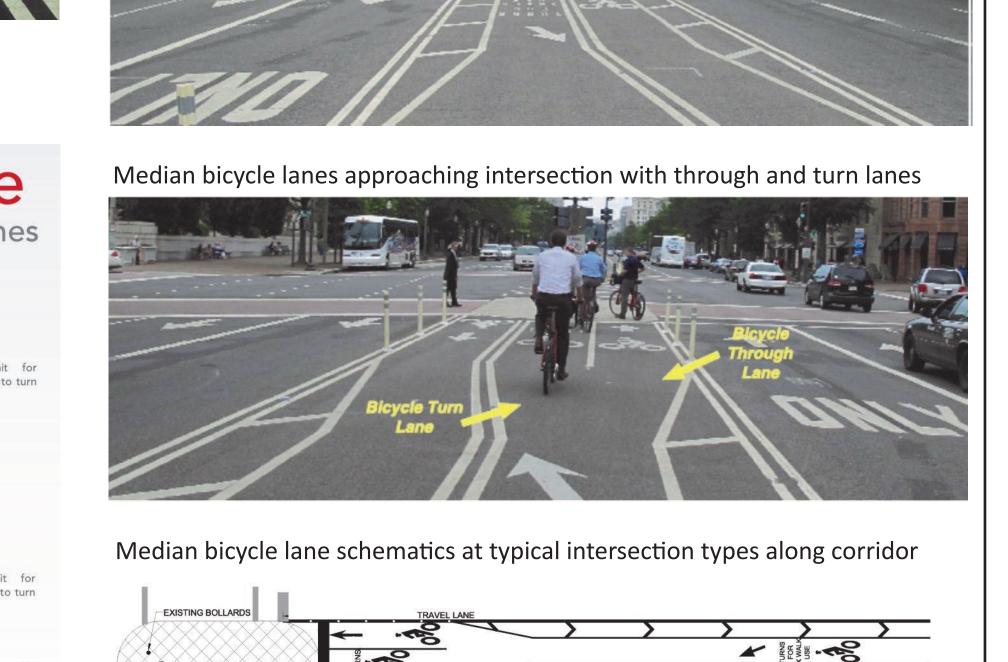
Pennsylvania Avenue Northwest Buffered Median Lanes

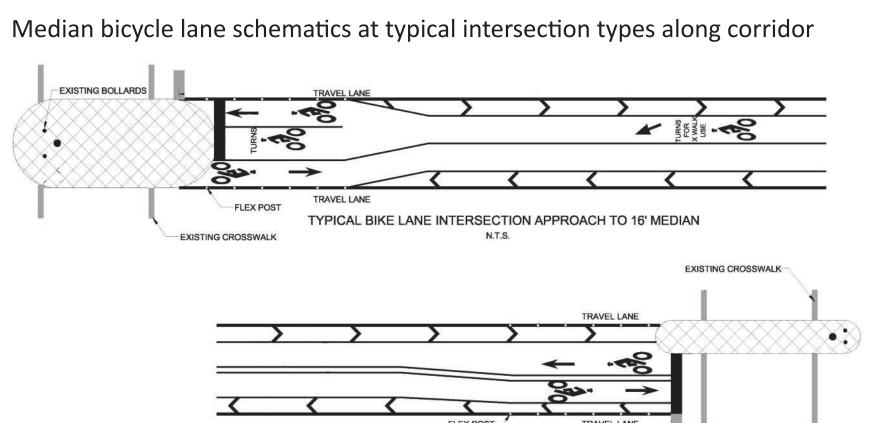
ONE WAY



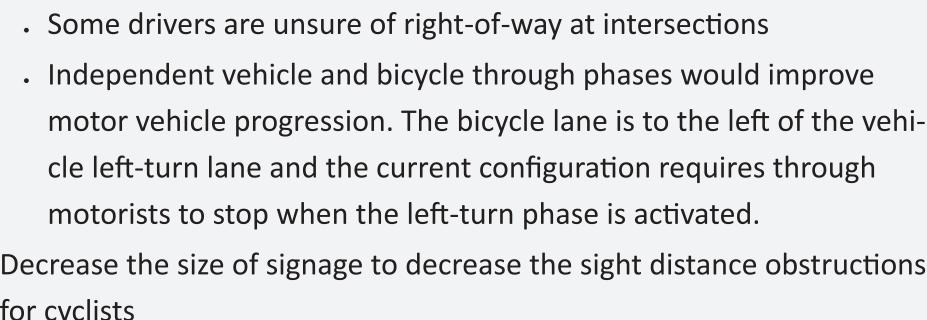


Pennsylvania Avenue



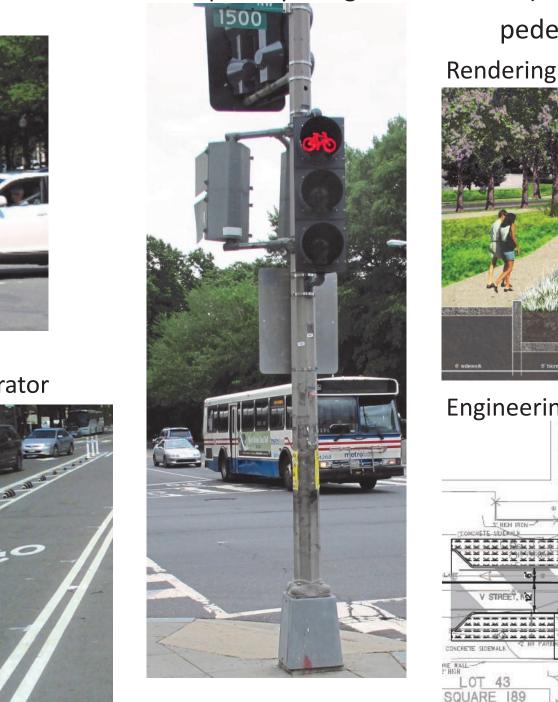


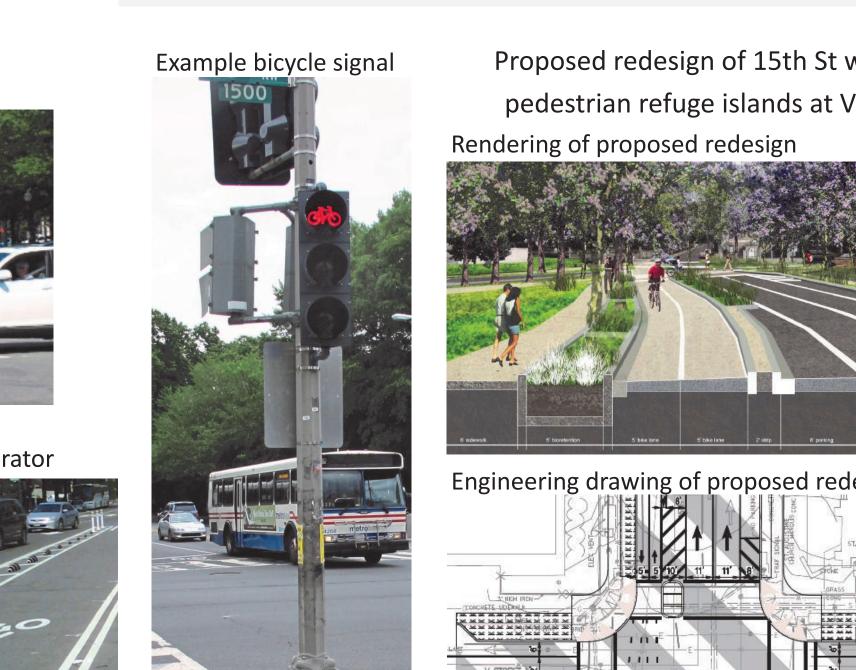
Institute a cyclist education and enforcement campaign to encourage



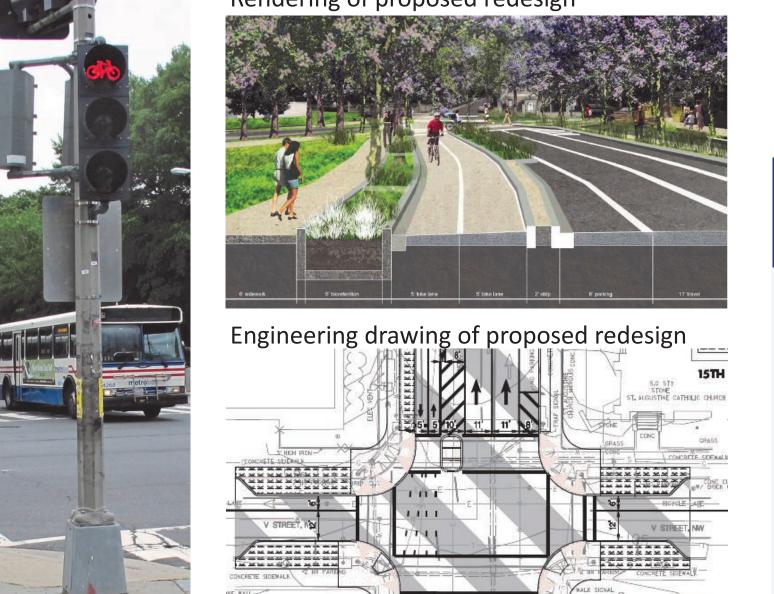








Improve pavement conditions along cycle track



Makes deliveries more challenging; mixed support

Install a bicycle box at 15th/Pennsylvania for turning cyclists

Add green pavement coloring at high conflict driveways and in-

Add pedestrian crossing islands north of Massachusetts Ave

15th Street NW Cycle Trac

portion between Sept. '07 and July '11

Increased from D and E to A and B

-implementation. Poor pavement quality an issu

progression for vehicles particularly impacts

Relatively unchanged: less than 14% decrease,

