



District Department of Transportation



# Innovative Bicycle Facility Research and Analysis

District of Columbia Department of Transportation

Research conducted by Kittelson & Associates, Inc., Portland State University, and Toole Design Group

Stephanie Dock

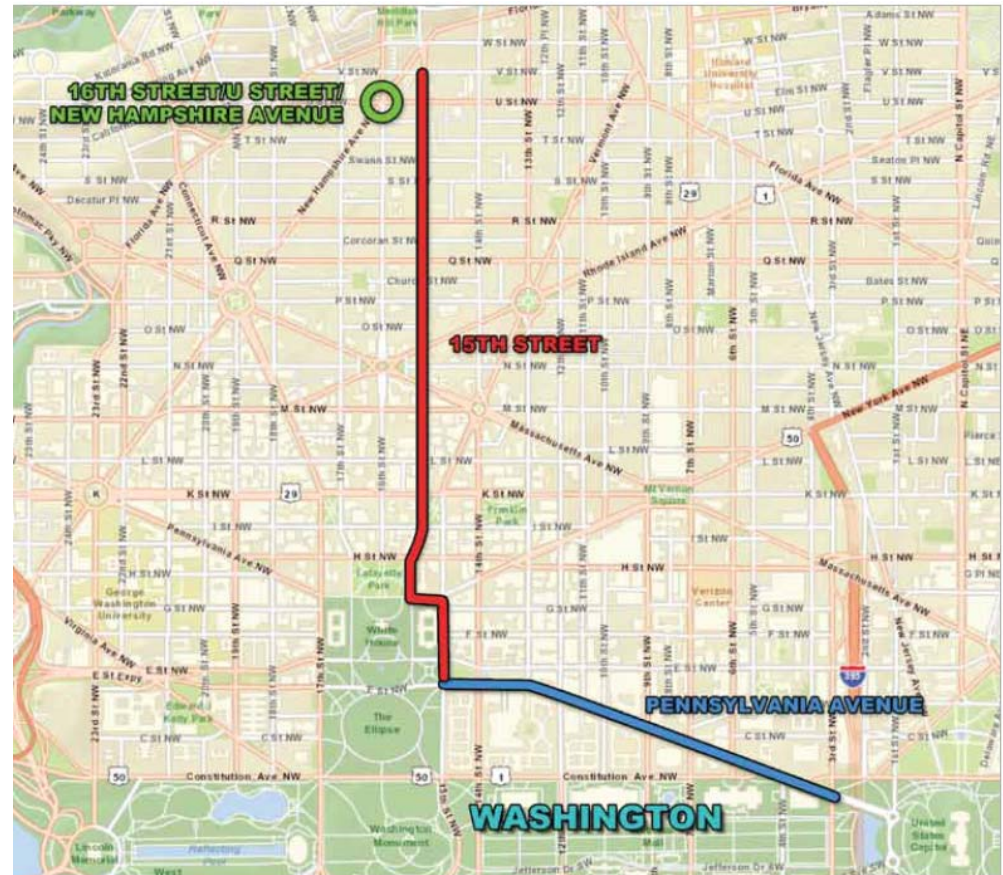
High Value Research Sweet Sixteen

AASHTO-RAC/TRB State Representatives Annual Meeting

July 16, 2013

# The Study

- In 2009 and 2010, DDOT installed 3 new and innovative facilities:
  - Two-way cycletrack (red)
  - Center median bicycle lanes (blue)
  - Intersection treatments (green)
- Evaluation areas:
  - Facility use
  - Efficient operations (LOS)
  - Convenience (corridor travel times for users)
  - Safety
  - Comfort



# Facilities Studied

## 16<sup>th</sup>/U/New Hampshire

**Goal:** Facilitate bicycling through large, complex intersection



- Bicycle signals
- Bicycle loop detectors
- Bicycle boxes
- Contraflow bike lane
- Sharrows

## Pennsylvania Ave

**Goal:** Separated bicycle facility along high volume roadway in core



- Median buffered bike lanes
- Bicycle signs
- Turn restrictions
- Signal timing change

## 15<sup>th</sup> Street

**Goal:** Separated, two-way bicycle travel on a one-way street

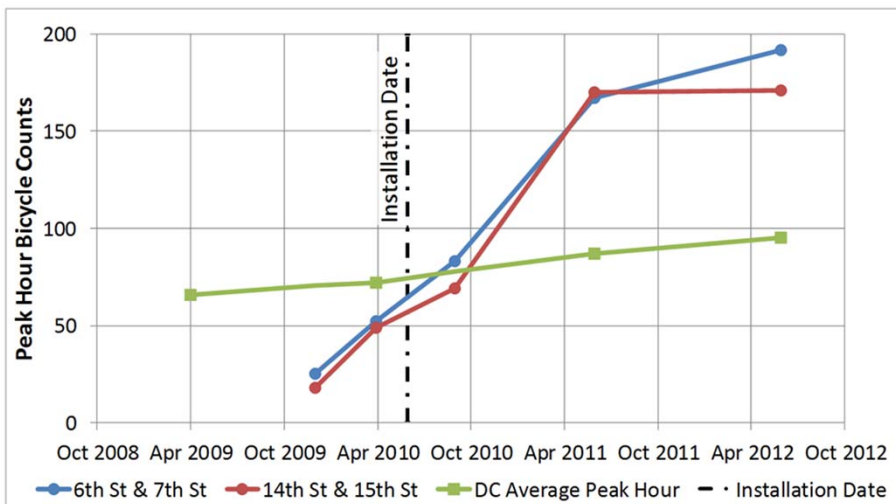


- Two-way cycle track
- Bicycle signal
- Sharrows
- Left turn restrictions
- Signs and pavement markings

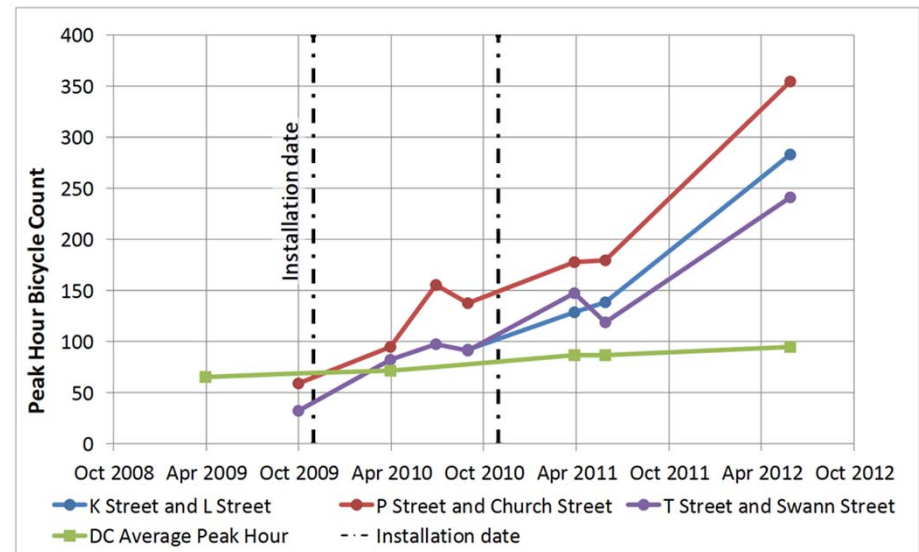
# Study Results

- **Facility Use:** Dramatic increase on all facilities since installation
  - 16<sup>th</sup>/U/New Hampshire:  $\approx$  150% through June 2011
  - Pennsylvania Avenue:  $\approx$  250% through June 2012
  - 15<sup>th</sup> Street:  $\approx$  500% through June 2012 (one-way portion of the corridor)
  - City-wide: 32% increase from April 2010-June 2012.

Pennsylvania Avenue Peak Hour Bicycle Volumes



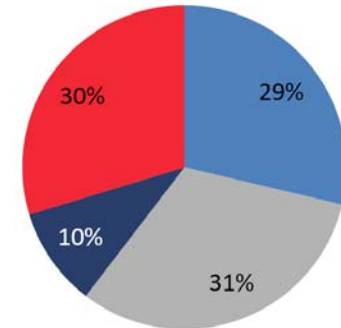
15<sup>th</sup> Street Peak Hour Bicycle Volumes



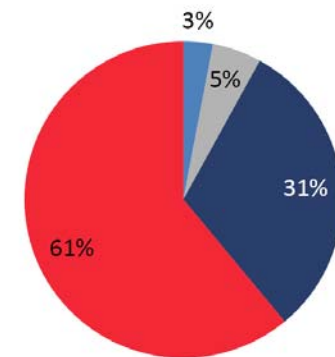
# Study Results

- **Operations:** Bike LOS improved, minimal impact on cars and pedestrians
  - Before and after traffic volumes and LOS very similar for motor vehicles
  - Surveys indicate driver support for separation, but some perceived delay increases >>
- **Convenience**
  - Corridor progression for bicyclists mixed: LOS D or better for most of lanes, poor for the contraflow cyclists on 15<sup>th</sup>
  - On 16<sup>th</sup>/U/New Hampshire – the design is unintuitive and so few cyclists used the bike box and bike signals as intended.

My perception is that traffic congestion has gotten worse as a result of the center bike lanes.

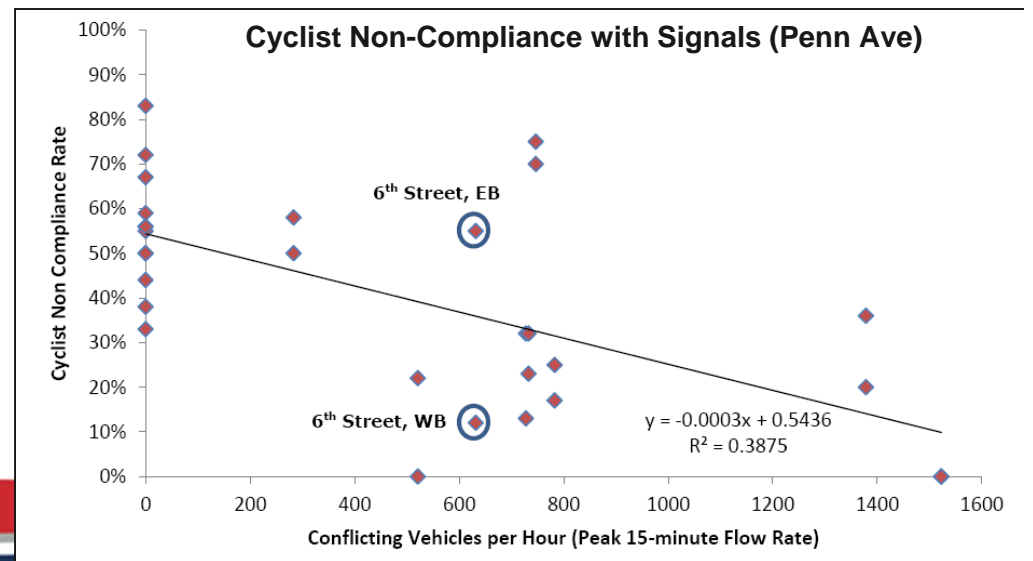


Overall, I like that bicycles are separated from the motor vehicle traffic.



# Study Results

- **Comfort:** Users and non-users support
  - Residents support bicycle investment, regardless of whether they use a bicycle
  - Cyclists overwhelmingly supported the new facilities in surveys
- **Safety:** No conclusive trends
  - No impact on motor vehicle crashes
  - Bicycle crashes increased, but so did cyclist volumes
  - 1 year of “after” crash data is insufficient, more analysis needed
  - Cyclist compliance with signals was low on corridors >>



# Recommendations

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## General

- Include cyclist progression as a factor in future signal re-timing.
- Education and enforcement campaign to encourage compliance with designs

## Design changes

- 16th/U/New Hampshire
  - Change bike signal operations to reflect how cyclists use the intersection
  - Better visibility to improve legibility for all users
- Pennsylvania Avenue
  - Bicycle signals or signs to clarify operations
  - Greater protection from illegal U-turning vehicles
  - Additional pavement markings to reduce bicycle/pedestrian conflicts
- 15<sup>th</sup> Street
  - Better connection to Pennsylvania Avenue lanes
  - Bicycle signals to reduce confusion
  - Better pavement conditions

# Implementation

- Actively seeking strategies to reduce U-turns across Pennsylvania Avenue >>
- Redesigning the facilities at the intersection of 16th Street/U Street/New Hampshire Avenue based on cyclist behavior and the issues observed with wait times
- Looking into signal separation for the corridors
- Changing future plans:
  - Two-way cycletrack on a one-way street does not work well given our signal progression – future cycletracks are one-way on one-way streets. This also helps to avoid crowding issues now emerging on 15<sup>th</sup>.





# Value of Research

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- DDOT understands both the positives and the negatives of the facility designs from the perspective of users
- Allowed us to observe how people were using and interacting with the facilities.
- Design better facilities going forward based on real, measured outcomes

# More information

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## Reports:

<http://dc.gov/DC/DDOT/On+Your+Street/Bicycles+and+Pedestrians/Bicycles/Bicycle+Lanes/Bicycle+Facility+Evaluation>

## Contacts:

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