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

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High Value Research Sweet Sixteen
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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

16th/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

15th 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
  - 16th/U/New Hampshire: ≈ 150% through June 2011
  - Pennsylvania Avenue: ≈ 250% through June 2012
  - 15th Street: ≈ 500% through June 2012 (one-way portion of the corridor)
  - City-wide: 32% increase from April 2010-June 2012.
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 15th
  - On 16th/U/New Hampshire – the design is unintuitive and so few cyclists used the bike box and bike signals as intended.
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

![Cyclist Non-Compliance with Signals (Penn Ave)](image-url)
Recommendations

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
• 15th 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 15th.
Value of Research

• 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

Reports:

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