Pedestrian & Bicycle Safety Innovations & Applications

County Engineers Association of Maryland
Spring, 2017 Conference

May 25, 2017

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Pedestrian Program Coordinator
District Department of Transportation
Why protected bike lanes?

- Safety
- Perception and popularity
- Benefits to pedestrians and neighbors
- Benefits to drivers

Credit: People for Bikes, using DDOT data
15th Street NW

- The first physically separated bike lanes in the City
- Two-way cycle track
- Protected by Parking Lane
15th Street, NW Cycle Track

Two-way for Bikes

Residential

One Way North for Cars

Two Way for Cars

Downtown CBD

Two-way for Bikes
15th Street Before

North Half
- 4 lanes 1-way North
- Residential Neighborhood
- Concerns of safety, traffic speeds
  - Posted speed 25
  - 85th Percentile between 36-45 mph
- Excess capacity
  - 6 to 12,000 ADT

South Half
- 6 to 7 lanes, 2-way
- Downtown
15th St. After

North Half
- Removed 1 NB auto lane
- Protected left-turns
- LOS drop of one letter grade at most intersections

South Half
- Removed 1 auto lane
Signalization Challenges of Bidirectional Cycletracks

Same direction bicyclist crashes with left turning vehicles is the primary danger where utilizing two way roadway and cycle track designs...

15th St has 46 Intersections
- 21 signal control
- 6 uncontrolled minor streets
- 4 parking garage drives
- 1 hotel driveway
- 11 alleys
- 3 residential driveways
Controlled Intersection. Left Turn Conflict Mitigation, one-way section

- Separate phasing
  - Left arrow/lane
  - Leading bike/ped phase
- Parking restriction
  - Bike SSD 50 feet
- Chicane bike approach designed for 10 mph
  - Shifts cyclist to line of sight of approaching motorists
  - Flex post keep cars in lane
- No color in bike xwalk
Controlled Intersection. Left Turn Conflict Mitigation, one-way section

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  - Shifts cyclist to line of sight of approaching motorists
  - Flex post keep cars in lane
- No color in bike x-walk
Uncontrolled Intersection Mitigations

- Parking restriction on approach
- Chicane cycle track approaching conflict
- Flex posts up to crosswalk
- Bike symbols within conflict zone
- Signs

*Replace parking to minimize complaints*
Two-way traffic CBD mitigations

- Fully protect left turns
- Left turn prohibitions at 3 locations (to reduce traffic delay)
- Parking restrictions to create right turn lanes for 100 feet
- RTOR prohibited
- Separate bike crosswalk
- Leading Bike/Ped Interval of 3 seconds
Pennsylvania Avenue, NW

- Center median bike lanes with buffers
- Turn lane and signals for cars turning left across the bike path
Pennsylvania Ave. Before

- Dozen **WMATA bus** routes
- **Tour bus** loading zones
- **Flush median** – portions with parking
- **Limited curb side parking** with some VIP and valet
- High **pedestrian** volumes (up to 2,000/hr/intersection)
Pennsylvania Ave. Before

- **Mix of left turn treatments** *(protected /restricted /permitted)*
- **Excellent Vehicular LOS**

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Level of Service</th>
<th>Volume-to-Capacity Ratio</th>
<th>Average Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennsylvania Avenue at 6th Street</td>
<td>B (C)</td>
<td>0.38 (0.58)</td>
<td>15.2 (27.5)</td>
</tr>
<tr>
<td>Pennsylvania Avenue at 7th Street</td>
<td>C (C)</td>
<td>0.66 (0.51)</td>
<td>20.6 (20.7)</td>
</tr>
<tr>
<td>Pennsylvania Avenue at 9th Street</td>
<td>B (C)</td>
<td>0.47 (0.69)</td>
<td>10.0 (21.1)</td>
</tr>
</tbody>
</table>

- **ADT - 35,000 vehicles per day**
- **Not a through route** – all vehicles turn off to congested north/south routes
- **Inauguration Parade & other local & national events**
Pennsylvania Ave. – Before
Pennsylvania Ave. After

• Median cycle track
  – Avoids bus & other curb conflicts
  – No Left Turn easier to enforce than No Right Turn

• Auto **left turns prohibited** or changed to **protected only phasing**

• Bike turns via crosswalks, following ped signals
Pennsylvania Ave – After
Pennsylvania Ave. – After
Pennsylvania Ave – After
Pennsylvania Ave – Illegal u-turns
Pennsylvania Ave – After After
L Street Parking and Loading Impacts

- North Side Parking Removed
- South Side Parking during non rush-hours
- Loading zones on south side and side streets
- Reduction in redundant signs/clutter
L Street NW – Left Turn Typical

- Car/bike merge area – cars must yield to through bikes
- Left-turn lane
- Green through bike lane
- “Mix zone” – adherence vs. perception
M Street NW – Right Turn Typical Section
1st St NE – First hard-barrier cycletrack
Measures of Success: Goals of 15th St Cycle Track Pilot

- Increase bicycle trips
- Improve safety for all modes
- Calm traffic
- Minimize motorist delay
- Provide more options for cyclists
- Provide DDOT with a better understanding for future cycle tracks
Research Overview

- One Year
- Three projects:
  - 16th, U, New Hampshire
  - Pennsylvania Avenue
  - 15th Street
- Safety
  - Compliance with traffic laws
  - Modal interactions
  - Crash analysis
- Traffic volumes
- Operations
  - Multi-modal LOS
- Convenience
  - Multi-modal travel time
- Comfort
  - Intercept & neighborhood surveys
Highlights of Research Results – 15th St

- Increase bicycle trips
  - Over 500% increase in bicyclist volumes
- Improve safety for all modes
  - Bicycle crashes increased but remained similar when adjusted for exposure
  - No increase for other modes
- Calm traffic
  - > 45 mph - 98%
  - > 25 mph - 60%
- Minimize motorist delay
  - Motor vehicle volumes remained the same
  - Minor changes in LOS
- Provide DDOT with a better understanding for future cycle tracks
  - Bicycle signals are important, but be cautious which intersection you choose to signalize
  - Consider coloring conflict zones
  - Improve signal progression for southbound (contra-flow) movement
Cyclists
• Cyclists believe that the cycle track makes riding a bicycle safer (96%), easier (98%), more convenient (98%), and would go out of their way to ride in it (93%).
• Up to 39% of riders do not understand what traffic signal they should follow.
• Cyclists violate traffic signals 41% of the time.

Residents
• 81% agree that DC should be investing in projects that encourage more people to ride bicycles for transportation.
• 83% think that the cycle track is a valuable neighborhood asset.
• Only 45% think bicycling in DC is safe.
Highlights of Research Results – Pennsylvania Ave, NW

- Arterial LOS was similar for motor vehicles before and after the bicycle facilities were installed.
- Motor vehicle volumes decreased between 15% and 21% since the installation of the bike facilities.

Cyclists
- Cycling volume increased over 300%.
- Cyclists believe that the center bike lanes make riding a bicycle safer (90%), easier (94%), more convenient (92%), and would go out of their way to ride in it (86%).
- Cyclists understand what traffic signal to follow, but frequently don’t obey: 42% violate the red signal indication.
- 26% indicated that they would stop in the crosswalk, a potential safety hazard due to the path of left-turning vehicles.
- Bicycle crashes have increased: 16 in 14 months versus 9 during previous 4 years.

Pedestrians
- 75% notice fewer cyclists on the sidewalks since the installation of the center bike lanes.
- 33% feel that crossing the street is more difficult with the center bike lanes.

Motorists
- 69% think that there are fewer cyclists in the car lanes due to the bike facility.
- 84% like that bicycles are separated from the motor vehicle traffic.

Residents
- 74% agree that DC should be investing in projects that encourage more people to ride bicycles for transportation.
- 71% think that the cycle track is a valuable neighborhood asset.
- Only 33% think bicycling in DC is safe.
Pedestrian Safety and Access Countermeasures
Vision Zero & MoveDC Multi-Modal Plan policy foundations:

1. Crosswalk Marking Policy - Recommends enhancements for crosswalks multi-lane arterials with high traffic volumes:
   a. Pedestrian Hybrid Beacon ("HAWK")
   b. Rectangular Rapid Flash Beacon (RRFB)
   c. Pedestrian Refuge Crossing Island
   d. Uncontrolled Crosswalk Side-of-Street Sign

2. Bus stop alignment with safer crossings
3. Curb Extensions
4. Leading Pedestrian Interval Signal Timing
5. Complete Streets Policy
6. Vision Zero – Reduce speeding and reduce crash severity
Crash Typing & Countermeasure ID
Most Frequent DC Ped Crash Types

Uncontrolled crosswalk - Fail to yield
High Risk Motorist At-Fault Crashes, Unsignalized

- “Multiple Threat” crash

In crosswalk, no signal, multiple threat
Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations (Zegeer, 2002):

- **Sign.** = Significant Difference
- **N.S.** = No Significant Difference

![Bar chart showing the comparison of Pedestrian Crash Rate per Million Crossings for marked (M) and unmarked (U) crosswalks at different types of crossings.](chart)

**Type of Crossing**

- No Median
  - All ADT's (914 Sites)
  - No Raised Median
    - ≤ 12,000 ADT (260 Sites)
  - No Raised Median
    - 12,000-15,000 ADT (149 Sites)
  - No Raised Median
    - > 15,000 ADT (87 Sites)

- Raised Median
  - 3 to 8 Lanes
    - ≤ 15,000 ADT (173 Sites)
    - > 15,000 ADT (3 to 8 Lanes) (173 Sites)

**Crosswalk Type**

- **M** = Marked
- **U** = Unmarked

**Significance Levels**

- (p=0.00)
- (p=0.02)
- (p=0.004)
- (p=0.59)
**FHWA Crosswalk Compliance Matrix**

Table 1. Recommendations for installing marked crosswalks and other needed pedestrian improvements at uncontrolled locations.*

<table>
<thead>
<tr>
<th>Roadway Type (Number of Travel Lanes and Median Type)</th>
<th>Vehicle ADT ≤ 9,000</th>
<th>Vehicle ADT &gt;9000 to 12,000</th>
<th>Vehicle ADT &gt;12,000 - 15,000</th>
<th>Vehicle ADT &gt; 15,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 30 mi/h</td>
<td>35 mi/h</td>
<td>40 mi/h</td>
<td>≤ 30 mi/h</td>
</tr>
<tr>
<td>2 Lanes</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>3 Lanes</td>
<td>C</td>
<td>C</td>
<td>P</td>
<td>C</td>
</tr>
<tr>
<td>Multi-Lane (4 or More Lanes) With Raised Median***</td>
<td>C</td>
<td>C</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Multi-Lane (4 or More Lanes) Without Raised Median</td>
<td>C</td>
<td>P</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

- Zegeer Study, FHWA, 2002
FHWA Guidance on Uncontrolled Crosswalks

New marked crosswalks **alone**, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence, should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph and either:

A. The roadway has **four or more lanes** of travel **without a raised median** or pedestrian refuge island and an **ADT of 12,000 vehicles per day or greater**; or

B. The roadway has **four or more lanes** of travel **with a raised median or pedestrian refuge island** and an **ADT of 15,000 vehicles per day or greater**.

- 2009 MUTCD, Section 3B-18 (page 384)
## DDOT Uncontrolled Crosswalk Policy Matrix

**Table 1 - Proposed DC Uncontrolled Crosswalk Engineering Treatments**

For roadways posted 30mph or less

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>1,500 - 9,000 vpd</th>
<th>9,000 - 12,000 vpd</th>
<th>12,000 - 15,000 vpd</th>
<th>&gt; 15,000 vpd</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Lanes</td>
<td>A</td>
<td>A</td>
<td>A or B</td>
<td>B or C</td>
</tr>
<tr>
<td>2 Lanes with CTL</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B or C</td>
</tr>
<tr>
<td>2 Lanes One Way</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>4 Lanes w/Raised Median</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>3 Lanes No Median</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>5 Lanes w/Raised Median</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>6 Lanes w/Raised Median</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>4 Lanes No Median</td>
<td>B</td>
<td>B or C</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>5 Lanes No Median</td>
<td>B</td>
<td>B or C</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>6 Lanes No Median</td>
<td>B</td>
<td>B or C</td>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>

- **Volumes Below 1500 vpd**
  - Treatment A: Parallel Crosswalk and/or W11-2 assembly
  - Treatment B: High Visibility Crosswalk and Side of Street Ped Law Sign
  - Treatment C: In-Street Stop For Peds Sign and/or Traffic Calming
  - Treatment D: Activated Pedestrian Device (RRFB, In-road LEDs, etc.)
  - Treatment D: Something with a red signal (Ped Hybrid, Full Signal)
### DC HAWK Preliminary Evaluation Form

- Planning department conducts preliminary evaluation
- If score is sufficiently high, Signals Team conducts formal Warrant Study

#### DDOT HAWK (PHB) Preliminary Evaluation Matrix

<table>
<thead>
<tr>
<th>Location:</th>
<th>Date: 2015</th>
<th>Analyst: Branyan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max Points Possible</strong></td>
<td><strong>Points Awarded</strong></td>
<td><strong>Points and Considerations</strong></td>
</tr>
<tr>
<td>Pedestrian and Bicycle Crashes at intersection</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Vehicular crashes at intersection</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Street Traffic Volume (ADT)</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of lanes at peak hour</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderly/disabled population density (65+, based on 2010 census tracts)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to school (pre-K-HS)</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection to parks, rec ctr, libraries, commercial zone, or other large ped generator</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metro Station/Bus Stop presence and use (each stop)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posted speed limit</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Distance to nearest signalized intersection</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crossing part of designated bike route</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL LOCATION SCORE:</strong></td>
<td>200</td>
<td>0</td>
</tr>
</tbody>
</table>

**Notes and Comments:**
Uncontrolled Crosswalks:

**HAWK Pedestrian Hybrid Beacon/Signal**

For Use at selected uncontrolled crosswalks on major arterial streets
HAWK Pedestrian Hybrid Beacons in DC

- Major roadway sees a beacon/signal
- Minor roadway sees a stop sign
- Dark when not in use

FHWA Study:
- Up to a 69% reduction in pedestrian crashes
- Up to a 29% reduction in total crashes.

- DDOT study showed 97% compliance
- No problem observed with stop-controlled side street
- Minor roadway gets less cut-through traffic
Operational Issues with the PHB/HAWK in DC

1. Some drivers do not understand that they may proceed on Flashing Red:
   - Not observed as a safety problem
   - Reduces somewhat the operational advantage of the PHB
   - DDOT posted a sign to help explain the Flashing Red phase

2. Some reports of drivers moving on the Flashing Red in a manner that seemed hazardous to pedestrians:
   - Lengthen the solid red phase
   - Enforcement
PHBs in the suburban context

• Most pedestrian fatalities occur at mid-block crossings or on multi-lane roadways at non-signalized locations.
PHB Warrant - MUTCD

Total of all pedestrian crossings at the major street - pedestrians per hour (PPH)

*Note: 20 pph applies as the lower threshold volume
FHWA PHB Guide, 2014
PHBs have been shown to significantly reduce pedestrian crashes. A Federal Highway Administration (FHWA) study published in 2010 found that pedestrian hybrid beacons can reduce pedestrian crashes by 69 percent and total crashes by 29 percent.

http://safety.fhwa.dot.gov/ped_bike
**What is a HAWK Signal?**

A HAWK (High-Intensity Activated crossWalk) signal is a signal-beacon designed to help pedestrians safely cross busy streets.

While different in appearance for motorists, for the pedestrian, this signal works like other push-button activated traffic signals in the District by stopping traffic with a red signal, allowing pedestrians to cross with a WALK signal. At certain locations, the signal can automatically detect the presence of pedestrians waiting to cross and will activate the signal.

HAWK signals can be installed on streets with regular traffic signals as part of the District’s coordinated signal system.

---

**Pedestrians**

<table>
<thead>
<tr>
<th>Will see this...</th>
<th>Will do this...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push button</td>
<td>Push button to call for WALK signal (some locations automatically detect pedestrians)</td>
</tr>
<tr>
<td>Wait (It may take up to one minute for the signal to change)</td>
<td></td>
</tr>
</tbody>
</table>

**Start crossing after you see the WALK signal** (Be sure traffic has stopped)

**Continue Crossing** (Countdown signal)

**Push the button to cross**

---

**Motorists**

<table>
<thead>
<tr>
<th>Will see this...</th>
<th>Will do this...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proceed with Caution (Signal has been activated)</td>
<td></td>
</tr>
<tr>
<td>Proceed with Caution if clear</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flashing</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Proceed</th>
</tr>
</thead>
</table>

**How does a HAWK Signal Work?**
Rectangular Rapid Flashing Beacon (RRFB):

- Pedestrian actuated, solar powered, high intensity LED beacons that flash in a stutter pattern at approaching drivers
- 7 Locations in DC
- Interim Approval from FHWA (2008)
## RRFB Evaluation Results - Baseline

**Location:** Brentwood Rd. & 13th St. NE  
**Treatment:** HiViz CW (w/ ped pylon)  
**Observers:** Branyan/Goodno/Hefferan  
**Date:** 4/23/08, Time: 9:30-10:30 am  
**Date:** 4/25/08, Time: 4:30-5:20 pm

<table>
<thead>
<tr>
<th>Date/Crossings</th>
<th>Cars Yielding</th>
<th>Cars Not Yielding</th>
<th>Distance Cars Yielded from Crosswalk</th>
<th>Driver Passed Stopped Veh or Attempt</th>
<th>Car Behind Yielding Car Jams Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 10 ft</td>
<td>Red 10ft-20ft</td>
<td>Orange 20ft-30ft</td>
</tr>
<tr>
<td>4/23:20</td>
<td>34</td>
<td>66</td>
<td>0</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4/23:20</td>
<td>39</td>
<td>60</td>
<td>0</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>4/25:20</td>
<td>38</td>
<td>158</td>
<td>0</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>4/25:20</td>
<td>35</td>
<td>128</td>
<td>10</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>146</strong></td>
<td><strong>412</strong></td>
<td><strong>7%</strong></td>
<td><strong>27%</strong></td>
<td><strong>25%</strong></td>
</tr>
</tbody>
</table>

**Total vehicles:** 558  
**Overall Compliance rate:** 26%  
**Best 20 crossings:** 39%  
**Worst 20 crossings:** 19%

**41% of vehicles yielding 30' or farther from crosswalk**
RRFB Evaluation
Results- 100 days

<table>
<thead>
<tr>
<th>Date/Crossings</th>
<th>Cars Yielding</th>
<th>Cars Not Yielding</th>
<th>Distance Cars Yielded from Crosswalk</th>
<th>Driver Passed Stopped Veh or</th>
<th>Car Behind Yielding Car Jams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 10 ft</td>
<td>Red 10ft-20ft</td>
<td>Orange 20ft-30ft</td>
</tr>
<tr>
<td>8/14/20</td>
<td>50</td>
<td>11</td>
<td>3</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8/14/20</td>
<td>48</td>
<td>13</td>
<td>3</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>8/21/20</td>
<td>58</td>
<td>13</td>
<td>3</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>8/21/20</td>
<td>54</td>
<td>21</td>
<td>3</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Totals</td>
<td>210</td>
<td>58</td>
<td>1%</td>
<td>5%</td>
<td>17%</td>
</tr>
</tbody>
</table>

74% of yielding vehicles 30' or farther from crosswalk

Total vehicles: 268
Overall Compliance rate: 78%
Best 20 crossings: 82%
Worst 20 crossings: 72%
Road Diets

Before Conversion to Road Diet
1 foot = .305 meters

After Conversion to Road Diet
Road Diets

Before Conversion to Road Diet

After Conversion to Road Diet

1 foot = .305 meters
Why Road Diets?

• Do you want to slow speeders, especially top end speeders?
• Do you want to reduce right angle, sideswipe and rear-end crashes? (29%-53%)
• Do you want to make it safer and easier for people to cross the street?
• Do you want to improve conditions for cycling?
• Do you want the street to support more non-motorized human activity?
Sherman Ave. NW Road Diet, 2013

.85 mile, mainly residential

BEFORE:
4 travel lanes
On street parking
No bike facility
No sidewalk buffer
Sherman Ave. NW Road Diet, 2013

After:
- 2 travel lanes
- LT pockets
- Raised, landscaped median
- On street parking
- 14’ wide shared lane
- Added 4 ft. tree/grass buffer to each side.
Sherman Ave. NW After:

- Example of the “give and take” required to “right size” a street and make a former auto-dominated corridor with poor pedestrian, bike and transit facilities function as a “complete street.”
Sherman Ave. NW Road Diet Evaluation Study:

- **85%ile Speeds (25 mph posted):**
  - Before, northbound- 32 mph
  - After, northbound- 29 mph
  - Before, southbound- 35 mph
  - After, southbound- 28 mph

- **Crashes:**
  - Total crashes- 23% decline
  - Injury crashes- 44% decline

- **Auto Mobility:**
  - Traffic volumes: Before: 15,000 ADT. After: 13,000 ADT
  - Intersection delay: One LOS B before to D after. All others are LOS C or better.

- **Bicycle LOC:**
  - Before: D, After C+
Sherman Ave. NW Road Diet
Forward to the Past

1951

1964

2016
Road diet candidate guidelines
(DPS-201 Course)

• ADT (Road Diet Candidate)
  – 23,000 or less (suburban)
  – 17,000 or less (urban)

• Peak hour peak direction volume (Road Diet Candidate)
  – 1,200 or less (suburban)
  – 950 or less (urban)
  – Other factors:
    • Percentage of left turns at intersection
    • VPH on side street

• These apply IF you want to accommodate existing traffic volumes (discuss...)

• Look for opportunities to implement Road Diets