The DC Pedestrian Master Plan

September 28, 2010

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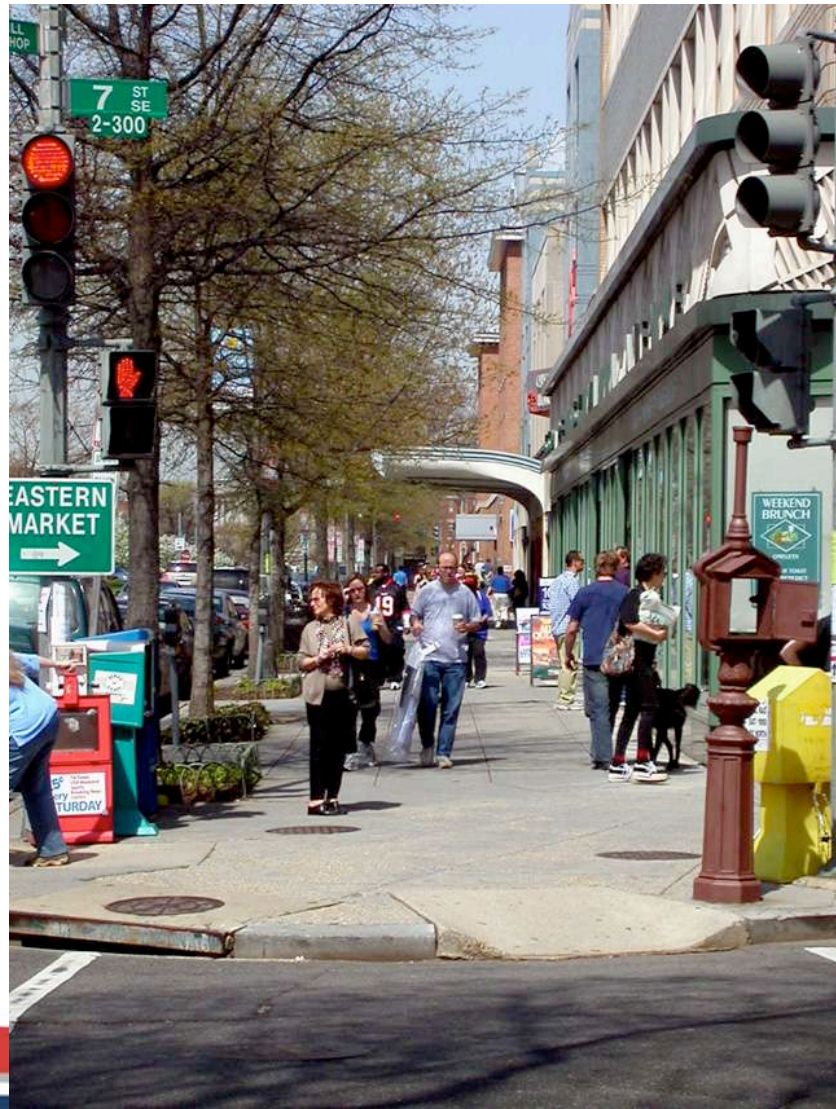
Pedestrian Program Coordinator
District Department of Transportation

Presentation Agenda

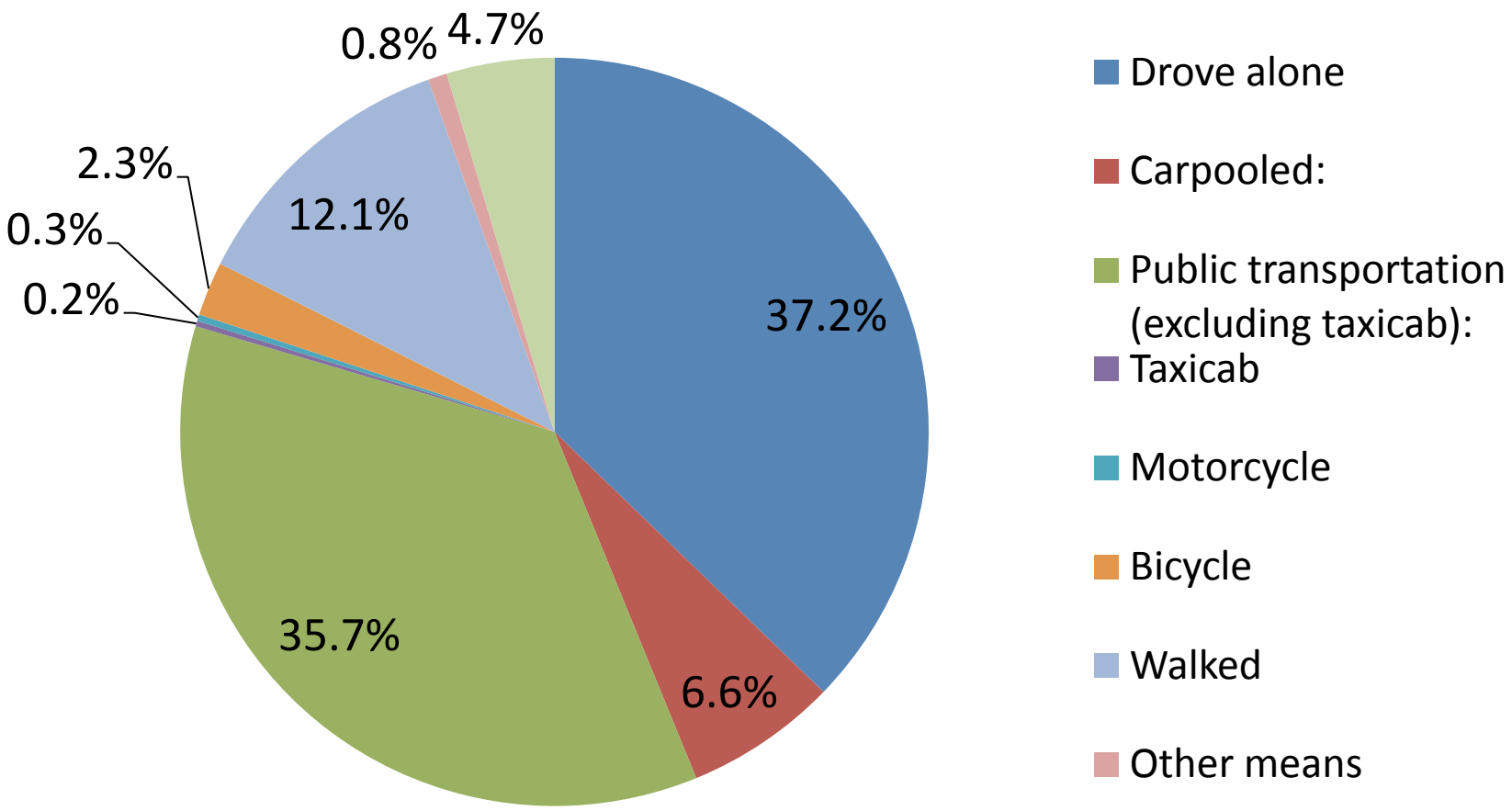
District Department of Transportation

Scope of the Plan
Methodology
Recommendations
Implementation



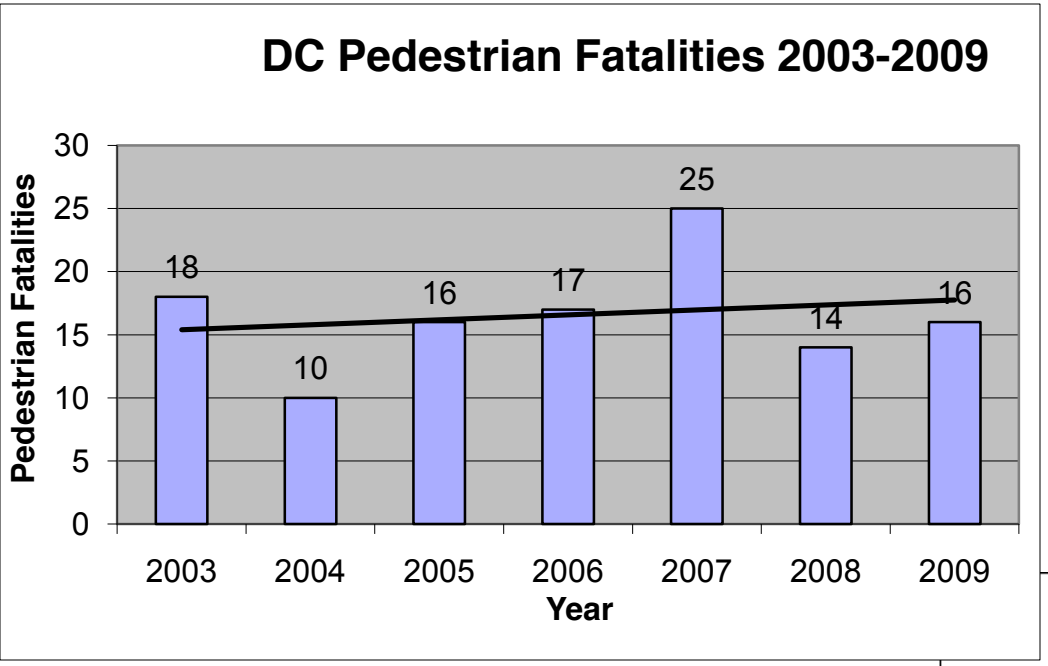
DDOT Initiatives that are increasing Walking and Biking:

How do DC residents get to work?

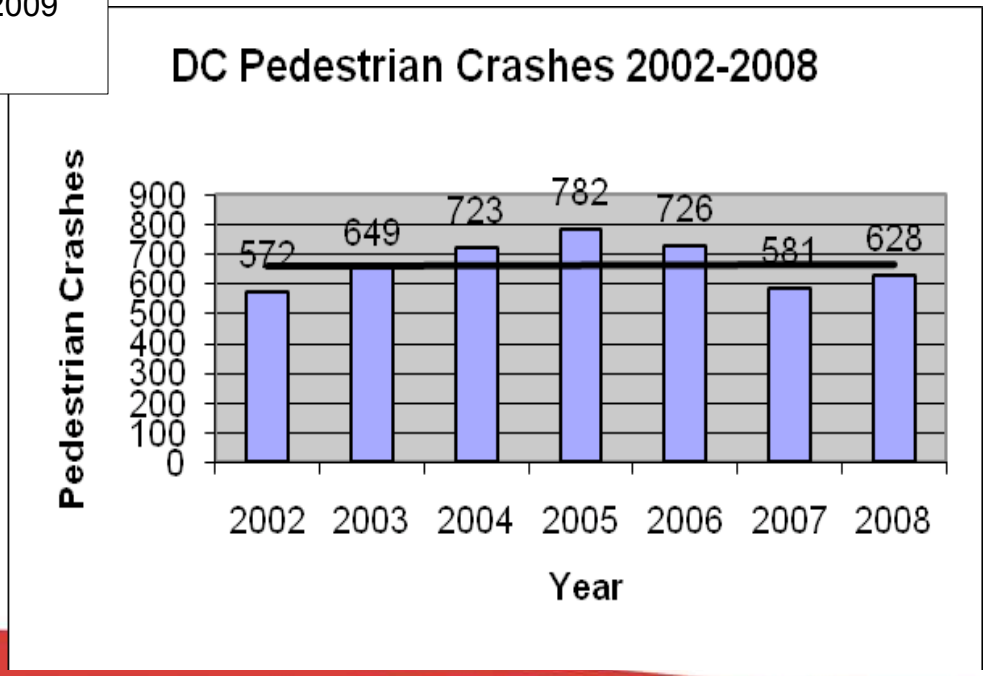


2008 American Community Survey

DC Pedestrian Crash Trends



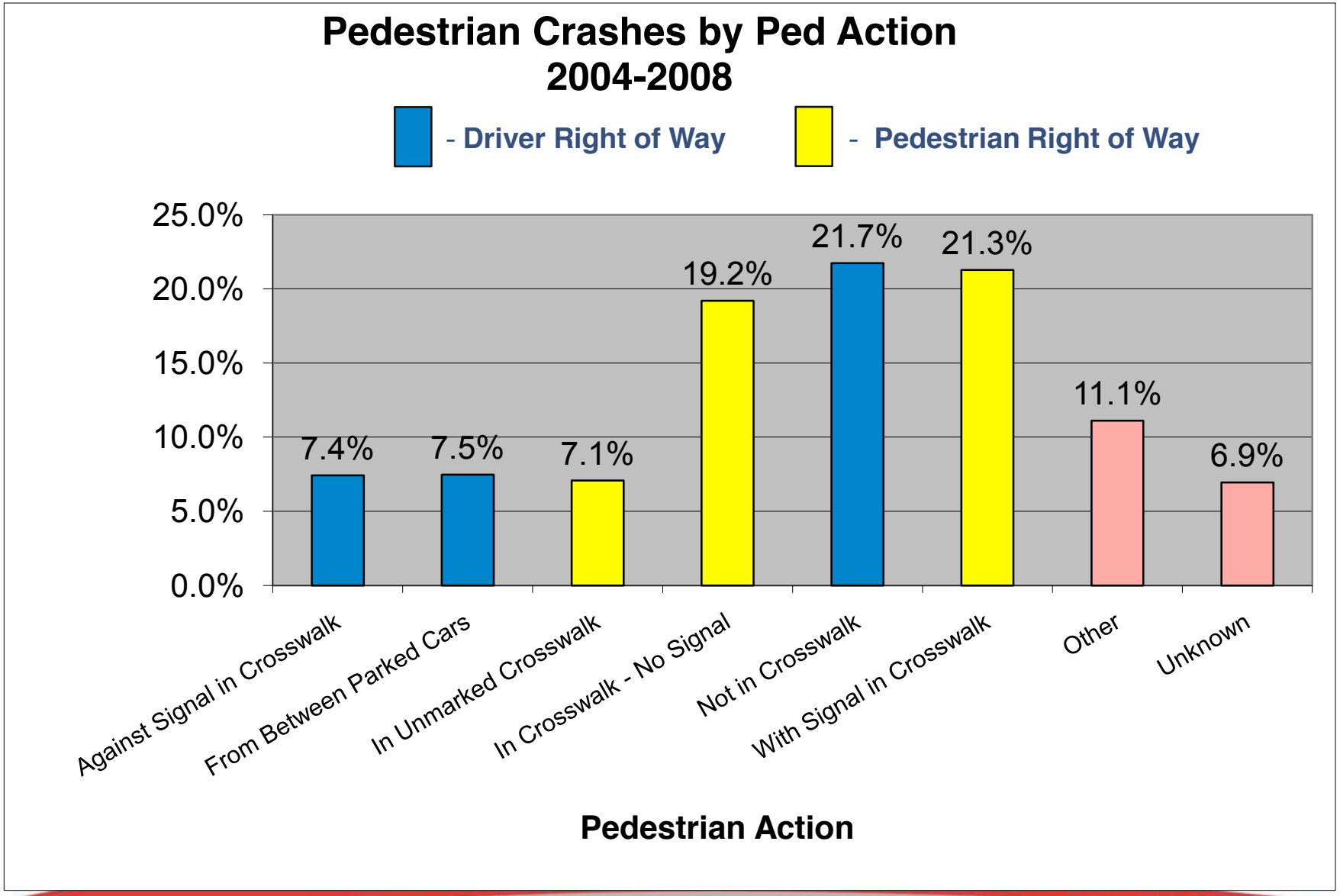
Source: MPD



Comparison Cities, 2005

City	Total Traffic Fatalities	Ped Fatalities	Peds as Percent of Total	Ped Fatality Rate per 100,000 persons
Washington, DC	48	16	33.3	2.9
Safer Cites for Pedestrians				
Seattle, WA	33	6	18.2	1.0
Boston, MA	19	7	36.8	1.3
Portland, OR	35	8	22.9	1.5
New York, NY	323	152	47.1	1.9
San Francisco, CA	33	16	48.5	2.2
Chicago, IL	187	64	34.2	2.3
Los Angeles, CA	283	96	33.9	2.5
Less Safe Cities for Pedestrians				
Phoenix, AZ	184	64	34.2	3.2
Dallas, TX	155	46	29.7	3.7
Orlando, FL	50	9	18.0	4.2
Albuquerque, NM	65	21	32.3	4.2
Jacksonville, FL	149	34	22.8	4.3
Miami, FL	66	22	33.3	5.7

DC Pedestrian Crash Types



Ped Master Plan Scope of Work

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Key work tasks

1. Public involvement
2. Review existing policies and guidelines
3. Identify sidewalk deficiencies in neighborhoods
4. Identify priority pedestrian corridors; conduct detailed field analysis
5. Develop design guidelines and conduct training
6. Develop prioritized recommendations and a final plan

Review Existing Policies and Guidelines

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Policies that affect comfort along the roadway:

- Driveway width & Access Management
- Sidewalks
- Tree boxes & furnishing area

Policies that affect safety crossing the roadway:

- Crosswalks:
  - Marking and design
- Intersections Treatments:
  - Signage
  - Signal timing
  - Restrictions
  - Push buttons
- Uncontrolled crossing treatments:
  - Signage
  - Physical changes
  - Beacons & special signals
- School Zones
- WMATA bus stop design guidelines/practices

3. Neighborhood Sidewalk Deficiencies

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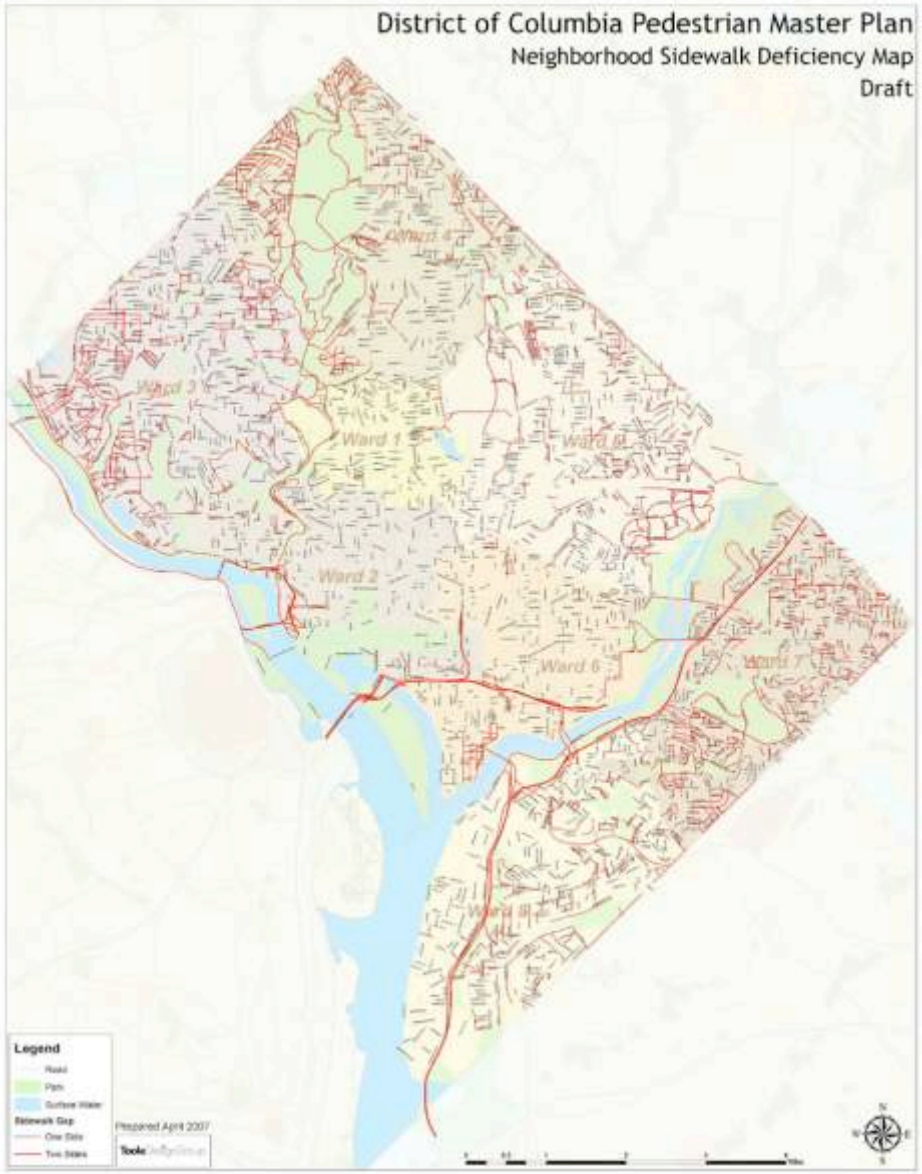
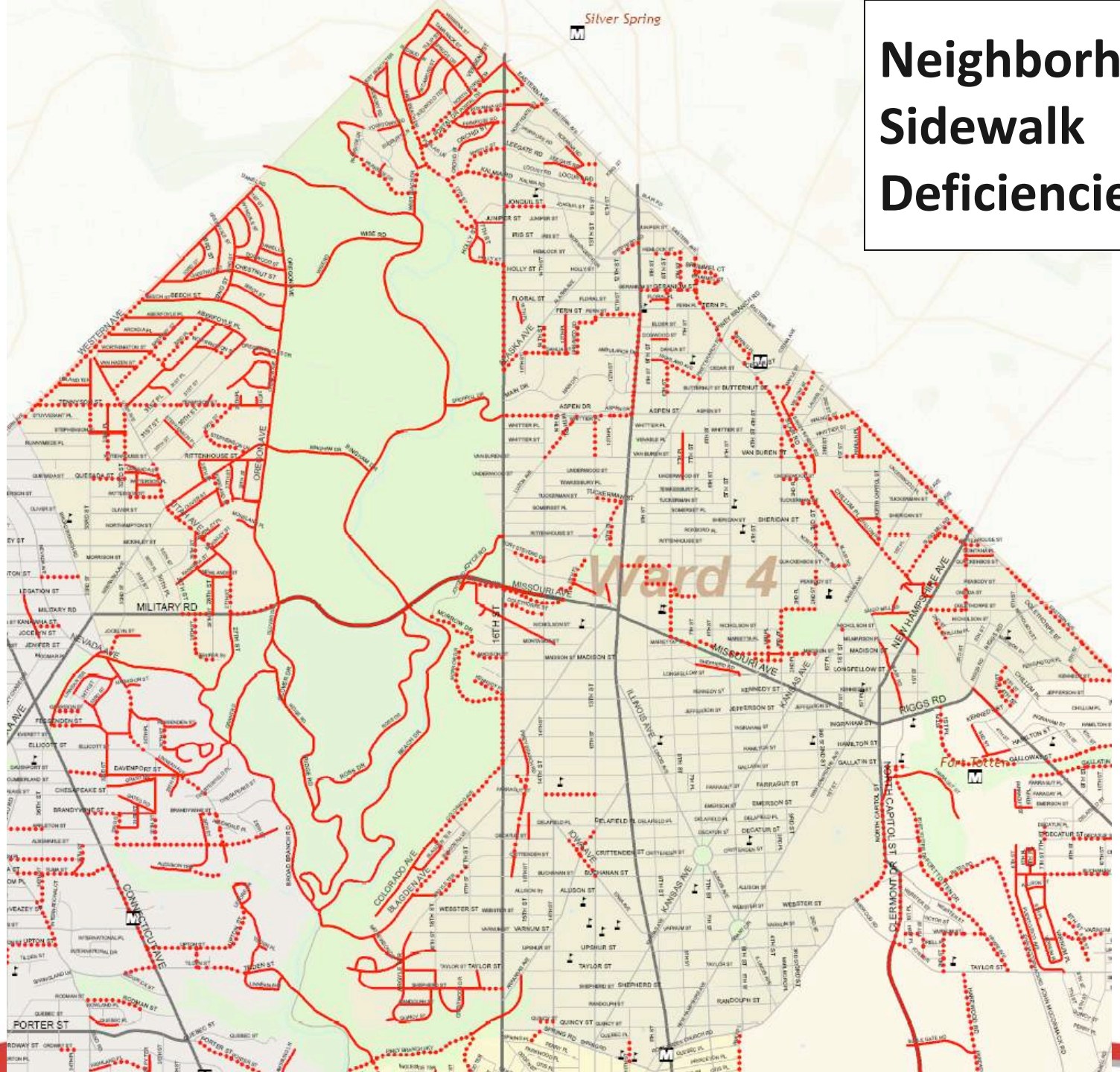


- Identification of sidewalk gaps for entire network of roads in the District

Neighborhood Sidewalk Deficiencies



Priority Pedestrian Study Areas

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- Select priority corridors
  - Locations with most people and worst conditions
  - 8 corridors were analyzed

- Field analysis of priority corridors
  - Existing conditions
  - Key deficiencies for walking along the road and crossing the road
  - Concept recommendations

Identifying Priority Pedestrian Study Areas

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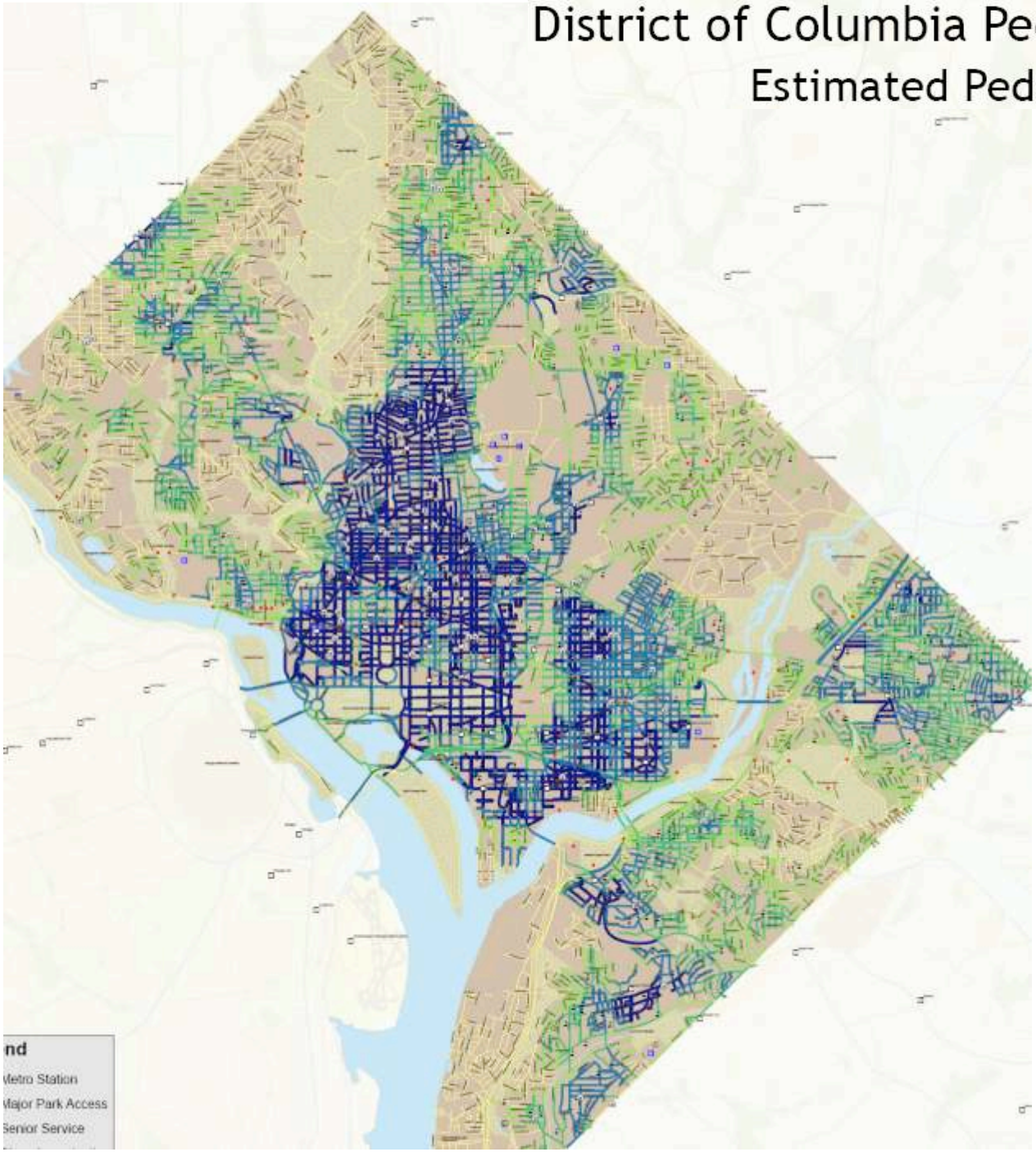
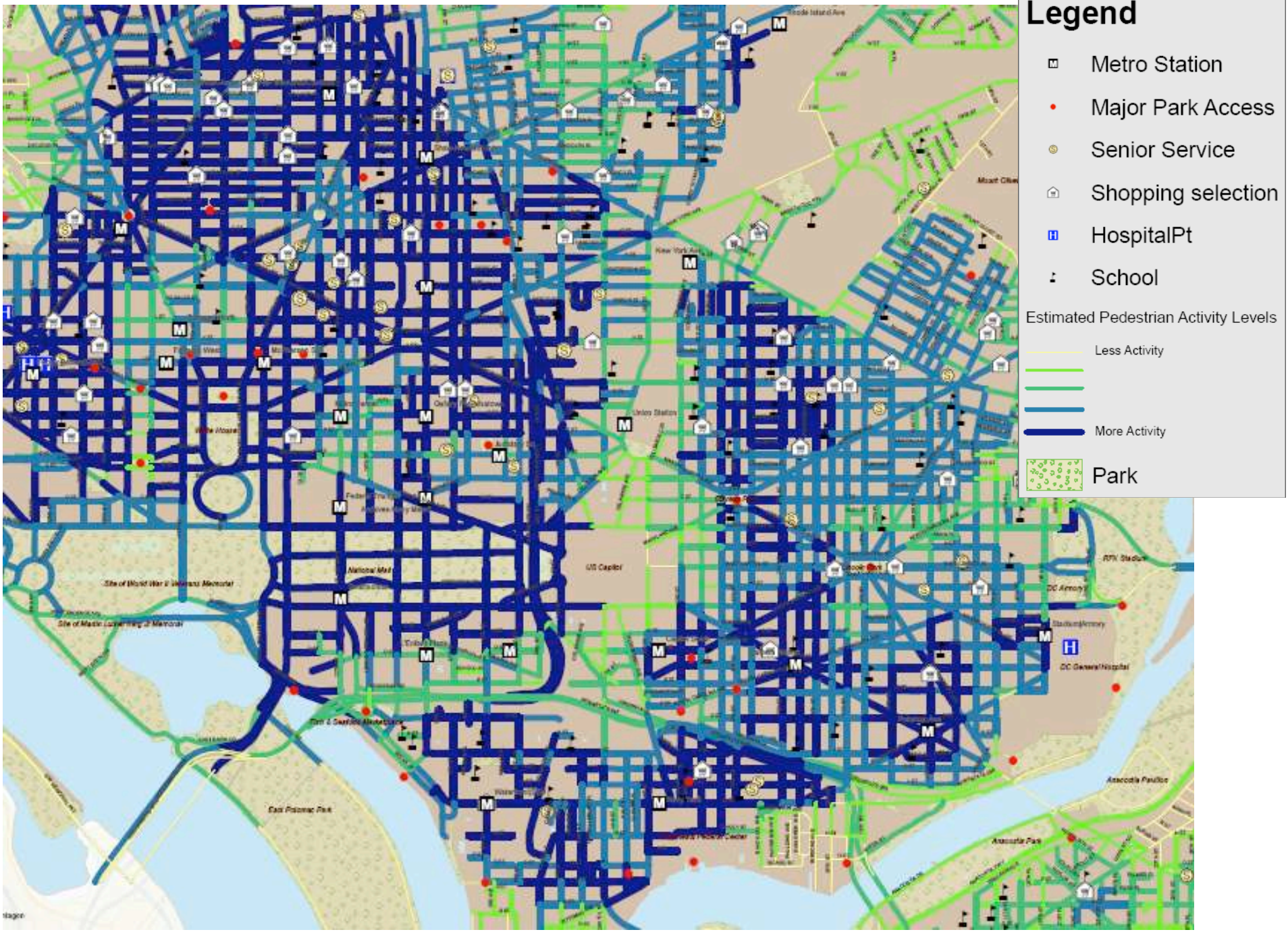
1. Pedestrian Potential Index: Locations with high levels of pedestrian activity
   - Population and Employment Density
   - Roadways near:
     - Metro stations and bus stops
     - Schools, colleges/universities
     - Shopping destinations
     - Major park entrances
     - Senior centers
     - Tourist & special event destinations (convention center)

District of Columbia Pedestrian Master Plan

Estimated Pedestrian Activity Levels




Legend
Metro Station
Major Park Access
Senior Service
Shopping selection
HospitalPt
School
Estimated Pedestrian Activity Levels
Less Activity
More Activity
Park
US Capitol
National Mall
East Potomac Park
Anacostia Park
DC General Hospital
RFK Stadium

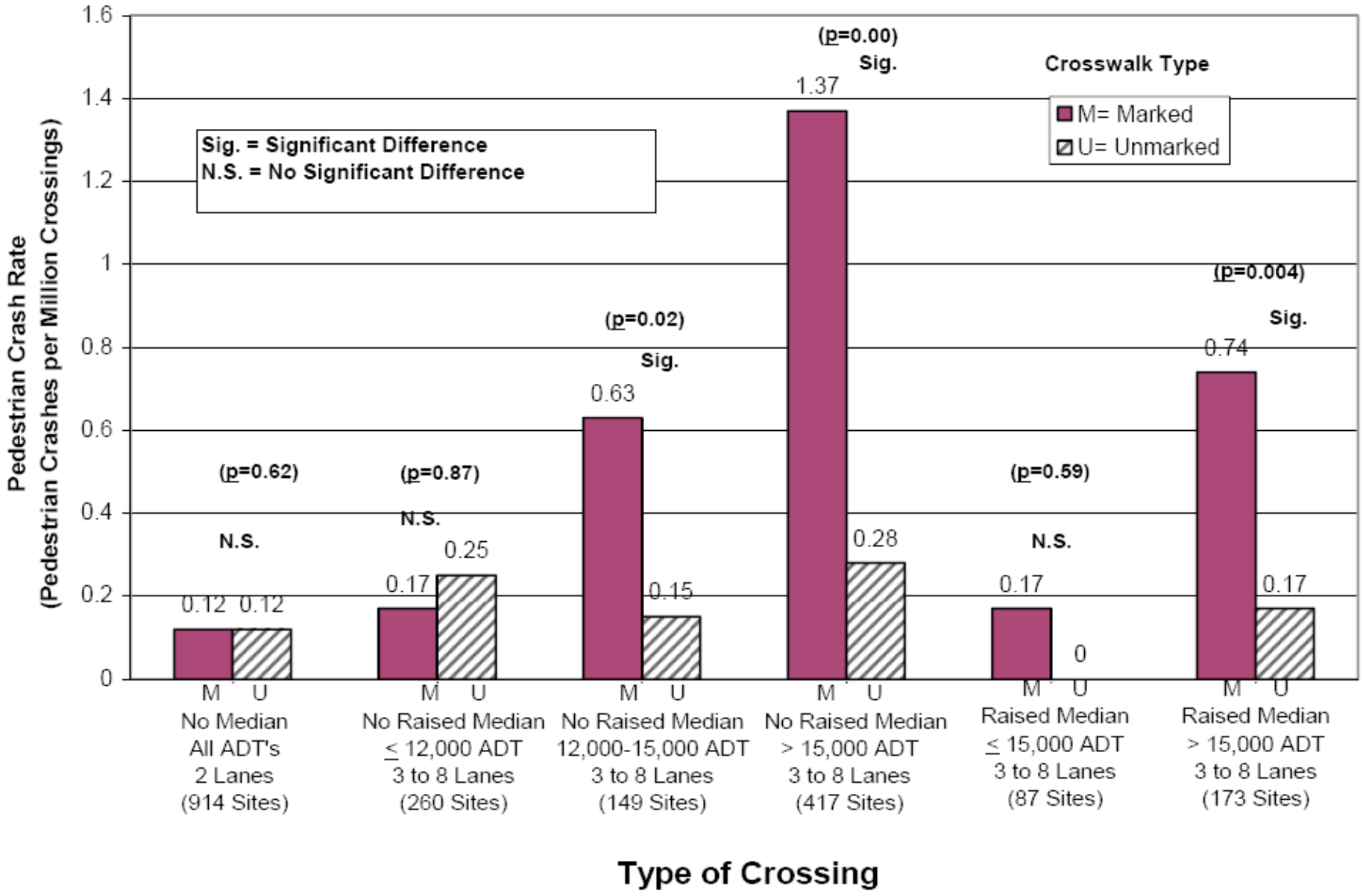
Identifying Priority Pedestrian Study Areas

District Department of Transportation

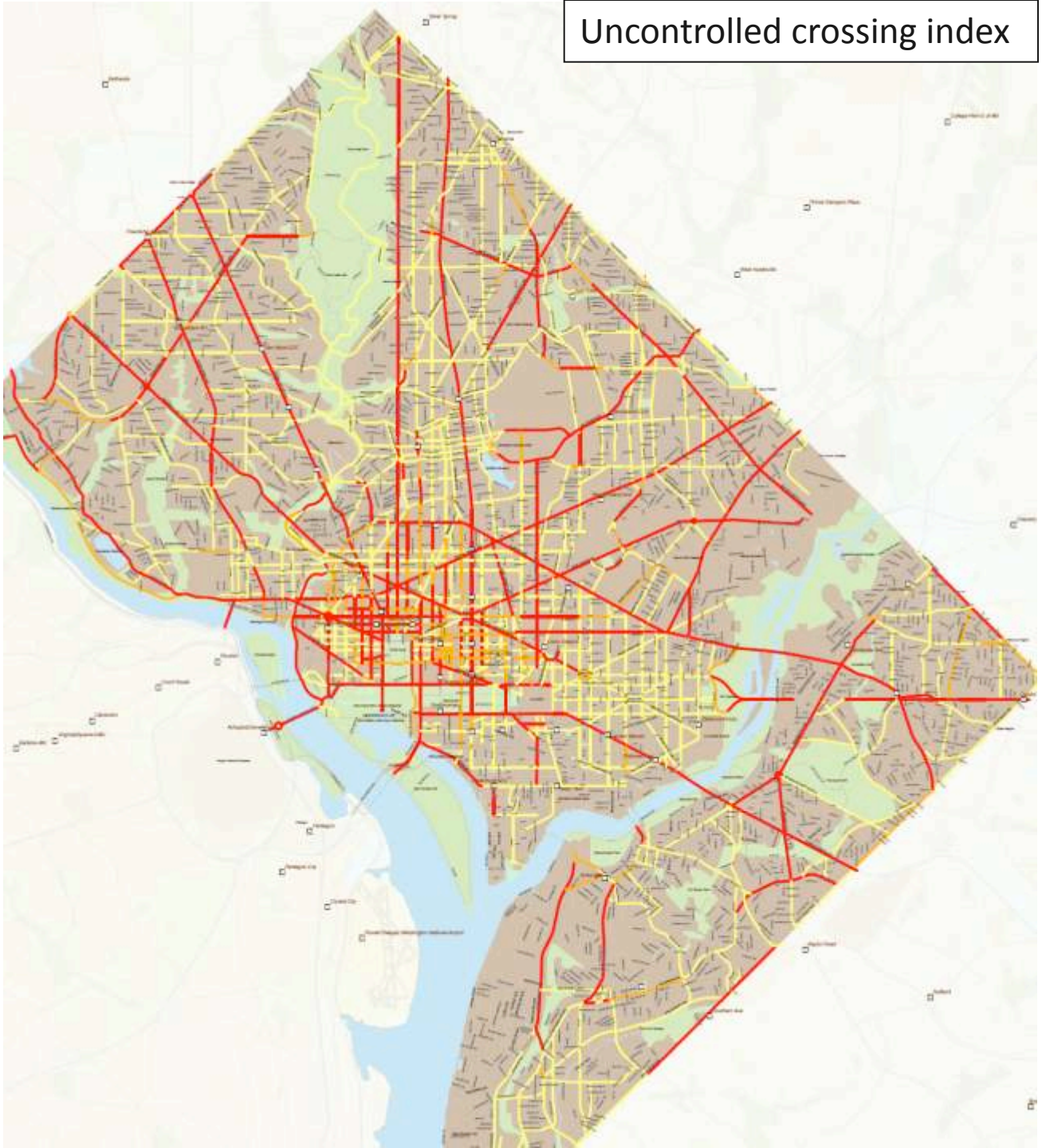
2. Pedestrian Deficiency Index: Locations with poor conditions for pedestrians
   - Roadways with:
     - Sidewalk gaps
     - Narrow sidewalks (under 4’ or 5’ wide)
     - Higher traffic volumes (ADT)
     - Higher posted speed limit
     - Lack of planting strip
     - Lack of street trees
     - Higher number of vehicle travel lanes
     - Lack of median island
     - Longer distance between signalized intersection

Uncontrolled Marked Crosswalk:

Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations:



Uncontrolled crossing index



Uncontrolled crossing index

Uncontrolled crossing index

District of Columbia Pedestrian Master Plan

Pedestrian Crash Data 2000 - 2006

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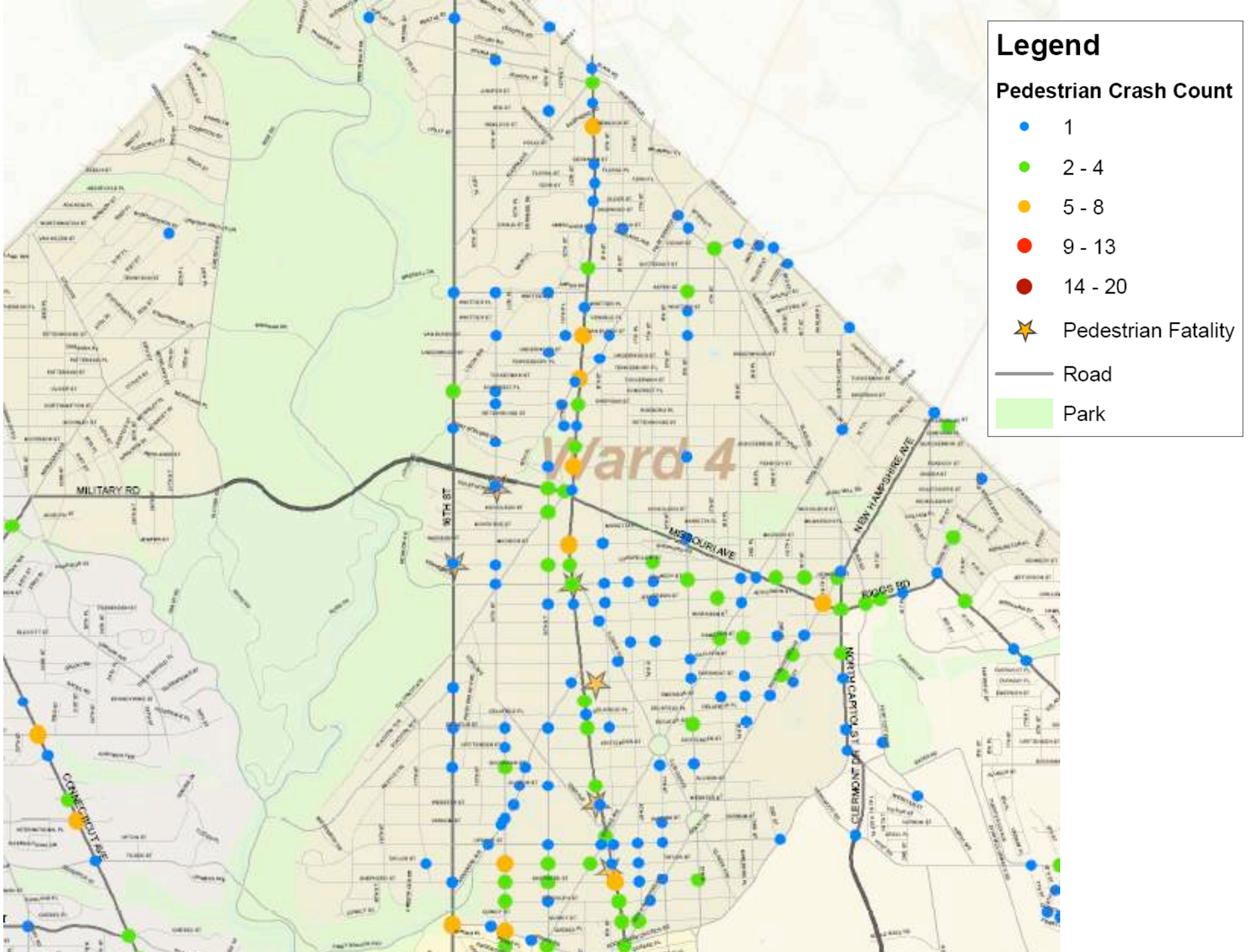
Legend

Pedestrian Crash Count

- 1
- 2 - 4
- 5 - 8
- 9 - 13
- 14 - 20
- Pedestrian Fatality
- Road
- Park


Legend
Pedestrian Crash Count
1
2 - 4
5 - 8
9 - 13
14 - 20
Pedestrian Fatality
Road
Park
Ward 4
MILITARY RD
16TH ST
MISSOURI AVE
NEW HAMPSHIRE AVE
RIGGS RD
NORTH CAPITOL ST NW
CONNECTICUT AVE

Legend

Road Outside Network

Park

Surface Water

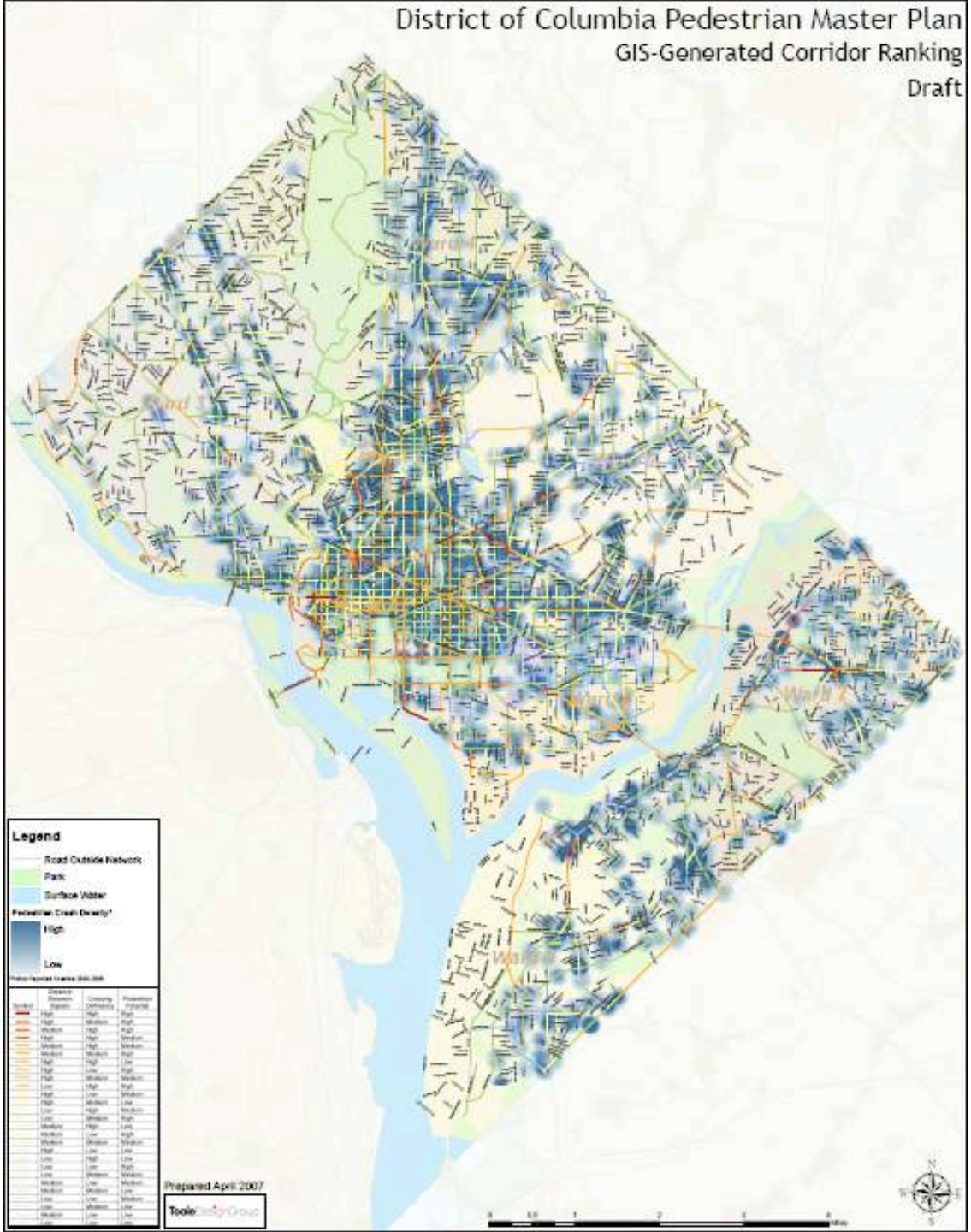
Pedestrian Crash Density*

High

Low

*Police Reported Crashes 2000-2006

Symbol	Distance Between Signals	Crossing Deficiency	Pedestrian Potential
	High	High	High
	High	Medium	High
	Medium	High	High
	High	High	Medium
	Medium	High	Medium
	Medium	Medium	High
	High	High	Low
	High	Low	High
	High	Medium	Medium
	Low	High	High
	High	Low	Medium
	High	Medium	Low
	Low	High	Medium
	Low	Medium	High
	Medium	High	Low
	Medium	Low	High
	Medium	Medium	Medium
	High	Low	Low
	Low	High	Low
	Low	Low	High
	Low	Medium	Medium
	Medium	Low	Medium
	Medium	Medium	Low
	Low	Low	Medium
	Low	Medium	Low
	Medium	Low	Low
	Low	Low	Low



Legend

- Road Outside Network
- Park
- Surface Water

Pedestrian Crash Density*

- High
- Low

*Police Reported Crashes 2000-2006

Symbol	Distance Between Signals	Crossing Deficiency	Pedestrian Potential
	High	High	High
	High	Medium	High
	Medium	High	High
	High	High	Medium
	Medium	High	Medium
	Medium	Medium	High
	High	High	Low
	High	Low	High
	High	Medium	Medium
	Low	High	High
	High	Low	Medium
	High	Medium	Low
	Low	High	Medium
	Low	Medium	High
	Medium	High	Low
	Medium	Low	High
	Medium	Medium	Medium
	High	Low	Low
	Low	High	Low
	Low	Low	High
	Low	Medium	Medium
	Medium	Low	Medium
	Medium	Medium	Low
	Low	Low	Medium
	Low	Medium	Low
	Medium	Low	Low
	Low	Low	Low

District of Columbia Pedestrian Master Plan

High Pedestrian Activity/High Deficiency Roadways

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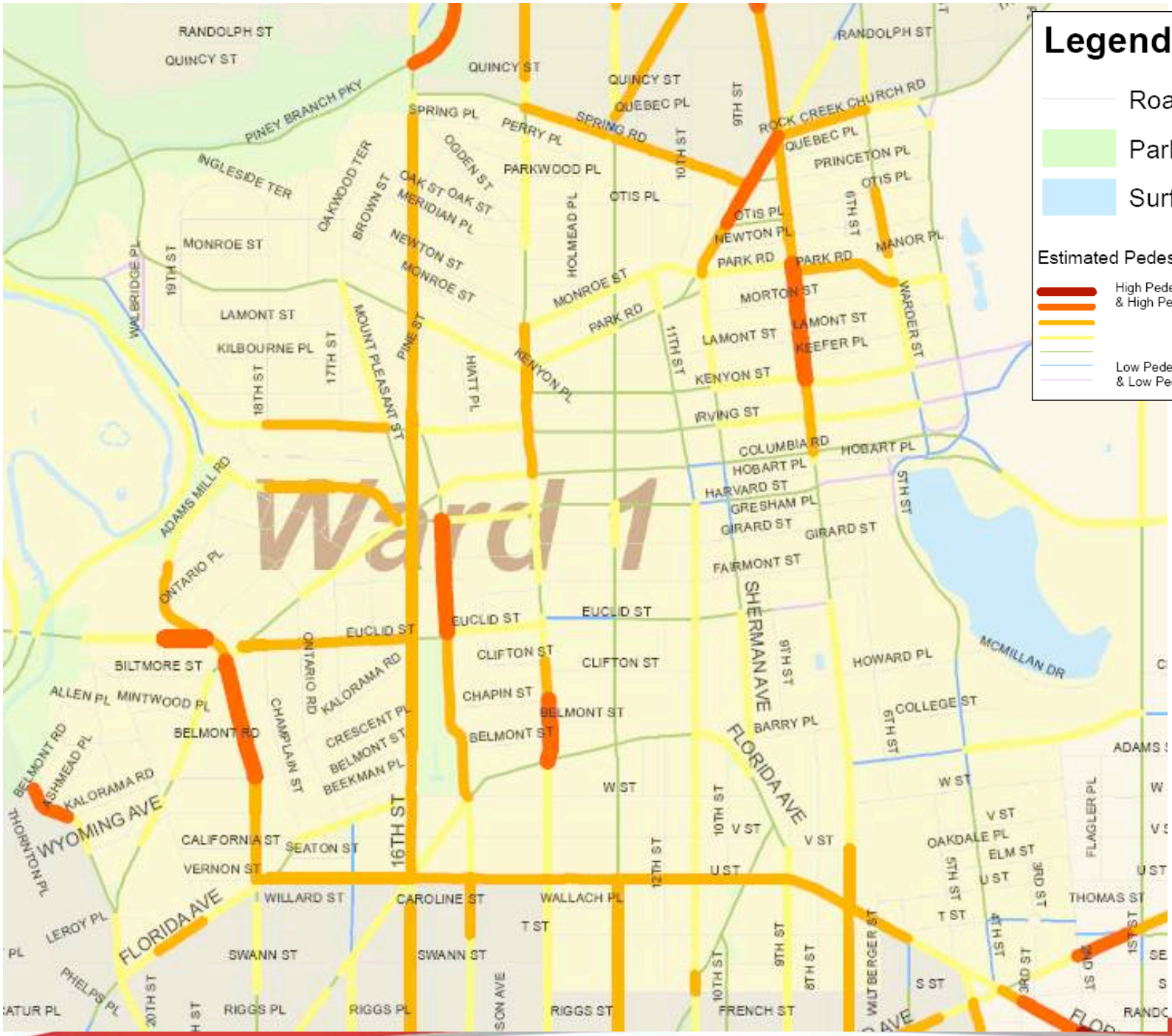
Legend

- Road Outside Network
- Park
- Surface Water

Estimated Pedestrian Activity/Deficiency

- High Pedestrian Activity & High Pedestrian Deficiency
- Low Pedestrian Activity & Low Pedestrian Deficiency


Ward 1
Legend
Road Outside Network
Park
Surface Water
Estimated Pedestrian Activity/Deficiency
High Pedestrian Activity & High Pedestrian Deficiency
Low Pedestrian Activity & Low Pedestrian Deficiency
RANDOLPH ST
QUINCY ST
PINEY BRANCH PKY
INGLESIDE TER
OAKWOOD TER
BROWN ST
SPRING PL
PERRY PL
OGDEN ST
OAK ST
MERIDIAN PL
PARKWOOD PL
SPRING RD
QUEBEC PL
OTIS PL
HOLMEAD PL
10TH ST
9TH ST
ROCK CREEK CHURCH RD
PRINCETON PL
6TH ST
MANOR PL
NEWTON PL
NEWTON ST
MONROE ST
MONTROE ST
PARK RD
MORTON ST
LAMONT ST
KEEFER PL
WARDER ST
WALBRIDGE PL
19TH ST
17TH ST
18TH ST
KILBOURNE PL
MOUNT PLEASANT ST
PINE ST
HIATT PL
KENYON PL
11TH ST
KENYON ST
IRVING ST
COLUMBIA RD
HOBART PL
HARVARD ST
GRESHAM PL
GIRARD ST
FAIRMONT ST
5TH ST
ADAMS MILL RD
ONTARIO PL
ONTARIO RD
EUCLID ST
CLIFTON ST
CHAPIN ST
BELMONT ST
SHERMAN AVE
HOWARD PL
MCMILLAN DR
BARRY PL
COLLEGE ST
1ST H ST
BILTMORE ST
ALLEN PL
MINTWOOD PL
BELMONT RD
KALORAMA RD
CRESCENT PL
BEEKMAN PL
CHAMPLAIN ST
ASHMEAD PL
THORNTON PL
WYOMING AVE
FLORIDA AVE
W ST
V ST
U ST
T ST
CALIFORNIA ST
SEATON ST
VERNON ST
16TH ST
12TH ST
OAKDALE PL
ELM ST
FLAGLER PL
THOMAS ST
WILLARD ST
CAROLINE ST
WALLACH PL
LEROY PL
PHELPS PL
SWANN ST
RIGGS PL
RIGGS ST
FRENCH ST
WILTBERGER ST
S ST
1ST ST
2ND ST
3RD ST
4TH ST
20TH ST

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Priority Pedestrian Corridors

d.

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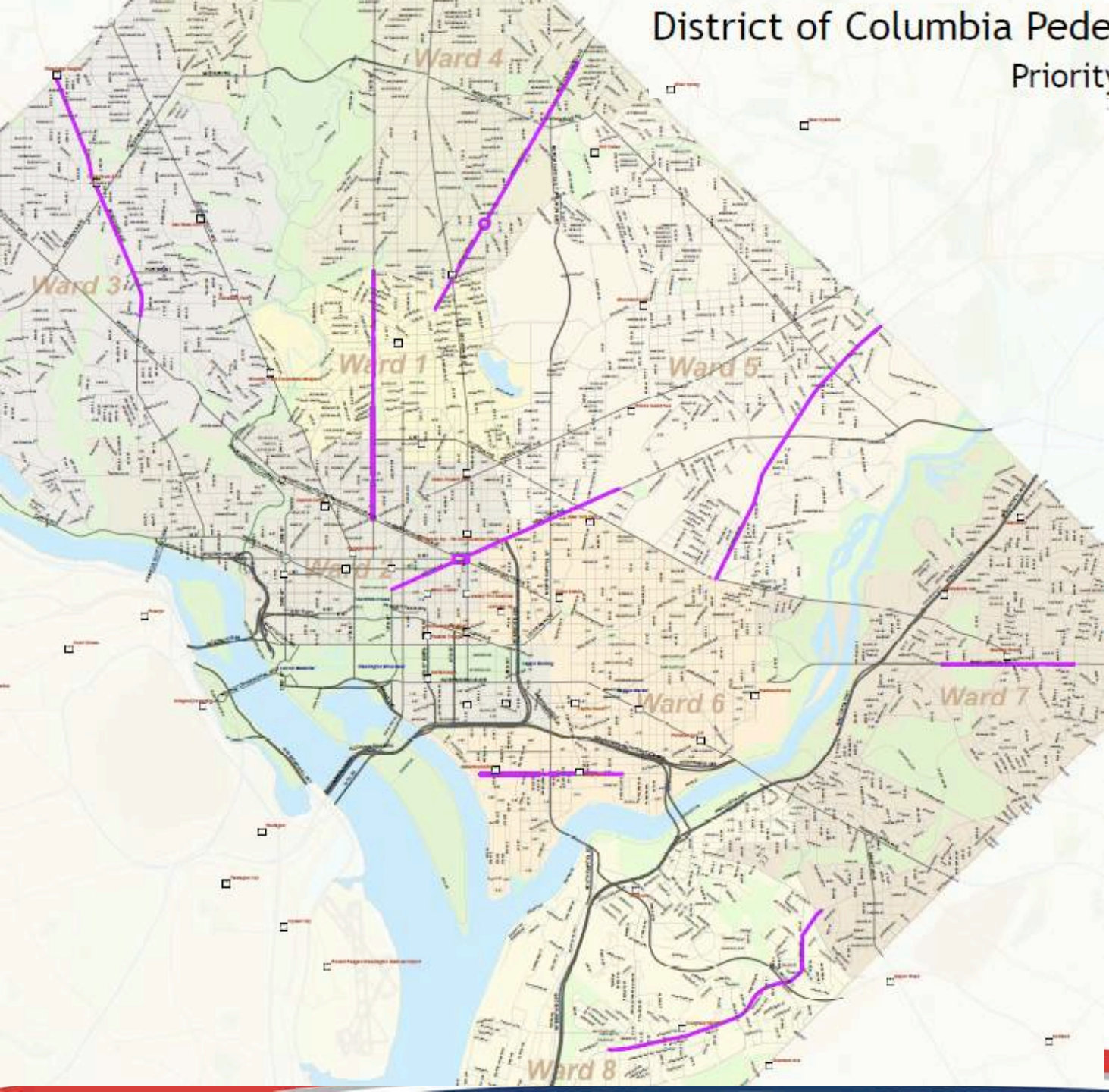


Analyzing Priority Pedestrian Study Areas

WARD 1 – 16th Street
Date: June 12, 2007; Time: 9:00 AM
Weather: Sunny (about 80 degrees)
Surveys Completed: 98

1. What is the primary purpose of your walk today? (check one)
(44) To access transit (metro station or bus stop)
(15) To go to work
(16) To go shopping, run errands
(05) To go to a restaurant/movies/other entertainment
(05) To visit friends, go to the gym, etc.
(05) For exercise only
(01) To go to school
(07) Other: Sell papers, On vacation, Walk dog, Move car

Analyzing Priority Pedestrian Study Areas

3. Why is it difficult to cross at that location? *(check all that apply)*

(36) Drivers' behavior (failing to yield to pedestrians, speeding, running red lights and stop signs)

(15) Traffic signal is not long enough for me to cross

(13) No crosswalks

(04) No traffic light to stop cars

(03) Lack of personal safety (from crime)

(08) Crossing distance is too long

(01) No median island (or refuge)

Missing or poorly maintained curb ramps

(30) Other: Accidents (3)

- Light is to long (8)
- Very congested (3)
- Lights favor cars
- Rush hour
- Hard to get on and off of bus
- Confusing (5)
- Lights do not coincide with each other (2)
- Angle on New Hampshire is odd and catches people off guard
- North corner of New Hampshire needs a stop sign/no turn on red sign

Design Guidelines and Training

District Department of Transportation

- Pedestrian Design Guidelines
  - New and innovative tools for pedestrian safety
  - Details to illustrate appropriate design measures for pedestrians

- Training
  - Two training sessions for DDOT staff
  - Best practice pedestrian design and construction guidelines
  - Tailored to the District

Major policy recommendations to meet national design best practices

1. Crosswalk Marking Policy
   a. Based on Zegeer Study (2002) and Boulder, CO Research (2006), and VDOT policy
   b. Requires enhancements for multi-lane arterials with high volumes
2. Advance Stop Lines on multi-lane arterials at:
   a. Uncontrolled marked crosswalks
   b. Rapid Flash Beacon marked crosswalks
   c. Pedestrian Hybrid Signal marked crosswalks
3. Uncontrolled Crosswalk Side-of-Street Sign (Boulder, CO and MDSHA)
4. Rapid Flash Beacons (St. Petersburg, FL and Boulder, CO)
5. HAWK Pedestrian Hybrid Signals (Tucson, AZ)
6. Far Side Bus Stops (Arlington, VA and Portland, OR)
6. Pedestrian Refuge Islands
7. Curb Extensions
8. Leading Pedestrian Interval Signal Timing

Uncontrolled Crosswalk Matrix

District Department of Transportation

Table 1 - Proposed DC Uncontrolled Crosswalk Engineering Treatments

For roadways posted 30mph or less

Roadway Configuration	1,500 - 9,000 vpd	9,000 - 12,000 vpd	12,000 - 15,000 vpd	> 15,000 vpd
2 Lanes[1]	A	A	A or B	B or C
2 Lanes with CTL[1]	A	A	B	B or C
2 Lanes One Way	B	B	C	C
4 Lanes w/Raised Median[2]	B	B	C	C
3 Lanes No Median[3]	B	B	C	C
5 Lanes w/Raised Median[3]	B	B	C	C
6 Lanes w/Raised Median[4]	B	B	C	D
4 Lanes No Median[4]	B	B or C	C	D
5 Lanes No Median[3]	B	B or C	D	D
6 Lanes No Median[4]	B	B or C	D	D

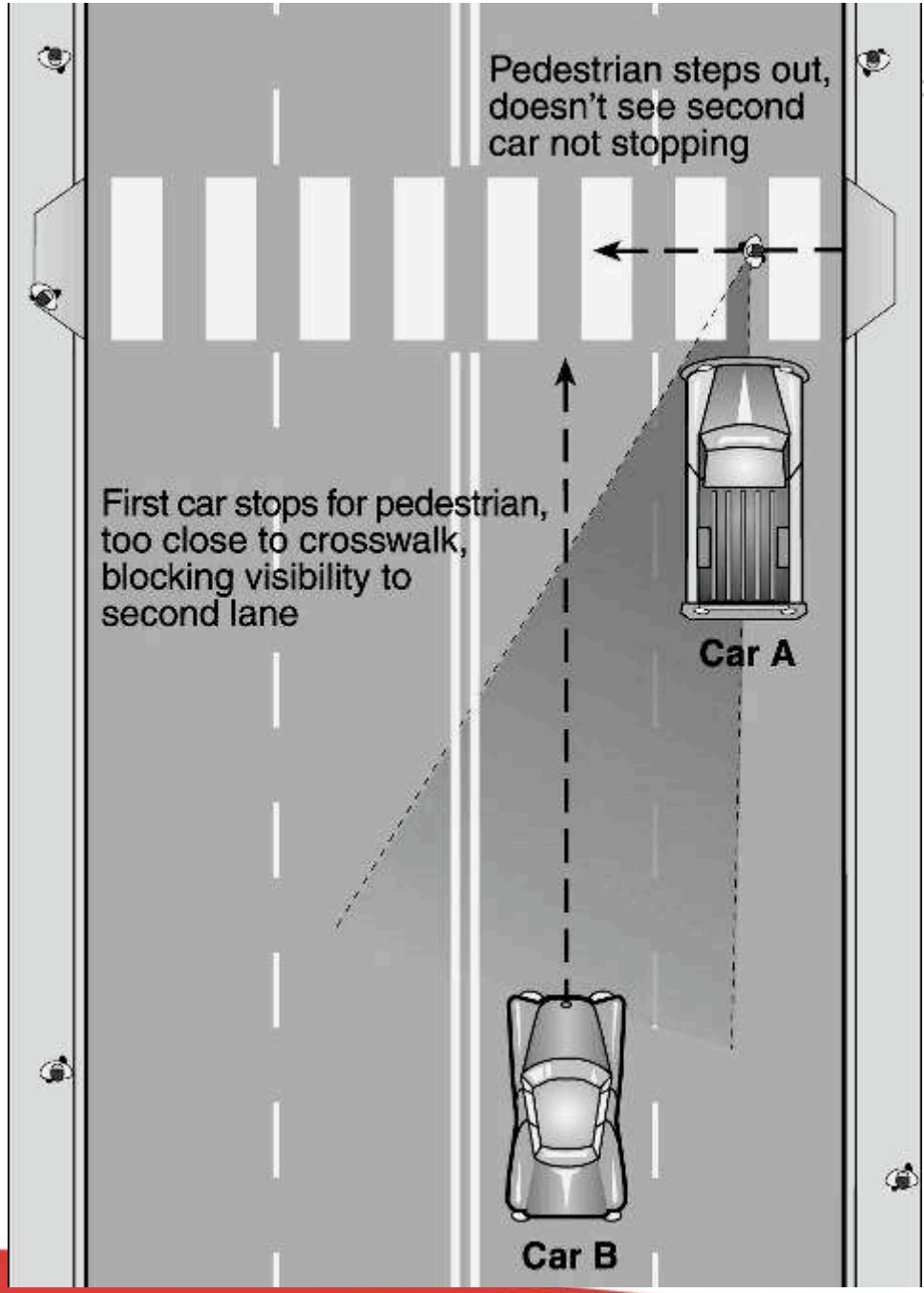
Volumes below 1,500	Parallel Crosswalk and/or W11-2 as sembly
Treatment A	High Visibility Crosswalk and Side of Street Ped Law Sign
Treatment B	In Street Stop For Peds Sign and/or Traffic Calming (See Traffic Calming Guide) Advance Stop Line Should be Used for all Multi Lane Crossings
Treatment C[5]	Activated Pedestrian Device (Rapid Flash Beacon, Flashing Beacon, In-Roadway Lights)
Treatment D	Signal (Pedestrian Hybrid, Full Signal) or Grade Separation

Advance Stop Lines:

Multiple threat crash problem

1st car stops to let pedestrian cross

1st car masks 2nd car, which doesn't stop, hits pedestrian at high speed

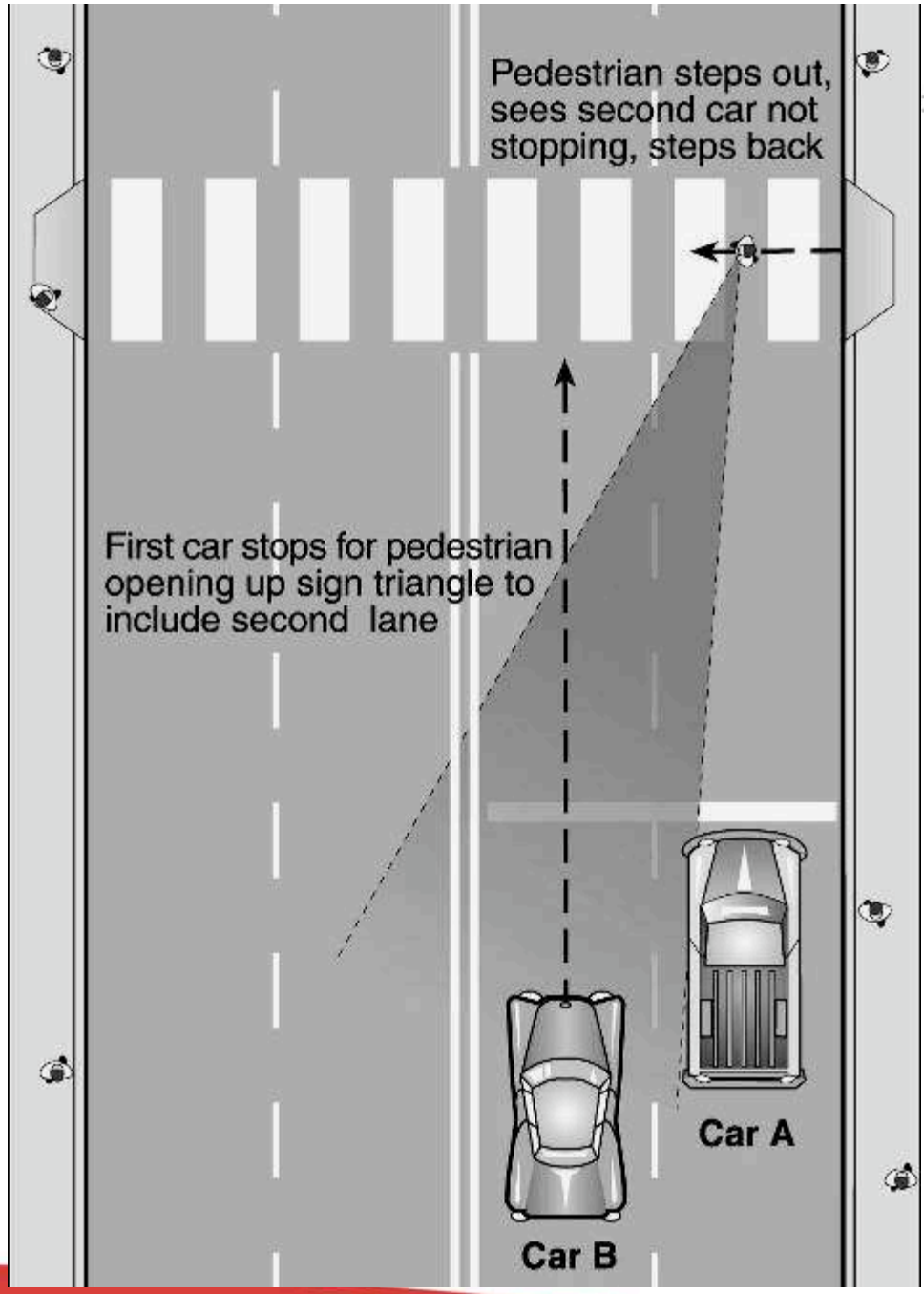


Multiple threat crash solution

Advance stop/yield line

1st car stops further back

1st car no longer masks 2nd car, which can be seen by pedestrian

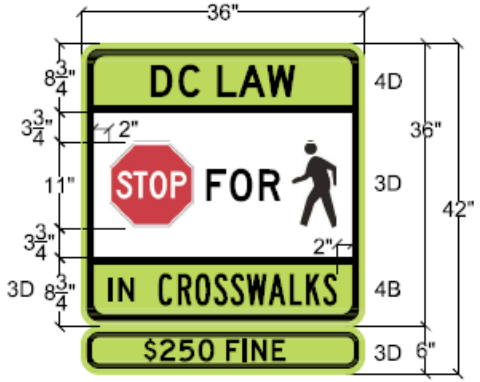



Advance Stop Lines at uncontrolled crosswalks
STOP
HERE
FOR
PEDESTRIANS
STOP
HERE
FOR
PEDESTRIANS
R1-5c

Proposed Side of Street Crosswalk Sign

SIDE OF STREET PEDESTRIAN WARNING SIGN USE CRITERIA

R1-6a(1)



W16-7pR

W16-7pL

SIDE-OF-STREET PEDESTRIAN CROSSING SIGN (R1-6a(1))

GUIDANCE:
The Side-of-Street Pedestrian Crossing sign (R1-6a(1)) shall be utilized to notify road users of the stop for pedestrians law controlling right-of-way at an uncontrolled pedestrian crosswalk.

If used, the Side-of-Street Pedestrian Crossing sign shall be placed at the crosswalk. On multi-lane roadways the signs shall be posted on the left and right sides of the travel way. At locations with medians or pedestrian refuge islands, the signs shall be posted on the left and right sides of the each vehicular traveled way approach.

When used at the crossing, the Side-of-Street Pedestrian Crossing shall be supplemented with a diagonal downward pointing arrow (W16-7P) plaque showing the location of the crossing.

The Side-of-Street Pedestrian Crossing sign shall not be used at a signalized intersection.

OPTION: a plaque may be utilized below the R1-6a(1) to display the motorist fine as established by DC Law.

INSTALLATION:
The sign shall conform to DDOT standards for letter height and layout. Signs must be installed according to DDOT sign hanging standards.

R1-6a SIGN DESIGN

SOURCE:	MD SHA SIGN R1-6a(1)
SIZE:	36" x 36" standard 42" x 42" oversize
COLOR:	black letters on fluorescent yellow-green background red stop sign symbol and black pedestrian symbol on white background

DRAFT

Enhanced Uncontrolled Crosswalk

Rectangular Rapid Flashing Crosswalk Beacon (RRFB)

District Department of Transportation

For use at selected crosswalks on collector and minor arterial streets

Vendor: Stop Experts

RRFB Evaluation

BASELINE

Location: Brentwood Rd. & 13th St. NE Treatment: HiViz CW (w/ ped pylon) Day_X_ Night ___

Date: 4/23/08 Time: 9:30-10:30 am Observers: Branyan/Goodno/Hefferan
4/25/08 Time: 4:30-5:20 pm

Date/Crossings	Cars Yielding	Cars Not Yielding	Distance Cars yielded from crosswalk							Driver Passed Stopped Veh or Attempt	Car Behind Yielding Car Jams Brakes
			< 10 ft	Red 10ft-20ft	Orange 20ft-30ft	Yellow 30ft-50ft	Green 50ft-70ft	Blue 70ft-100ft	Red >100ft		
4/23:20	34	66	0	4	5	13	12	0	0	1	0
4/23:20	39	60	0	11	12	7	6	3	0	2	1
4/25:20	38	158	0	10	13	8	6	0	1	7	0
4/25:20	35	128	10	14	7	4	0	0	0	11	0
Totals	146	412	7%	27%	25%	22%	16%	2%	1%	21	1

Total vehicles: 558 41% of vehicles yielding 30' or farther from crosswalk

Overall Compliance rate: 26%
Best 20 crossings: 39%
Worst 20 crossings: 19%

RRFB Evaluation

100-DAY FOLLOW UP

Location: Brentwood Rd. & 13th St. NE

Treatment: 2RFB + 1 Advance RFB Day_X_ Night ___
W/ advance stop lines. No Pylon

Dates: 8/14/08 Time: 9:30-10:30 am Obsrvs: Branyan/Goodno/Hefferan/Deutsch
8/21/08 Time: 4:30-5:07 pm

Date/ Crossings	Cars Yielding	Cars Not Yielding	Distance Cars yielded from crosswalk							Driver Passed Stopped Veh or	Car Behind Yielding Car Jams
			< 10 ft	Red 10ft-20ft	Orange 20ft-30ft	Yellow 30ft-50ft	Green 50ft-70ft	Blue 70ft-100ft	Red >100ft		
8/14:20	50	11		3	7	2	16	8	4		
8/14:20	48	13	3	1	8	18	17	1	4	2	
8/21:20	58	13		3	10	23	20	1	1		
8/21:20	54	21		3	11	8	27	2	3		
Totals	210	58	1%	5%	17%	24%	38%	6%	6%	2	0

Total vehicles: 268

74% of yielding vehicles 30' or farther from crosswalk

Overall Compliance rate: 78%

Best 20 crossings: 82%

Worst 20 crossings: 72%

- Five new RRFB locations installed in August/September 2010

Vendor: Spot Devices

Enhanced Uncontrolled Crosswalk on major arterial

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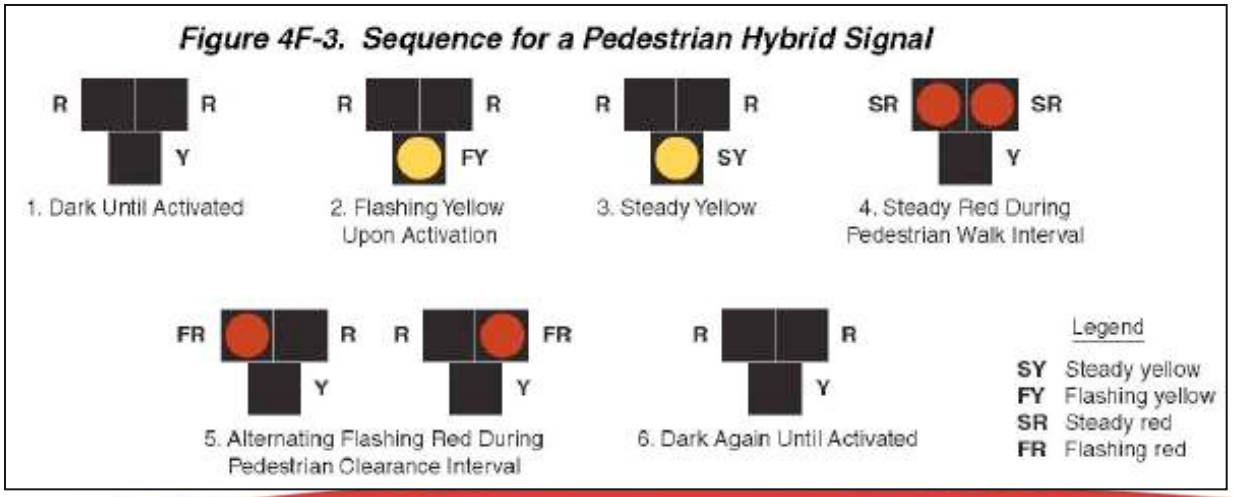
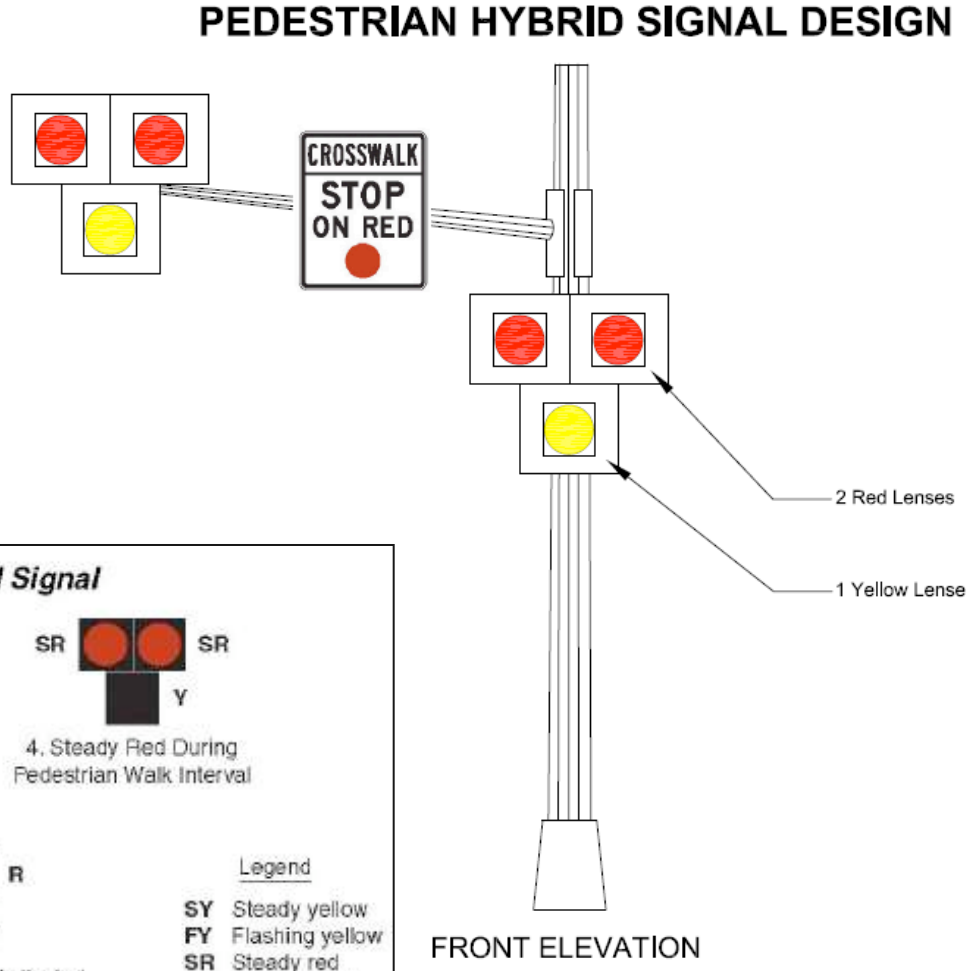
HAWK Pedestrian Hybrid Signal

Pedestrian-activated signal

For Use at selected currently uncontrolled crosswalks on major arterial streets.





HAWK Pedestrian Hybrid Signal in DC

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Major roadway gets traffic signal.

Minor roadway keeps stop sign

Minor roadway gets less cut-through traffic.

Study showed 97% compliance by drivers.

Curb Extensions with LID features

Source: Toole Design Group


Source: Richard Drdul

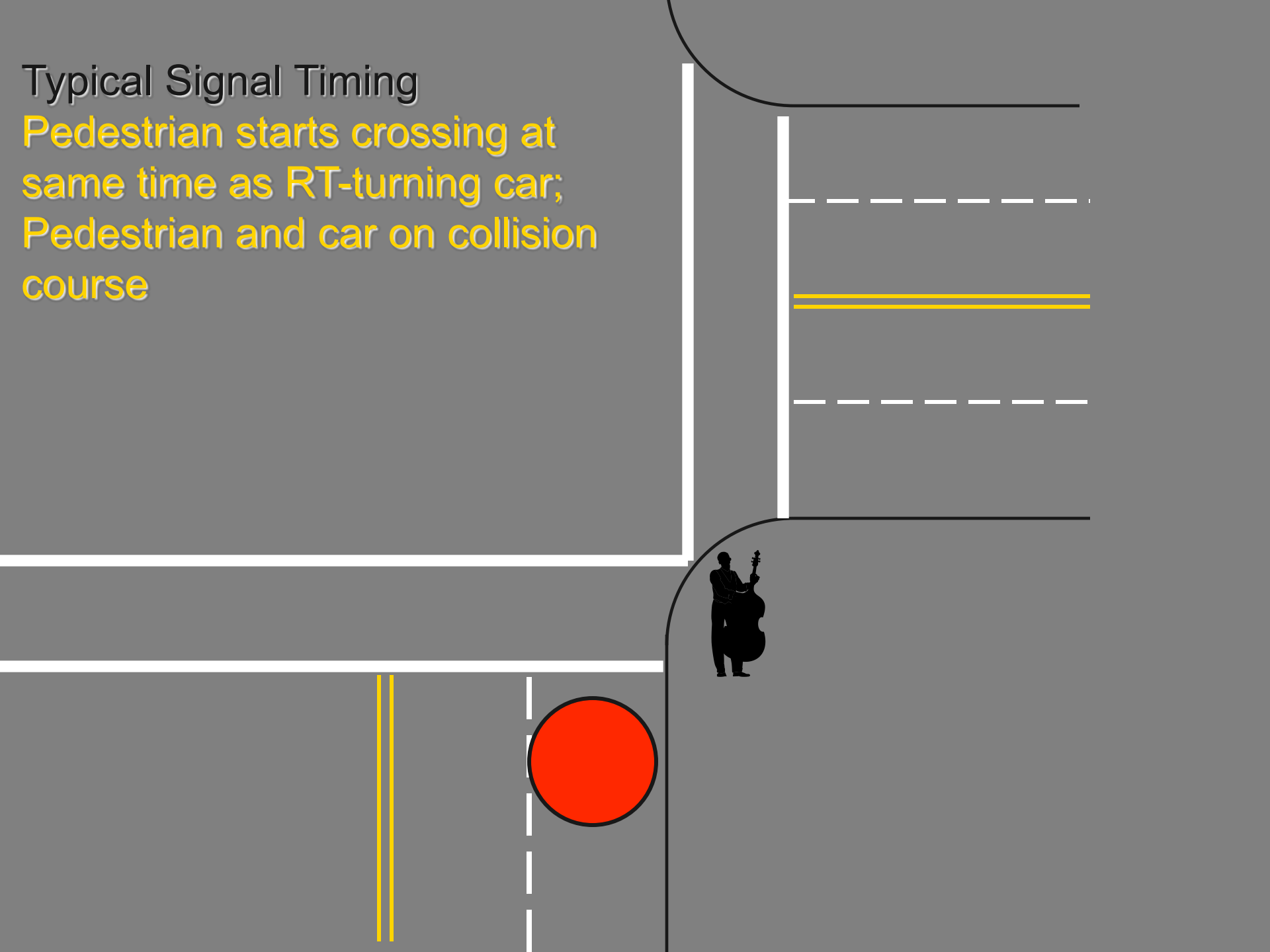
Leading Pedestrian Interval or LPI

District Department of Transportation

- *LPIs gives pedestrians a head start;* Looks like a regular signal to drivers
- *Reduces turning vehicle/pedestrian conflicts*
- *Works best at locations where right on red is prohibited*

Typical Signal Timing

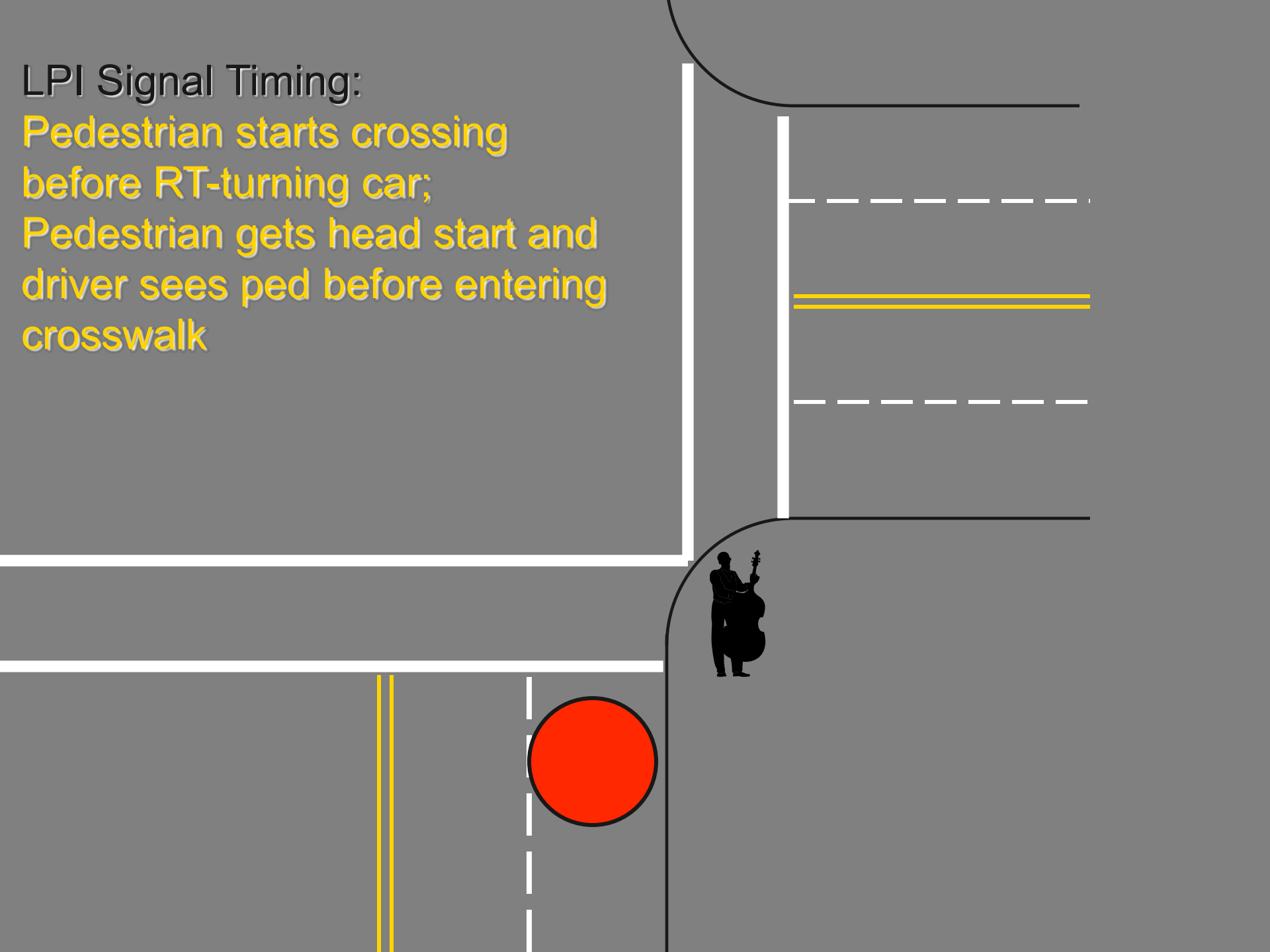
Pedestrian starts crossing at same time as RT-turning car; Pedestrian and car on collision course



LPI Signal Timing:

Pedestrian starts crossing before RT-turning car;

Pedestrian gets head start and driver sees ped before entering crosswalk



Leading Pedestrian Interval or LPI

District Department of Transportation

- *31 intersections completed to date; 9 more have been designed and will soon be implemented.*
- *30 more locations are being analyzed for a total of 70 locations.*

Ward 4 Priority Pedestrian Study Corridor

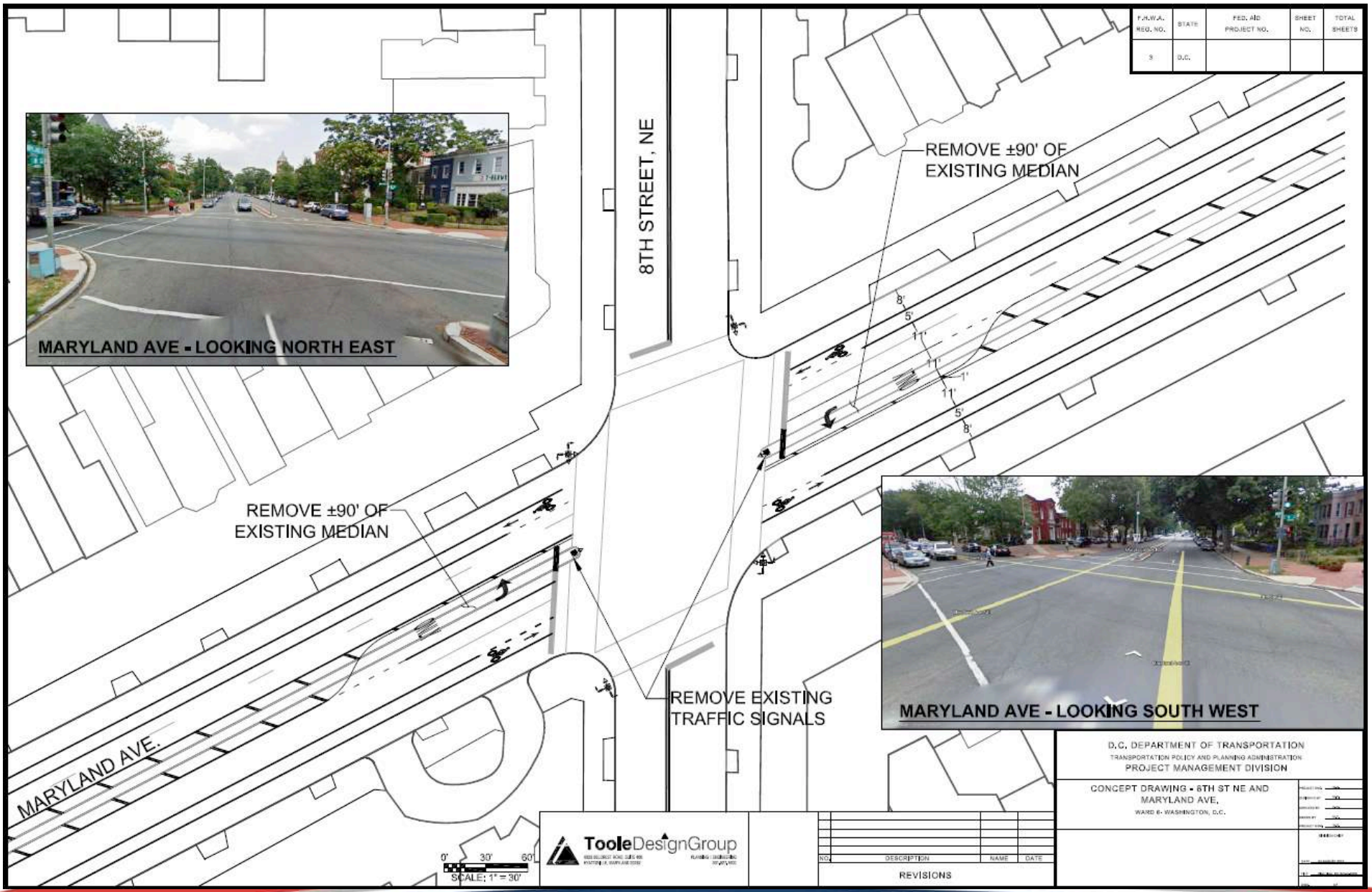
New Hampshire Ave., Park Rd. NW – Peabody St. NE

Ward 4 Priority Pedestrian Study Corridor

New Hampshire Ave., Park Rd. NW – Peabody St. NE

Taylor Street, NW

Maryland Avenue NE Road Diet



Priority Pedestrian Study Corridors Citywide

District Department of Transportation

Proposed Recommendation	Quantity
New Right Turn on Red Restrictions	100
Bus stop relocations	75
Signal recommendations (add full signals, pedestrian activated signals,	40
Curb ramp improvements	550
Crosswalk improvements (new crosswalk markings, restripe crosswalks, raised crossings, stripe edge lines, advance stop bars)	330
Remove crosswalk marking	40
Sidewalk improvements	340
Build Curb Extension	175
Construct or Extend Median or island	75
Remove or narrow driveway	40
Install Speed or Red Light Camera	4

Enforcement & Education Recommendations

District Department of Transportation

- Increase penalties for motorists who fail to stop for pedestrians in crosswalks
- Increase enforcement of traffic laws that protect pedestrians
- Expand MPD Photo Radar speeding reduction program
- Expand pedestrian safety campaign efforts such as “STREET SMART”
- Develop a tag line that conveys the walkability of the District
- Expand the Implementation of the Safe Routes to School program

District Department of Transportation

Thank you !

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