Appendix A ~ Pedestrian Demand Methodology

This document describes the methodology used to identify and select priority corridors in the District for detailed study as part of the Pedestrian Master Plan. Eight arterial road segments were selected for this high level of analysis, focusing on corridors with higher levels of pedestrian activity, yet poorer conditions for walking. The pedestrian demand model that was used for this analysis was based on a modified version of Portland, Oregon's Pedestrian Potential and Deficiency Indices.

The selected corridors were analyzed in the field, and detailed recommendations were developed to improve pedestrian conditions (see Priority Corridor Recommendations – a separate document available on the DDOT website). The Pedestrian Plan also incorporates general recommendations to make all streets in the District more walkable, including a neighborhood sidewalk gap analysis to identify needed sidewalk improvements. This pedestrian demand analysis can also be used in the future to prioritize capital projects in other parts of the District.

Road segments in the District have been rated on two factors; pedestrian potential (how much pedestrian activity is expected in particular locations) and pedestrian deficiency (how challenging it is for pedestrians to travel along or cross particular roads). Road segments with high potential for pedestrian activity and high deficiency are considered to be priorities for further evaluation. The criteria used to rate pedestrian potential and deficiency are described below. Because this is a sketch plan method, it is not intended to produce precise estimates of the number of pedestrians along a particular roadway or the relative risk of pedestrian crashes in specific locations. Instead, it is used to select general corridors for additional detailed analysis.

PEDESTRIAN POTENTIAL

The potential for pedestrian activity on a given roadway segment was determined by the pedestrian attractors/generators and the anticipated growth in population and employment density near that location. Corridors that were scheduled for significant transportation and pedestrian improvements were also considered as having potential for greater future pedestrian activity. Pedestrian potential was determined using the following two criteria:

1. Proximity - Roadway segments received more points for being located close to pedestrian attractors and generators*. Buffer zones of one-eighth, one-fourth, and one-half mile (straight line distance, not network distance) were drawn around each attractor and generator. Road segments received points for falling within each of these buffer areas as follows:

Attractor/Generator	1/8 mile	1/4 mile	1/2 mile
Metro Station	15	10	5
Bus stop	5	3	
School (public, charter, and colleges/ universities)	5	3	
Major Park Access Point	3	1	
Shopping	3	1	
Senior Center/Nursing Home	3	1	
The National Mall (proximity to any part of the National Mall)	20	5	
Stadiums/Convention Center (proximity to any part of the building)	20	5	

**point allocations are based on average pedestrian activity.*

For example, the National Mall is a location of significant pedestrian activity for both tourists and residents. Most pedestrian activity is concentrated on the National Mall or within several blocks of it, so roadways that are in or adjacent to the Mall received a large number of points (30), but those locations further away were not assigned any points. In contrast, people are generally willing to walk longer distances to transit (studies have shown that a typical walk to transit is ¼ to ½ mile, and many people walk even further[1]). Therefore, points were given to roadways as far away as ½ mile from each Metro station. In addition, more pedestrians walk to most Metro stations than walk to schools, bus stops, or parks, so the roads near the stations received higher scores.

2. Population and Employment Density - This category incorporates population and employment forecasts for 2025 from the Metropolitan Washington Council of Governments (MWCOG). Roadway segments contained in MWCOG Traffic Analysis Zones (TAZs) with greater future population and employment density were assigned more points. As more pedestrian trips are typically generated from a residential location than an employment location, population forecasts were assigned greater values than employment forecasts. Population and employment projections were divided into quintiles, and points assigned for each class as follows:

Quintile	**2025 Population Forecast** (per sq. mile)	**Points**	**2025 Employment Forecast** (per sq. mile)	**Points**
1	0 - 2,527	0	0 – 1,040	0
2	2,528 – 7,929	5	1041 – 2,888	3
3	7,930 – 13,071	10	2,889 – 8,007	6
4	13,072 – 22,626	15	8,008 – 41,258	9
5	22,627 – 134,959	20	41,259 – 464,493	12

PEDESTRIAN DEFICIENCY

Barriers to walking on the city's network of approximately 400 miles of arterial and collector roadways were analyzed to identify roads that are most deficient for pedestrian travel. The pedestrian deficiency factor was determined using the following criteria:

1. Walking Along the Roadway

The deficiency rating for walking along the roadway was developed using sidewalk inventory data. Roadway segments with sidewalk gaps, with narrow sidewalks and without buffers or street trees were given more points to indicate they are highly deficient for pedestrian travel. Points were also given to roadway segments with higher traffic volumes and speed limit to indicate a more deficient environment for walking. Each roadway segment was assigned a deficiency rating for walking along the roadway based on the following factors:

Factor/criteria		**Points allocated**
Sidewalk Gap: more than 10% of a block length without sidewalk*		
	1 side of street with a sidewalk gap	10
	2 sides of street with a sidewalk gap	20
Sidewalk Width		

[1] Weinstein, A., V. Bekkouche, K. Irvin, and M. Schlossberg. "How Far, by Which Route, and Why? A Spatial Analysis of Pedestrian Preference," Presented at 2007 Transportation Research Board Annual Meeting.

	Under 5' wide	2
	Under 4' wide	3
Presence of Planting Strip		
	No planting strip	3
Presence of Street Trees		
	No street trees	1
Traffic Volume (ADT)		
	5,000 – 10,000	1
	10,001 – 15,000	2
	15,001 – 20,000	3
	20,001 – 25,000	4
	25,001 or more	5
Posted Speed Limit		
	30mph	1
	35mph	2
	40mph	3
	45mph or more	5

**Data from a 2003 inventory of arterial roadways in the District were used to assign points for the walking along the roadway analysis. Where data was missing for a specific road segment, data from the adjacent segment was applied.*

2. Crossing the Roadway

Roads with higher traffic volumes, more travel lanes, higher speed limits and no medians generally present more hazards for pedestrians trying to cross the road. Therefore, the deficiency rating for crossing the roadway at uncontrolled locations was based on roadway characteristics including traffic volume, number of travel lanes, speed limit and the presence of a raised median or median island. The deficiency rating was not based on an actual evaluation of crosswalks in the District, but was derived based on these roadway characteristics. Using categories developed by FHWA[2] (see below), roadway segments are classified into the non-compliant (represented by a "N" in the chart on the next page), possibly compliant ("P"), and compliant ("C") categories based on the following characteristics:

- Traffic Volume (ADT)
  - Less than 9,000
  - 9,000 – 12,000
  - 12,001 – 15,000
  - More than 15,000
- Number of Vehicle Travel Lanes
  - 2 lanes
  - 3 lanes
  - 4 or more lanes with raised median
  - 4 or more lanes without raised median
- Speed Limit
  - Less than or equal to 30mph
  - 35mph
  - 40mph

[2] Zegeer, C., J. Stewart, H. Huang, and P. Lagerwey. "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations- Executive Summary and Recommended Guidelines." Report No. FHWA-RD-01-075, Federal Highway Administration, Washington, D.C., February 2002

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

Roadway Type (Number of Travel Lanes and Median Type)	Vehicle ADT ≤ 9,000			Vehicle ADT >9000 to 12,000			Vehicle ADT >12,000 - 15,000			Vehicle ADT > 15,000		
	Speed Limit**											
	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h
2 Lanes	C	C	P	C	C	P	C	C	N	C	P	N
3 Lanes	C	C	P	C	P	P	P	P	N	P	N	N
Multi-Lane (4 or More Lanes) With Raised Median***	C	C	P	C	P	N	P	P	N	N	N	N
Multi-Lane (4 or More Lanes) Without Raised Median	C	P	N	P	P	N	N	N	N	N	N	N

Distance between signalized intersections was also incorporated into the roadway crossing analysis. Greater distances between signalized intersections may potentially increase in the frequency of mid-block crossings. Because mid-block crossings are associated with a higher pedestrian crash risk in non-compliant or possibly compliant corridors, it is particularly important to focus pedestrian crossing facility improvements on the corridor segments with long distances between signals.

SELECTING PRIORITY CORRIDORS

Once the pedestrian potential and deficiency analyses were completed, maps were produced showing the following:

- Road segments in the District with the greatest potential for pedestrian activity.
- Road segments highly deficient for pedestrians walking along the roadway.
- Road segments highly deficient for crossing the roadway.
- Road segments with long distances between signalized intersections. This map highlights areas with the greatest potential for mid-block crossings.

The data shown on these maps was combined to highlight corridors with high potential and high deficiency for walking along the roadway and/or crossing the roadway, and greater distances between signalized intersections.

Two additional factors were then used as overlays to these maps in order to identify the priority corridors:

Pedestrian Crashes

Police-reported pedestrian crashes occurring in the District between 2000 and 2005 were mapped to help determine the corridors and road segments with higher crash risk. Locations with a greater frequency of crashes may need focused pedestrian facility improvements. Once corridors were identified as having high pedestrian potential and deficiency, the crash map was reviewed to help prioritize corridors and identify the limits of a prioritized corridor.

Policy

Corridors that have been officially designated as important for pedestrians, such as roadways designated as Great Streets, or roadways recommended for pedestrian improvements in corridor planning projects

or the transportation improvement program were also considered in the corridor selection process. These corridors are addressed in two ways:

- Roads expecting a significant increase in pedestrian activity due to a special designation may be given a higher priority for further analysis in this Pedestrian Master Plan.
- Roads that have specific pedestrian recommendations from another existing or future study will not be prioritized for additional analysis in this Pedestrian Master Plan because improvements will be made to pedestrian facilities as part of the other study.