November, 2003

Pennsylvania Avenue, SE Transportation Study

FINAL REPORT

Submitted by:

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JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future

Prepared for:

District of Columbia Government Department of Transportation

d.
DISTRICT DEPARTMENT OF TRANSPORTATION

EXECUTIVE SUMMARY

The District Department of Transportation (DDOT), in response to citizens' comments, is investigating transportation improvements in the Pennsylvania Avenue, SE area. The consultant firm of Johnson, Mirmiran, and Thompson (JMT), with the assistance of DDOT staff, is examining existing and future conditions within the study area and developing short term and long term options. The options address issues raised through citizen input and identified during the technical analysis. Specifically, the proposed improvements will look to improve traffic, transit, pedestrian and bicycle, access operations, and safety.

Four categories were developed for the proposed options for the Pennsylvania Avenue, SE Transportation Study. Each of the short-term and long-term transportation options within these four categories help create a more livable community so that residents have an attractive place to live, work, play, and have a sense of pride. These categories are: Community Cohesiveness and Amenities, Community Circulation, Pedestrian Accessibility and Transit Facilities, and Overall Circulation of Pennsylvania Avenue, SE.

- Community Cohesiveness and Amenities – The purpose is to create a more unified community throughout the study area, both with adjacent neighborhoods along the corridor as well as creating a sense of a single community between neighborhoods to the north and south of Pennsylvania Avenue, SE. These options also provide a variety of amenities to the area.
- Community Circulation – The purpose is to provide the citizens within the study area greater ease in getting around the study area.
- Pedestrian Accessibility and Transit Facilities – The purpose is to provide improved pedestrian accessibility within the study area as well as to improve and promote the use of transit.
- Overall Circulation of Pennsylvania Avenue, SE – The purpose is to improve traffic operations throughout the study area to aid both the local community as well as the commuter to traverse the area as efficiently as possible.

A total of 26 short term options and 11 long term options have been developed providing improvements to the various transportation and safety concerns within the study area. The following table illustrates the break down of options by category as well as total costs.

Category	**Short Term Options[1] Total Number of Projects**	**Long Term Options[2] Total Number of Projects**
Community Cohesiveness and Amenities	4	2
Community Circulation	7	2
Pedestrian Accessibility and Transit Facilities	8	4
Overall Circulation of Pennsylvania Avenue, SE	7	3
TOTAL[3]	**26 Options $1.5 million - $2.0 million**	**11 Options $37.9 million – $45.2 million**

1. Short Term Options – Any option that can be completed within the next 12 months
2. Long Term Options – Any options that will take longer than a 12 month period to complete
3. Cost does not include construction cost, administration/overhead cost, engineering cost, escalation cost, or right-of-way cost.

The attached tables, broken out by location, describe each of the options as well as the various benefits for each option. It should be noted that the order of the matrix (by location) best illustrates the total number of improvements at each location along the Pennsylvania Avenue, SE corridor, however, the following report describes the options by category, not location.

Pennsylvania Avenue, SE Transportation Study: Corridor Options - Community Cohesiveness and Amenities

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
CCA	**Reduce Speeds** – Placement of Variable Speed Display	• Provides visual reminder to motorists about posted/traveled speeds • Encourages motorists to slow down to reasonable speeds • Provides flexibility due to the portability of display which allows for display to be set up at a variety of locations	Short-Term	Requires Agency Coordination	• Citizens requested speed cameras. • Citizens requested more law enforcement
CCA	**Signs** – Replace Regulatory Signs along Pennsylvania Avenue, SE	• Provides better understanding of the regulations • Increases chances of regulations being followed creating safety and efficiency	Short-Term	Funded Separately	• Request schedule of DDOT contract
CCA	**Parking** – Clarify Signing Regarding Restrictions/ Regulations	• Provides better understanding of the restrictions and regulations • Increases chances of restrictions and regulations being followed • Increases ease of enforcement by the police	Short-Term	$140,000	• .Citizens requested the elimination of parking between Southern Avenue and Alabama Avenue
CCA	**Signs** – Extend Wayfinding Signs	• Provides uniform look to Pennsylvania Avenue, SE on both sides of the Anacostia River • Increases aesthetics and visibility of signs • Assists in preventing motorists from getting lost	Short-Term	$10,000	
CCA	**Streetscape** – Provide Streetscape Amenities along the Corridor	• *Lighting* – used to increase the safety as well as the character of sidewalks and streets • *Curb and Gutter* – granite curb will be used to take advantage of its aesthetics and longevity • *Sidewalks* – improvement of sidewalks will increase pedestrian safety and unify the community • *Enhanced Medians* – upgrades will bring a feeling of community and improve aesthetics of the region	Long-Term	$10,750,000	
CCA	**Safety –** Place Red Light Running Cameras at Intersections	• Increases safety by decreasing the number of red light incidents • Increases safety by forcing drivers to be more aware of their speeds as they approach intersections	Long-Term	Requires Agency Coordination	

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** Long-Term Option – Any option that will take longer than a 12 month period to complete.

*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Corridor Options - Community Circulation

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
CC	**Signals –** Improve Signal Timing within the Study Area	• Improves access to and from adjacent communities by minimizing delays • Improves efficiency of corridor through optimization of signals	Short-Term	$180,000	
CC	**Traffic Calming –** Place Devices in Neighborhoods to Deter Cut-Through Traffic	• Increases pedestrian/bicyclist safety through neighborhoods • Decreases cut-through traffic • Improves aesthetics and safety within neighborhoods	Long-Term	Ranges $2,000 - $50,000 per device	

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CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Corridor Options - Pedestrian Accessibility and Transit Facilities

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
PATF	**Pedestrians –** Review Pedestrian Signals and Timing	• Provides pedestrians ample to cross street • Improves pedestrian safety with "count-down clocks" by providing the pedestrian with the time remaining that he/she has to cross the street	Short-Term	$165,000	
PATF	**Pedestrians –** Complete Sidewalk Network within Study Area	• Increases pedestrian accessibility throughout study area • Improves pedestrian safety	Short-Term	$725,000	• Citizen stated that at the intersection with Branch Road – placing the missing sidewalk would be in close proximity to the roadway – suggested to place a barrier between the roadway and sidewalk
PATF	**Pedestrians –** Provide for ADA Compliance	• Increases pedestrian accessibility for pedestrians with disabilities • Increases pedestrian accessibility for pedestrians with strollers	Short-Term	$165,000	
PATF	**Bicycle Lanes** – Provide signage directing bicyclists to a route through the area	• Provides a "safe" route through the area for bicyclists • Completes the bicycle connection from the east of the project area to the hiker/biker trail across the Sousa Bridge	Short-Term	$1,500	• This option has been added based on comments heard at the July 14, 2003 Public Meeting
PATF	**Transit –** Place Amenities at High Volume Bus Stops	• Provides higher visibility of bus stops • Increases aesthetics and conveniences for the transit user	Short-Term	$29,000 per location at 9 locations = $261,000	• Citizens requested that shelters be placed with no benches
PATF	**Pedestrians –** Place Textured Crosswalks at Intersections with Pedestrian Amenities	• Provides a completed pedestrian network along Pennsylvania Avenue, SE • Provides a safer pedestrian network • Increases driver awareness of pedestrians while promoting a higher sense of a unified community	Long-Term	$1,800,500	

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CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Corridor Options - Overall Circulation of Pennsylvania Avenue, SE

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
OCPA	**Reversible Lane –** Improve Signage along Pennsylvania Avenue, SE	• Increases driver's awareness and expectancy • Increases safety	Short-Term	$10,000	
OCPA	**Reversible Lane –** Place Overhead Signs	• Increases visibility of reversible lane configuration • Minimizes confusion for "time of day" use • Increases safety for all motorists	Long-Term	$790,000	• Citizen support this option – suggested that signs placed by aesthetically pleasing and fit in with the community and surrounding environment.

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*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/Southern Avenue

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
PATF	**Signs –** Place Signs in Maryland Encouraging Transit and Carpool Use	• Relieves congestion by encouraging carpooling and Metro Rail use	Short-Term	$6,000	
CC	**Signals –** Repair Loop Detectors at Pennsylvania Avenue, SE/Southern Avenue	• Allows intersection to operate properly	Short-Term	$8,000	
OCPA	**Pavement Markings –** Change Lane Configuration at Pennsylvania Avenue, SE/Southern Avenue	• Improves intersection capacity	Short-Term	$2,000	
CC	**Turn Lane Lengths –** Increase Turn Lane Lengths to Accommodate Turning Volumes	• Increases storage length from the left turn lane from southbound Southern Avenue to eastbound Pennsylvania Avenue, SE • Improves community access to Pennsylvania Avenue, SE	Short-Term	$1,500	

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** Long-Term Option – Any option that will take longer than a 12 month period to complete.

*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/Branch Avenue

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
CC	**Pavement Markings –** Northbound Branch Avenue Improvements	• Minimizes storage length decreasing overall motorist delay • Increases efficiency of intersection	Short-Term	$25,000	
OCPA	**Intersection Improvements –** Correct Eastbound Transition at the Intersection of Pennsylvania Avenue, SE/Branch Avenue	• Increases safety through the intersection during the PM peak period • Minimizes impact of bus stop on southeastern corner of intersection to through traffic • Minimizes impact of motorists turning left into Penn Branch Shopping Center to through traffic	Short-Term	$10,000	• Citizens supported this option

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** Long-Term Option – Any option that will take longer than a 12 month period to complete.

*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/Texas Avenue

Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
CC **Signals –** Complete Detailed Signal Warrant Analysis at the Intersection of Pennsylvania Avenue, SE/Texas Avenue. Install New Signal if Warranted.	• Introduces traffic calming in the area recording the highest speeds. • Allows for vehicles to platoon along Pennsylvania Avenue, SE helping other unsignalized side streets gain access to Pennsylvania Avenue, SE • Allows for a signalized pedestrian crosswalk to access the eastbound bus stop.	Short-Term	$100,000	• Citizens requested this traffic signal to slow vehicles and improve safety

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** Long-Term Option – Any option that will take longer than a 12 month period to complete.

*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Randle Highlands Elementary School

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
PATF	**Signs –** Repair Damaged School Flashers at Randle Highlands Elementary School	• Increases drivers' awareness of school • Improves school children pedestrian safety	Short-Term	$35,000	
PATF	**Pedestrian –** Repair damaged pedestrian signal at Pennsylvania Avenue, SE/31st Street	• Improves safety for pedestrians/school children crossing at this location by allowing them to activate crossing signal	Short-Term	$10,000	• This option has been added based on comments heard at the July 14, 2003 Public Meeting
PATF	**Intersection Improvements –** Simplify to Create Better Pedestrian Access at the Intersection of Pennsylvania Avenue, SE/31st Street	• Minimizes crossing distance along Pennsylvania Avenue, SE for pedestrians and school children • Increases visibility of school crossing • Improves safety by meeting driver and pedestrian expectations for layout of an intersection	Long-Term	$275,000	• Citizens supported this option – suggested to include a countdown clock at this location

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CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/29th Street/28th Place

Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
PATF **Intersection Improvements –** Simplify to Create Better Pedestrian Access at the Intersection of Pennsylvania Avenue, SE/29th Street/28th Place	• Provides safer pedestrian access through community • Increases potential community park areas • Improves safety by meeting driver and pedestrian expectations for layout of an intersection • Minimizes vehicular conflict points	Long-Term	$350,000	• Citizens supported this option – stated that the Engine Company Number 19 is currently getting a red light installed

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** Long-Term Option – Any option that will take longer than a 12 month period to complete.

*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/27th Street

Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
PATF **Transit –** Repair Damaged Facility	• Increases safety of bus stop	Short-Term	Requires Agency Coordination	

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CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/Minnesota Avenue/25th Street

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
OCPA	**Median Improvements –** Modify Median at Pennsylvania Avenue, SE/ southbound Minnesota Avenue	• Improves efficiency of eastbound traffic • Increases safety for eastbound and westbound traffic	Short-Term	$17,000	
CC	**Intersection Improvements –** Simplify to Create Better Efficiency at the Intersection of Pennsylvania Avenue, SE/Minnesota Avenue/25th Street	• Decreases number of conflict points along Pennsylvania Avenue, SE • Increases potential community park areas • Increases eastbound left turn lane storage length	Long-Term	$820,000	• Citizens felt that pedestrian issues are not fully addressed with this option • Citizens strongly endorse the unification of the parklands

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** Long-Term Option – Any option that will take longer than a 12 month period to complete.

*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/Fairlawn Avenue

Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
CC **Channelization –** Create Right-In, Right-Out Only at Northbound Fairlawn Avenue	• Prohibits illegal maneuver of motorists accessing the Anacostia Freeway (I-295) northbound on-ramp • Increases safety at this location	Short-Term	$30,000	• Citizen stated that an additional barrier should be included to further deter motorists * (cost reflects this addition)

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** Long-Term Option – Any option that will take longer than a 12 month period to complete.

*** Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/Anacostia Freeway (I-295)

	Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
OCPA	**Median Improvements –** Close Median Barrier at CSX Rail Line	• Increases safety by disallowing illegal maneuvers • Increases left turn storage length	Short-Term	$17,500	
OCPA	**Roadway Improvements -** Pave Over CSX Rail Lines	• Eliminates delay caused by WMATA buses stopping at tracks • Minimizes chances of rear-end accidents	Short-Term	$29,000	
OCPA	**Pavement Markings –** Increase the Storage Length for Eastbound Pennsylvania Avenue, SE Left Turns at the Anacostia Freeway (I-295) Northbound On-Ramp	• Increases designated left turn storage length • Minimizes weave and confusion across the Sousa Bridge	Short-Term	$23,500	• Citizen suggested that flexi-poles be installed to further channelize the left turn lanes.

* Short-Term Option – Any option that can be completed within the next 12 months.

** Long-Term Option – Any option that will take longer than a 12 month period to complete.

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CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options by Location

Pennsylvania Avenue, SE/Anacostia Freeway (I-295) (continued)

Option - Description	Benefits	Short-Term* vs. Long-Term**	Approximate Cost***	What We Heard
OCPA **Interchange Configuration –** Place Directional Ramp on the Northwestern Quadrant of Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange	• Provides for motorists to directly access westbound Pennsylvania Avenue, SE • Minimizes amount of u-turns occurring along Pennsylvania Avenue, SE between the Anacostia Freeway (I-295) and 27th Street • Decreases traffic volumes along southbound Anacostia Freeway (I-295) exit ramp to eastbound Pennsylvania Avenue	Long-Term	$3,000,000 - $5,000,000	
OCPA **Interchange Configuration –** Place a Single Point Urban Diamond Interchange at Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange	• Increases efficiency of interchange • Eliminates weaving throughout the interchange • Minimizes the number of conflict points at this location	Long-Term	$20,000,000 - $25,000,000	• Citizens strongly support this option.

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CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
CC	Community Circulation	OCPA	Overall Circulation of Pennsylvania Avenue, SE

Pennsylvania Avenue, SE Transportation Study: Options Not Pursued

Option - Description	Issues
Transit – Provide Westbound HOV Lane During AM Peak Period	• Increases overall congestion along eastbound Pennsylvania Avenue, SE by limiting the number of usable lanes for all vehicles • Decreases benefit to HOV vehicles by sharing the lane with buses due to the frequent number of bus stops within the study area

Reversible Lane – Revise Operations	*Four Westbound Lanes/One Eastbound Lane (left turns prohibited)*
	• Decreases efficiency of the following intersections with Pennsylvania Avenue, SE:
	  • Branch Avenue
	  • Minnesota Avenue
	• Prohibits eastbound left turns into communities
	• Decreases response time for emergency vehicles due to accessibility issues
	
	Eliminate Reversible Lane – Maintain Three Westbound Lanes/Two Eastbound Lanes
	• Decreases efficiency at the intersection of Pennsylvania Avenue, SE/Branch Avenue

Roadway Improvements – Create a Free Flowing Eastbound Right Turn Lane onto Branch Avenue	*Option Removed due to Community Input* • Citizens stated that this option is not pedestrian friendly
Turn Lane Lengths – Increase Turn Lane Length to Accommodate Turning Volumes	*Option Removed due to Community Input* • Citizens stated that this option eliminates too much parking at this location which the residents of nearby apartment buildings utilize.
Transit – Provide Bus Pull-Over Lane at L'Enfant Square	*Option Removed due to Community Input* • Citizens requested a pull-over lane at the bus stop located just west of this location along Pennsylvania Avenue, SE • Citizen stated that bus pull-over lanes should not be implemented due to bus drivers not fully utilizing them
Traffic Calming – Close Fairlawn Avenue to deter Cut-Through Traffic	*Option Removed due to Community Input* • Citizens stated that closing Fairlawn Avenue would negatively impact the community within the nearby vicinity.
Interchange Configuration – Place Loop Ramp on the Southeastern Quadrant of Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange	• Decreases safety of area due to the amount of vehicular weave • Requires purchase of right-of-way • Impedes future use of existing rail line • Requires relocation of existing ramp into the surrounding community
Interchange Configuration – Place an Interchange at Pennsylvania Avenue, SE/Minnesota Avenue	• Decreases visual aesthetics for the community • Promotes "freeway" mentality through the surrounding communities • Provides a physical barrier between the communities north and south of Pennsylvania Avenue, SE • Impacts businesses and houses at this location • Decreases pedestrian and bicycle safety

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CCA	Community Cohesiveness and Amenities	PATF	Pedestrian Amenities and Transit Facilities
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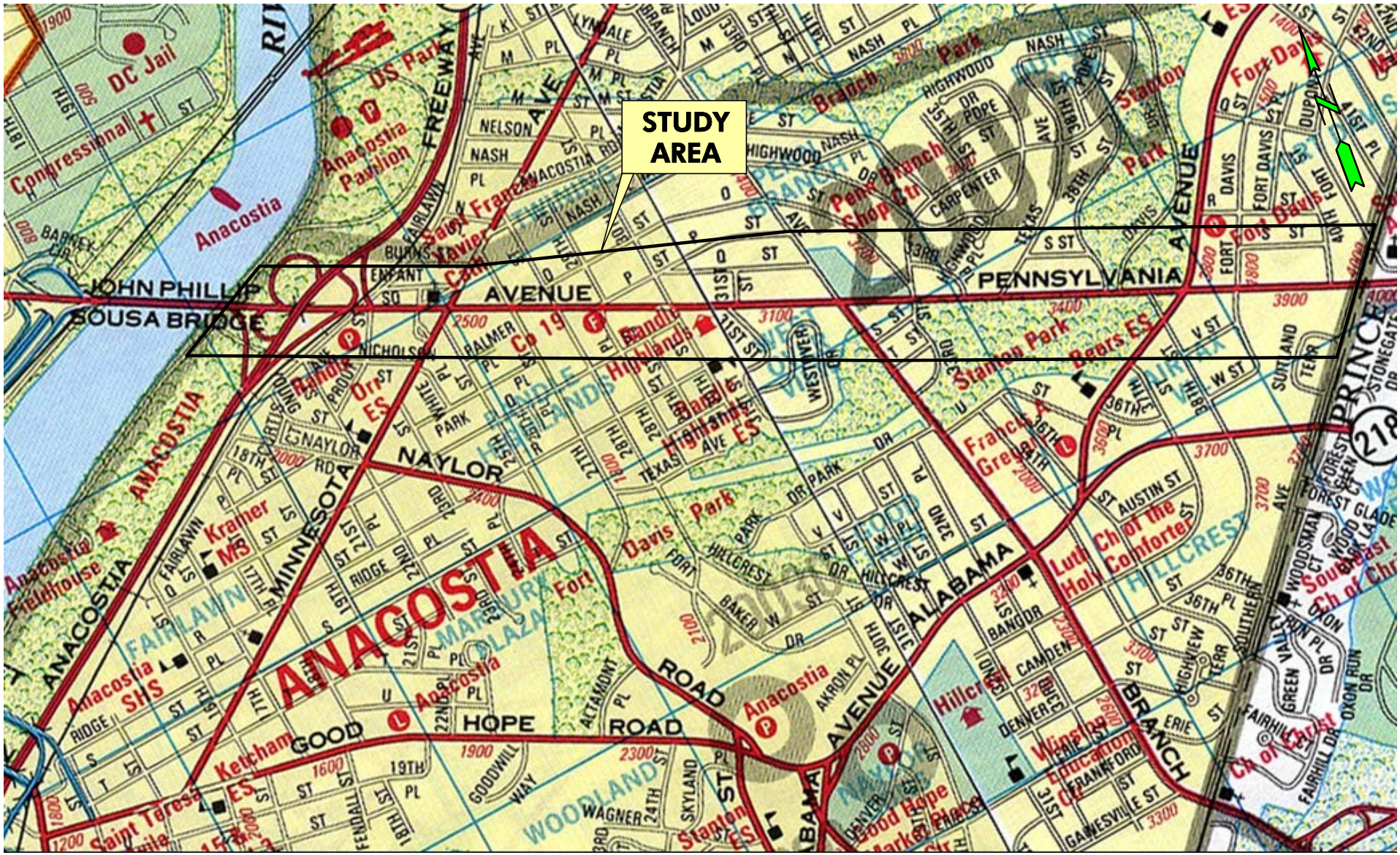
I. INTRODUCTION

The District Department of Transportation (DDOT), in response to citizens' concerns, is investigating transportation management improvements within the Pennsylvania Avenue, SE area. The consultant firm of Johnson, Mirmiran & Thompson (JMT), with the assistance of DDOT staff, is examining existing and future conditions within the study area and developing short-term and long-term options. The options will address issues raised through citizen input and identified during the technical analysis. In addition, the options will support and encourage livable communities through transportation planning. The study will look to improve traffic, transit, pedestrian and bicycle, access operations, and safety.

The Pennsylvania Avenue, SE Transportation Study lies within the southeast portion of the District of Columbia. More specifically, the study area includes the portion of Pennsylvania Avenue, SE from the east end of the Sousa Bridge to the District of Columbia/Maryland state line, and two blocks north and south of Pennsylvania Avenue, SE for the 1.8 mile length of the project. For the purpose of this project, the orientation of Pennsylvania Avenue, SE is assumed to be east/west. Figure 1 illustrates the study area. It should be noted that the study area does not include any improvements associated with the Sousa Bridge. The study area includes a total of 11 signalized intersections as well as the ramps to and from the Anacostia Freeway (I-295). Pennsylvania Avenue, SE has a posted speed of 30 MPH and is the major east-west arterial that serves the mobility needs of the local community and functions as a major commuter route to downtown Washington D.C.

The purpose of this report is to present the final short-term and long-term recommendations for the Pennsylvania Avenue, SE Transportation Study. These final recommendations are a result of the findings from the data collection, public input, and in response to deficiencies identified by the analyses conducted.



PENNSYLVANIA AVENUE SE, TRANSPORTATION STUDY

Location Map

Not to Scale

FIGURE 1 PAGE 2

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future

DISTRICT DEPARTMENT OF TRANSPORTATION

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II. EXISTING CONDITIONS

A complete understanding of the existing conditions was obtained through the collection of information from field reconnaissance as well as information provided by DDOT and the community. This information was consolidated and analyzed. The following sections represent the results of this effort.

A. Major Roadways in the Study Area

The study area for the Pennsylvania Avenue, SE Transportation Study includes several major roadways for the District of Columbia. These roadways are Pennsylvania Avenue, SE, Anacostia Freeway (I-295), Minnesota Avenue, Branch Avenue, Alabama Avenue, and Southern Avenue.

Pennsylvania Avenue, SE within the study area is 1.8 miles long and is used both as a major commuter route for downtown Washington D.C. and as a local access route for the residents to reach the major north and south roadways as well as access local businesses. The roadway is classified as a principal arterial. The posted speed limit is 30 MPH. Within the study area, Pennsylvania Avenue, SE ranges from a four-lane section road on the east end to an eight-lane section road on the west end. In the middle of the study area, from the intersection with Branch Avenue to the intersection with 27th Street, Pennsylvania Avenue, SE is a five-lane section with the middle lane operating as a reversible lane during the peak periods. The reversible lane serves westbound traffic all day except during the hours of 4:00 PM through 6:30 PM on Mondays through Fridays (except on holidays) when it serves eastbound traffic.

Pennsylvania Avenue, SE looking westbound east of Engine Company Number 19

The **Anacostia Freeway (I-295)** traverses the study area crossing over Pennsylvania Avenue, SE just east of the Sousa Bridge. The Anacostia Freeway (I-295) is a north/south freeway connecting the Baltimore-Washington Parkway to I-95/I-495 on the southern side of Washington D.C. This limited access roadway has a northbound on-ramp located at the east end of I-295. The Anacostia Freeway (I-295) interchange at Pennsylvania Avenue, SE provides all ramp movements except for the I-295 southbound to Pennsylvania Avenue, SE westbound movement into downtown Washington D.C.

Minnesota Avenue is a north/south roadway that intersects Pennsylvania Avenue, SE near the west end of the study area. Minnesota Avenue's southern limit is Good Hope Road. Minnesota Avenue continues north and becomes Sheriff Road as it exits the District of Columbia in the Fairmont Heights community. Through the study area, Minnesota Avenue is a four-lane road with a posted speed limit of 25 MPH and is classified as a minor arterial.

South leg of Branch Avenue

Branch Avenue is a north/south roadway that intersects with Pennsylvania Avenue, SE toward the center of the study area. Branch Avenue enters the District of Columbia as Maryland Route 5 from the southern end and ends at Randle Circle on the northern end. Through the study area, Branch Avenue is a four-lane section road with a posted speed of 25 and is classified as a minor arterial to the north of Pennsylvania Avenue, SE and a principal arterial to the south of Pennsylvania Avenue, SE.

Alabama Avenue is a north/south roadway that intersects Pennsylvania Avenue, SE towards the eastern end of the study area. Alabama Avenue begins on the southern end at South Martin Luther King Jr. Boulevard and becomes Bowen Road as it exits the District of Columbia north of the Boulevard Heights community. Through the study area, Alabama Avenue is a four-lane section road south of Pennsylvania Avenue, SE and a three-lane section (one lane northbound, two lanes southbound) road north of Pennsylvania Avenue, SE. Alabama Avenue is classified as a minor arterial through the study area. The posted speed limit for Alabama Avenue through the study area is 30 MPH.

Looking southbound on the north leg of Alabama Avenue

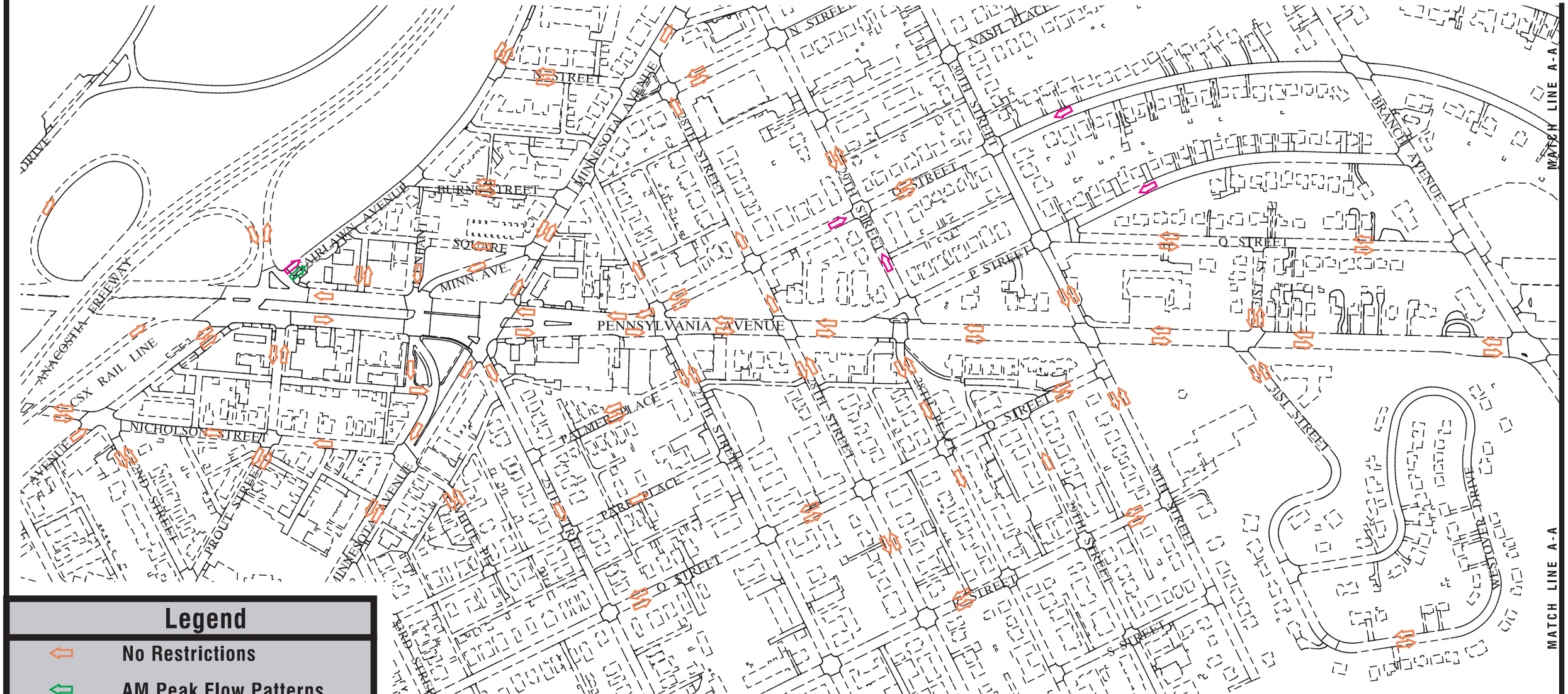
Southern Avenue is the sixth major road within the study area and is classified as a minor arterial. Southern Avenue runs along the southeast edge of the District of Columbia/Maryland state line within the District. Through the study area, Southern Avenue is a two-lane section road with a posted speed of 30 MPH.

The following signalized intersections are located along Pennsylvania Avenue, SE within the study area:

- Anacostia Freeway (I-295) northbound on-ramp
- Minnesota Avenue
- 27th Street
- 28th Street
- 30th Street
- 31st Street
- Branch Avenue
- 38th Street
- Alabama Avenue
- Southern Avenue

In addition to understanding the characteristics of the major roadways through the area, an inventory of the flow patterns along these major roadways and through the local streets accessing these roadways was studied. These flow patterns are illustrated on Figures 2a and 2b.

Pennsylvania Avenue, SE Transportation Study



Legend

- No Restrictions
- AM Peak Flow Patterns
- PM Peak Flow Patterns

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FLOW PATTERNS

(SHEET 1 of 2)

NOT TO SCALE

FIGURE 2a

PAGE 6

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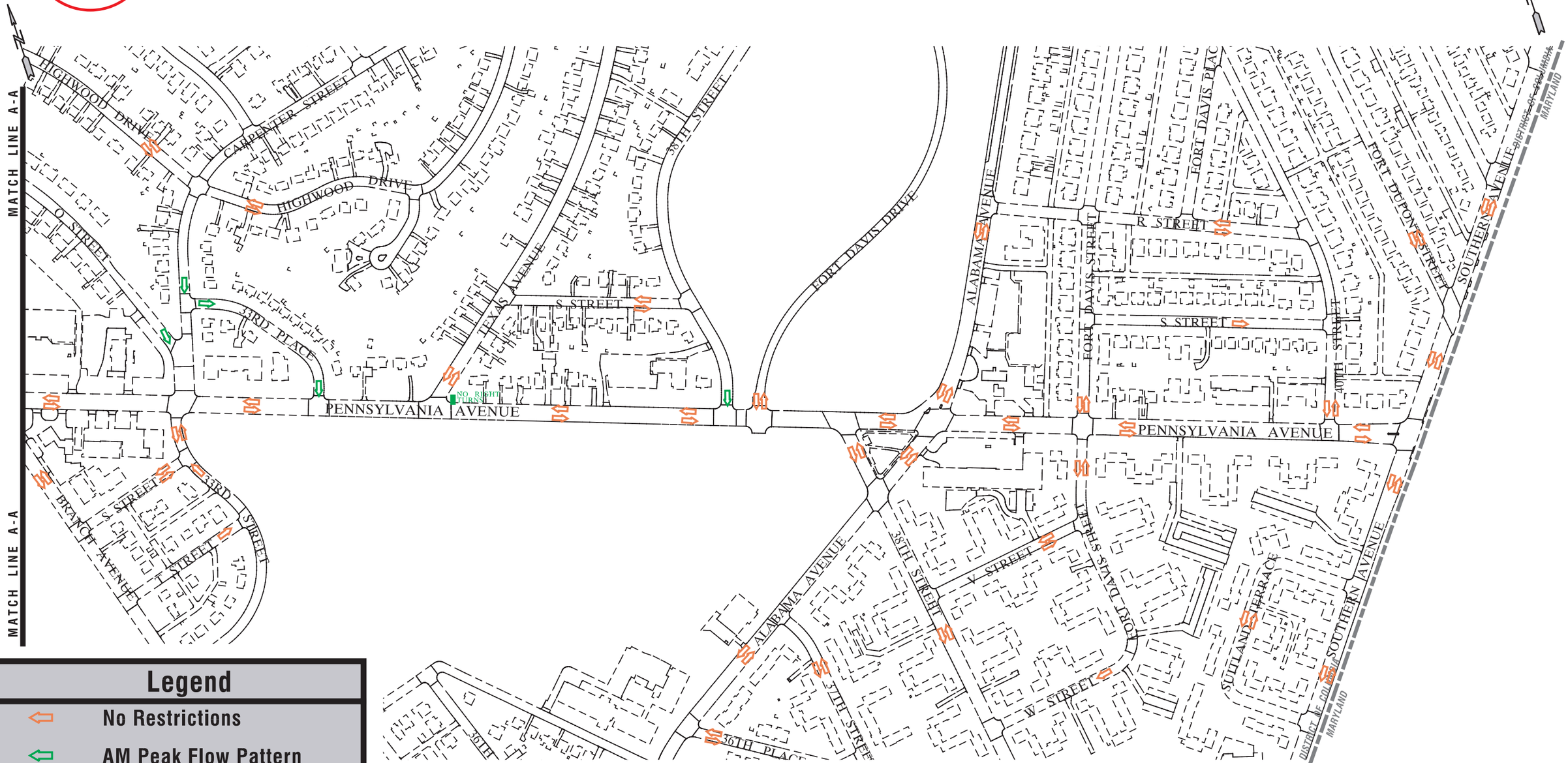
Pennsylvania Avenue, SE Transportation Study



Legend

- No Restrictions
- AM Peak Flow Pattern
- PM Peak Flow Pattern

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FLOW PATTERNS
(SHEET 2 of 2)

NOT TO SCALE

FIGURE 2b

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B. Generalized Land Use

An understanding of the generalized land use was developed through field reconnaissance. It was determined that the predominant land use within the study area is residential. There are several schools intermixed throughout the study area. There are also pockets of commercial areas with a predominance found towards the western end of the study area. The land uses along the major roadways are as follows:

- Pennsylvania Avenue, SE - a variety of residential; including apartment complexes, town-houses, and single family houses; and commercial properties
- Minnesota Avenue - predominantly a mixture of residential and commercial
- Branch Avenue - predominantly residential
- Alabama Avenue - predominantly a mixture of residential and commercial
- Southern Avenue - predominantly residential

There are several major activity centers throughout the study area. These activity centers and their locations are listed below:

- Saint Francis Xavier School – northeast corner of Pennsylvania Avenue, SE/27th Street intersection
- Pennsylvania Avenue Baptist Church – northeast corner of Pennsylvania Avenue, SE/28th Street intersection
- Randle Highlands Elementary School – southeast corner of Pennsylvania Avenue, SE/30th Street intersection
- Randle Highlands Recreation Center – southwest corner of Pennsylvania Avenue, SE/31st Street intersection
- Central Baptist Church – northeast corner of Pennsylvania Avenue, SE/30th Street intersection
- Penn-Branch Shopping Center – northeast corner of Pennsylvania Avenue, SE/Branch Avenue intersection
- Shopping Center – southeast corner of Pennsylvania Avenue, SE/Branch Avenue intersection
- Church of Jesus Christ, Inc. – northwest corner of Pennsylvania Avenue, SE/38th Street intersection
- Anacostia Waterfront – parallel to the Anacostia River below the Sousa Bridge. It was determined that the only vehicular access to the waterfront within the study area is Nicholson Street, which travels under the Anacostia Freeway (I-295) to access the waterfront. There is also access for bicyclists crossing the Sousa Bridge to Nicholson Street via a bike path.

C. Traffic Volumes

Turning movement traffic counts and portable traffic counts were conducted along the Pennsylvania Avenue, SE corridor to gain a full understanding of the amount of traffic the corridor is experiencing on a daily basis. These counts include turning movement counts as well as volume counts.

Turning Movement Counts
Turning movement counts were conducted for the study area during the morning peak period (6 AM – 9 AM) and again during the evening peak period (4 PM – 7 PM). These counts were conducted during spring, 2003 on a Tuesday, Wednesday, or Thursday at the following intersections with Pennsylvania Avenue, SE:

- Anacostia Freeway (I-295)
- Minnesota Avenue
- 27th Street
- Branch Avenue
- Alabama Avenue
- Southern Avenue

Supplemental turning movement counts were conducted at four additional intersections with Pennsylvania Avenue, SE to gain a better understanding of the traffic through the study area. These supplemental counts were completed at the following intersections with Pennsylvania Avenue, SE:

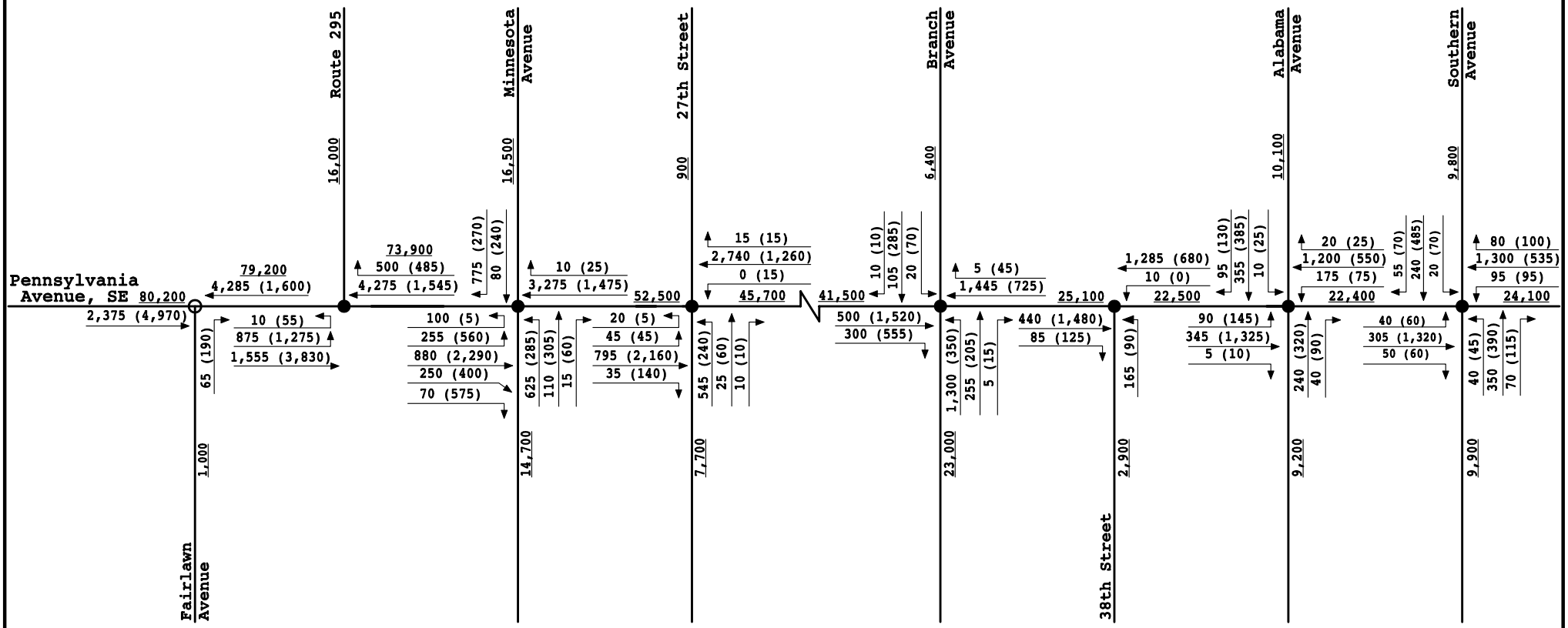
- Anacostia Freeway (I-295) southbound off-ramp to Pennsylvania Avenue, SE eastbound
- 25th Street
- 30th Street
- 38th Street

The AM and PM peak hour turning movement counts were balanced and are displayed on Figure 3. The overall directional distribution for the AM peak period is split 75% westbound and 25% eastbound. In the PM peak period, the overall directional distribution is split 33% westbound and 67% eastbound.

The turning movement counts illustrated several intersections with very high left turn volumes. The following lists these intersections with Pennsylvania Avenue, SE where these high left turn volumes exist:

- Pennsylvania Avenue, SE eastbound to Anacostia Freeway (I-295) northbound
- Minnesota Avenue northbound to Pennsylvania Avenue, SE westbound
- Branch Avenue northbound to Pennsylvania Avenue, SE westbound
- 27th Street northbound to Pennsylvania Avenue, SE westbound
- Pennsylvania Avenue, SE eastbound to Minnesota Avenue northbound

The lack of an interchange movement for motorists traveling from the Anacostia Freeway (I-295) southbound to Pennsylvania Avenue, SE westbound causes numerous u-turns within the corridor. This is especially true at Minnesota Avenue, where the following maneuvers are carried out by motorists in order to reach Pennsylvania Avenue, SE westbound: illegal u-turns, lefts on Minnesota Avenue northbound followed by a left turn onto Minnesota Avenue southbound. These u-turns and turning movements add traffic volume and delays on each roadway.



KEY:
AM (PM) Peak Hour Volume
Average Daily Traffic
○ Unsignalized Intersection
● Signalized Intersection

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PENNSYLVANIA AVENUE, SE TRANSPORTATION STUDY

EXISTING TRAFFIC VOLUMES

FIGURE 3 Not to Scale PAGE 11

DATE: 20-Nov-03 15:20 FILE: m:\PA Ave_pl\pen_ampm.dgn

Portable Counts

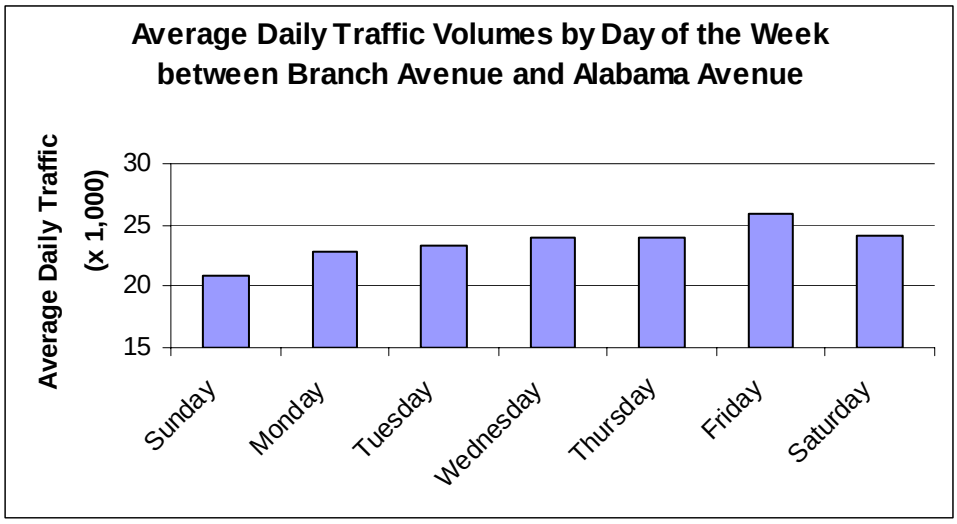
In addition to the turning movement counts, portable classification counts were also collected along Pennsylvania Avenue, SE between the Anacostia Freeway (I-295) and Branch Avenue and also between Branch Avenue and Southern Avenue during May, 2003 for a two week period. These counts were used to determine average daily traffic volumes as well as vehicle classifications to determine the types of vehicles traveling along the Pennsylvania Avenue, SE corridor.

As illustrated in Figure 3, the average daily traffic (ADT) between the Anacostia Freeway (I-295) and Branch Avenue ranges from 80,000 vehicles per day (vpd) to 41,500 vpd, and the ADT between Branch Avenue and Southern Avenue ranges from approximately 25,000 vpd to 22,000 vpd. The following lists the ADT's determined along Pennsylvania Avenue, SE as seen on Figure 3:

- West of Fairlawn Avenue (crossing the Sousa Bridge) – **80,200 vpd**
- Minnesota Avenue to 27th Street – **52,500 vpd**
- East of 27th Street – **45,700 vpd**
- West of Branch Avenue – **41,500 vpd**
- Branch Avenue to 38th Street – **25,100 vpd**
- 38th Street to Alabama Avenue – **22,500 vpd**
- Alabama Avenue to Southern Avenue – **22,400 vpd**
- East of Southern Avenue – **24,100 vpd**

Utilizing the portable counts, the traffic volumes were also evaluated on a daily basis to determine which day of the week provided the greatest volumes. This distribution was completed along Pennsylvania Avenue, SE between Branch Avenue and Alabama Avenue is illustrated in the following figure.

Figure 4:



According to Figure 4, the daily traffic along Pennsylvania Avenue, SE in this area fluctuates from an approximate minimum of 21,000 vehicles per day on a weekend to an approximate maximum of 26,000 vehicles per day during the week.

In addition to determining the volumes and distribution of vehicles along the corridor, the vehicle classifications were also collected and evaluated. The following tables illustrate the results of the vehicle classification study.

Table 1: Vehicle Classification - Eastbound Pennsylvania Avenue, SE between Branch Avenue and Alabama Avenue

	Vehicle Type Percentages (%)			
	Light Vehicles	**Buses**	**Medium Trucks**	**Heavy Trucks**
AM Peak Weekday	89.0	3.9	6.1	1.0
PM Peak Weekday	93.3	2.3	3.0	1.4
Weekday	**91.6**	**2.4**	**4.7**	**1.3**
AM Peak Weekend	91.8	1.7	5.9	0.5
PM Peak Weekend	94.2	1.3	3.6	0.9
Weekend	**93.8**	**1.3**	**4.0**	**0.8**

Table 2: Vehicle Classification - Westbound Pennsylvania Avenue, SE between Branch Avenue and Alabama Avenue

	Vehicle Type Percentages (%)			
	Light Vehicles	**Buses**	**Medium Trucks**	**Heavy Trucks**
AM Peak Weekday	91.3	3.8	2.8	2.1
PM Peak Weekday	96.1	2.0	1.3	0.6
Weekday	**94.0**	**1.9**	**3.0**	**1.1**
AM Peak Weekend	94.1	1.6	3.5	0.8
PM Peak Weekend	97.6	0.5	1.0	0.9
Weekend	**96.7**	**0.7**	**1.6**	**0.9**

The overall average percentage of trucks and buses ranges from 4% to 8% during the week and weekend in both directions of Pennsylvania Avenue, SE. This can be broken into about 1% heavy trucks, 4% medium trucks, and 2% buses. This percentage is considered appropriate for an urban arterial route.

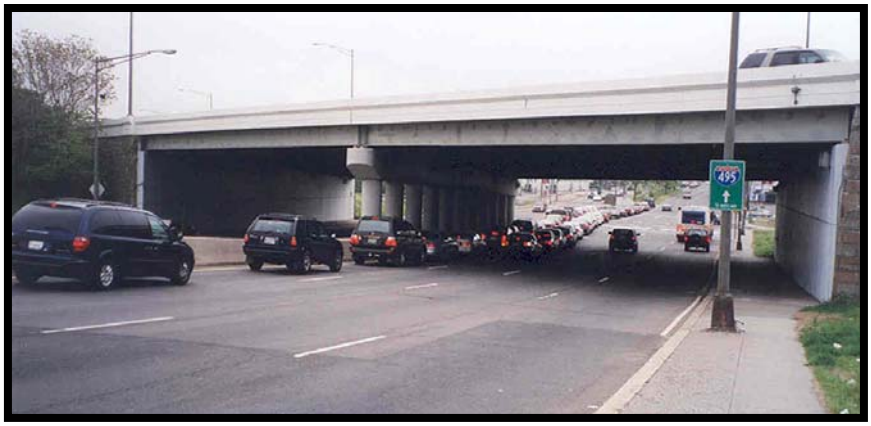
D. Queues at Critical Intersections

Queuing studies were completed during May, 2003. These studies recorded the longest queue occurring at the intersections on each approach. The results of the queuing study are illustrated in Figures 5a and 5b.

During the AM peak period, significant queues are experienced along westbound Pennsylvania Avenue from the Anacostia Freeway (I-295) back to the intersection with Fort Davis Drive. These queues are due to the heavy traffic traversing the area to get to the Anacostia Freeway (I-295) as well as into the downtown area. Significant queues are also experienced at a variety of other locations within the study area during the morning peak period at the following locations:

- Eastbound Pennsylvania Avenue, SE left turns onto northbound Anacostia Freeway (I-295).
- Northbound Minnesota Avenue turning left onto westbound Pennsylvania Avenue, SE.
- Northbound Branch Avenue turning left onto westbound Pennsylvania Avenue, SE. The Branch Avenue queue during the AM peak period is over 750’ long.

- Many of the cross streets west of Branch Avenue and south of Pennsylvania Avenue, SE experience two and three block queues approaching Pennsylvania Avenue, SE.



Eastbound Pennsylvania Avenue, SE AM peak period left turn queues waiting to access northbound Anacostia Freeway (I-295)

During the PM peak period, there are shorter queues experienced throughout the study area. The two locations along Pennsylvania Avenue, SE that do experience significant queues are the following:

- Eastbound Pennsylvania Avenue, SE left turns onto northbound Anacostia Freeway (I-295). These queues are more severe than during the AM peak period and can extend back to the I-395 interchange.
- Eastbound Pennsylvania Avenue, SE left turns onto northbound Minnesota Avenue.

The remainder of Pennsylvania Avenue, SE does not experience significantly long queues during the PM peak period.

Pennsylvania Avenue, SE Transportation Study

Legend

EB55	Directional AM Peak Queuing
EB55	Directional PM Peak Queuing
WB*	WB traffic from I-295 backs up to vicinity of Fort Davis Drive in morning peak hour

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** Left turn queue

Queuing represents the number of vehicles, assuming a 25' vehicle

SIGNIFICANT QUEUES
(SHEET 1 of 2)

NOT TO SCALE

FIGURE 5a

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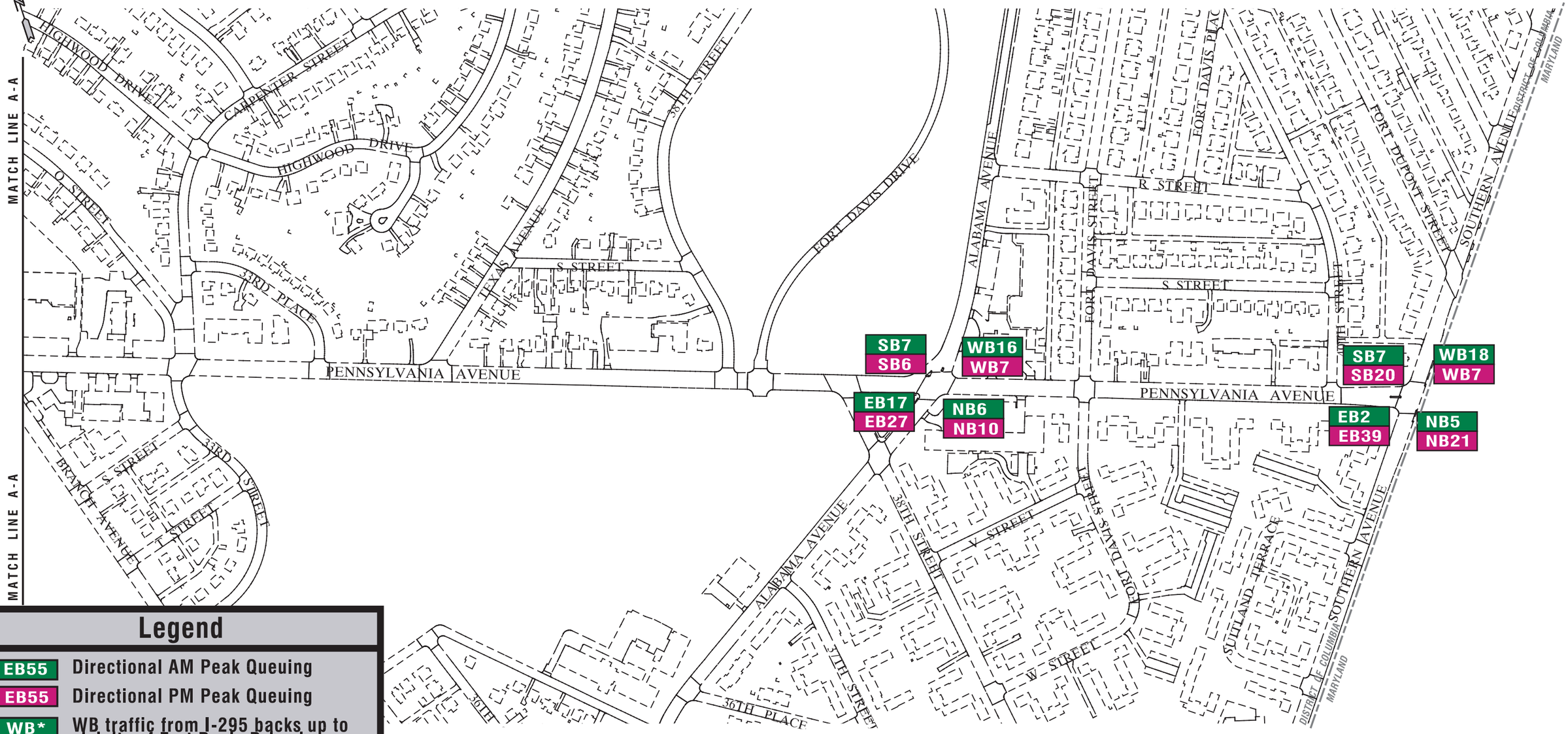
Pennsylvania Avenue, SE Transportation Study



Legend

EB55	Directional AM Peak Queuing
EB55	Directional PM Peak Queuing
WB*	WB traffic from I-295 backs up to vicinity of Fort Davis Drive in morning peak hour

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** Left turn queue

Queuing represents the number of vehicles, assuming a 25' vehicle

SIGNIFICANT QUEUES
(SHEET 2 of 2)

NOT TO SCALE

FIGURE 5b

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E. Existing Levels of Service

A level of service (LOS) analysis was completed for the AM and PM peak periods using the procedures outlined in the 2000 Highway Capacity Manual (HCM). The results of these analyses are illustrated on Figure 6. A complete definition of LOS and what each letter rating represents is listed in Appendix A. The signal timings were provided by DMJM Harris and Associates to complete the capacity analysis for the Pennsylvania Avenue, SE corridor. The results of the existing capacity analysis are located in Appendix B.

During the AM peak period, the following intersections with Pennsylvania Avenue, SE operate at a LOS of F:

- Anacostia Freeway (I-295) northbound on-ramps
- Minnesota Avenue
- Branch Avenue

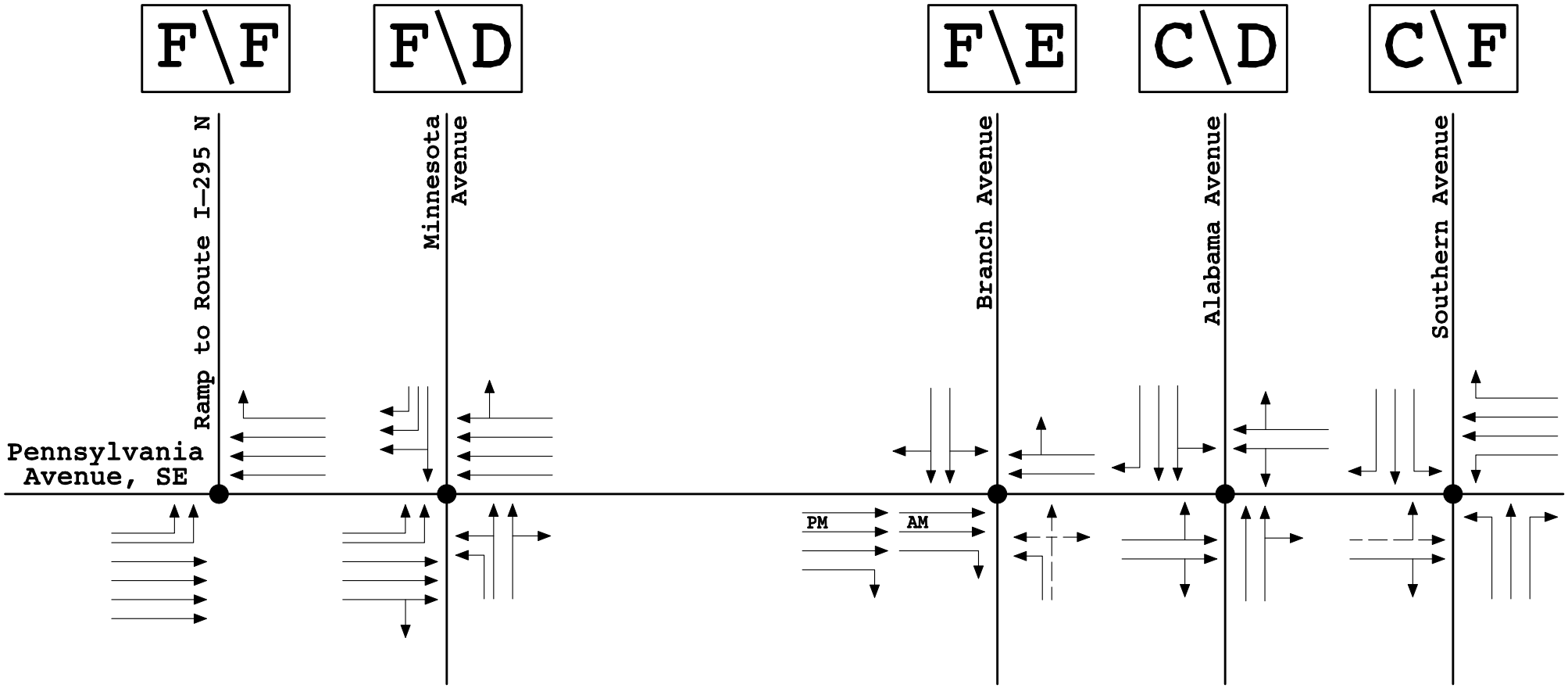
It should be noted that based on field observations and observed delays, the intersection of Pennsylvania Avenue, SE/27th Street operates at LOS F.

During the PM peak period, the following intersections with Pennsylvania Avenue, SE operate at LOS F:

- Anacostia Freeway (I-295) northbound on-ramps
- Southern Avenue

The intersection of Pennsylvania Avenue, SE/Branch Avenue operates at LOS E during the PM peak period. The remainder of the intersections analyzed operates at LOS D or better during the PM peak period.

Overall, Pennsylvania Avenue, SE operates poorly during the peak periods of the day. These findings coincide with comments received from citizens stating that the periods of concern for traffic are the following: AM peak period, PM peak period, Mid-day peak period, and the weekends.



KEY:

F\F AM LOS\PM LOS

Existing Lane Configuration

Observed Lane Usage

Unsignalized Intersection

Signalized Intersection

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PENNSYLVANIA AVENUE

EXISTING LOS

Figure 6 Not to Scale PAGE 19

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F. Speed and Travel Times

Speed studies were conducted along Pennsylvania Avenue, SE to address the citizens concerns about speeding. Both spot speed studies as well as portable speed counters were utilized to determine the speed of vehicles along the Pennsylvania Avenue, SE corridor. Travel time runs were also completed to determine the average speed during the peak hours.

Spot Speed Studies

Spot speed studies were conducted during non-peak hours at three different locations in both the eastbound and westbound directions. These locations and ensuing spot speed study results are shown in Table 3.

Table 3: Pennsylvania Avenue, SE Spot Speed Study Results (Non-Peak Hours)

Location	Posted Speed (MPH)	50th Percentile* (eastbound/ westbound) MPH	85th Percentile** (eastbound/ westbound) MPH
Anacostia Freeway (I-295) to Branch Avenue	30	28/29	33/32
Branch Avenue to Alabama Avenue	30	38/39	44/45
Alabama Avenue to Southern Avenue	30	32/31	37/36

* The 50th Percentile represents the speed that 50% of the drivers are moving at or below. Therefore, the remaining 50% of the drivers are exceeding this speed.

**The 85th Percentile represents the speed that 85% of the drivers are moving at or below. Therefore, the remaining 15% of the drivers are exceeding this speed.

As shown in the table, the 85th percentile is higher than the posted speed limit along the Pennsylvania Avenue, SE corridor, but is most prominent and notable between Branch Avenue and Alabama Avenue. This portion of Pennsylvania Avenue, SE has fewer signalized and unsignalized intersections, as well as fewer overall access points to impede the flow of traffic and slow travel speeds.

Portable Speed Studies

Portable speed counters were placed along Pennsylvania Avenue, SE between the Anacostia Freeway (I-295) and Branch Avenue and also between Branch Avenue and Southern Avenue during May, 2003. The counters were used to determine the speed over a longer period of time. The results of the speed study over an entire week in both the eastbound direction is illustrated in Figures 7 and 8, and the results for the westbound direction are illustrated in Figures 9 and 10.

Figure 7:

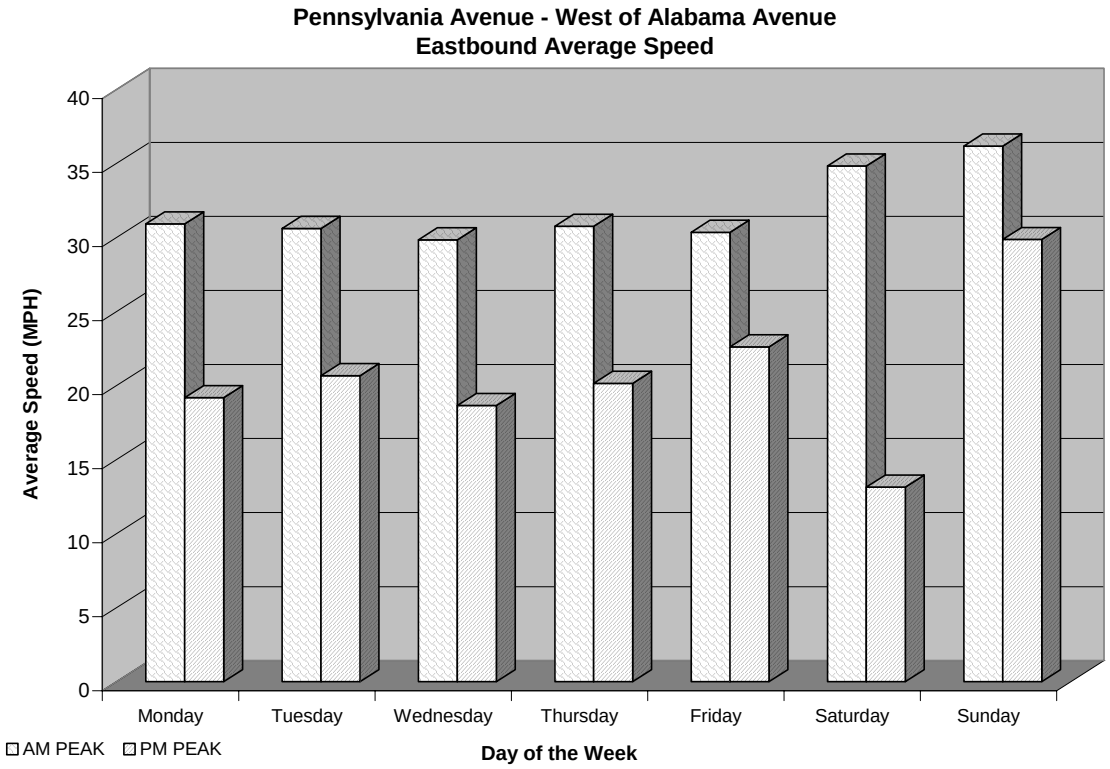


Figure 8:

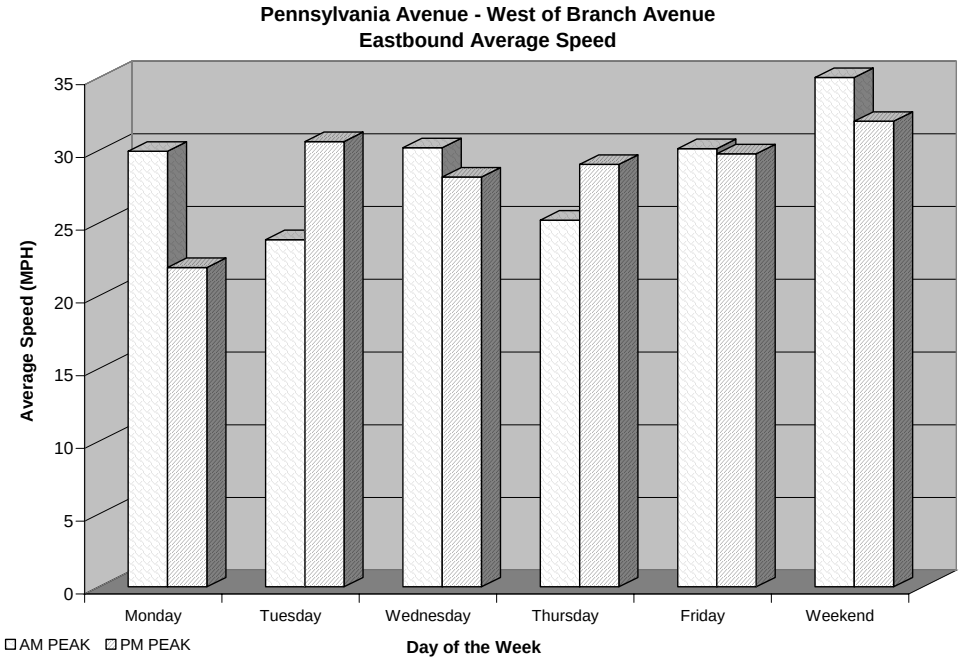


Figure 9:

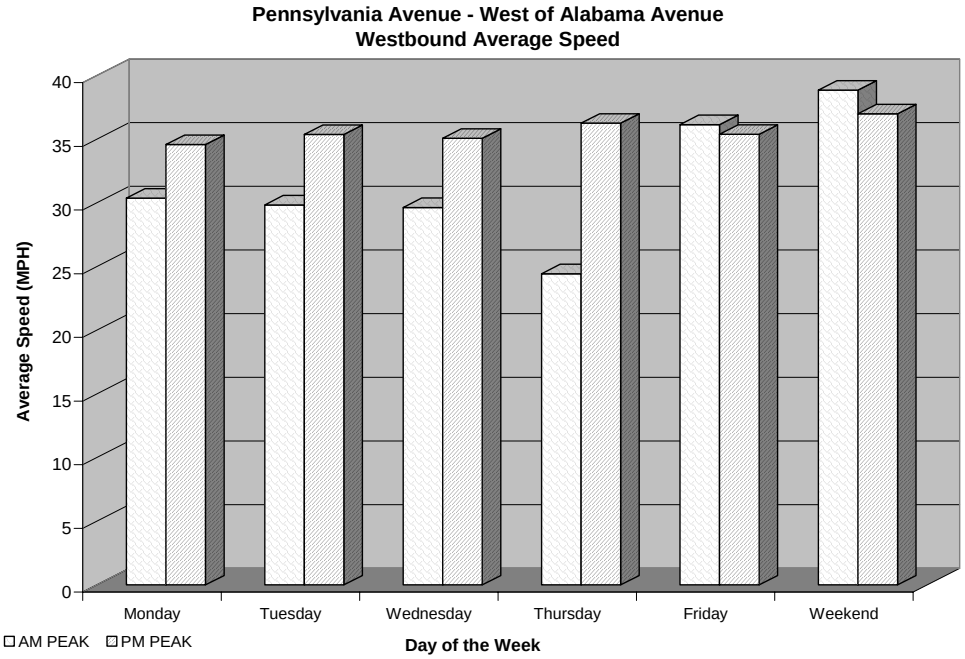
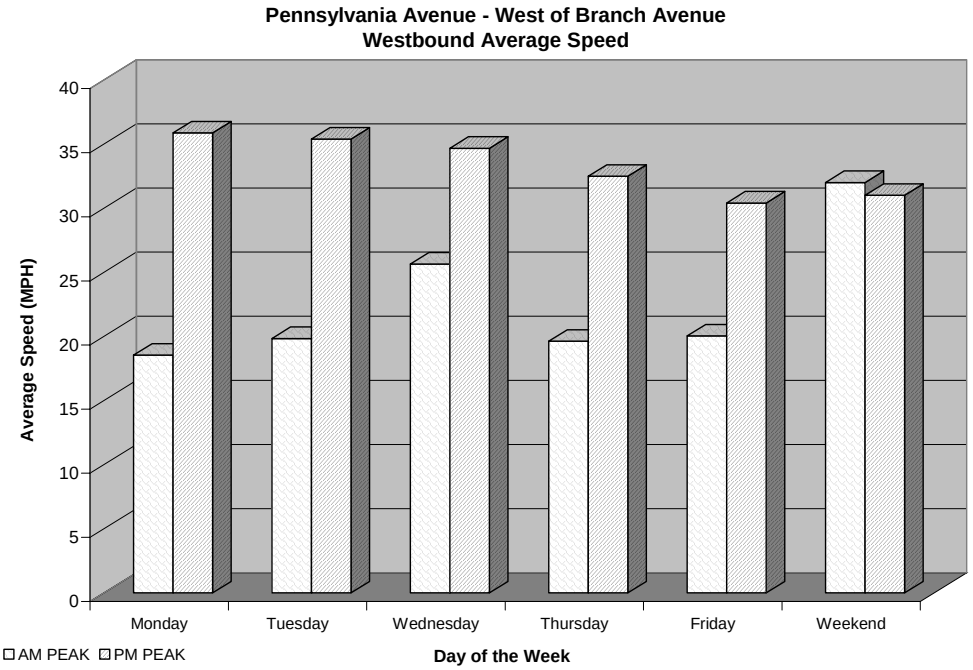


Figure 10:



The following figures represent the speeds along Pennsylvania Avenue, SE on a Wednesday by hour of the day in both the eastbound (Figures 11 and 12) and westbound (Figures 13 and 14) directions.

Figure 11:

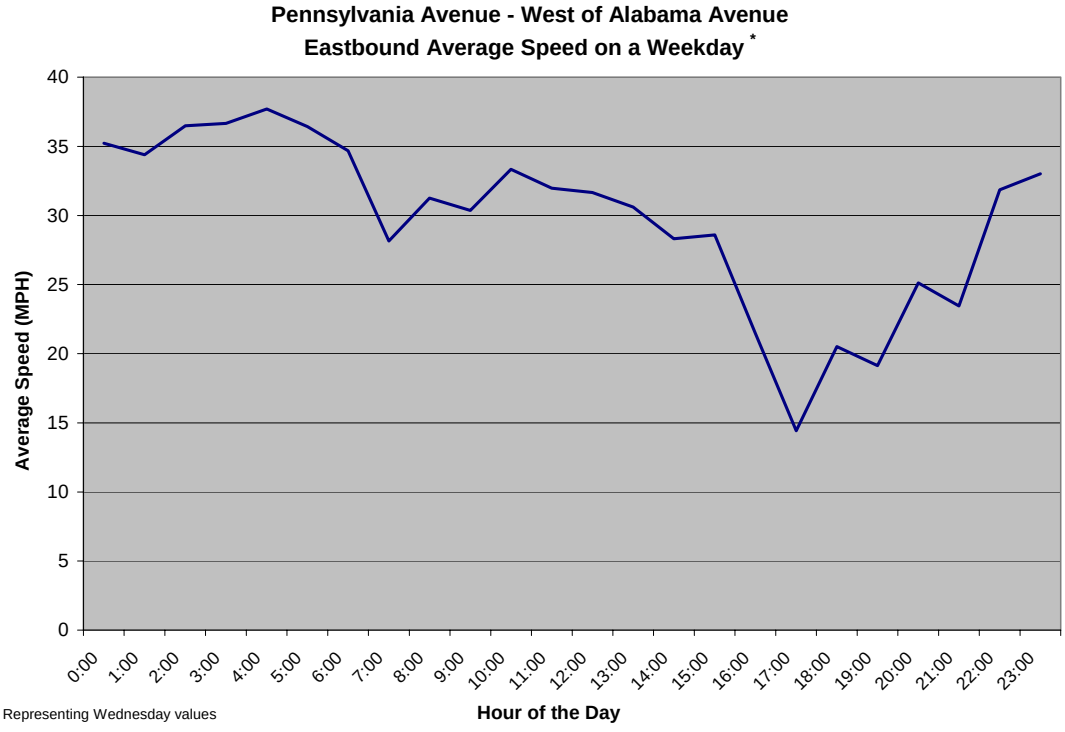
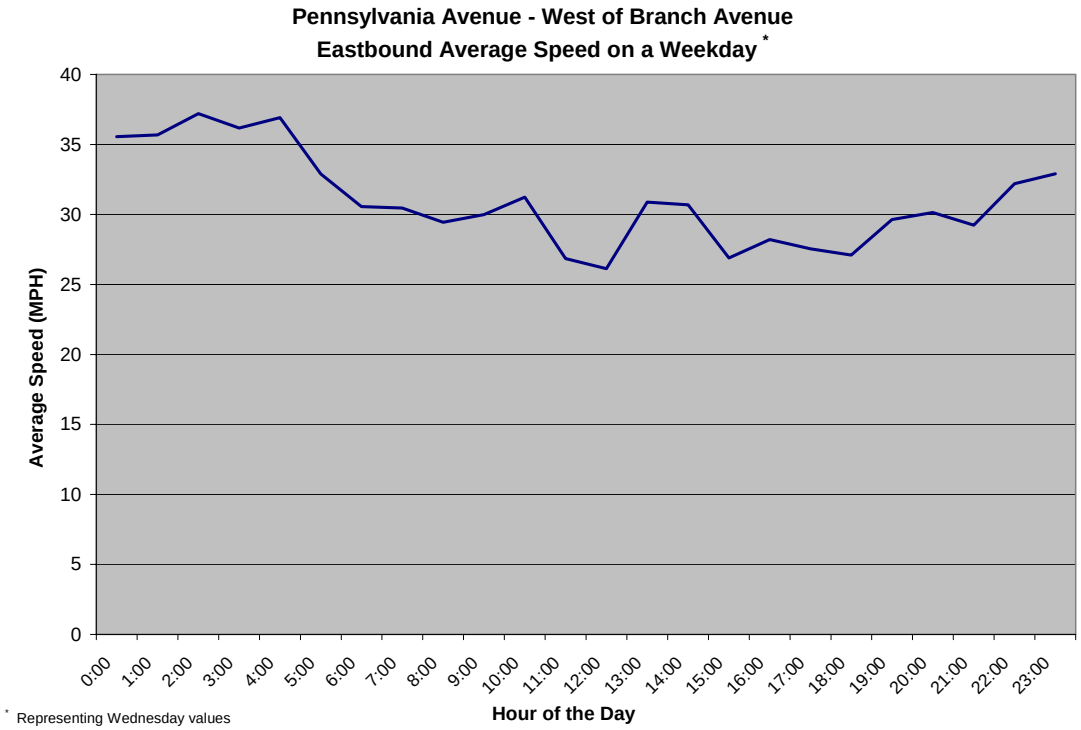
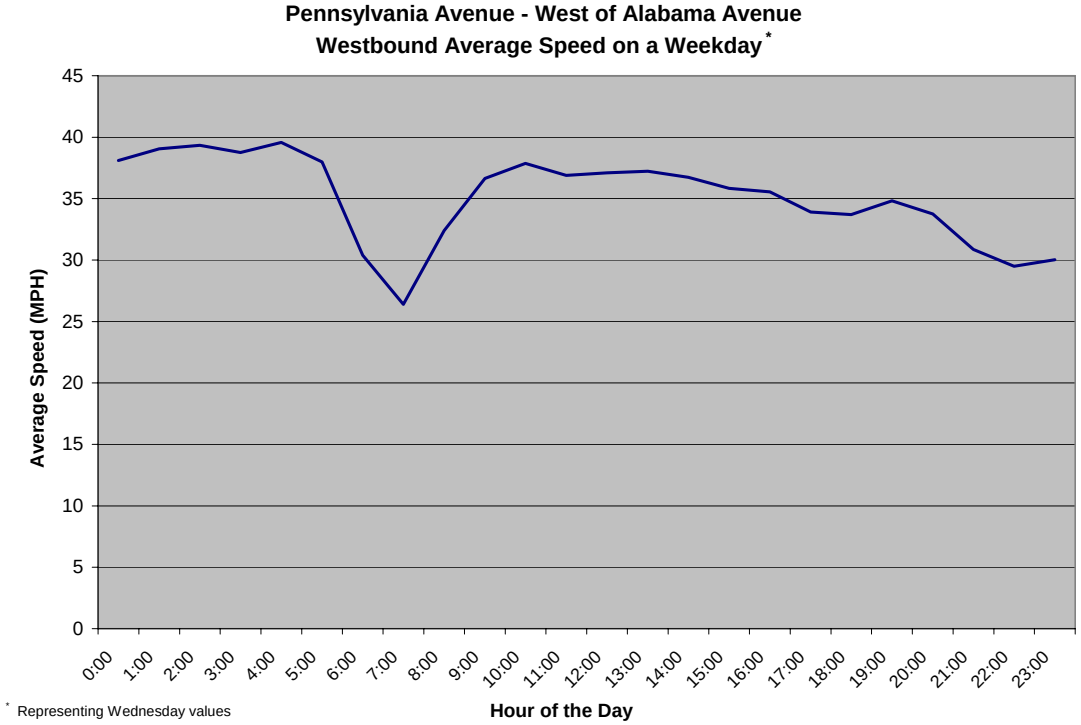


Figure 12:



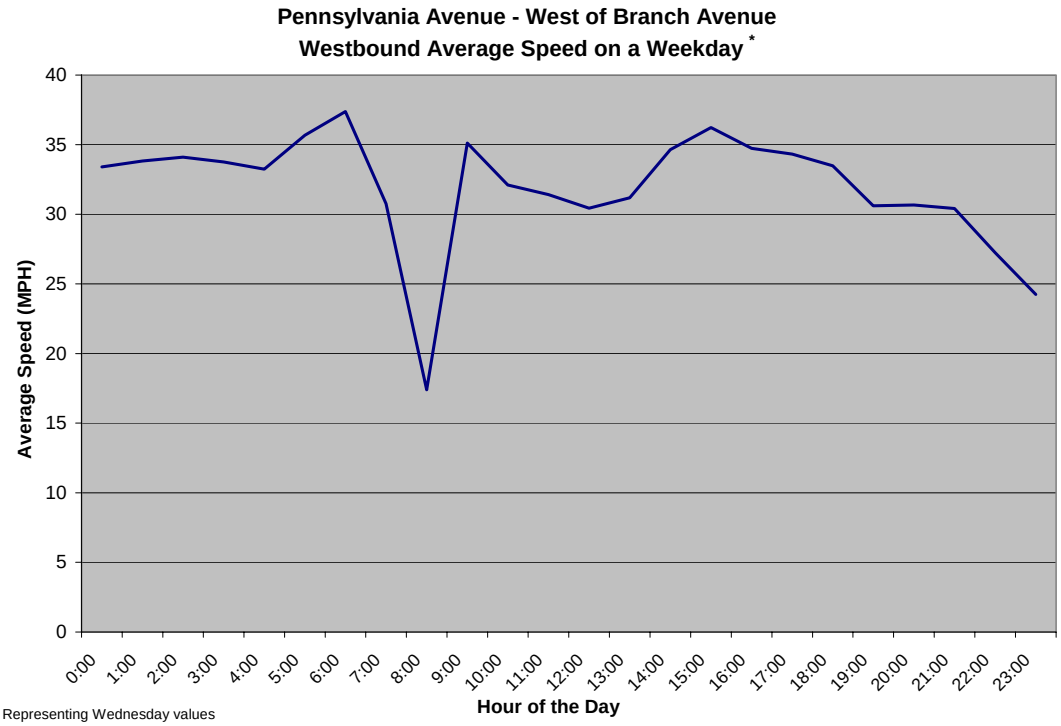
* Representing Wednesday values

Figure 13:



* Representing Wednesday values

Figure 14:



* Representing Wednesday values

Travel Time Runs

Travel time runs were conducted for Pennsylvania Avenue, SE during the peak periods to determine the average travel speed along the corridor. The travel time runs were completed utilizing Global Positioning System (GPS) receivers to track the latitudinal and longitudinal coordinates and velocities of the vehicle traversing the corridor. The travel runs were conducted for a two hour period during both the morning peak period and the evening peak period on two separate days. The results of these travel time runs indicating the average travel speed are as follows:

- AM Peak Period
  - Westbound = 7 MPH
  - Eastbound = 17.5 MPH
- PM Peak Period
  - Westbound = 19 MPH
  - Eastbound = 17 MPH

G. Generalized Origin-Destination Analysis

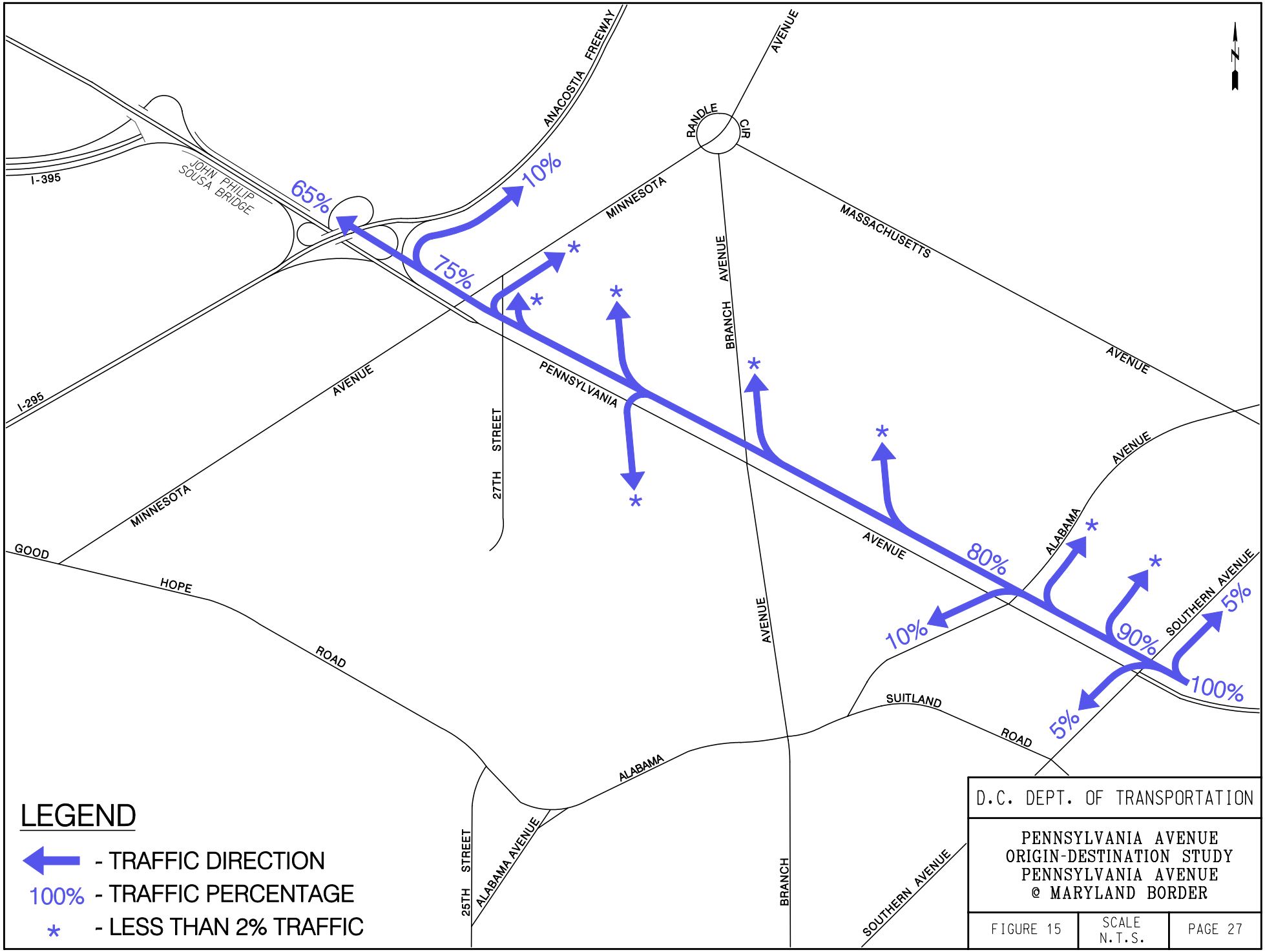
A generalized origin-destination (O-D) survey was conducted along Pennsylvania Avenue on Tuesday, April 29, 2003. The purpose of the study was to determine the major trip characteristics for motorists entering and exiting the Pennsylvania Avenue corridor. The survey consisted of recording license plates at major entry and exit points

during the AM peak period. The PM peak period was not recorded based on the assumption that the percentages would mirror the traffic data and show a reverse pattern during this period. Due to the high volume of traffic along Pennsylvania Avenue, SE, only license plates for white vehicles were recorded. White vehicles were chosen as this is the second most popular color of vehicle and is easily identifiable. In addition to the O-D data, the traffic count data was also used to analyze patterns. Results of the O-D study are shown on Figures 15-20.

The following is a summary of the findings of the origin-destination survey and traffic count data related to AM travel patterns:

1. Approximately 75% of trips crossing the Maryland border at Southern Avenue travel at least to the Anacostia Freeway (I-295).
2. Approximately 45% of the Branch Avenue northbound motorists' destination is I –395.
3. Motorists traveling northbound on 27th Street are split between traveling on Pennsylvania Avenue, SE toward the downtown area (approximately 50%) and toward I-395 southbound (approximately 30%).
4. Approximately 65% of Minnesota Avenue northbound motorists are destined to westbound Pennsylvania Avenue, SE toward the downtown area.
5. I-395 is the major destination of Minnesota Avenue southbound motorists (approximately 50%).

6. Thirty-five percent of the motorists exiting from the Anacostia Freeway (I-295) southbound to Pennsylvania Avenue, SE eastbound turn around and cross the Sousa Bridge as there is no direct movement from southbound Anacostia Freeway (I-295) to westbound Pennsylvania Avenue, SE.



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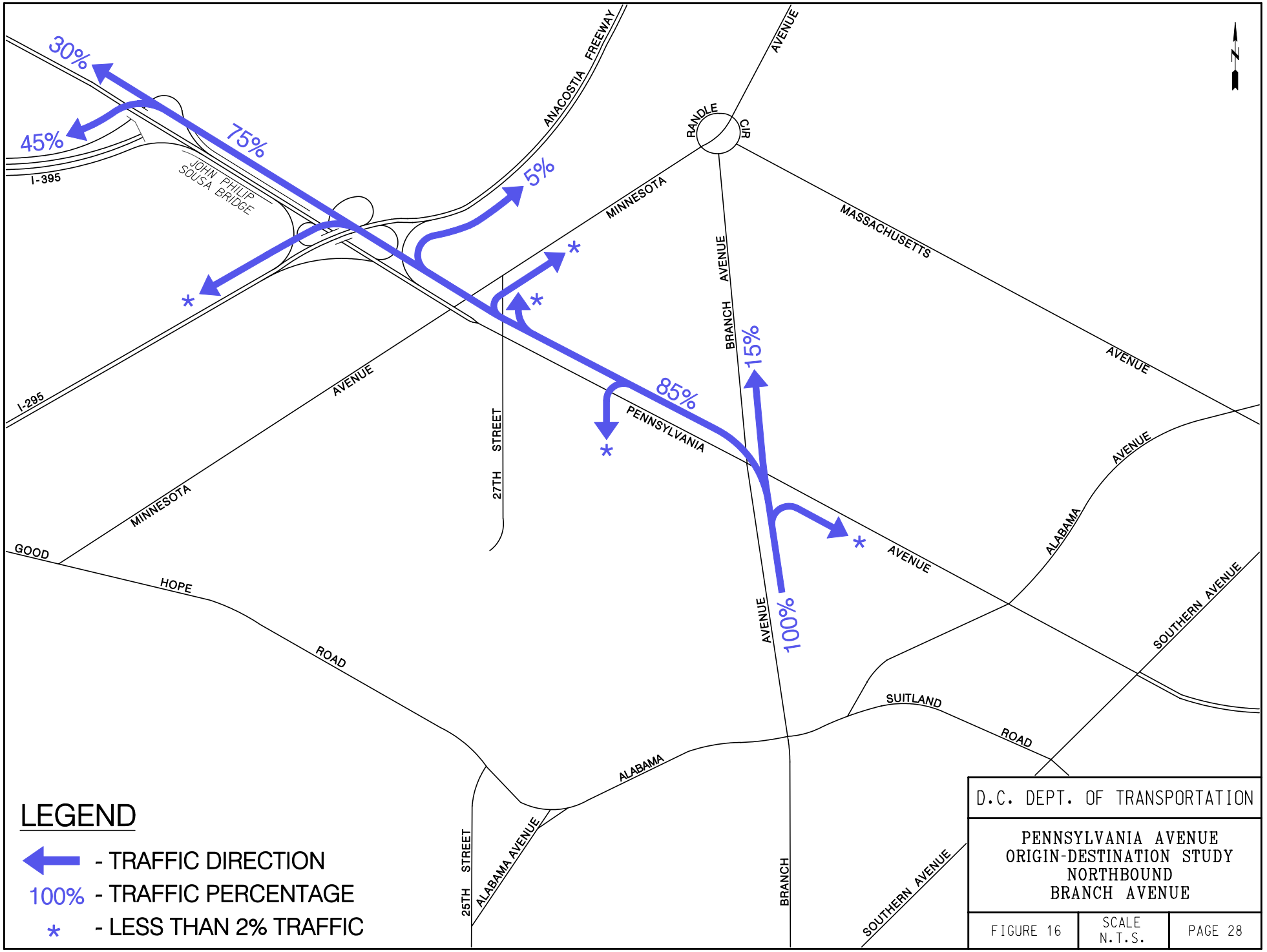

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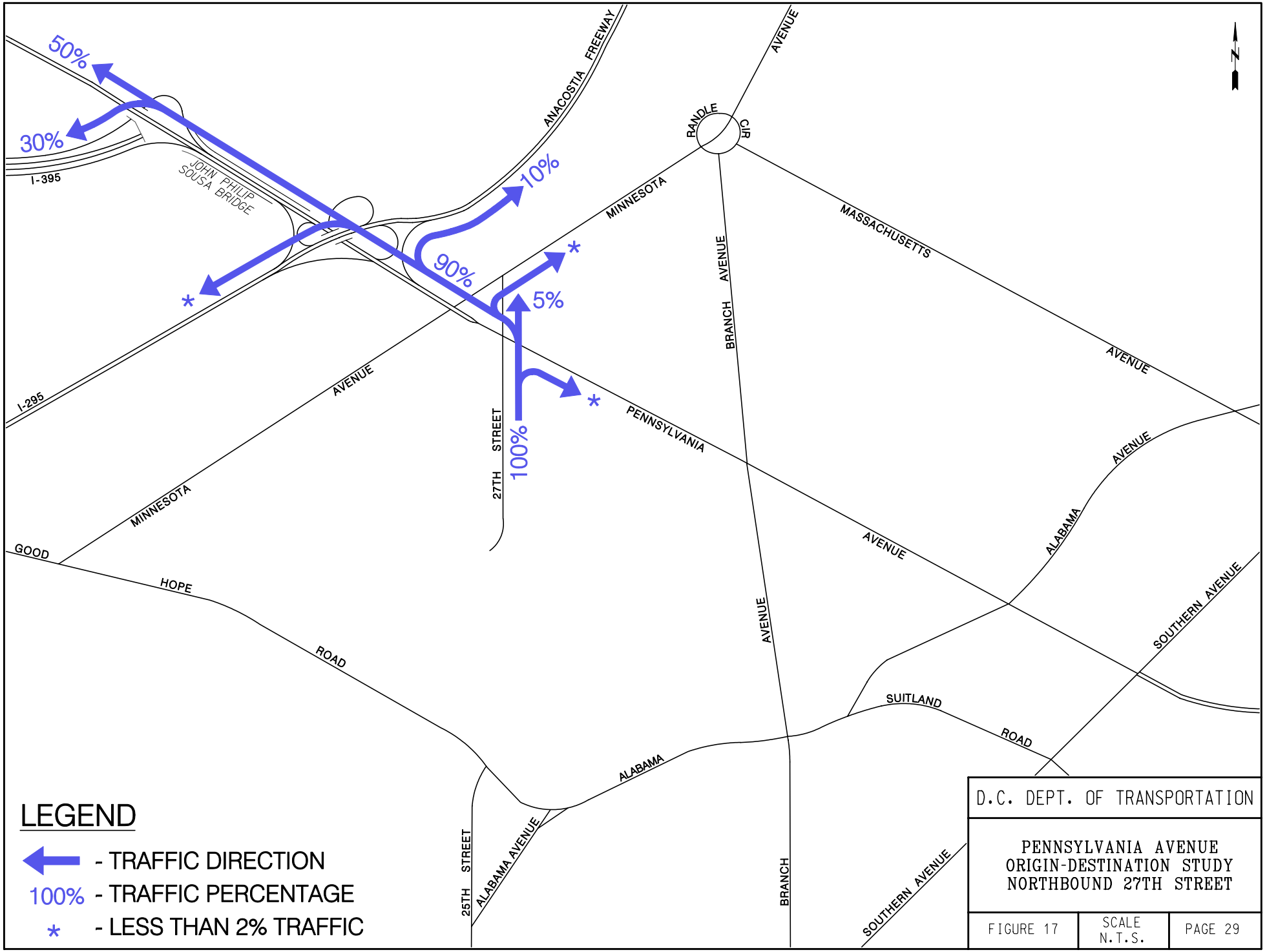

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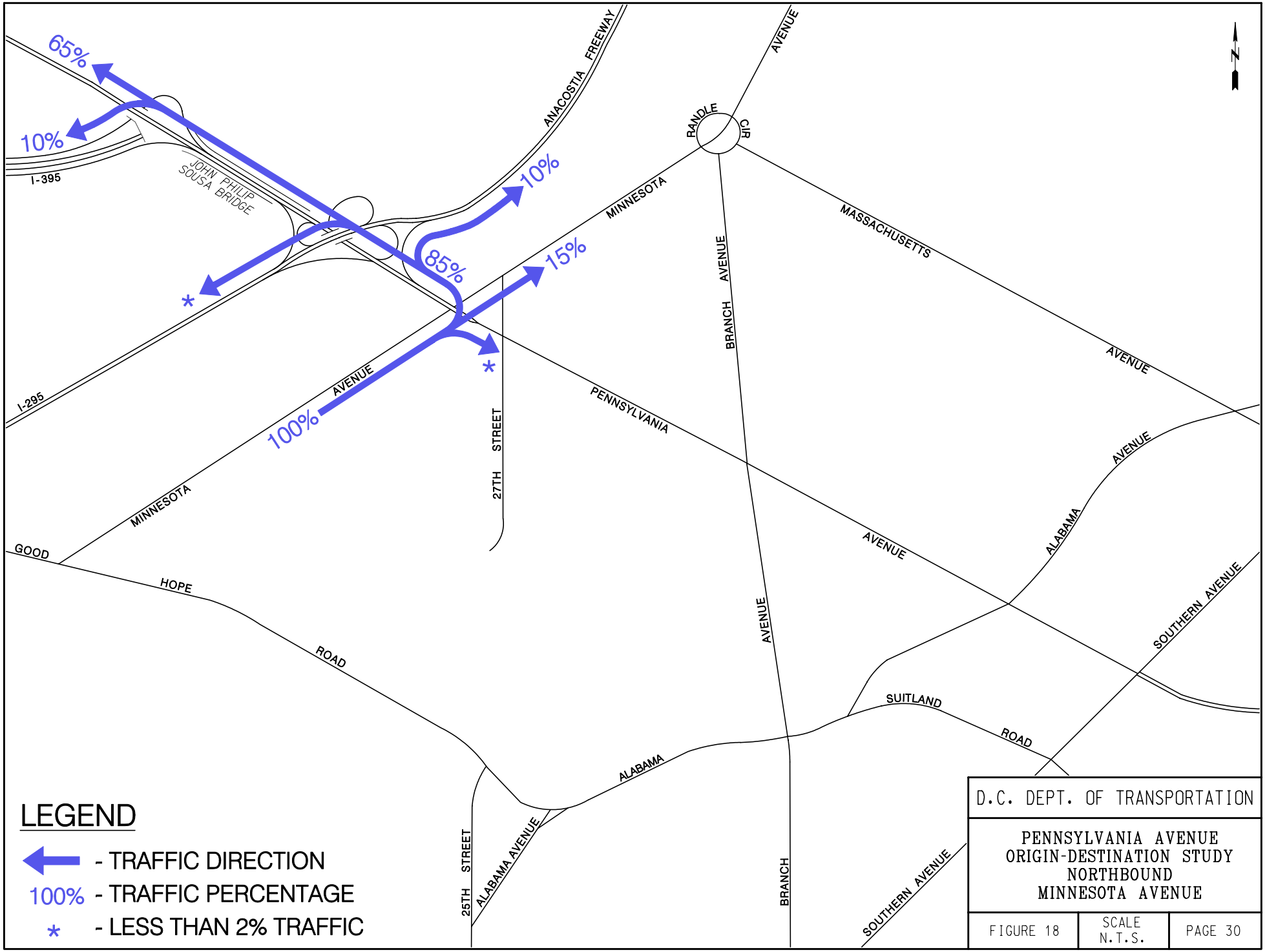

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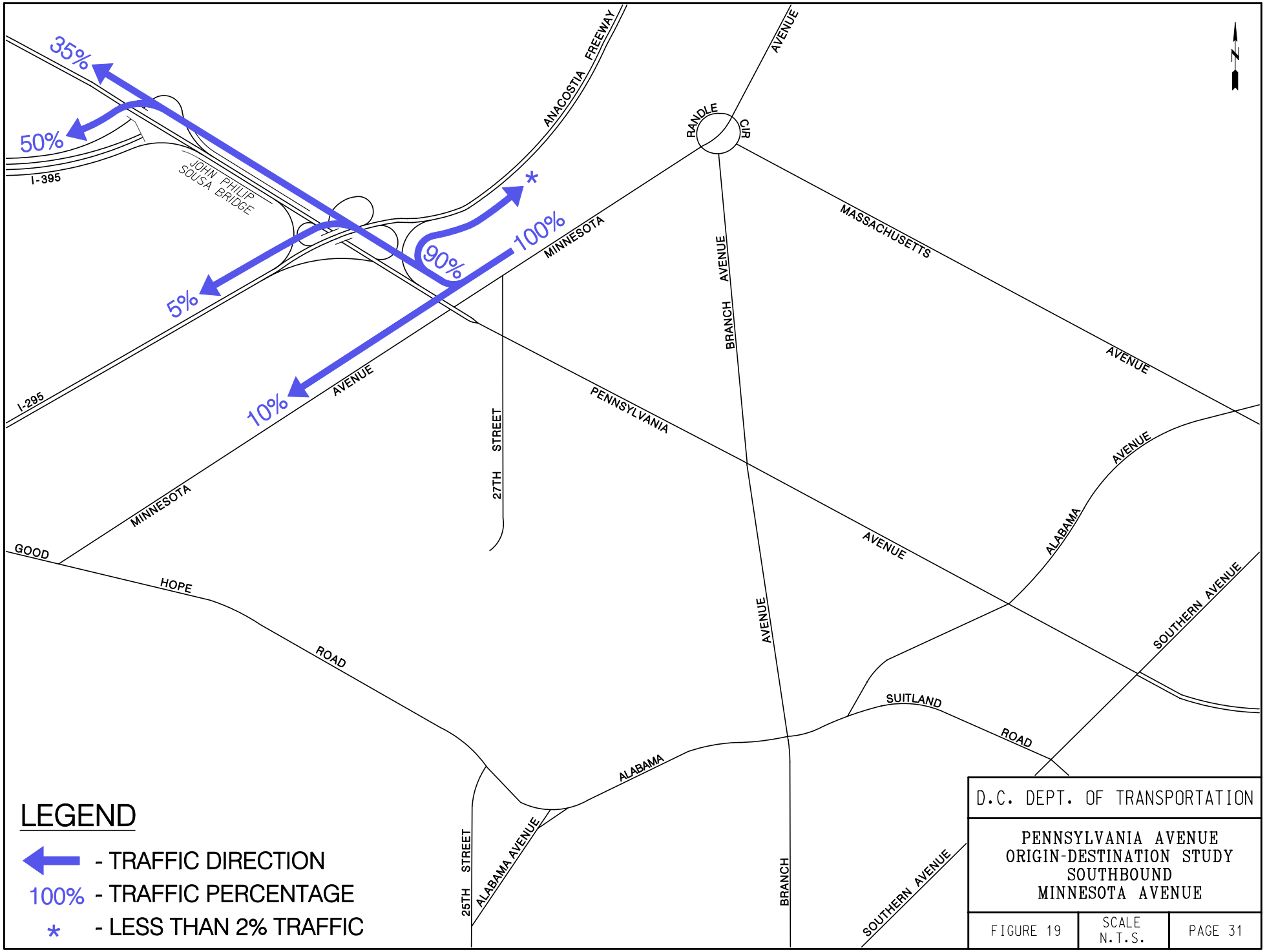

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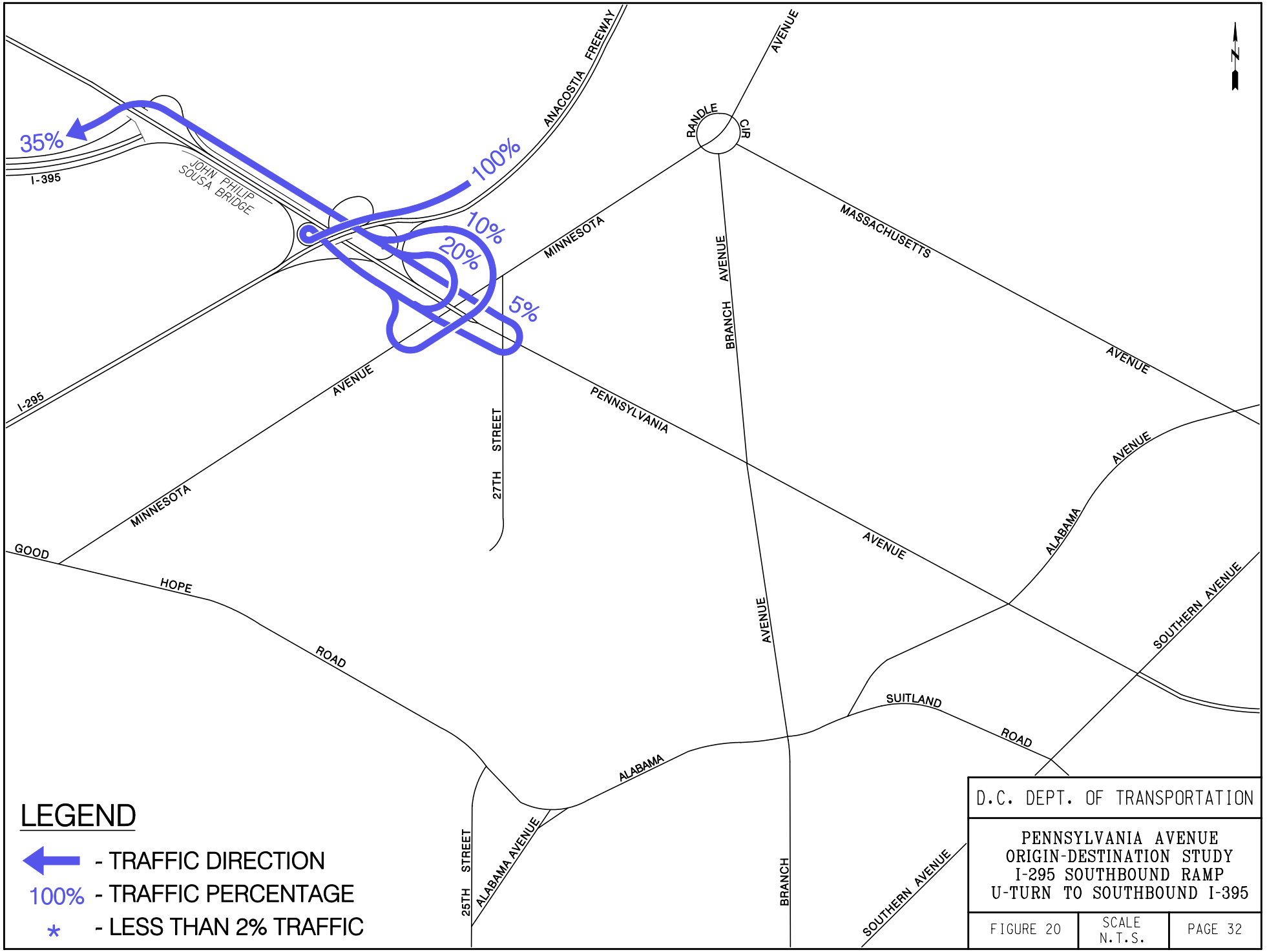

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H. Accident Summary

In order to pursue recommendations to create a safer environment for motorists, pedestrians, bicyclists, and transit users within the study area, the accident information for Pennsylvania Avenue, SE was obtained and reviewed. DDOT provided a summary of the accident reports from January 1, 2000 through December 31, 2002 for the following intersections with Pennsylvania Avenue, SE

- Minnesota Avenue
- P Street
- 31st Street
- 33rd Street
- Branch Avenue
- 33rd Place
- Texas Avenue
- 38th Street
- Fort Davis Drive
- Southern Avenue

These summaries are located in Appendix C. Of these locations, the intersections of Pennsylvania Avenue, SE and Minnesota Avenue, 31st Street, Branch Avenue, and Southern Avenue are signalized intersections. The remaining intersections are stop controlled.

Combining the accident summaries from the above mentioned intersections, a total of 273 accidents occurred during the time period of the reports. It should be noted that these results are for the **intersections only** and may not necessarily include all accidents occurring along the corridor away from the intersections. These accident summaries only include reported accidents.

From the information obtained, the following was noted:

- The highest number of accidents were reported at the intersections of Pennsylvania Avenue, SE/Minnesota Avenue (125 accidents) and Pennsylvania Avenue, SE/Branch Avenue (79 accidents)
- Of the reported accidents, 55.3% occurred in the evening between the hours of 4:00 PM and 7:30 PM.
- Of the reported accidents, 76.6% occurred during the weekday.
- Of the reported accidents, the four most common types of accidents were rear-end accidents (36.3%), side-swipe accidents (23.8%), right angle accidents (19.4%), and left turn accidents (7.3%). These are all considered to be the types of accidents associated with roadway congestion.

- Of the reported accidents, six involved pedestrians. Three of these accidents occurred at the intersection of Pennsylvania Avenue, SE/Minnesota Avenue, two of the accidents occurred at Pennsylvania Avenue, SE/Branch Avenue, and the remaining pedestrian involved accident occurred at Pennsylvania Avenue, SE/Fort Davis Drive.

As indicated from the accident summaries, the number of accidents can largely be attributed to the congestion of the roadway in the weekday-evening hours. In addition, the rear-end accidents are also a result of stop-and-go conditions. The side-swipe accidents can be attributed to vehicles changing lanes and aggressive driving, while the right-angle accidents largely occur due to congestion and frustration resulting in motorists taking chances to clear the intersection.

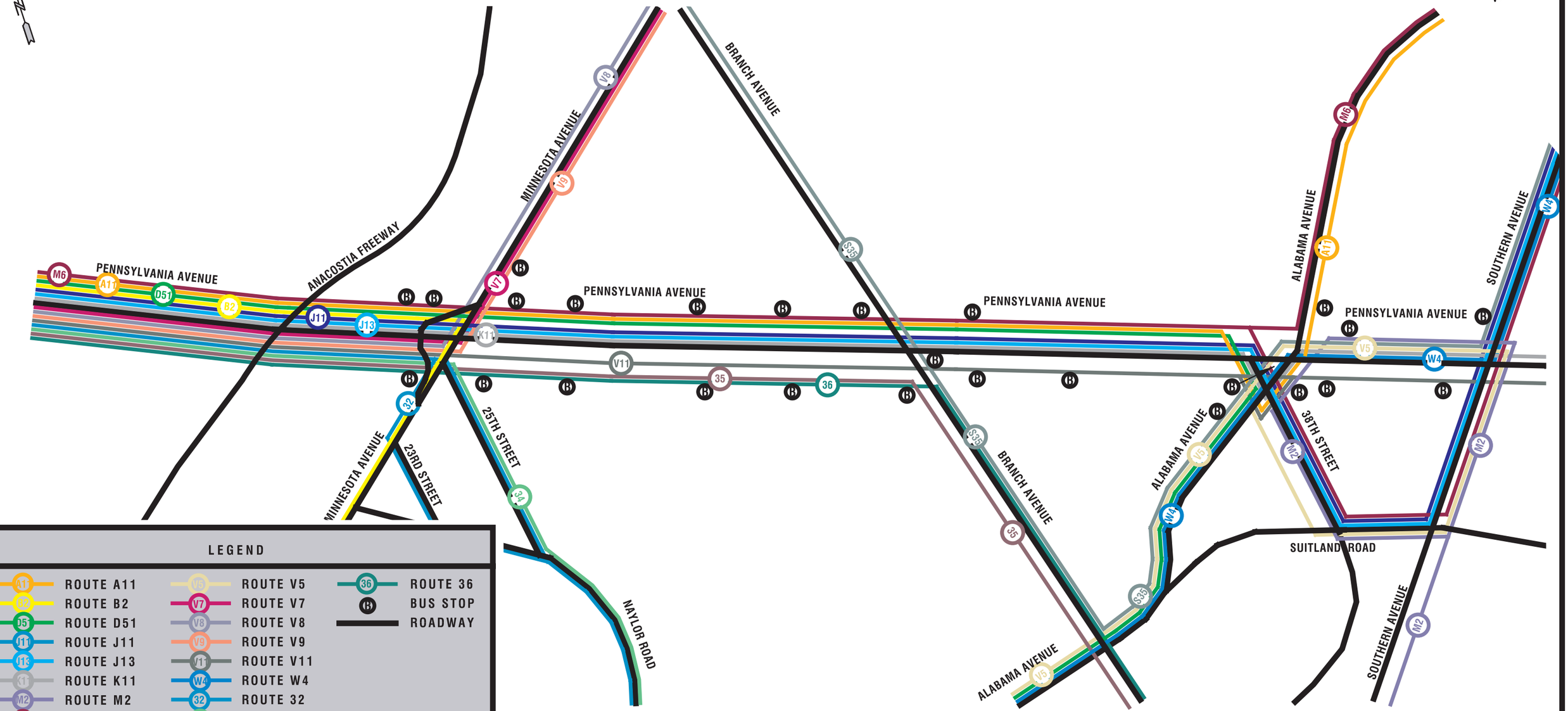
I. Public Transportation

Transit is a very important alternative for the local community in the Pennsylvania Avenue, SE corridor. Within the study area there are a total of 19 bus lines that operate at 26 bus stops. Figure 21 illustrates the bus lines and location of the bus stops within the study area. It should be noted that there are no Metrorail stops within the study area; however, several of the bus lines do run to the nearby Metrorail stations located north, south, and east of the study area.

CSX Rail Crossing

It was also noted during the field reconnaissance that in accordance with WMATA safety requirements, the buses stop at the CSX rail line located at the west end of the project just west of the intersection of Pennsylvania Avenue, SE/Anacostia Freeway (I-295) northbound on-ramp. This is in accordance with the Washington D.C. safety requirement. It was determined that on a weekday, there are approximately 380 eastbound buses and 400 westbound buses that cross the rail line.

Pennsylvania Avenue, SE Transportation Study



LEGEND

ROUTE A11	ROUTE V5	ROUTE 36
ROUTE B2	ROUTE V7	BUS STOP
ROUTE D51	ROUTE V8	ROADWAY
ROUTE J11	ROUTE V9	
ROUTE J13	ROUTE V11	
ROUTE K11	ROUTE W4	
ROUTE M2	ROUTE 32	
ROUTE M6	ROUTE 34	
ROUTE S35	ROUTE 35	

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TRANSIT ROUTES

NOT TO SCALE

FIGURE 21

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Transit Amenities

During recent field reconnaissance visits to the study area, an inventory was taken of all existing transit amenities at each of the bus stops. The following describes each of the amenities that were inventoried as well as a brief description of the item.

- Visibility of Bus Stop: The visibility of a bus stop was determined by whether it was hidden by trees, shrubs, behind other signs, or obstacles.
- Accessibility: The accessibility of each stop was determined by whether a bus stop has sidewalk leading to it, as well as a crosswalk with ADA ramps in the nearby vicinity.
- Concrete Waiting Area at the Bus Stop: This category describes whether the bus stop has an all-weather area for the patrons to wait in addition to the regular sidewalk where they could impede other pedestrians.
- Route Number Posted: This refers to the route number being posted on the bus stop sign.
- Map of Bus Routes Posted: This refers to a generic map of the bus routes that indicates the individual bus stops, similar to the map that is located within the schedules.
- Schedule Posted: The schedule posting can be in either a digital format, or a hard copy of a schedule for all of the routes accessing an individual bus stop.
- Real-Time Travel Information: This information provides the transit patron with knowledge concerning any delays associated with the patron's transit route and whether another route may be a better option due to the situation. It was noted that no bus stops within the study area utilize real-time travel information.
- Bus Shelter: A bus shelter was considered to be anything that provided shelter from the weather, either fully enclosed, or simply a roof.
- Bench: Benches were assumed to be amenities for the bus stop only if they were associated with the stop.
- Newspaper Machines: Newspaper machines were assumed to be an amenity for the bus stop only if it was located at the stop.
- Trash Receptacles: Trash receptacles were considered to be an amenity for the bus stop only if it was located at the stop.

A total of 26 bus stops were examined within the Pennsylvania Avenue, SE study area according to the previous parameters. Tables 5, 6, and 7 list the location of these bus stops as well as the amenities located at each bus stop.

In addition to completing the transit amenity inventory, transit ridership information was provided by DDOT regarding the total number of boardings and alightings at each bus stop along Pennsylvania Avenue only. This information can be found in Appendix D. The Washington Metropolitan Bus Study has proposed standards regarding amenities required for bus stops based on daily boardings. These standards are listed in the following table:

Table 4: Bus Stop Amenities Required Based on Boardings

Number of Boardings	Amenities Required
0 - 50	• Concrete waiting area at the bus stop • Accessibility • Adequate lighting • Up-to-date and accurate bus stop signs
51 – 100	• All amenities provided for bus stops with 0 – 50 boardings • Bus shelter • Trash receptacle
101 – 300	• All amenities provided for bus stops with 0 – 50 boardings • All amenities provided with bus stops with 51 – 100 boardings • Schedule Posted • Larger bus shelter **or** two standard size bus shelters
301 and up	• All amenities provided for bus stops with 0 – 50 boardings • All amenities provided for bus stops with 51 – 100 boardings • All amenities provided for bus stops with 101 – 300 boardings • Map of bus routes posted

Table 5: Bus Stop Amenities for Bus Stops located along Eastbound Pennsylvania Avenue, SE

Bus Stop Locations – Eastbound	Visibility of Bus Stop	Accessibility	Concrete Waiting Area	Route Number Posted	Map of Bus Routes Posted	Schedule Posted	Bus Shelter	Bench	Newspaper Machine	Trash Receptacle
Minnesota Avenue (SB) ✸	x	x	x	x	x		x			x
Between 25th Street and 27th Street ✸	x		x	x			x[1]	x		x
28th Street	x	x	x	x	x					x
30th Street	x	x	x	x	x					x
31st Street	x	x	x	x	x					x
Branch Avenue (near side)	x			x	x					
Branch Avenue (far side)		x		x	x					x
33rd Street	x	x		x	x					x
Across from Texas Avenue				x						
38th Street	x	x		x			x[2]			
Fairfax Village Shopping Center	x	x		x						
Across from 40th Street ✸	x		x	x	x					x

1. The bus shelter has no glass.
2. The bus shelter at this location is a brick building with interior lights.

Legend

✸ - Stops with 51 – 100 boardings all day

✸ - Stops with 101 - 300 boardings all day

✸ - Stops with 301 and up boardings all day

All other stops have 50 or fewer boardings all day

Table 6: Bus Stop Amenities for Bus Stops located along Westbound Pennsylvania Avenue, SE

Bus Stop Locations – Westbound	Visibility of Bus Stop	Accessibility	Concrete Waiting Area	Route Number Posted	Map of Bus Routes Posted	Schedule Posted	Bus Shelter	Bench	Newspaper Machine	Trash Receptacle
Fort Davis Street	x	x	x	x						
Carpenter Street	x	x	x	x	x					x
Branch Avenue ✸	x	x	x	x	x		x	x		x
31st Street	x	x		x	x					x
30th Street ✸	x	x	x	x	x		x			x
28th Street ✸	x	x		x						x
Between 27th Street and Minnesota Ave.	x			x						x
Between L'Enfant Sq. and Fairlawn Ave. ✸	x	x		x			x		x	x

Legend

✸ - Stops with 51 – 100 boardings all day

✸ - Stops with 101 - 300 boardings all day

✸ - Stops with 301 and up boardings all day

All other stops have 50 or fewer boardings all day

Table 7: Bus Stop Amenities for Bus Stops located along Side Streets

Bus Stop Locations – Side Streets	Visibility of Bus Stop	Accessibility	Concrete Waiting Area	Route Number Posted	Map of Bus Routes Posted	Schedule Posted	Bus Shelter	Bench	Newspaper Machine	Trash Receptacle
Minnesota Avenue (SB – north side)	x		x	x						
Minnesota Avenue (NB – north side)	x	x		x				x		x
Alabama Avenue (SB – south side)	x	x		x			x	x		
Alabama Avenue (NB – south side)	x	x		x						
Alabama Avenue (NB – north side)	x	x		x						
Southern Avenue (SB – north side)	x	x	x	x						

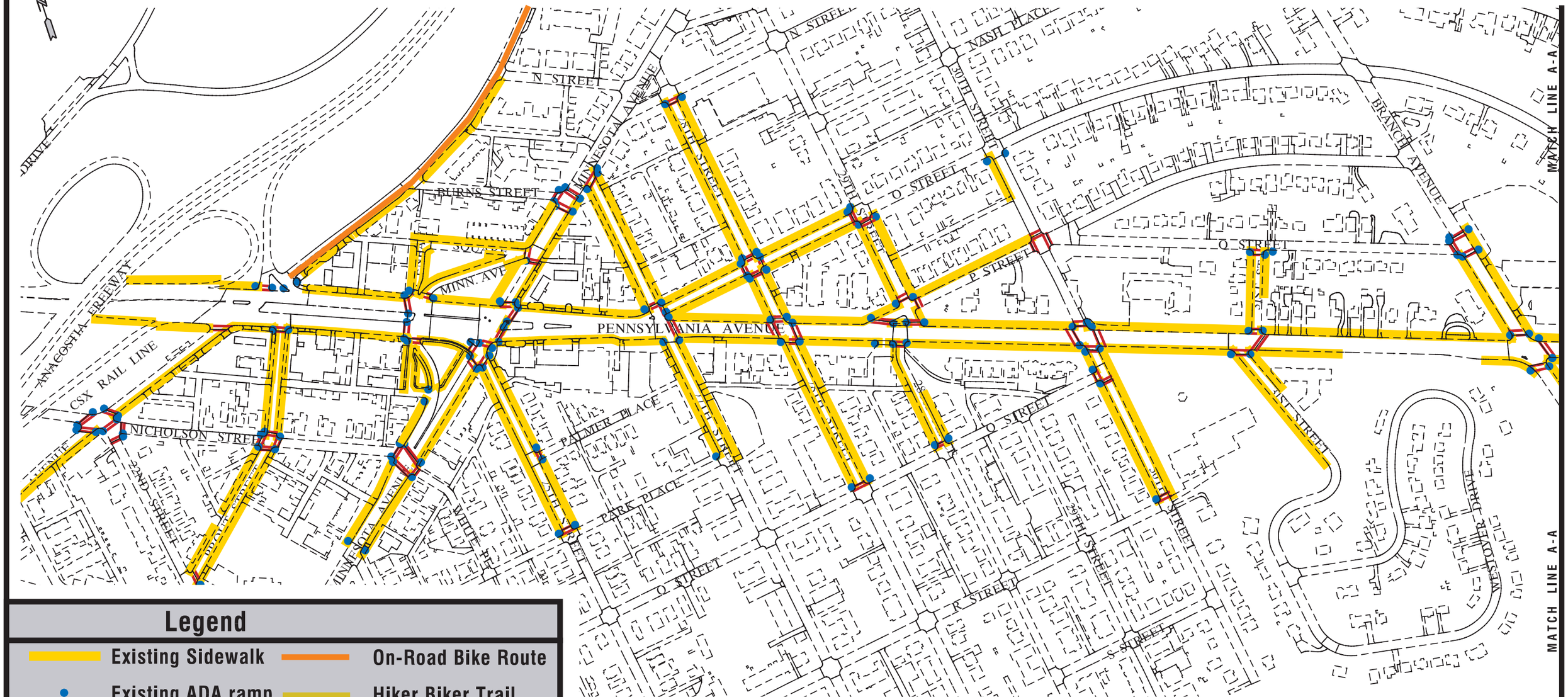
J. Pedestrian and Bicycle Facilities

A complete understanding of the existing pedestrian network was gained during the field visits of the study area. This assessment included locating any areas that do not include sidewalks, crosswalks, and ADA ramps. Figures 22a and 22b illustrates the results of these field visits. From the inventory, two locations were identified along Pennsylvania Avenue, SE that do not provide sidewalks, as well as several locations along the side streets that do not provide sidewalks. In addition, there are several locations in which crosswalks and ADA ramps have not been provided on all necessary crossings of an intersection. Overall, the sidewalk appears to be in good condition and provides ample width (approximately six-feet wide).

No sidewalk - south side of Pennsylvania Avenue, SE west of Branch Avenue

Research was also completed pertaining to the bicycle and hiker/biker facilities within the area including the ADC Washington DC Regional Bike Map, 5th Edition. Through the research, a number of on-road and off-road facilities were identified within the study area. These facilities are illustrated on Figures 22a and 22b. The most notable facility is the Fort Circle Park Hiker/Biker Trail that crosses Pennsylvania Avenue, SE near Fort Davis Drive. It should be noted that D.C. Bicycle Master Plan is currently being updated.

Pennsylvania Avenue, SE Transportation Study



Legend

- Existing Sidewalk
- Existing ADA ramp
- Existing Crosswalk
- On-Road Bike Route
- Hiker Biker Trail

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PEDESTRIAN / BICYCLE INFORMATION
(SHEET 1 of 2)

FIGURE 22a NOT TO SCALE PAGE 42

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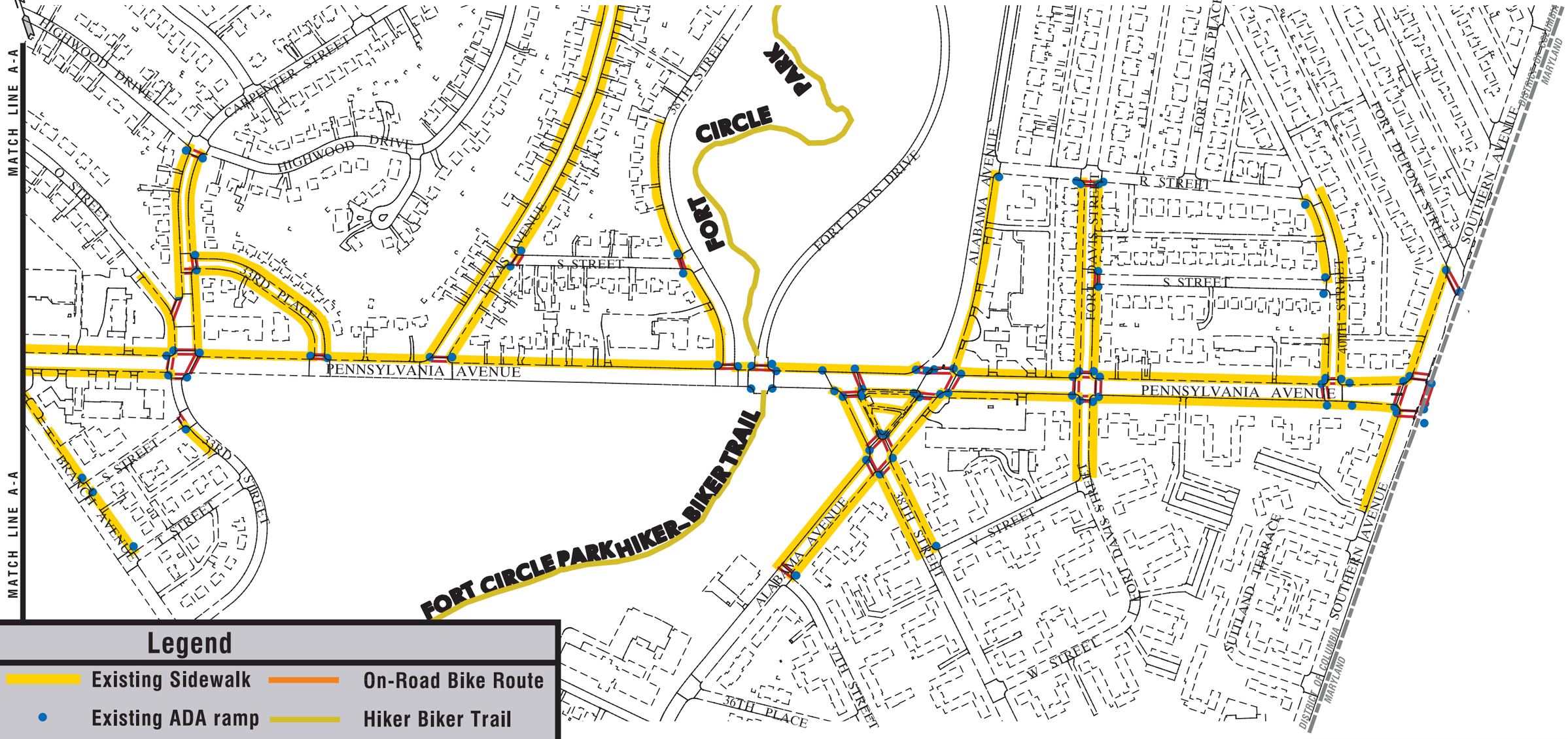
Pennsylvania Avenue, SE Transportation Study



Legend

- Existing Sidewalk
- Existing ADA ramp
- Existing Crosswalk
- On-Road Bike Route
- Hiker Biker Trail

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PEDESTRIAN / BICYCLE INFORMATION

(SHEET 2 of 2)

FIGURE 22b NOT TO SCALE PAGE 43

FILE: m:\PA Ave_pl\dl sidewalk pedinfo_sht2.dgn
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K. Parking Inventory and Utilization

A parking inventory was completed for the study area to determine the location of available parking as well as the parking restrictions along the Pennsylvania Avenue, SE corridor. A total of 24 different parking restrictions were identified within the study area. These restrictions varied by the location, the time of day, and the day of week. Parking is allowed at various times along the entire length of Pennsylvania Avenue, SE through the study area except at intermittent restricted areas (e.g. Metro bus stops).

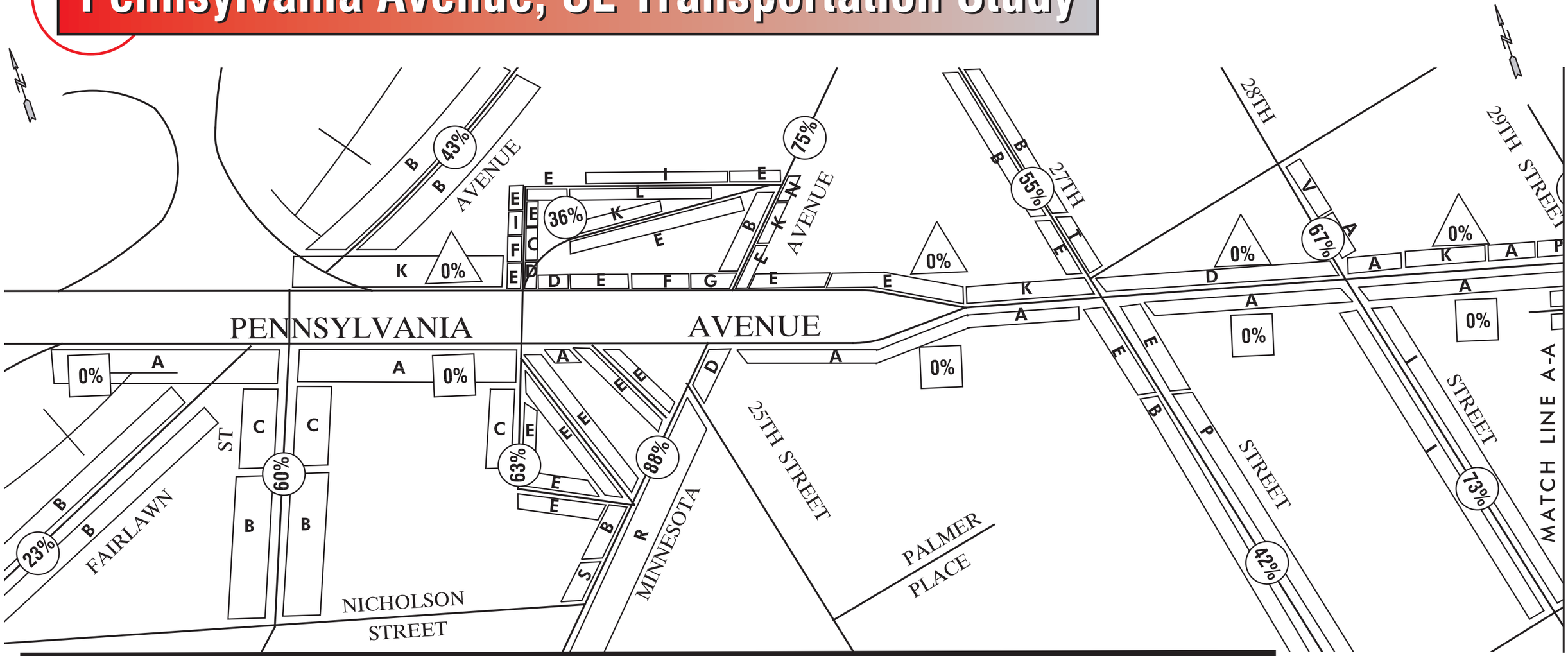
Parking restrictions along Pennsylvania Avenue, SE looking west just east of 28th Street.

Once the restrictions were noted within the study area, a utilization study was completed. The first step within the utilization study was to determine the total number of parking spaces available within each individual parking area. As there are no marked parking spaces, the length of an area was measured and divided by 20' (the assumed length of a parking space). Once the number of parking spaces was established, the number of cars parking in each of these areas between the hours of 10 AM and 7 PM was counted on an hourly basis. From this data, the maximum utilization of each area was determined.

Both the parking restrictions as well as the maximum utilization percentages are illustrated on Figures 23a - 23d. Based on the parking inventory and utilization information, there is significant parking available within the study area. Even though

parking is permitted for the entire length of Pennsylvania Avenue, SE, no vehicles were observed utilizing the parking between the Anacostia Freeway (I-295) and Alabama Avenue. Parking along the side streets within this area was highly utilized. Parked vehicles were observed along Pennsylvania Avenue, SE between Alabama Avenue and Southern Avenue, which is predominantly residential. It should be noted that illegal parking was witnessed within this portion of Pennsylvania Avenue, SE. Vehicles remained on the roadway during the peak periods, in violation of the parking restrictions. These vehicles affected traffic operations during the peak periods from Southern Avenue to Alabama Avenue.

Pennsylvania Avenue, SE Transportation Study



Legend

A - No Parking/Standing 7:00am to 9:30am 4:00pm to 6:30pm M - F
B - No Restrictions
C - One Hour Parking 7:00am to 6:30pm M - Sat
D - No Parking/Standing 7:00am to 9:30am 4:00pm to 6:30pm
One Hour Parking 9:30 - 4:30pm M - F
E - No Parking or Standing anytime
F - One Hour Parking
G - One Hour Parking 9:30am to 4:00pm Monday - Friday
H - No Parking at Stop bar and 40' from Stop bar
I - Two Hour Parking Limit in Zone 7
7:00am to 8:30 pm M - F
K - No Parking or Standing Metro Bus Zone
L - One Hour Parking 9:30am to 6:30pm M - F
N - No Parking/Standing 4:00pm to 6:30pm M - F
P - No Parking or Standing 7:00am to 9:30am M - F
R - No Parking or Standing 7:00am to 6:30pm
S - No Parking Loading Zone 7:00am to 6:30pm M - Sat
T - No Parking School Days 7:00am to 6:30 pm
V - Two Hour Parking 7:00am to 6:30 pm M - F
X - Two Hour Parking 9:30am to 4:00pm
Y - No Parking or Standing With No Parking Sign
(double headed arrow) 7:00am to 9:30am M - F
Z - No Stopping or Parking With No Parking Sign
(double headed arrow) 4:00pm to 6:30pm Metro Bus Zone
AA - No Parking/Standing 7:00am to 9:30am
Two Hour Parking 9:30am to 6:30pm
AB - No Parking (Street Cleaning) 10:00am to 5:00pm M
Two Hour Parking 9:30am to 6:30pm M - F
AC - Metro Bus Zone No Parking 4pm - 6:30pm Street
Cleaning 10pm to 5am
AD - No Parking 7am - 9:30am / Street Cleaning Monday
12:30pm to 2:30pm
75% - Maximum percentage parking utilization along the block
75% - Maximum percentage parking utilization PA Ave. North side
75% - Maximum percentage parking utilization PA Ave. South side

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PARKING UTILIZATION
(SHEET 1 of 4)

FIGURE 23a NOT TO SCALE PAGE 46

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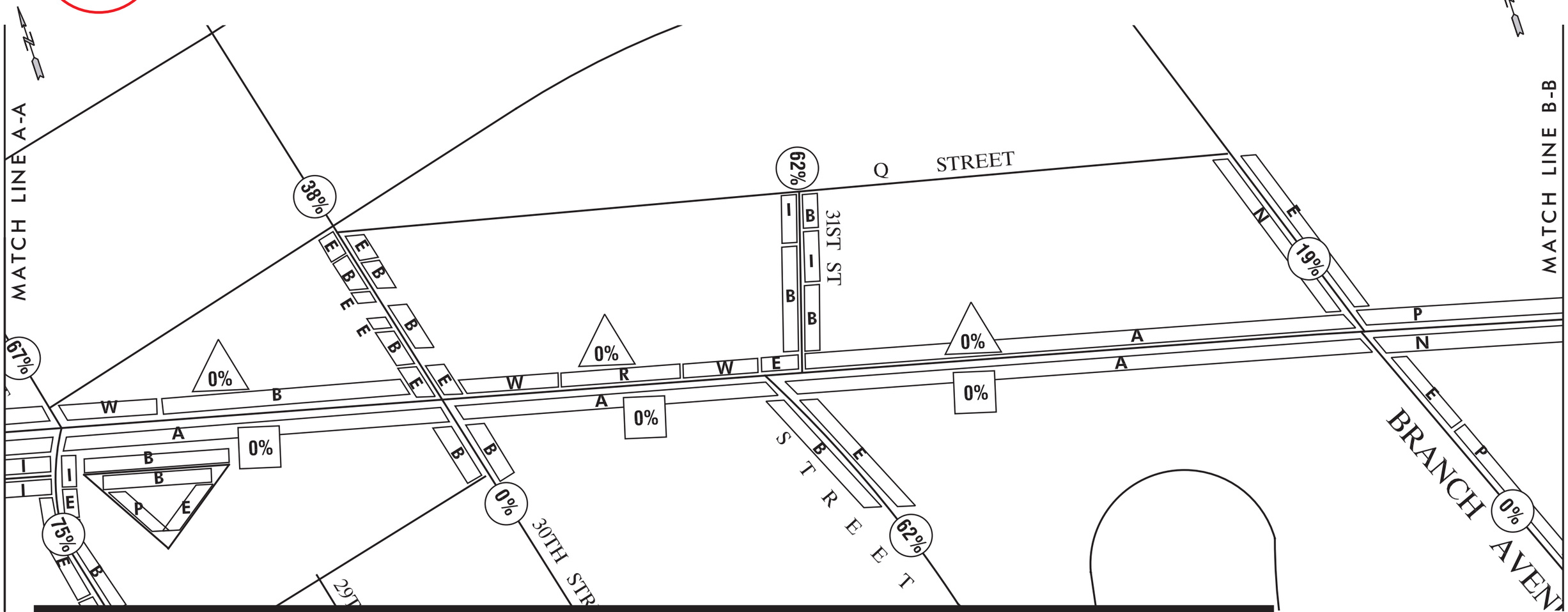
Pennsylvania Avenue, SE Transportation Study



Legend

A - No Parking/Standing 7:00am to 9:30am 4:00pm to 6:30pm M - F
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75% - Maximum percentage parking utilization PA Ave. North side
75% - Maximum percentage parking utilization PA Ave. South side

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PARKING UTILIZATION
(SHEET 2 of 4)

FIGURE 23b NOT TO SCALE

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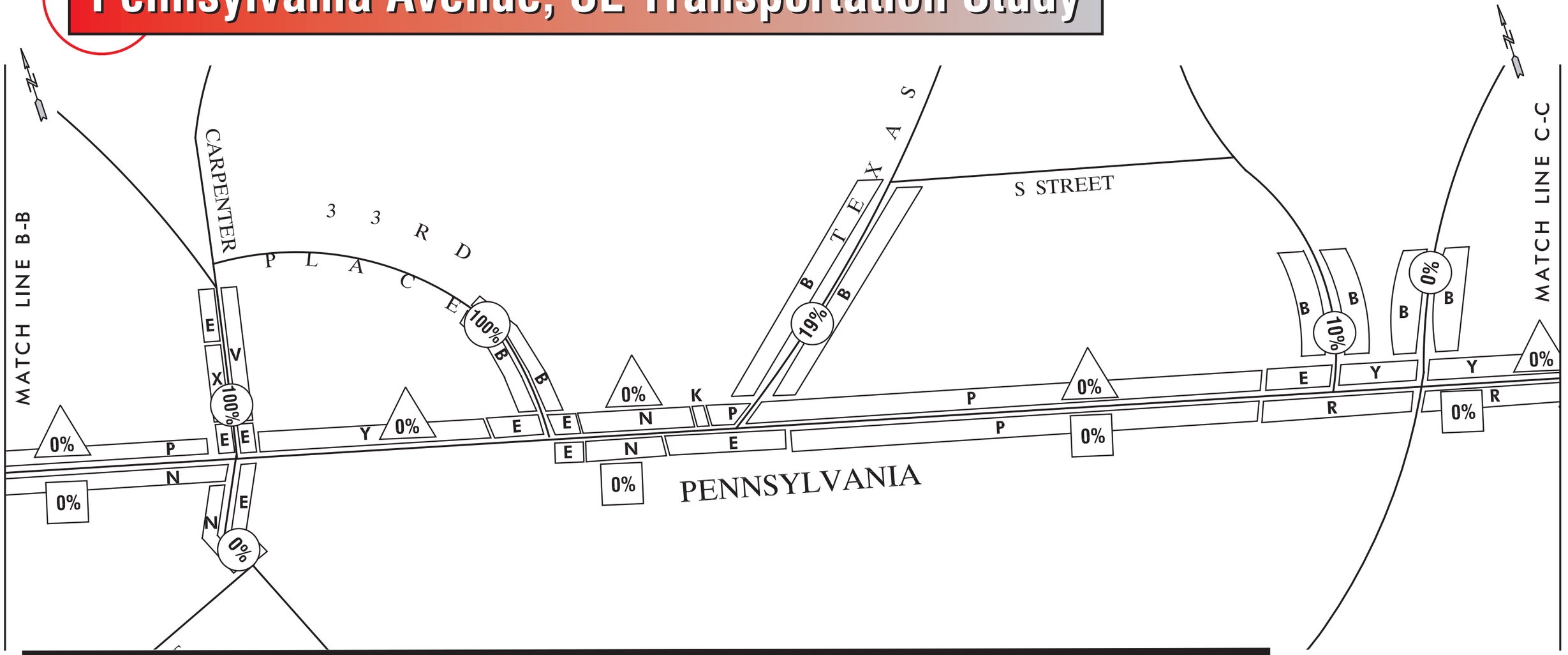
Pennsylvania Avenue, SE Transportation Study



Legend

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75% - Maximum percentage parking utilization PA Ave. South side

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PARKING UTILIZATION
(SHEET 3 of 4)

FIGURE 23c NOT TO SCALE

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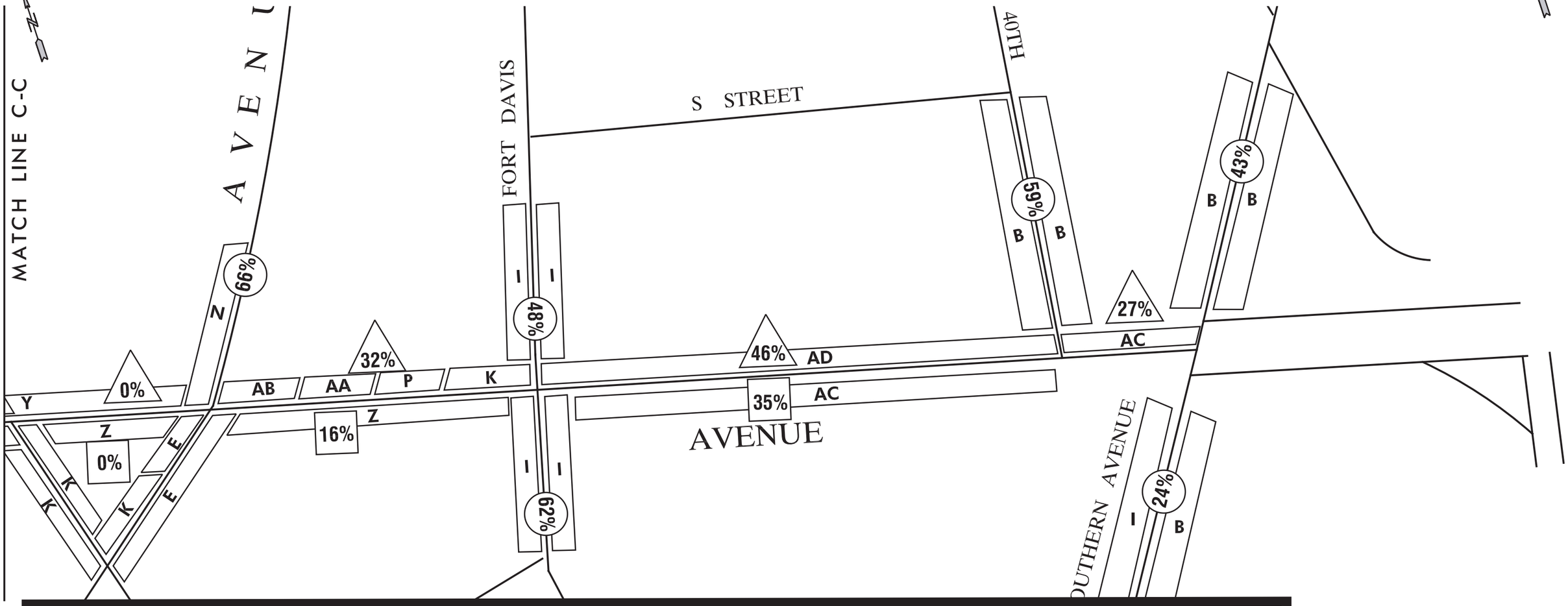
Pennsylvania Avenue, SE Transportation Study



Legend

A - No Parking/Standing 7:00am to 9:30am 4:00pm to 6:30pm M - F
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C - One Hour Parking 7:00am to 6:30pm M - Sat
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PARKING UTILIZATION
(SHEET 4 of 4)

FIGURE 23d NOT TO SCALE PAGE 49

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III. RELATED STUDIES

Research and coordination was initiated to gain an understanding of other studies that either have been completed or are ongoing in and around the study area. This effort was to gain insight into the fabric of the community, ensure that no effort was being duplicated as well as ensure coordination with all other study efforts in or adjacent to the Pennsylvania Avenue, SE study area. The following is a list and description of the related studies:

A. Comprehensive Plan, District of Columbia, Revised 1999

The Home Rule Act requires the District of Columbia government to develop a comprehensive plan. This plan is a general policy document that provides overall guidance for future planning and development of the City. The primary transportation objectives are to provide and maintain an efficient and effective transportation system that will do the following:

- Maximize accessibility and the safe movement of people and goods;
- Enhance growth and economic development;
- Support the development of housing; and
- Provide safe and convenient pedestrian and bicycle circulation within neighborhoods
- Redesign and/or maintain the areas east of the Anacostia River to ensure their contributions to the National Capital Environment.
- Emphasize gateway with special treatments including the possible use of public art.

B. District of Columbia Strategic Neighborhood Action Plan – Neighborhood Cluster 34, Summer 2002 / District of Columbia Strategic Neighborhood Action Plan – Neighborhood Cluster 35, Summer 2002

The intention of these plans is to focus on the near term goals for the neighborhoods' most pressing challenges. A transportation study of Pennsylvania Avenue extending from the Sousa Bridge to Southern Avenue was identified as one of those goals. The purpose of the transportation study is to identify needed roadway, pedestrian and transit improvements to relieve congestion and safely manage neighborhood generated pedestrian and vehicular traffic. These items are the focus of the Pennsylvania Avenue, SE Transportation Study.

C. Memorials and Museums Master Plan, September 2001

This master plan identifies 100 potential sites for future memorials and museums and provides guidelines for their development. Authorizing commemorative works is the responsibility of Congress with the funding usually carried out by

private sponsoring organizations. Pennsylvania Avenue qualifies under the Monumental Corridors category for Gateways and Principal Avenues. There are two candidate sites located within the study area of the Pennsylvania Avenue Transportation area – site 31 at Fort Davis Park and site 67 south of Pennsylvania Avenue on the east side of the Sousa Bridge. If site 67 were to have a monument placed at that location, transportation improvements for light rail, the Anacostia Freeway (I-295) interchange, and others may be significantly impaired and may result in increased costs for any transportation improvements.

D. Anacostia Waterfront Initiative

The Anacostia Waterfront Initiative envisions the creation of a superior system of parks, trails and waterfront activities that is accessible to all District residents to enjoy the opportunity to walk, bike, fish, and attend riverside concerts and festivals in a safe, living waterfront setting. The key coordination issues with the Pennsylvania Avenue, SE Transportation Study are providing for bicycle and pedestrian connections to the park from the study area which extends two blocks north and south of Pennsylvania Avenue, SE.

E. Middle Anacostia Crossings Transportation Study

The study purpose is intended to evaluate and recommend ways to simplify and improve bridge and roadway connections while improving access to the Anacostia River. The study will include the Sousa Bridge and the 11th Street Bridge transportation connections to the east and west sides of the Anacostia River, including the sections of the SE/SW and Anacostia Freeway (I-295) between the river crossings. The study's twin goals include reducing the adverse effect of the transportation system on the adjoining neighborhoods while increasing the mobility for residents and commuters on both sides of the Anacostia River. Recommendations will also include increased bicycle, pedestrian, and transit access with appropriate connections to the Anacostia River activity facilities. This study has not yet started. The Middle Anacostia Crossings Transportation Study will rely, in part, on the results brought forth from the Pennsylvania Avenue, SE Transportation Study. One key finding of the Pennsylvania Avenue, SE Transportation Study is that 35% of the vehicles from southbound Anacostia Freeway (I-295) sampled in the origin-destination study made u-turns east of the Sousa Bridge to return westbound across the Sousa Bridge.

F. Regional Bus Study, September 2002

The two year study was designed to assess the transit bus needs of a region that has decentralized and grown rapidly. The study was conducted to meet the Metro Board's goal of doubling the number of riders between the years 2000 and 2025 by identifying how to meet and finance the region's future bus service needs. These needs are planned to be met by extending operating hours, add

neighborhood circulators, develop transfer centers with real time schedule information, and improve access to Metrorail stations.

G. District of Columbia Transit Development Study

The purpose of the study was to address traffic congestion that is seriously impacting the growth and quality of life in the District of Columbia and the region. The intent is to improve transit mobility within the District while reinforcing the development objectives that support transit oriented development and identify the most promising transit corridors for development and implementation. There were four promising corridors identified including the corridor, using in part the decommissioned CSX rail line, extending from the National Harbor development in Maryland to the Minnesota Avenue Metro Station by way of the Anacostia Metro Station. A promising starter line along the CSX rail line from Bolling Air Force Base to Pennsylvania Avenue has been identified and is being promoted as reinforcing the Anacostia Waterfront Initiative, and to stimulate development in Historic Anacostia. The potential traffic operations and circulation impacts of locating a station near Pennsylvania Avenue, SE are not known at this time. These impacts can only be determined after a station selection is selected.

H. Pennsylvania Avenue Scenic Byway Corridor Management Plan – Draft Report, June 2002

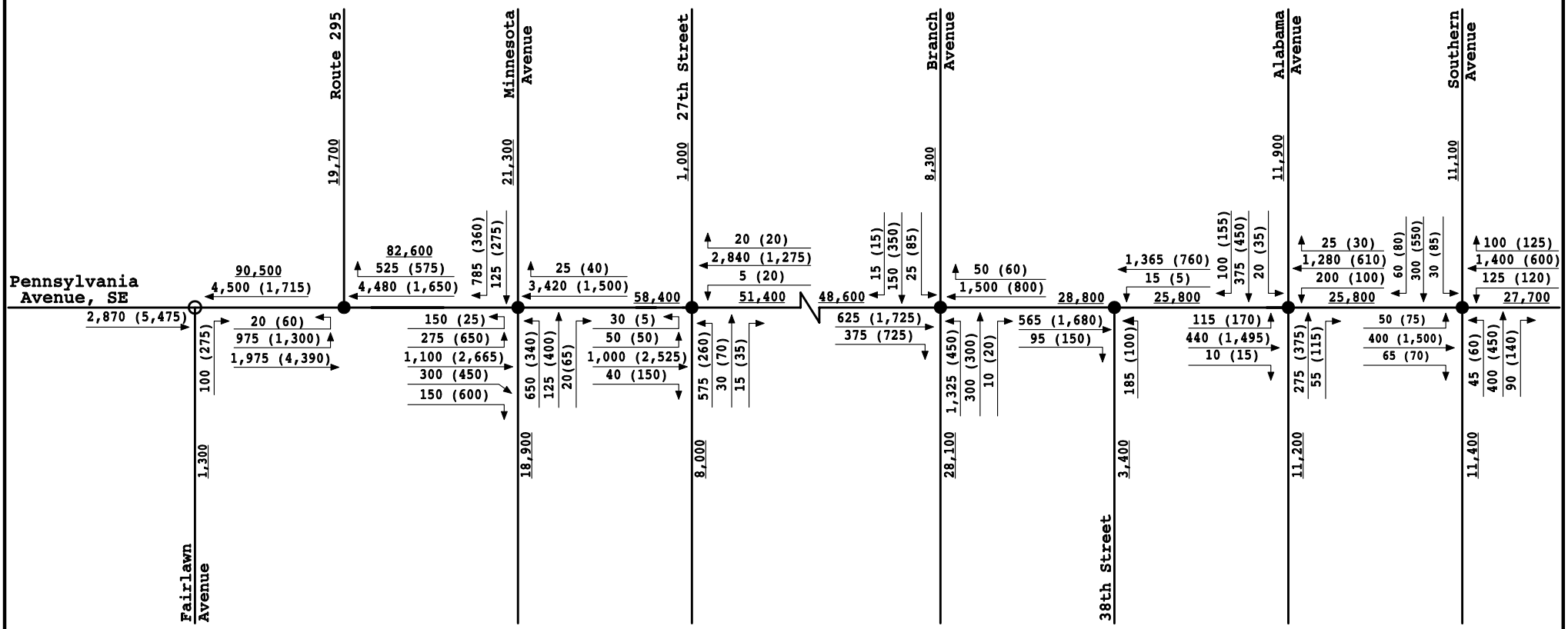
The Scenic Byways Program, as developed by the District Department of Transportation, established an administrative, nomination and review process. The intent of the program is:

- To provide a means for the maintenance, protection and enhancement of important community resources along designated roadways in the District;
- To interpret and promote those resource and related intrinsic qualities for the enjoyment and education of the residents and visitors; and
- To establish community-based goals and strategies to manage the intrinsic qualities while enhancing the economic benefits derived from people traveling the byways.

Pennsylvania Avenue, SE is a key focus of the corridor management plan. The transportation study will incorporate the scenic byway criteria to all recommended improvements in the corridor.

IV. PROPOSED CONDITIONS

To address community concerns and accurately analyze short-term and long-term options, projected 2025 No Build traffic volumes were established. The No Build condition assumes that only routine maintenance and minor construction projects will be pursued during the time frame. The 2025 projections were established utilizing the Washington Metropolitan Council of Governments (WASHCOG) regional traffic model. This model is a holistic approach to land use and traffic growth for the region. Figure 24 illustrates the 2025 No Build traffic volumes, and Figure 25 illustrates the LOS of each intersection analyzed in 2025. The results of the capacity analysis are located in Appendix E. The ADT indicates a growth of approximately 13%, and assumes that all traffic signals have been optimized. This growth is primarily from outside the corridor and is an increase in the non-peak hours. The peak hours indicate a marginal increase for the projected traffic volumes. These volumes were used as the base when analyzing both the short term and long term options.



KEY:
AM (PM) Peak Hour Volume
Average Daily Traffic
○ Unsignalized Intersection
● Signalized Intersection

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Engineering A Brighter Future

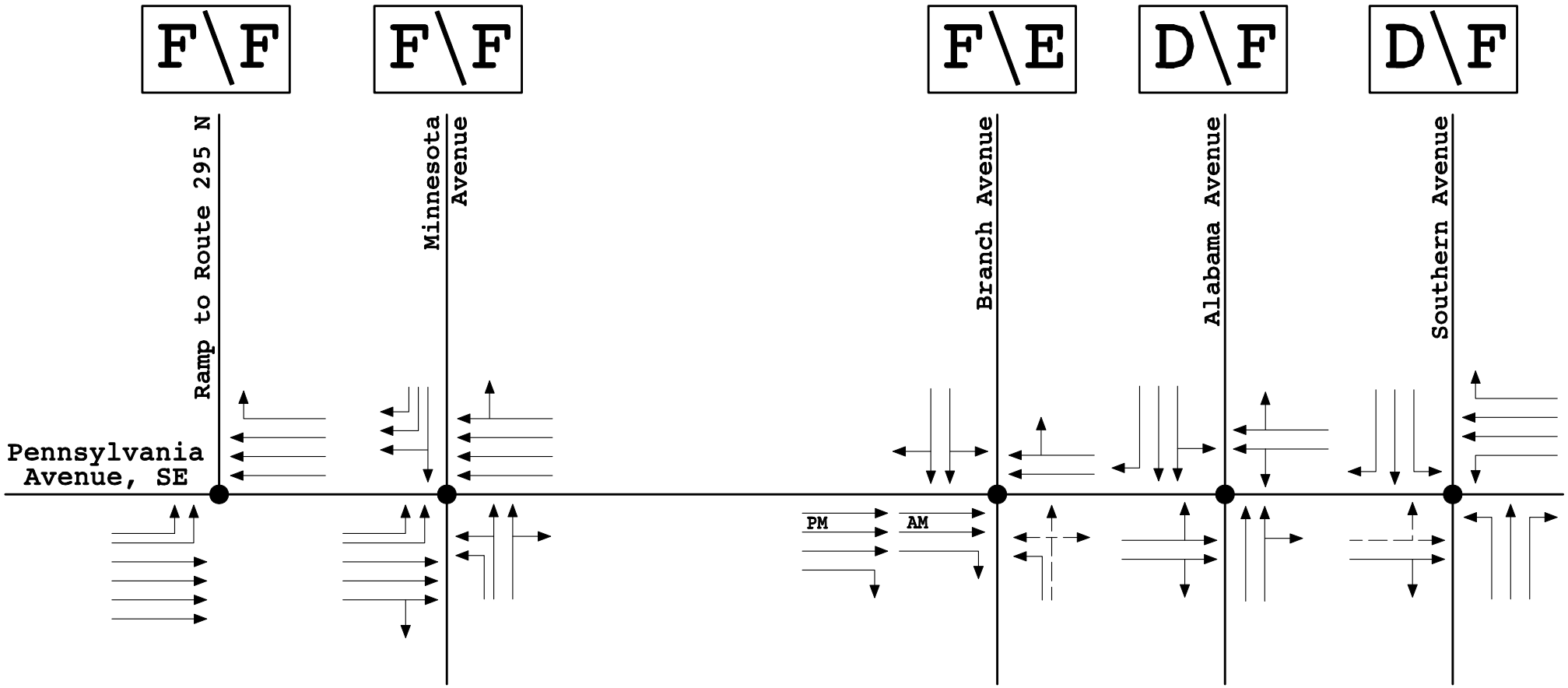
District Department of Transportation

PENNSYLVANIA AVENUE, SE TRANSPORTATION STUDY

2025 TRAFFIC VOLUMES NO BUILD CONDITION

FIGURE 24 Not to Scale PAGE 54

DATE: 20-Nov-03 17:06 FILE: m:\PA Ave_pl\2025 no build vol.dgn



KEY:

F\F AM LOS\PM LOS

Existing Lane Configuration

Observed Lane Usage

Unsignalized Intersection

Signalized Intersection

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DISTRICT DEPARTMENT OF TRANSPORTATION

PENNSYLVANIA AVENUE

2025 NO BUILD LOS

Figure 25 Not to Scale PAGE 55

DATE: 21-Nov-03 11:30 FILE: m:\PA Ave_pl\2025 nobuild los.dgn

V. SHORT-TERM OPTIONS

Based upon the data collected and analyzed, field observations, and community input (Appendix F has all comment forms and meeting minutes from the four public meetings), several short-term options have been developed. A short-term option is defined as any option that can be completed within the next 12 months. The options included within this report include improvements that address the following concerns expressed during the public meetings:

- Community Cohesiveness and Amenities
- Community Circulation
- Pedestrian Accessibility and Transit Facilities
- Overall Circulation of Pennsylvania Avenue, SE

Each of the improvements within these categories has been studied for impacts on mobility, safety, level of service, and overall feasibility. It should be noted that each option was examined as a stand alone option. If several options are used in conjunction with each other, the overall impacts and costs would need to be adjusted accordingly. **It should also be noted that any costs associated with the improvements are construction costs only and do not include any contingencies for administration/overhead, engineering, future escalation or right-of-way costs.** The following sections describe each improvement in more detail.

A. Community Cohesiveness and Amenities

Comments have been received from the community regarding the need for better cohesiveness among the communities along Pennsylvania Avenue, SE as well as those north and south of Pennsylvania Avenue, SE. In addition, the citizens have stated that they would like to see street amenities within the study area. The following options address these concerns for the short term. **There are additional options within the long-term portion of this report that provide additional cohesiveness and amenities for the communities but will require longer than 12 months to implement.**

1. Reduce Speeds – Place Variable Speed Display

The posted speed through the study area on Pennsylvania Avenue, SE is 30 MPH. This speed limit is currently exceeded to varying degrees, as can be noted from the aforementioned speed study. In an effort to promote motorists following the posted speed, increase safety within the community, and educate motorists regarding the speeds they are traveling along Pennsylvania Avenue, SE, the use of variable speed display boards are recommended. The variable speed display boards are portable and unmanned. They display the posted speed limit as well as utilize a radar gun to display the motorists' actual speed as he/she approaches the board. Variable speed displays are mounted on trailers and can be transferred to

different locations throughout the corridor for greatest impact on the motorists. This effort provides benefits for short periods of time, and as such needs to be repeated throughout the year.

Benefits: The variable speed display board provides a visual reminder to the motorist about both the posted speed as well as their traveled speed. This visual reminder generally causes the motorist to slow down to a reasonable speed. In addition, the portability of the board allows for the variable speed display board to be set up at a variety of locations along the corridor. It has been noted that the police department currently owns at least one variable message speed display board; therefore this would not need to be purchased.

Anticipated Issues: This option would require coordination within the police department for use along the Pennsylvania Avenue, SE corridor. In addition, due to the trees planted within the buffer areas along the majority of Pennsylvania Avenue, SE, there are only a few locations in which the speed display board could be placed to be able to capture the speed of the approaching motorists. Several locations have been identified in the area between Branch Avenue and Alabama Avenue where the highest speeds were witnessed. A sign would be recommended to be placed at either the northwestern corner of Pennsylvania Avenue, SE/40th Street; the northeastern corner of Pennsylvania Avenue, SE/Alabama Avenue or the northeastern corner of Pennsylvania Avenue, SE/Fort Davis Drive for westbound motorists. A sign would be recommended to be placed at either the south side of Pennsylvania Avenue, SE just west of the Randle Highlands Elementary School; the southeastern corner of Pennsylvania Avenue, SE/Branch Avenue or the southeastern corner of Pennsylvania Avenue, SE/33rd Street for eastbound motorists.

Costs: The cost of these improvements needs to be coordinated with the police department.

2. Signs – Replace Regulatory Signs along Pennsylvania Avenue, SE

Many of the existing signs along Pennsylvania Avenue, SE within the study area are faded, illegible, redundant or outdated. The purpose of this option is to replace all signage with new signage that is clear and readable to both residents and people commuting through the area. Currently there is a District-wide project that is repairing and replacing signs throughout the District of Columbia.

Benefits: By replacing signs with ones that are easier to read during the day and night and removing unnecessary signs, the local community has a better understanding of the regulations. In addition, regulations are more likely to be followed which helps to improve safety and efficiency.

Costs: The cost for this option would be funded separately and coordinated with the various departments within DDOT.

Example of non-readable existing sign within the study area.

3. Parking – Clarify Signing Regarding Restrictions/Regulations

This option relates directly to parking restrictions. Within the study area there are a total of 24 different types of parking restrictions. In many locations the signage is confusing and even contradictive. This type of signage creates confusion for the motorist and affects the overall operation of the roadway.

Example of existing parking restrictions within the study area.

In addition, the option was evaluated to eliminate all parking at the east end of the study area (Alabama Avenue to Southern Avenue) due to the parking restrictions being violated and impeding the flow of traffic. This evaluation yielded that the greater impact to the elimination of this parking would be to the residents within this area. Therefore, this sub-option is not being recommended.

Benefits: Because the messages provided by the existing signage can be confusing, the effect is to disregard parking restrictions. With more simplified and clearly stated parking restriction signage, restrictions will be adhered to more often because they will be easily understood by the motorist and more easily

enforced by the police. This results in more efficient operations along the corridor.

Costs: The cost for this option would be funded separately and coordinated with the various departments within DDOT as it would be considered within the District-wide signing project.

4. Signs – Extend Wayfinding Signs

It was stated at a public meeting that there is a lack of wayfinding signs within the area to aid visitors in reaching downtown Washington D.C. The purpose of this option is to not only place wayfinding signs, but to update the current wayfinding signs within the study area to match the new standard. In adherence with the recommendations published in the Pennsylvania Avenue Scenic Byway Corridor Management Plan, June 2002, a total of two wayfinding signs will be placed on the west side of the Anacostia River. One will be placed for eastbound traffic at the Maryland State line and one will be at L'Enfant Park also for eastbound traffic. The following is a picture of the updated wayfinding signs that are recommended to be placed within the study area.

Benefits: This option will give a uniform look to Pennsylvania Avenue, SE on both sides of the Anacostia River. In addition, the new signs are more visible to the motorist and will assist in preventing motorists from getting lost.

Costs: The anticipated cost for the two new signs is approximately **$10,000***.

* Note: Cost does not include construction cost administration/ overhead, engineering costs, escalation costs, or right-of-way costs.

Updated wayfinding sign.

B. Community Circulation

Based on comments received from the citizens as well as field observations, it has been noted that it is difficult circulating through the community, specifically with regards to accessing the cross streets during peak periods. The options within this section address these concerns for the short term.

1. Signals – Improve Signal Timing within Study Area

It was noted during field observations that the existing signal timing within the study area did not appear to be coordinated between the intersections. Signal timing plans were received from DMJM Harris and reviewed in the office. From these plans it was noted that there appears to be areas in which the signal timing and coordination for the vehicular traffic along Pennsylvania Avenue, SE could be modified, potentially improving the flow of traffic. It is recommended that the existing signals be optimized along Pennsylvania Avenue, SE. In addition, it is recommended that the optimized signal timing plans be reviewed in the field to ensure the plans and field conditions coincide.

Benefits: Optimizing the signals along a corridor and adjusting signal timing at a given intersection improves the efficiency of each intersection along the corridor and can improve access to and from the adjacent communities, while minimizing delay for those traveling through the corridor.

Costs: There are a total of 12 signalized intersections in the project area. Assuming a unit cost of **$15,000*** per intersection, the total cost for this recommendation is **$180,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. Signals – Complete Detailed Signal Warrant Analysis and Install Signal if Warranted at Pennsylvania Avenue, SE/Texas Avenue

It was noted through evaluations as well as heard from the citizens that one of the higher speed areas along the corridor is in the vicinity of the intersection of Pennsylvania Avenue, SE/Texas Avenue. It is recommended that a complete detailed signal warrant analysis be completed and a traffic signal installed at this location if warranted.

FIGURE 26: Proposed traffic signal and pedestrian improvements at Pennsylvania Avenue, SE/Texas Avenue.

Benefits: Introducing a traffic signal at this location would increase safety for vehicular traffic by permitting greater ease for traffic to enter and exit Texas Avenue onto Pennsylvania Avenue. A traffic signal at this location would also act as a traffic calming device along Pennsylvania Avenue, SE by creating another point at which vehicular traffic would be stopped. In addition, the traffic signal would increase safety for pedestrians wishing to access the south side bus stop at this location by proposing more visible crosswalks and a pedestrian phase within the traffic signal

Costs: If the traffic signal warrant analysis concludes that a new signal is warranted at this location, the cost will be $100,000.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

3. Pavement Marking – Northbound Branch Avenue Improvements

The southern approach of the existing intersection of Pennsylvania Avenue, SE/Branch Avenue experiences very high northbound queues during the AM peak period. One option to address this issue is to provide for a dual left turn lane on the northbound approach at this intersection. The existing lane configuration for this approach of the intersection is a left turn lane and a shared through/right turn lane. The proposed option would restripe this approach to be a left turn lane and a shared left/through/right turn lane. No physical changes would be required

beyond the restriping and resigning of this approach as two accepting lanes already exist on Pennsylvania Avenue, SE. It should be noted that plans for this options currently exist and are with DDOT for review. This recommendation is illustrated in the following figure:

FIGURE 27: Restripe and resign northbound Branch Avenue to accommodate left turn queues.

Benefits: These changes will help accommodate the left turn queues at this location by splitting them between the two lanes. This will increase the overall capacity of the intersection. In other words, motorists will experience less delay when traveling through the intersection while more time should be provided for pedestrians to cross the street.

Anticipated Issues: Currently there are times in which northbound vehicles can not turn left during the green phase for Branch Avenue due to congestion on westbound Pennsylvania Avenue, SE. If this situation were to occur for both westbound lanes of Pennsylvania Avenue, SE, and vehicles in both northbound lanes on Branch Avenue wished to make a left onto Pennsylvania Avenue, SE then neither northbound lane would be able to clear. Therefore, any vehicle wishing to proceed through the intersection on northbound Branch Avenue, or turn right onto eastbound Pennsylvania Avenue, SE would be impeded by the left turn queues.

Costs: The total cost for this option is approximately **$25,000***. This includes signal modifications.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

4. Channelization – Create Right-in, Right-out Only at Fairlawn Avenue

Existing northbound Fairlawn Avenue is signed as a right turn only maneuver at the intersection with Pennsylvania Avenue, SE. During the public meetings, several comments were received regarding vehicles that violate the right-turn only signing at this location in order to drive straight across eastbound Pennsylvania Avenue, SE to illegally access the Anacostia Freeway (I-295) northbound on-ramp. This illegal maneuver was also noted during field observations. It was noted that this maneuver could only occur during the AM peak period as the eastbound traffic volumes during the PM peak period on Pennsylvania Avenue, SE were too high for a vehicle to be able to cut across the roadway. In order to minimize this illegal maneuver and increase safety at this location, a pork-chop island is proposed to channelize traffic onto and off of Fairlawn Avenue. This island will re-enforce the right-in, right-out regulation with a physical barrier. In addition to the pork-chop island, the median will also be extended along Pennsylvania Avenue, SE to create further physical barriers reinforcing the right-in, right-out regulation at this location. The following illustrates the improvements:

FIGURE 28: Short-term improvements at Pennsylvania Avenue, SE/northbound Fairlawn Avenue

Benefits: The addition of this island and median extension minimizes the possibility of motorists performing the illegal maneuver of entering the dual left turn lane to access the northbound Anacostia Freeway (I-295) on ramps. This will increase the safety at this location as well as the operations of the Pennsylvania Avenue, SE/Fairlawn Avenue intersection.

Costs: The construction cost for the Fairlawn Avenue Island Improvements is approximately **$30,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

5. Signals – Repair Loop Detectors at Pennsylvania Avenue, SE/Southern Avenue

It was noted during a field visit to the study area that the loop detectors at the intersection of Pennsylvania Avenue, SE/Southern Avenue are not functioning properly and are believed to be broken. It is recommended that the detectors be tested and repaired if necessary.

Benefits: Without functional loop detectors at this intersection, the signal will not properly phase through the cycle as it will not be able to detect vehicles waiting in the turn lanes. A properly functioning signal will allow the intersection to operate more efficiently.

Costs: The total cost for this improvement is approximately **$8,000***. This cost assumes repairs on all four approaches

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

6. Turn Lane Lengths – Increase Turn Lane Length to Accommodate Turning Volumes

The intersection of Pennsylvania Avenue, SE/Southern Avenue has one approach in which the turn lane does not currently accommodate the queue length. The lane that is not accommodated is the left turn lane from southbound Southern Avenue to eastbound Pennsylvania Avenue, SE. The turn lane can be extended without impacts, therefore, it is recommended that the exiting turn lane be extended to fully accommodate the turning maneuvers.

Benefits: By extending the storage length, the queue will be accommodated at these intersections.

Anticipated Issues: There are no anticipated issues with respect to extending the storage length at the intersection of Pennsylvania Avenue, SE/Southern Avenue.

Costs: The total cost to extend the turn lane at the intersection of Pennsylvania Avenue, SE/Southern Avenue is approximately **$1,500***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

7. Enforcement – Discuss Existing Issues with Local Law Enforcement

There are several concerns mentioned by citizens that are enforcement issues. These are the following:

- Speeding
- Illegal parking (east end of study area)
- Violation of one-way travel patterns (specifically along Fairlawn Avenue)
- Illegal left turns (west end of study area)
- Illegal u-turns (west end of study area)
- Neighborhood cut-through traffic

There are several options proposed within this study to aid in the regulation of each of these issues through the use of physical barriers and increased/clarified signage. However, these items can also be addressed through increased law enforcement with the help of the citizens.

C. Pedestrian Accessibility and Transit Facilities

Two of the goals associated with the Pennsylvania Avenue, SE Transportation Study are to improve pedestrian accessibility and improve transit operations through the study area. These goals include the ease for the pedestrian and transit user to traverse the area. After reviewing citizen comments and field observations, several short-term options have been prepared to meet these goals.

1. Signs – Repair Damaged School Flashers at Randle Highlands Elementary School

The existing school flashers surrounding the Randle Highlands Elementary School are currently bent and/or broken (see pictures). The purpose of the school flashers is to alert motorists to reduce their speed to 15 MPH due to the fact that there are school children in the area during certain times of day. With the school flashers bent, the motorists can not clearly see the flashing light when it is operational. It is recommended that these signs be replaced. This should be considered a maintenance issue.

Existing school flasher
P Street and 28th Street

Existing school flasher
28th Place and 30th Street

Benefits: The replacement of these signs will increase drivers' awareness and improve pedestrian safety. In this case, school children safety will be improved.

Costs: The total cost to replace both school flashers is approximately **$35,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. Pedestrians – Complete Sidewalk Network within Study Area

No sidewalk on the south side of Pennsylvania Avenue, SE just west of Branch Avenue.

The existing sidewalk network has several locations in which there are gaps. These gaps do not allow for a complete pedestrian network throughout the study area, forcing the pedestrian to either walk through grass or cross the street to continue walking on a sidewalk. It is recommended that sidewalk be placed to fill these gaps and complete the pedestrian network.

Benefits: Completing the existing sidewalk network will increase pedestrian accessibility throughout the study area. This will help to improve pedestrian safety as well. It should also be noted that in areas where new sidewalk is being recommended, ADA ramps are also recommended.

Anticipated Issues: There are two locations along Pennsylvania Avenue, SE adjacent to parklands where sidewalks are being recommended. In these areas further research will be needed to determine if the parklands will be impacted by

the proposed improvements. In addition, there are several areas in which the slopes may require the sidewalk to be less than the recommended six-feet width in order to minimize impacts to the adjacent properties while remaining compliant with ADA guidelines.

It was recommended by a citizen to include a barrier between the roadway and proposed sidewalk along the south side of Pennsylvania Avenue, SE just west of Branch Avenue as the sidewalk is immediately adjacent to the roadway. This option was examined and determined that due to the proximity of the retaining wall on the outside edge of the proposed sidewalk, a barrier could not be placed for this length as it would violate ADA regulations.

Costs: The total cost to complete the pedestrian network within the study area is approximately **$725,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

3. Pedestrians – Review Pedestrian Signals and Timing

It was noted during field observations that there appear to be several locations in which the pedestrian phase does not provide adequate time for the pedestrian to cross the street, specifically at the intersection of Pennsylvania Avenue, SE/southbound Minnesota Avenue/L'Enfant Square. Signal timing plans, which include pedestrian signals and timing, were received from the District Department of Transportation. These plans were reviewed and it was noted that there appears to be sufficient time for pedestrians to cross Pennsylvania Avenue. However, field observations noted a lack of pedestrian crossing time throughout the corridor. Therefore, it is recommended that the pedestrian signals along Pennsylvania Avenue, SE be reviewed in conjunction with the signal timing plans to ensure all signals are coordinated to provide adequate pedestrian crossing time. In addition, any missing pedestrian signal heads should be placed. Once again, the plans differ from what was observed out in the field. Signal heads are needed wherever there is a crosswalk. Consideration should be given to installing "count down" signalization. This type of signalization provides the pedestrian a timer that "counts down" the amount of time remaining for the given pedestrian crossing phase.

Benefits: The benefits of providing adequate signal timing for pedestrians are to ensure that pedestrians have enough time to safely cross the street in all directions. The placement of pedestrian signal heads improves pedestrian safety by giving the pedestrian a clear indication as to when it is safe to cross the street. In addition, the placement of "count down" signalization will provide the pedestrian a greater level of comfort in knowing how much time he/she has to cross the street. The knowledge will allow the pedestrian to make a more

informed decision as the whether he or she believes that there is ample time to safely cross the street.

Costs: The total cost to incorporate "count down" signalization at the existing signals with pedestrian crosswalks is **$165,000***. This cost assumes that the "countdown" signalization will be used to cross Pennsylvania Avenue, SE only, and not on the cross streets.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

4. Pedestrians – Provide for ADA Compliance

Based on field observations, it was noted that there were several locations throughout the corridor in which ADA ramps are missing. ADA facilities would provide for the movements of disabled pedestrians within the study area. In order to provide for complete accessibility for all pedestrians, it is recommended that ADA ramps be constructed to complete the pedestrian network.

Benefits: Completing the pedestrian network with ADA ramps at every intersection will allow for true pedestrian accessibility throughout the study area including disabled pedestrians.

Costs: The total cost to place ADA ramps along only Pennsylvania Avenue, SE is approximately **$50,000***.

These costs were prepared on a per intersection basis so that improvements can be phased if necessary. The individual intersection and approximate costs are listed below:

Along Pennsylvania Avenue, SE	
• Southbound Anacostia Ramp	**$2,800***
• Fairlawn Avenue	**$9,500***
• Prout Street	**$3,900***
• Minnesota Avenue	**$14,900***
• 31st Street	**$2,000***
• Branch Avenue	**$2,000***
• 33rd Street	**$3,900***
• 38th Street	**$2,000***
• 40th Street	**$3,900***
• Southern Avenue	**$3,900***
TOTAL	**$48,800 say $50,000**

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

5. Signs – Place Signs in Maryland Encouraging Transit and Carpool Use

It is recommended that four carpooling and four METRO Wayfinding signs be placed west of the Maryland/District line. This will provide information on alternate modes of transportation to motorists traveling on Pennsylvania Avenue and Branch Avenue, from Maryland into Washington D.C.

Benefits: The intent is to relieve congestion by encouraging carpooling and METRO use.

Anticipated issues: Upon placement of the signs, maintenance of the signs traffic may be an issue.

Costs: The total cost to place a total of eight signs, which includes two each for carpooling and METRO wayfinding, is approximately **$6,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

6. Transit – Repair Damaged Facilities

Repairing existing bus facilities is an important recommendation. Based on field visits and inventory the bus shelter located on the south side of Pennsylvania Avenue, SE between 25th Street and 27th Street is in need of repairs. Specifically, glass panels are missing from the bus shelter.

Benefits: By repairing transit amenities at bus stops, transit is made safer, more inviting and more convenient. This helps to promote transit usage.

Costs: The cost for this improvement should be within WMATA's maintenance funds.

7. Bicycle Lanes – Provide Signage Directing Bicyclists to a Route through the Area

Currently there are no provisions along or near Pennsylvania Avenue, SE for bicycles. Due to the current lane widths and traffic volumes along Pennsylvania Avenue, SE through the study area, it would be dangerous utilize this as a bicycle route. Therefore, it is recommended to provide signage through the area encouraging bicyclists to use Massachusetts Avenue to Randle Circle. At Randle Circle, bicyclists can travel south along Fairlawn Avenue to access the bicycle facilities along the Sousa Bridge to cross the Anacostia River. The following

picture and figure illustrates the proposed signage and bicycle route to be signs, respectively:

Example of proposed bike route signage.

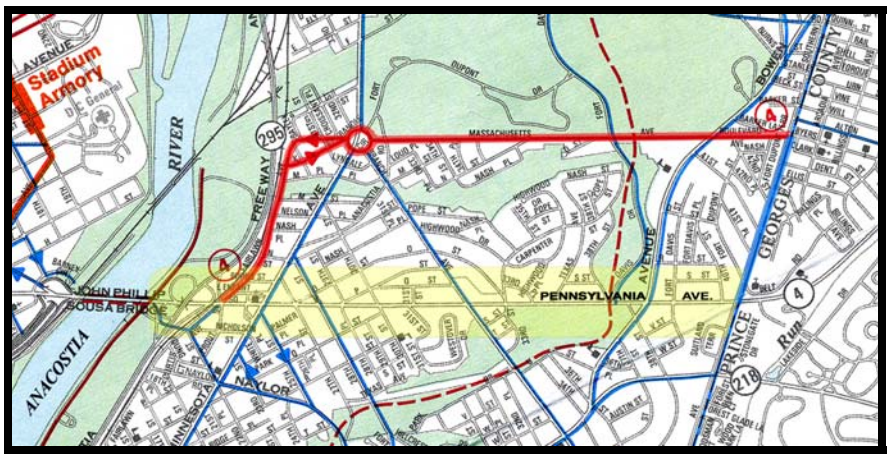


FIGURE 29: Bike route to be signed through the study area.

Benefits: The proposed signage will help direct bicyclists to a safe route through the area. This recommendation would also complete the bicycle connection from east of the project to the hiker/biker trail across the Sousa Bridge.

Costs: The anticipated cost for this recommendation is **$1,500***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

8. Pedestrian – Repair Damaged Pedestrian Signal at Pennsylvania Avenue, SE/31st Street

Currently the pedestrian signal at the intersection of Pennsylvania Avenue, SE/31st Street is not operating properly due to a vehicular accident. This recommendation calls out the repair of this existing pedestrian signal.

FIGURE 30: Location of pedestrian signal to be repaired.

Benefits: The repair of this pedestrian signal would increase the safety for the pedestrians at this location. This is also one of the primary crossings for school children in this area.

Costs: The anticipated cost for this maintenance recommendation is **$10,000**.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

D. Overall Circulation of Pennsylvania Avenue, SE

One of the goals associated with the Pennsylvania Avenue, SE Transportation Study is to improve traffic operations along Pennsylvania Avenue, SE as well as access to the intersecting residential streets within the study area. After reviewing citizen comments and field observations, several short-term options have been prepared to meet these goals.

1. Median Improvements - Modify Median at Pennsylvania Avenue, SE/southbound Minnesota Avenue

Currently, there is an existing median break to accommodate the southbound traffic through the intersection of Pennsylvania Avenue, SE/southbound Minnesota Avenue. This location is signed for the prohibition of eastbound u-turns for vehicles traveling on Pennsylvania Avenue, SE. However, field observations determined that there are illegal u-turns made at this location. It should be noted that the curb radius on the existing median nose does not adequately deter eastbound u-turning maneuvers at this location. Therefore, it is recommended that the median nose be squared off to make u-turns more difficult to execute. The proposed median modifications are shown in the following figure:

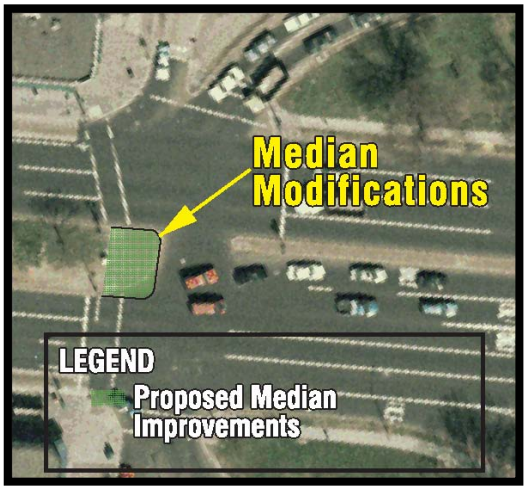


FIGURE 31: Median modifications to deter illegal u-turns at Pennsylvania Avenue, SE/southbound Minnesota Avenue

Benefits: Currently any vehicle making this u-turn causes eastbound motorists to stop waiting for u-turn maneuver to be executed. By modifying the median to deter the u-turn maneuver, eastbound traffic will operate more efficiently. In addition, safety will improve at this intersection for both eastbound and westbound traffic along Pennsylvania Avenue, SE.

Costs: The construction cost for the median modifications at Pennsylvania Avenue, SE/southbound Minnesota Avenue is approximately **$17,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. Median Improvements - Close Median Opening at CSX Rail Lines

The barrier between eastbound and westbound Pennsylvania Avenue, SE at the intersection of Pennsylvania Avenue, SE/Anacostia Freeway (I-295) northbound on-ramps currently has an opening for the existing rail lines that traverse the roadway at this location. Eastbound vehicles in the left-turn queue were observed to be making u-turns at this median barrier break, which is not only signed for no u-turns, but also creates conflicts with westbound vehicles.

Research was completed to determine that this rail line is not currently in use. It has been stated by the CSX Corporation, current owners of this rail line, that the line has been inactive since October, 2001. According to CSX, in a letter dated November 4, 2003 (see Appendix G), the line is not formally abandoned with the federal regulatory agency, and there are current negotiations with WMATA regarding a possible sale of the line.

Therefore, it has been recommended that the median barrier be extended to close off the portion over the CSX rails. In the event that the rail line were to be reactivated, the barrier could be removed. The barrier will be extended to the intersection of Pennsylvania Avenue, SE/Anacostia Freeway (I-295) northbound on-ramp. The following figure indicates the recommended improvements:

FIGURE 32: Close gap at the existing CSX rail crossing to prohibit illegal u-turns at this location.

Benefits: Safety will be increased with the extension of the barrier. Drivers will no longer be able to make illegal u-turns or dangerous maneuvers to gain access to westbound Pennsylvania Avenue, SE. In addition, by closing off the median gap, vehicles will be able to better utilize this area as part of the left turn queue length.

Costs: The total construction cost for this option is approximately **$17,500*.**

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

3. Reversible Lane – Improve Signage along Pennsylvania Avenue, SE

There is not adequate signing along Pennsylvania Avenue, SE for the existing reversible lane system on Pennsylvania Avenue, SE between 27th Street and Branch Avenue. The current reversible lane system causes confusion among motorists due to a lack of signing, as well as not being in accordance with standards as established by the Manual on Uniform Traffic Control Devices (MUTCD), which states that reversible lanes should be signed with overhead signals. Motorists using this portion of Pennsylvania Avenue for the first time have no knowledge of how the reversible lane system works or when it is effect. This creates safety issues. In addition, there are not enough warning signs regarding the reversible lanes for motorists entering from the side streets onto Pennsylvania Avenue, SE. This recommendation involves placing signs throughout the corridor, including on each intersecting street, for the length of the reversible lane portion of Pennsylvania Avenue, SE.

Benefits: The addition of these signs along Pennsylvania Avenue, SE and at the side streets will greatly increase driver's awareness and thereby increase safety in this region.

Costs: The total cost for this recommendation is approximately **$10,000*.** This is an approximate cost for the installation of 350 square feet of aluminum sheet signs to help with the reversible lane system of Pennsylvania Avenue between 27th Street and Branch Avenue.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

4. Roadway Improvements – Pave over the CSX Rail Road Tracks

The CSX railroad tracks cross Pennsylvania Avenue, SE at-grade, west of Fairlawn Avenue. Research was completed to determine that this rail line is not currently in use. It has been stated by the CSX Corporation, current owners of this rail line, that the line has been inactive since October, 2001. According to CSX, in a letter dated November 4, 2003 (see Appendix G), the line is not formally abandoned with the federal regulatory agency, and there are current negotiations with WMATA regarding a possible sale of the line. It is recommended that the inactive railroad tracks be paved over. In order to complete this, milling is required up to 15 feet upstream and downstream of the tracks for a smooth crossing and removal of railroad striping. A minimum pavement depth of four inches over the tracks is recommended. The following figure indicates the proposed recommendations:

FIGURE 33: Area to be paved over

Benefits: Currently, all WMATA buses that pass over the tracks are required to stop and open the door to verify that a train is not approaching. However, since these tracks have been de-commissioned, this procedure only serves to delay both eastbound and westbound traffic from crossing the tracks. By paving over the tracks, this traffic delay will be eliminated. In addition, the chances of a rear end accident are minimized if buses do not have to stop at the tracks. This will help improve safety in the area.

Costs: The total cost for paving over the CSX tracks is approximately **$29,000***. This cost for the portion of the tracks that cross over Pennsylvania Avenue, as well as the ramp to access northbound Anacostia Freeway (I-295).

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

5. Pavement Markings – Increase the Storage Length for Eastbound Pennsylvania Avenue, SE Left Turns to the Northbound Anacostia Freeway (I-295) On-Ramp

The left turns from eastbound Pennsylvania Avenue, SE result in large queues, especially during the AM and PM peak hours. The recommendation to address

this situation involves changing the signage and pavement markings on eastbound Pennsylvania Avenue, SE from the Sousa Bridge to Fairlawn Avenue so that the left lane on the bridge is designated for left turns only to gain access to the Anacostia Freeway (I-295) northbound on-ramp. Two overhead signs currently in place need to be replaced to designate the lane for left turns only. Also, the existing pavement markings must be replaced. The following figure indicates the proposed recommendations:

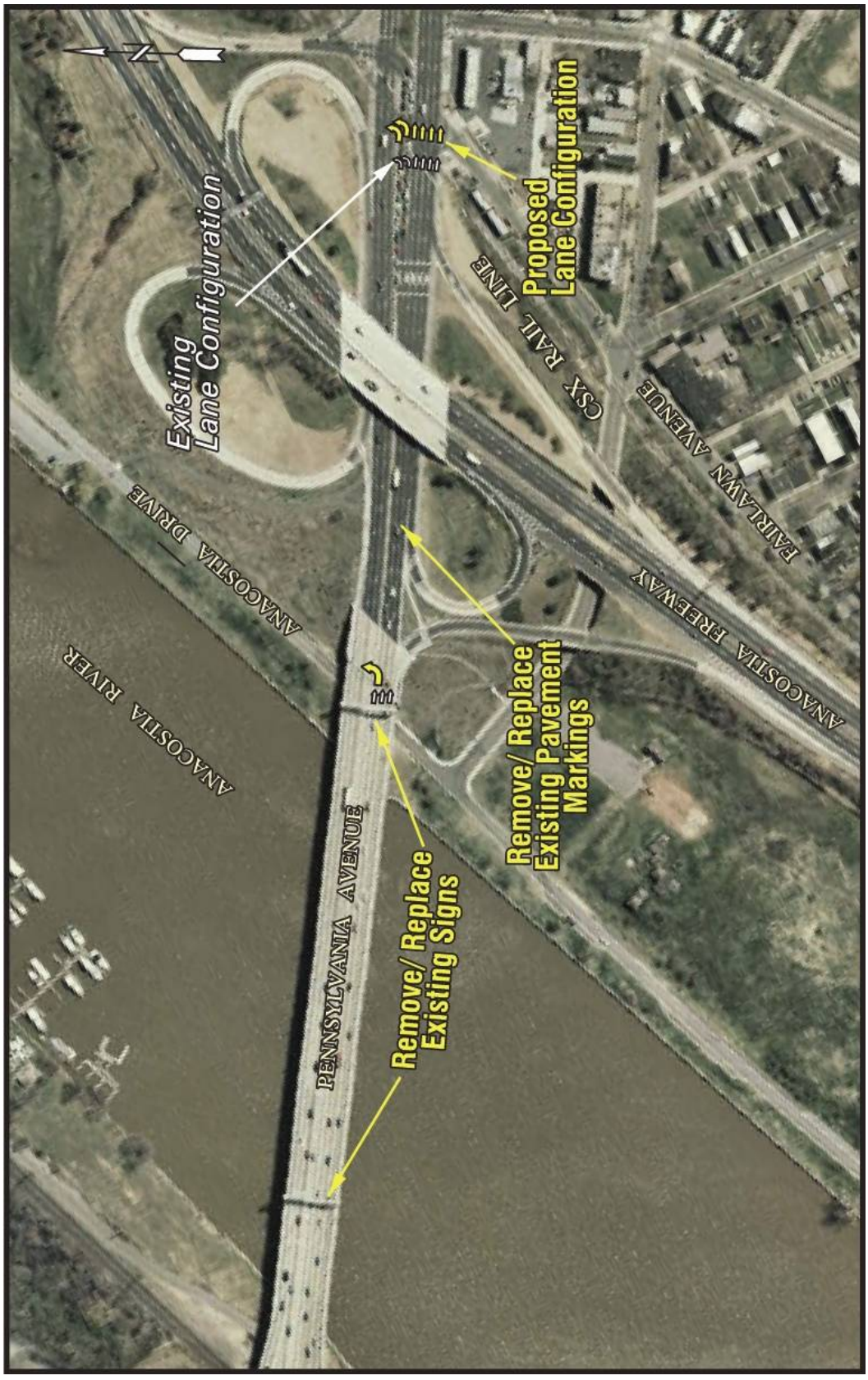


FIGURE 34: Various signing and pavement changes are needed to designate the northern-most lane as a left turn only lane.

Benefits: The addition of this dedicated left turn lane will increase the dedicated left turn capacity which will help improve operations at the intersection of Pennsylvania Avenue, SE and the Anacostia Freeway (I-295) Northbound On-Ramps. As a result, motorists will experience fewer delays at this intersection. Safety will be improved since queued vehicles will be removed from the eastbound through traffic.

Anticipated Issues: There will be fewer lanes dedicated to eastbound traffic lanes crossing over the Sousa Bridge. However, this should not be a significant issue since the roadway is essentially operating as the recommended improvements are dictating.

Costs: The total cost for this recommendation is approximately **$23,500***. This estimated cost is for the replacement of existing overhead signs and replacement of existing pavement markings.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

6. Pavement Markings – Change Lane Configurations at Pennsylvania Avenue, SE/Southern Avenue

The left lane of eastbound Pennsylvania Avenue, SE at Southern Avenue is currently a left turn only lane. It is recommended that this lane be changed to a shared left/through lane. There are two accepting eastbound lanes on the other side of the intersection. The proposed recommendations are indicated in the Figure 35.

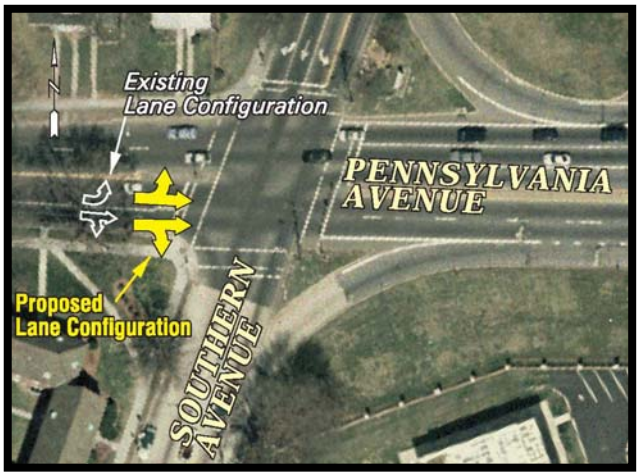


FIGURE 35: Change lane configuration at Pennsylvania Avenue, SE/Southern Avenue

Benefits: The changes to the lane configuration will assist in improving the intersection's capacity. This will allow motorists to experience less delay when traveling through the intersection. Some cars were witnessed making the through maneuver from the left lane. Therefore, the implementation of this recommendation will make the through movement legal while also lessening the confusion among motorists.

Costs: The total cost for the signage and pavement marking changes to convert the left lane of eastbound Pennsylvania Avenue at Southern Avenue to a left through lane is approximately **$2,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

7. Intersection Improvements – Correct Eastbound Transition at the Intersection of Pennsylvania Avenue, SE/Branch Avenue

The existing lane configuration at the intersection of Pennsylvania Avenue and Branch Avenue currently consist of one eastbound right turn lane, two eastbound through lanes, two westbound through lanes, and one reversible lane. The traffic pattern for the reversible lane normally flows in the westbound direction, except between the hours of 4:00 PM to 6:30 PM Monday through Friday on normal workdays. During those hours the traffic flows in the eastbound direction of Pennsylvania Avenue, SE. Due to the current lane configurations at the intersection of Pennsylvania Avenue, SE/ Branch Avenue, there are only two accepting lanes for three through lanes during the PM peak hours when the reversible lane is in operation. It was determined that there is enough pavement on the eastern leg of the intersection to accommodate three eastbound lanes. The width of pavement from the double yellow pavement markings to the southern curb face is 30 feet. This dimension matches the width of the eastbound lanes at 33rd Street. Therefore, it is recommended that pavement markings be revised so there are three eastbound lanes, 10 feet wide each, on the eastern leg of the intersection.

FIGURE 36: Eastbound Transition at Branch Avenue

Benefits: There are several benefits regarding this recommendation. First, traffic operations and safety will be improved during the PM peak hour since the two-lanes to three-lanes transition in the middle of the Pennsylvania Avenue, SE/Branch Avenue intersection will be eliminated. This benefit will be experienced by all motorists traveling through the intersection. In addition, the bus stop on the southeastern corner of the intersection and the motorists turning left into the Penn Branch Shopping Center will not have as great an impact on the traffic flow in the eastbound direction.

Costs: The total cost for this recommendation is approximately **$10,000***

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

VI. LONG-TERM OPTIONS

Based upon the data collected and analyzed, field observations, and community input, several long-term options have been developed. A long-term option is defined as any option that will take longer than a 12 month period to complete. The options included within this report include improvements that address the following concerns expressed during the public meetings:

- Community Cohesiveness and Amenities
- Community Circulation
- Pedestrian Accessibility and Transit Facilities
- Overall Circulation of Pennsylvania Avenue, SE

Each of the improvements within these categories has been studied for impacts on mobility, safety, level of service, and overall feasibility. It should be noted that each option was examined as a stand alone option. If several options are used in conjunction with each other, the overall impacts and costs would need to be adjusted accordingly. It should also be noted that any costs associated with the improvements are construction costs only and do not include any contingencies for administration/overhead costs. The following sections describe each improvement in more detail.

A. Community Cohesiveness and Amenities

Comments have been received from the citizens regarding the need for better cohesiveness among the communities along Pennsylvania Avenue, SE as well as those north and south of Pennsylvania Avenue, SE. In addition, the communities have stated that they would like to see street amenities within the study area. The following options address these concerns for the long term. **There are additional options within the short-term portion of this report that provide additional cohesiveness and amenities for the communities but will require less than 12 months to implement.**

1. Streetscape - Provide Streetscape Amenities Along the Corridor

The Pennsylvania Avenue, SE corridor is a mix of commercial and residential land uses. In an effort to create a better sense of community, a streetscape along the corridor is recommended. A streetscape will create a high quality and attractive environment throughout the project area that evokes a sense of pride, care and safety for people who live, work and visit in the area.

There are several items that are recommended to be included in the streetscape. These include the following:

- Lighting
- Curb and Gutter
- Sidewalks (Commercial and Residential)

- Enhanced Medians

The streetscape enhancements should follow the District of Columbia "Downtown Streetscape Regulations" and be customized to the Pennsylvania Avenue, SE corridor. The specific details will need to be developed in conjunction with the community to highlight and strengthen the uniqueness of the area.

Benefits: There are numerous benefits associated with the various aspects of a streetscape. The following is a list of each aspect and the associated benefits:

- Lighting

Lighting greatly influences the perception of safety as well as the character and the use of a particular area. Lighting both the street and sidewalk areas is a key element in creating a safe environment.

There are two distinct styles of streetlights that would be recommended throughout a streetscape along the Pennsylvania Avenue, SE corridor. These include vehicular and pedestrian streetlights. Vehicular lights are used for overall illumination of sidewalks and roadways. These lights are typically a cut-off shoebox luminaire fixture with a 32' tall, square tapered pole. Pedestrian lights are secondary streetlights used for illumination of sidewalks to increase the feeling of safety to the public.

- Curb and Gutter

Due to the inherent longevity and elegant appeal of granite, it would be recommended that the Pennsylvania Avenue, SE Streetscape use granite curbs throughout the entire corridor. There are existing granite curbs with concrete gutter pans for a majority of the corridor. These curbs would be reutilized.

- Sidewalks

It is important to have sidewalks that are in good condition. This creates a safe environment for pedestrians. Sidewalks can also be used to create unified atmosphere for the local community as well as create a visually pleasing ambience. The existing concrete sidewalks could be replaced with a combination of pavers and concrete.

- Enhanced Medians

Enhanced median treatments would be implemented on existing medians greater than 4 feet in width. All of these medians can be found on the west end of the project. This will give the neighborhood a feeling of being a community as well as being aesthetically pleasing.

By completing these upgrades, the Pennsylvania Avenue Streetscape option will create a high quality and attractive environment throughout the project area that evokes a sense of pride, care, and safety for people who live, work, and visit in the area.

Anticipated Issues: The issue involved with this option is maintenance of the streetscape amenities.

Costs: The total cost for this recommendation is approximately **$10,750,000** *

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. Safety - Place Red Light Running Cameras at Intersections

Some motorists are running through signalized intersections when they have the red signal. This creates a very hazardous situation and can lead to serious accidents. It is recommended that red light running cameras be placed at several of the intersections along the Pennsylvania Avenue, SE corridor to discourage the running of red lights. The camera system typically includes a 35-mm color camera, mounting poles, loop detectors and equipment cabinet. The red light running cameras are implemented by the police department. Further coordination between DDOT and the police department is required to understand where red light running cameras exist today and where additional cameras should be placed.

Benefits: Each red light camera system will increase safety within its intersection, by decreasing the number of red light related incidents. Enhanced safety is the focus point for installation of the camera systems. The systems will also force drivers to be more aware of their speeds as they approach intersections that are being enforced. The system has proven that it pays for itself through the collection of fines.

Costs: The cost of these improvements needs to be coordinated with the police department.

B. Community Circulation

Based on comments received from the community as well as field observations, it has been noted that it is difficult to circulate through the community, especially when trying to access Pennsylvania Avenue, SE. The options within this section address these concerns for the long term.

1. Traffic Calming – Place Devices in Neighborhoods to Deter Cut-Through Traffic

There were numerous comments from citizens within the study area regarding traffic cutting through their neighborhoods in order to bypass congested roads such as Pennsylvania Avenue, SE or Minnesota Avenue. This was specifically experienced in the community located between Minnesota Avenue and Fairlawn Avenue north of Pennsylvania Avenue, SE. Cut through traffic reportedly uses N Street and Burns Street to avoid the Minnesota Avenue / Pennsylvania Avenue, SE intersection. Traffic calming devices can be used to help deter cut-throughs. Devices such as speed humps, rumble strips, gateways, mid-block slow points, one-way streets, and intersection tables can be considered. It was stated that requests for traffic calming devices need to be made through the ANC's utilizing the traffic calming process. This process can be found on the DDOT website at http://ddot.dc.gov/services/traffic_calming/policies.htm.

Benefits: By utilizing one or more of these traffic calming devices, the neighborhoods along Pennsylvania Avenue, SE will be safer for pedestrians and bicyclists. Motorists may be less likely to use neighborhood streets as cut-throughs with traffic calming devices in place. Speed humps and intersection tables are relatively inexpensive, increase pedestrian and resident safety, do not affect on-street parking and may reduce traffic speed and volumes. Rumble strips require minimal maintenance and do not visually detract from the surroundings they are located in. A Gateway improvement is aesthetically pleasing and gives a feeling of entering a community area. Mid-block slow points may reduce speed and volumes. One-way streets prohibit the cut-throughs.

Anticipated Issues: Any form of traffic calming can interfere with the response time for emergency vehicles. Efforts need to be coordinated with emergency response teams regarding these issues regardless of the form of traffic calming used. Speed humps, intersection tables and mid-block slow points aesthetically impact the neighborhood environment, force transit services to be slower, and can increase maintenance costs. Rumble strips cause a noise when traversed. Gateways may need future maintenance. One-way streets sometimes create circuitous travel patterns, while having a tendency to increase traffic volume and speed.

Costs: The approximate costs associated with various traffic calming components is as follows:

1 Speed Hump:	**$2,000***
1 Set of Rumble Strips:	**$100***
1 Gateway:	**$12,000***
Mid-block Slow Points:	**$2,000***
One-way Streets:	**$500***
1 Intersection Table:	**$50,000***

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. Intersection Improvements – Simplify to Create Better Efficiency at the Intersection of Pennsylvania Avenue, SE/Minnesota Avenue/25th Street

The intersection of Pennsylvania Avenue, SE/Minnesota Avenue/25th Street is a complex and congested intersection. There are several recommendations for this intersection. First, the intersection actually consists of two separate signalized intersections that are separated by 250 feet. The western intersection is Pennsylvania Avenue, SE and southbound Minnesota Avenue. The eastern intersection is Pennsylvania Avenue, SE/northbound Minnesota Avenue/25th Street. The recommendation is to combine the two intersections into one. Second, the left turn lane queues for the eastbound Pennsylvania Avenue, SE to northbound Minnesota Avenue exceed the current length provided even though the maneuver is dualized. The recommendation is to extend the dualized left turn lanes to accommodate anticipated queues. By combining the two intersections into one, the dualized left turn lanes can be extended. Also, by combining the intersections, all right turns from eastbound Pennsylvania Avenue, SE onto southbound Minnesota Avenue will be combined with motorists also turning right onto 25th Street. The dualized right turns will be signed such that the inner right turn lane will accommodate motorists wishing to turn right onto 25th Street and Minnesota Avenue. The outside right turn lane will only accommodate motorists wishing to turn right onto Minnesota Avenue. The bus stops would be relocated closer to the newly aligned intersection, thereby creating a shorter walking distance for transit users to the proposed crosswalk. In addition, an ornamental fence would be placed down the median along Pennsylvania Avenue, SE to encourage the use of the proposed crosswalk and deter the unsafe pedestrian maneuver of crossing the road away from the intersection.

Analysis was completed for this alternative, and can be seen in Appendix H. Through this analysis, it was determined that for the intersection to improve widening would have to occur. Due to the potential impacts to the surrounding community, this widening is not being recommended.

FIGURE 37: Reconfiguration of Pennsylvania Avenue, SE/Minnesota Avenue/25th Street Intersection

Benefits: The number of "conflict points" along Pennsylvania Avenue, are reduced by combining the intersections. This may reduce the potential for accidents. In addition, this arrangement of two two-way street combining to form one intersection fits into what driver's typically expect which creates a safer environment for motorists.

By combining intersections the length of Minnesota Avenue is reduced and the amount of "green space" associated with the two areas in the northwestern and

southwestern quadrants of the intersection are increased. In addition the existing green areas are no longer split into two. These larger single green areas can better provide for the community.

By providing adequate storage space to accommodate the eastbound left turns, queues are much less likely to extend into the eastbound through lanes. This is a safer condition for motorists in the area and will assist in reducing congestion in the eastbound direction.

Anticipated Issues: By combing the two separate intersections into one, the level of service at the one combined intersection would operate at a lower level of service than either one of the two separate intersections.

Costs: The total cost for the recommendations is approximately **$820,000***

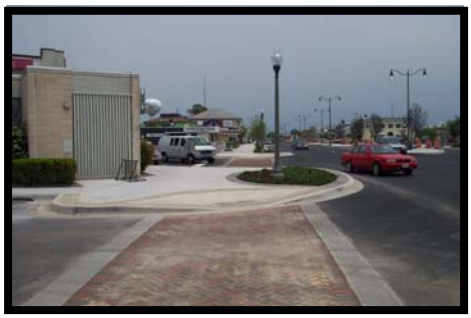
* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

C. Pedestrian Accessibility and Transit Facilities

Two of the goals associated with the Pennsylvania Avenue, SE Transportation Study are to improve pedestrian accessibility and transit operations through the study area. These goals include the ease for the pedestrian and transit user to traverse the area. After reviewing community comments and field observations, several long-term options have been prepared to meet these goals.

1. Pedestrians – Place Textured Crosswalks at Intersections with Pedestrian Amenities

There are numerous crosswalks along the Pennsylvania Avenue, SE corridor that either cross Pennsylvania Avenue, SE or the adjoining residential streets. It is desirable that any crosswalks be visible to motorists in the area and also let motorists know they have entered an area where there is a high volume of pedestrian activity. Therefore, it is recommended that the existing crosswalks will be upgraded to a "Cast In Place Concrete Paver" type of crosswalk which will visually define the various pedestrian crossing areas. These crosswalks are also textured and can be felt when traversed by a vehicle. This recommendation includes the placement of crosswalks where they are missing.



Textured Crosswalk

Benefits: Upgrading the existing crosswalks will provide and complete the pedestrian network along Pennsylvania Avenue as well as offer a safer pedestrian network. The new "Cast In Place Concrete Paver" crosswalks will increase driver awareness, which increases pedestrian mobility and safety.

Costs: The total cost for the Crosswalk Improvements is approximately **$1,800,500*** for the entire project area, including the improvements made two blocks north and south of the Pennsylvania Avenue, SE corridor. A total of 55 intersections were costed out independently for the crosswalk upgrades. This allows the projects to be built in a phased approach if so desired. The following is a list of each intersection and the approximate cost for the crosswalk upgrades on Pennsylvania Avenue, SE:

1. Anacostia FW NB exit **$16,500***
2. Fairlawn Avenue **$62,500***
3. L'Enfant Square/Minnesota Avenue **$160,500***
4. Minnesota Avenue **$173,000***
5. 27th Street **$88,000***

6. 28th Street		**$119,500***
7. P Street		**$39,000***
8. 28th Place		**$20,000***
9. 29th Street		**$26,500***
10. 30th Street		**$122,000***
11. 31st Street		**$92,000***
12. Branch Avenue		**$104,500***
13. 33rd Street		**$142,000***
14. 33rd Place		**$22,500***
15. Texas Avenue		**$40,000***
16. Fort Davis Drive		**$32,500***
17. 38th Street		**$93,500***
18. Alabama Avenue		**$142,000***
19. Fort Davis Street		**$112,000***
20. 40th Street		**$56,000***
21. Prout Street		**$24,000***
22. Southern Avenue		**$112,000***
	TOTAL	**$1,800,500**

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. Intersection Improvements – Simplify to Create Better Pedestrian and Vehicular Access at the Intersection of Pennsylvania Avenue, SE/ 31st Street

The southern leg of 31st Street currently intersects Pennsylvania Avenue, SE at a skewed angle, which is significantly less than the desirable 90 degree angle. Due to the current roadway alignment, motorists are strained to view the pedestrian crossing just east of the intersection. This pedestrian crossing accommodates numerous school children going to the Randle Highlands Elementary School. This improvement is based on community concern for safety. Traffic counts were not required to be completed at this location.

FIGURE 38: The realignment of 31st Street at Pennsylvania Avenue, SE

Benefits: The realigned intersection will provide better for the through movements from 31st Street north to 31st south. The new right angle intersection will improve safety by having a shorter distance and time for the school children and other pedestrians to be in the street as well as meet general driver expectancy and improve the driver's view of the school crossing.

Anticipated Issues: Right of way will be needed from the apartment building, under William C. Smith & Co. Management, which is located on the southeast corner of the intersection of Pennsylvania Avenue, SE and 31st Street. During construction, maintenance of vehicular and pedestrian traffic may be an issue.

Costs: The total costs for this recommendation is approximately **$275,000***

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

3. Intersection Improvements – Simplify to Create Better Pedestrian Access at the Intersection of Pennsylvania Avenue, SE/29th Street/28th Place

The current intersection of 29th Street and P Street is located only 20 feet to the north of Pennsylvania Avenue, SE. Both 29th Street and P Street continue and intersect with Pennsylvania Avenue, SE. This results in two access points on Pennsylvania Avenue which are located approximately 60 feet apart. The existing conditions result in a group of intersections that create safety issues for pedestrians and do not meet driver expectancy. It is recommended that P Street be re-configured to terminate at 29th Street and 29th Street be realigned to intersect Pennsylvania Avenue at a 90° angle. The realignment is also intended to provide a straight thru movement to 28th Place which currently does not exist.

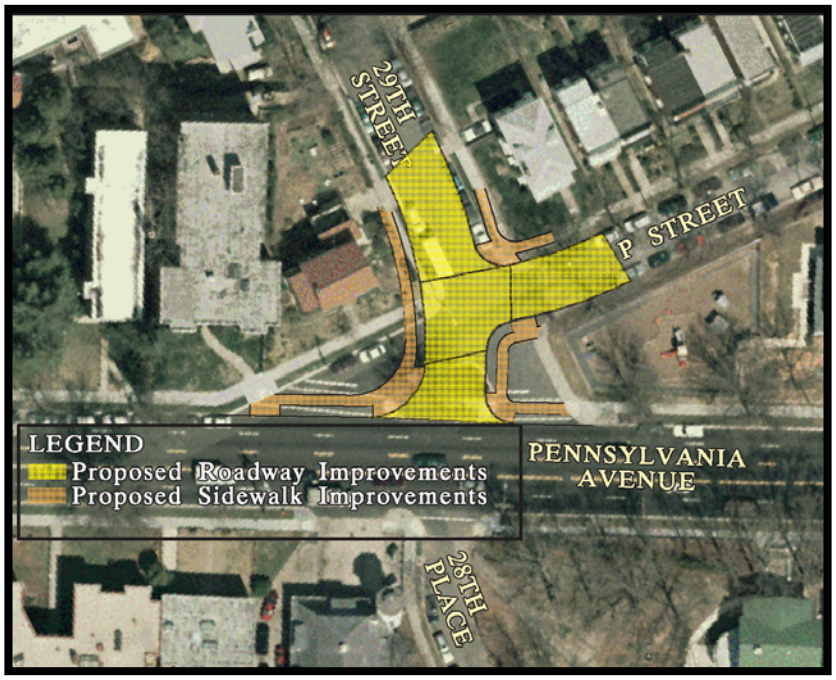


FIGURE 39: The realignment of Pennsylvania Avenue, SE/29th Street/28th Place

Benefits: The realigned intersection will provide safer pedestrian access in the community and a smoother flow of traffic with through movements between 29th Street and 28th Place. The reconfiguration of 29th and P Streets will be more in line with general driver expectancy and minimize potential points of conflict between pedestrians and vehicles. Congestion conflicts also will be improved since there will be only one access to Pennsylvania Avenue instead of two. Opportunities will be created to provide additional areas of landscaping.

Anticipated Issues: Upon removal and placement of new pavement, maintenance of traffic will be a concern. There will be an exchange of right-of-way take

regarding the property of Dwelling Place Elderly Services which is located on the northwestern corner of the intersection.

Costs: The total cost for the recommendation is approximately **$350,000***

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

4. Transit – Place Amenities at High Volume Bus Stops

Additional transit amenities are being recommended for the major bus stops along Pennsylvania Avenue, SE. New amenities will be added to high density and high demand areas to enhance transit operations according to proposed standards from the Washington Metropolitan Bus Study as described in Table 4. These facilities will include a bus shelter, concrete pad waiting area, trash can, bench, and paper coral for newspapers. Currently there are 4 bus stops that do provide such amenities. Some of these amenities are indicated in the following pictures:

Examples of various bus stop amenities

Benefits: By placing new transit amenities at existing bus stops, transit use is promoted because the higher visibility of the transit and transit use becomes more convenient. Also, the aesthetics along the corridor are improved. By encouraging more people to use transit, operations along Pennsylvania Avenue, SE, including access from the local communities, will be improved.

Anticipated issues: Upon placement of the various transit amenities, maintenance may be an issue. Each bus stop will need to be evaluated for the feasibility of placing these amenities.

Costs: The total cost to place all of these transit amenities at each bus stop facility is approximately **$29,000*.**

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

D. Overall Circulation of Pennsylvania Avenue, SE

One of the goals associated with the Pennsylvania Avenue, SE Transportation Study is to improve traffic operations along Pennsylvania Avenue, SE as well as side streets within the study area. After reviewing community comments and field observations, several long-term options have been prepared to meet these goals.

1. Reversible Lane – Place Overhead Signs

There is not adequate signing for the existing reversible lane system. The Manual of Uniform Traffic Control Devices (MUTCD) states that overhead devices are to be used for reversible lanes. The current reversible lane system, without overhead signs, causes confusion among motorists as to when the reversible lane can be used by the eastbound and westbound traffic. In addition, motorists using this portion of Pennsylvania Avenue for the first time have no knowledge of the reversible lane system. Therefore, it is recommended that overhead reversible lane electronic signing systems be placed along Pennsylvania Avenue from 27th Street to Branch Avenue. The systems will be placed approximately 800'-1000' apart along this 2750' stretch of roadway.

Example of an Overhead Reversible Lane Sign

Benefits: Overhead signing for the reversible lane system will make all motorists using the roadway aware of the changing lane conditions. The new system will provide motorists ample time to merge out of the reversible lane if they do not intend to use it. Overall, safety along Pennsylvania Avenue from 27th Street to Branch Avenue will be increased.

Anticipated Issues: It is anticipated that overhead signs will have a visual impact on the community.

Costs: The total cost for the recommendation is approximately **$790,000*.** It has been assumed that five systems will be needed to control this portion of Pennsylvania Avenue.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. Interchange Configuration – Place Directional Ramp on the Northwestern Quadrant of Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange

The existing interchange of Anacostia Freeway (I-295) and Pennsylvania Avenue accommodates all ramp movements, except one. This missing maneuver is from southbound Anacostia Freeway (I-295) to westbound Pennsylvania Avenue, SE. To currently accomplish this maneuver, motorists must exit via the loop ramp in the southwest quadrant of the interchange then travel eastbound on Pennsylvania Avenue, SE and perform illegal u-turns at several locations including both of the Pennsylvania Avenue, SE/Minnesota Avenue intersections. Based upon the general origin-destination counts, approximately 35% of the loop ramp traffic has a desire to travel westbound on Pennsylvania Avenue, SE. This is estimated to be approximately 950 vehicles during the AM peak hour. It is recommended that an exit ramp in the northwest quadrant of the Anacostia Freeway (I-295) and Pennsylvania Avenue, SE be constructed to accommodate this missing maneuver.

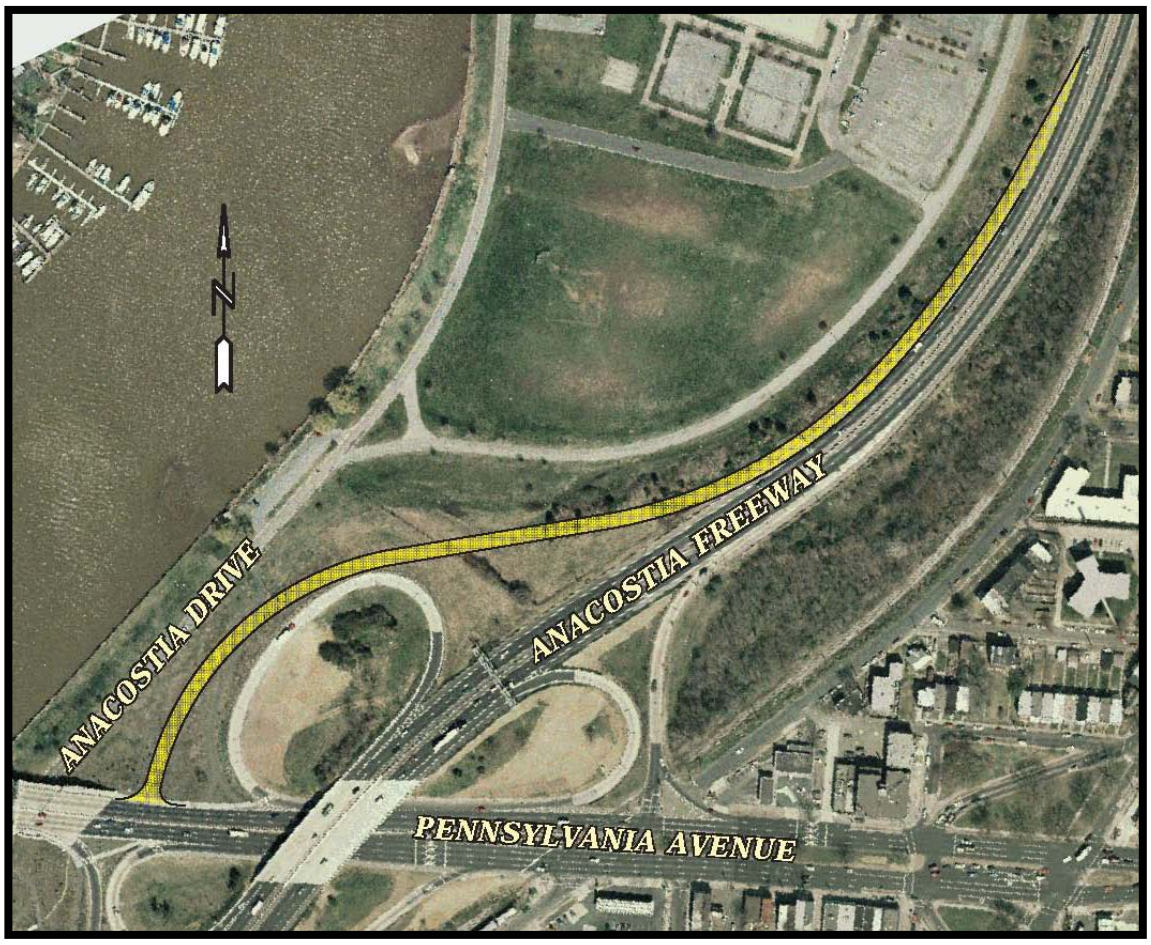


FIGURE 40: Exit Ramp from Southbound Anacostia Freeway (I-295) to Westbound Pennsylvania Avenue, SE

Benefits: The benefits with constructing an exit ramp in the northwest quadrant to accommodate motorists traveling from southbound Anacostia Freeway (I-295) to westbound Pennsylvania Avenue, SE include the following:

- Vehicles wanting to travel westbound on Pennsylvania Avenue will have a more direct route when exiting southbound Anacostia Freeway (I-295). This will improve the efficiency of the roadway network and motorists will experience less delay when trying to gain access to westbound Pennsylvania Avenue, SE.
- The construction of this ramp will eliminate the u-turn movements being performed at various locations along Pennsylvania Avenue, SE. This will improve the efficiency of several intersections along the corridor which means that any motorist traveling through those intersections will experience less delay.
- Traffic volumes will be reduced along the loop ramp that currently exists in the southwest quadrant. Once again, the efficiency of this loop ramp will be

improved and motorists will experience less delay. In addition, the weaves along eastbound Pennsylvania Avenue, SE will be reduced since the number of vehicles merging onto eastbound Pennsylvania Avenue, SE will be decreased.

Anticipated Issues: This option would require interstate access point approval, preparation of a NEPA EIS, right-of-way acquisition, park mitigation, widening of the Sousa Bridge and possible improvements to the I-395 interchange. Any major interchange improvement must be coordinated with the "Middle Anacostia Crossing Transportation Study" and be implemented in accordance with the findings of that study and be implemented in accordance with the findings of that study.

Costs: The estimated cost to construct this exit ramp would range from **$3 to $5 million dollars*.**

***** Note: Cost does not include administration/overhead costs, engineering costs, escalation costs, or right-of-way costs.

3. Interchange Configuration – Place a Single Point Urban Diamond Interchange at Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange

The existing interchange of the Anacostia Freeway (I-295) and Pennsylvania Avenue, SE provides a combination of both slip ramps and loop ramps for various movements between the two roadways. As stated in the previous two options, all movements are not currently provided for at this interchange. In addition, there are a number of weaving situations created by the current layout of the interchange. This alternative involves the construction of a single point urban diamond interchange to replace the existing interchange.

A single point diamond interchange is a unique configuration since no loop ramps are necessary to accommodate movements between the main roadway and the crossroad. All ramps are designed to be as close as possible to the mainline in order to minimize the amount of right-of-way needed for its construction. Ramps to accommodate all exiting and entering left-turn maneuvers are pulled into a central point to create one signalized intersection.

In this alternative, the intersection associated with the single point urban diamond interchange would be situated along Pennsylvania Avenue, SE under the Anacostia Freeway (I-295) overpass. All ramps to and from the Anacostia Freeway (I-295) would end or initiate from this intersection.

FIGURE 41: Single Point Urban Diamond interchange at Anacostia Freeway (I-295)/Pennsylvania Avenue, SE

Benefits: The benefits with constructing a single point urban diamond interchange at the Anacostia Freeway (I-295) and Pennsylvania Avenue, SE are the following:

- All vehicular movements would be accommodated unlike that which is provided by the existing interchange. The details of the many benefits, including increased efficiency and safety, were discussed in the Option 1 alternative for this interchange.
- The development of a single point urban diamond interchange would eliminate weaving issues along both the Anacostia Freeway (I-295) and Pennsylvania Avenue, SE with of the new ramp configurations.
- The development of a single point urban diamond interchange would reduce the number of intersections, which includes both signalized and unsignalized intersections, along Pennsylvania Avenue to one. This would help increase the distance between adjacent intersections along Pennsylvania Avenue as well as overall efficiency of the corridor, which in turn would improve access to the adjacent communities.
- The geometric layout of a single point urban diamond interchange is typically superior in addressing traffic operations when compared to conventional diamond interchanges.
- The single point urban diamond interchange consolidates the entire interchange. This move ramps further away from the intersection of Minnesota Avenue which allows for longer eastbound left turn lanes at the intersection of Pennsylvania Avenue, SE/Minnesota Avenue.

Anticipated Issues: The proper development of this interchange type would require that the existing interchange be completely reconstructed. This significant change would most likely require an extensive maintenance of traffic plan for the area while the new interchange is under construction. Any major interchange improvement must be coordinated with the "Middle Anacostia Crossing Transportation Study" and be implemented in accordance with the findings of that study.

Costs: The estimated cost to construct a Single Point Urban Diamond interchange at this location would range from **$20 million to $25 million dollars*.**

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

VII. OPTIONS STUDIED BUT NOT PURSUED

There were several short-term and long-term options that were developed based upon the data collected and analyzed, field observations, and community input that are **not** recommended. These options have been dropped for further consideration for a variety of reasons including potential displacements to the surrounding community and businesses, the option not fulfilling the purpose and need of the project, too many negative impacts associated with the option, and community input and opposition. The following section describes the alternative that was studied and provides reasons as to why it is not being recommended for further consideration.

A. Short Term Options

The following options were studied as short term options for the project but are not being recommended for further study.

1. COMMUNITY CIRCULATION: Roadway Improvements – Create a Free Flowing Eastbound Right Turn Lane onto Branch Avenue

The intersection of Pennsylvania Avenue, SE/Branch Avenue experiences delays during both the AM and PM peak period. At this intersection there is a high eastbound right turn volume from Pennsylvania Avenue, SE onto southbound Branch Avenue. Currently this eastbound right turn maneuver is stopped during the pedestrian phase of the traffic light, as well as stopped during the through phase for Branch Avenue. It was noted that the southbound through traffic at this intersection is not high and could operate using only one of the two shared through lanes provided without compromising the capacity of the intersection. An option was created to utilize the outside southbound lane on Branch Avenue south of Pennsylvania Avenue, SE as the accepting lane for the eastbound right turn lane, thereby establishing a free flowing right at this location, except during the pedestrian phase of the light where it will be stopped with a red light. In order to utilize the outside southbound lane on Branch Avenue as an accepting lane to establish an eastbound free flowing right turn lane, the outside southbound lane north of Pennsylvania Avenue, SE must end as a channelized right turn lane at the intersection. This recommendation is illustrated in the figure below.

FIGURE 42: Establish an eastbound free flowing right turn onto southbound Branch Avenue.

Benefits: The free flowing eastbound right turn lane will allow for a greater volume of vehicles to clear the intersection, thereby increasing the efficiency of all vehicles passing through this intersection. This will aid in reducing the queue for this right turn lane, as well as improving the LOS for the intersection during the PM peak period. The 2025 No Build Conditions for this intersection during the AM and PM peak periods are F and E, respectively. With this improvement, the LOS will improve to an F and D for the AM and PM peak periods respectively. Results of the analysis are located in Appendix I.

Anticipated Issues: With the introduction of the free flowing right turn lane, pedestrians will be required to utilize the push buttons in order to cross Branch Avenue at this location.

Costs: The anticipated cost for this improvement is approximately **$35,000***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

This recommendation is not being pursued due to citizen comments against the option.

2. COMMUNITY CIRCULATION: Traffic Calming – Close Fairlawn Avenue to Deter Cut-Through Traffic

Motorists traveling southbound on Minnesota Avenue are currently cutting through neighborhoods to access Fairlawn Avenue which can then be used a shortcut through the Citgo Gas Station to Pennsylvania Avenue, SE westbound. The desire is so great that motorists are ignoring the fact that Fairlawn Avenue is posted as one-way northbound during the AM and PM peak hours. Because Fairlawn Avenue is classified as an official on-road bicycle route, it is recommended that bollards be used to block motorists from using the southern portion of Fairlawn Avenue while still allowing bicyclists to access the bike route. The bollards are recommended to be placed just south of Fairlawn Avenue/L'Enfant Square and also at the intersection of Pennsylvania Avenue, SE/Fairlawn Avenue.

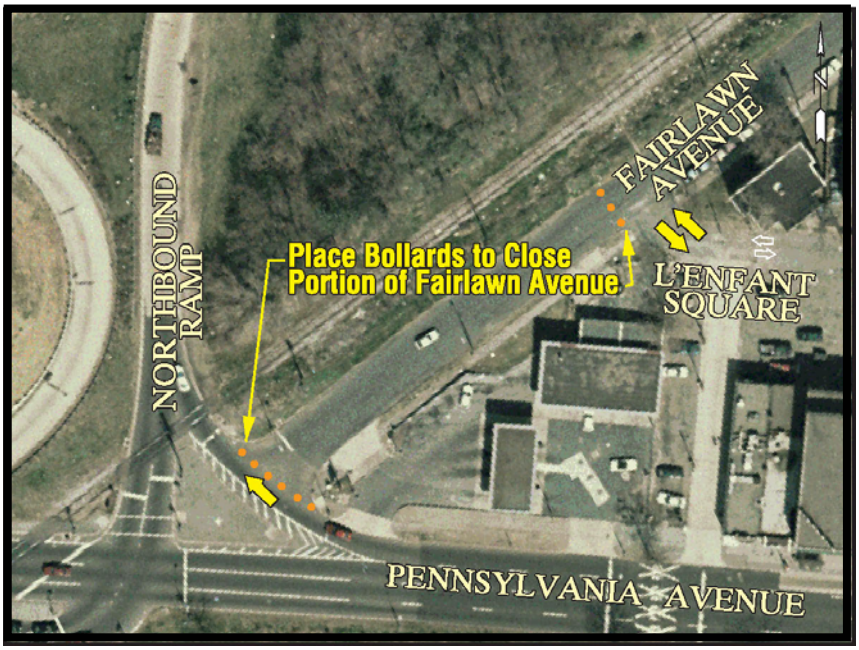


FIGURE 43: Bollards closing Fairlawn Avenue to cut-through traffic

Benefits: The benefit of this recommendation is it deters motorists from cutting through the communities and traveling in the wrong direction on Fairlawn Avenue. This option improves pedestrian safety as well as vehicular safety in the community.

Anticipated Issues: There is a Citgo Gas Station located on the corner of Fairlawn Avenue and Pennsylvania Avenue, SE. By creating this closure at the Fairlawn Avenue and L'Enfant Square intersection, the two existing access points on Fairlawn Avenue that leads into the Citgo Gas Station will be eliminated. It should be noted that there are two access points on Pennsylvania Avenue, SE.

This closure would also prohibit direct access to Pennsylvania Avenue, SE for the residents within this community

Costs: The total cost for this recommendation is approximately **$22,000***

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

This recommendation is not being pursued due to citizen comments against the option.

3. COMMUNITY CIRCULATION: Turn Lane Lengths – Increase Turn Lane Lengths to Accommodate Turning Volumes

The intersection of Pennsylvania Avenue, SE/27th Street has one approach in which the turn lane does not currently accommodate the queue length. The lane that is not accommodated is the left turn lane from northbound 27th Street to westbound Pennsylvania Avenue, SE. At the intersection of Pennsylvania Avenue, SE/27th Street, extending the left turn lane to accommodate the queue would put the left turn lane into the intersection of 27th Street/Q Street. Therefore the lane would not be extended beyond this point. In order to extend this lane, the existing on-street parking along the east side of 27th Street would need to be eliminated.

Benefits: By extending the storage length, the queue will be accommodated at these intersections.

Anticipated Issues: Based on the parking inventory and utilization study, this area of 27th Street has a 42% utilization rate of its on-street parking. Eliminating the parking on the east side will increase the utilization rate for the remaining parking spaces available. At various times during the day, there may not be adequate parking available along this block.

Costs: The total cost to extend the turn lane at the intersection of Pennsylvania Avenue, SE/Southern Avenue is approximately **$1,500***.

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

This recommendation is not being pursued due to citizen comments against the option.

B. Long Term Options

The following options were studied as long term options for the project but are not being recommended for further study.

1. PEDESTRIAN ACCESSIBLITY AND TRANSIT FACILITIES: Transit – Provide Bus Pull-over Lane at L'Enfant Square

There is currently a bus stop located on southbound Minnesota Avenue, just north of Pennsylvania Avenue, SE. One of the southbound lanes is impeded each time the buses pick up and/or discharge passengers. The community asked that a bus pull-over lane be placed at this location. There would be a designated concrete pad in the bus only lane.

FIGURE 44: Bus Pull-Over Lanes at L-Enfant Square

Benefits: The bus pull-over lane will remove stopped buses from impeding the southbound through traffic movement in this area. It should be noted that there is space available to accommodate this improvement. This improvement would only be provided if the Pennsylvania Avenue intersection is not reconstructed as a single intersection, an earlier recommendation.

Anticipated Issues: It may be difficult for busses to re-enter the southbound traffic from this separate bus pull-over lane. Another possible issue could be the loss of green space. It was also stated that bus pull-over lanes are not used by buses due to their inability to gain re-access to the roadway.

Costs: The total cost for this recommendation is approximately **$35,500***

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

2. PEDESTRIAN ACCESSIBILITY AND TRANSIT FACILITIES: Transit – Provide Westbound HOV lanes During the AM Peak Hour

Currently there are a minimum of two lanes in each direction along Pennsylvania Avenue, SE throughout the study limits. There are numerous buses traveling along the corridor. On several occasions, citizens recommended that a right turn only/bus lane/HOV lane be provided in the westbound direction for the AM peak period. This alternative would require an HOV analysis which is not currently included in this study. However, after the preliminary examination, this alternative is not being recommended for several reasons. The primary reason is that by limiting the outside westbound lane during the AM peak period, the pedestrian and vehicular access into and out of the adjoining communities would be significantly impacted by the vehicular congestion on the roadway. In addition, this is a short distance to be considered for an HOV lane and would be difficult to enforce. Finally, if the lane is to be shared by both HOV and buses, there would be little benefit to the HOV as these vehicles would be trapped behind the bus at each of the bus stop locations. This would hurt the overall LOS of the corridor.

3. OVERALL CIRCULATION OF PENNSYLVANIA AVENUE, SE: Reversible Lanes – Revise Operations

The eastbound reversible lane extends from 27th Street to Branch Avenue and is in operation from 4:00 PM to 6:30 PM. The reversible lane is a westbound lane throughout the remainder of the day. Consideration was given to two alterations associated with the reversible lane operations.

The first alteration included four westbound lanes and one eastbound lane (with no left turns allowed) during the AM peak hour. More specifically, there would be four westbound lanes between Branch Avenue and Anacostia Freeway (I-295) and three eastbound lanes through Minnesota Avenue. This was a suggestion from citizens. There are a couple of benefits associated with this alteration. This would accommodate the 75/25 split of traffic in the AM peak hour. In addition, this type of configuration would provide the least amount of network delay. When the 2025 No-Build Traffic Volumes were put into this proposed lane configuration, the Levels of Service virtually stayed the same except there was a major decrease in delay at Branch Avenue at the intersection of Pennsylvania Avenue, SE/Minnesota Avenue where the LOS improved from an F to a D during the AM peak hour. There are several anticipated issues. First, no left turns would be allowed on eastbound Pennsylvania Avenue, SE. Second, emergency vehicles may have accessibility issues with only one eastbound lane. Finally, there would

a cost to reconstruct Pennsylvania Avenue, SE between 27th Street and Minnesota Avenue.

The second alteration included no reversible lanes and maintaining the three westbound lanes and two eastbound lanes. This alteration provides a couple of benefits. First, it is anticipated that the center lane, which has been witnessed to be underutilized during the PM peak hour, would be more utilized. Finally, there is the cost savings associated with upgrading the current reversible lane system to meet the requirements put forth in the MUTCD. When the 2025 No-Build Traffic Volumes were put into this proposed lane configuration the levels of service virtually stayed the same except at the intersection of Pennsylvania Avenue, SE/Minnesota Avenue where the LOS minimally improved from an F to an E during the PM peak hour. There are also a couple of anticipated issues associated with this alteration. First, the Pennsylvania Avenue, SE/Branch Avenue intersection would operate at a LOS F during the PM peak hour. Second, there would be the cost to reconstruct Pennsylvania Avenue, SE between 27th Street and Minnesota Avenue.

It is recommended that neither of these alternative realignments of the reversible lanes be carried forward.

4. OVERALL CIRCULATION OF PENNSYLVANIA AVENUE, SE: Interchange Configuration - Place Loop Ramp on the Southeastern Quadrant of Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange

The existing interchange of the Anacostia Freeway (I-295) and Pennsylvania Avenue, SE provides an eastbound Pennsylvania Avenue, SE to northbound Anacostia Freeway (I-295) movement with dualized eastbound left turn lanes to the on-ramp in the northeastern quadrant of the interchange. This is a very high left turning volume, which operates at a LOS of F in the AM Peak period. This results in long queues that sometimes extend into the eastbound through lanes along Pennsylvania Avenue, SE. This alternative provides that a loop ramp be constructed in the southeast quadrant of the interchange to accommodate the eastbound Pennsylvania Avenue, SE to northbound I-295 movement. This improvement would also require that the exit ramp from northbound Anacostia Freeway (I-295) to eastbound Pennsylvania Avenue, SE, by way of Fairlawn Avenue, be reconstructed in order to properly design the loop ramp.

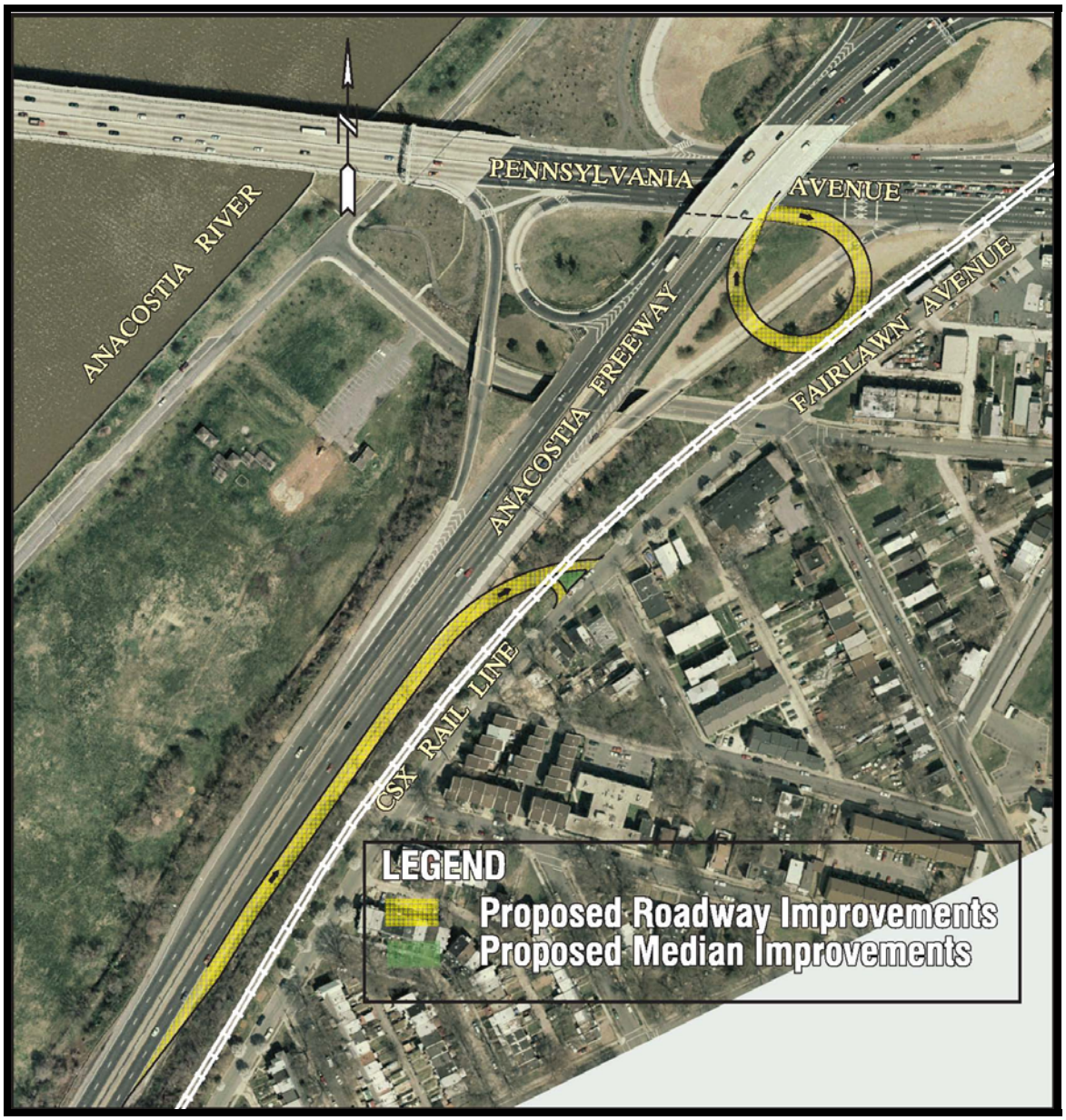


FIGURE 45: Loop Ramp from Eastbound Pennsylvania Avenue, SE to Northbound Anacostia Freeway (I-295)

Benefits: The benefits with constructing a loop ramp in the southeast quadrant to accommodate travelers along eastbound Pennsylvania Avenue, SE to northbound Anacostia Freeway (I-295) are:

- The eastbound queues associated with the existing left turn maneuver from Pennsylvania Avenue, SE to the Northbound On-Ramp to Anacostia Freeway (I-295) will be eliminated. Not only will this improve the efficiency of traffic heading eastbound on Pennsylvania Avenue, SE, but safety will also be improved.

- Vehicles wanting to travel northbound on the Anacostia Freeway (I-295) will not have to cross westbound traffic and the need for a signal would be eliminated.
- The efficiency of vehicles traveling westbound on Pennsylvania Avenue will be improved since the conflict with eastbound left turning vehicles will be eliminated along the traffic signal at this intersection of Pennsylvania Avenue, SE/Northbound On-Ramps to Anacostia Freeway (I-295). This means that any motorist traveling through this intersection will experience less delay.
- Traffic volumes will be reduced along the entrance ramp that currently exists in the northeast quadrant. Motorists using this ramp will experience less delay.

Anticipated Issues: There are several issues associated with this alternative. First, it is anticipated that this option would require the purchase of additional right-of-way to accommodate the new loop ramp as well as the reconstruction and relocation of the exit ramp from northbound Anacostia Freeway (I-295) to eastbound Pennsylvania Avenue, SE. This relocation was necessary due to the required size of the loop ramp, the location of the Anacostia Freeway (I-295) and the location of Fairlawn Avenue. Second, the introduction of a loop ramp in this quadrant could also create weaving issues along eastbound Pennsylvania Avenue, SE and northbound I-295. A weaving analysis would be needed to determine if the location of the proposed loop ramp provides adequate distance for weaving on both roadways. In a further complication, it appears that the proposed loop ramp will traverse the CSX rail line. This will require one of several things to occur. Either the CSX rail line will need to be relocated, or the design speed for the loop ramp will have to drop below the 20 MPH design speed utilized for the layout. The loop ramp construction would require that the existing ramp from northbound Anacostia Freeway (I-295) to eastbound Pennsylvania Avenue, SE be relocated. The new exit ramp must be constructed so that it ties in with Fairlawn Avenue since the location of the CSX rail lines prohibits direct tie in to Pennsylvania Avenue, SE. Fairlawn Avenue is a two-way collector road that handles local traffic in the immediate area. The reconstructed exit ramp would introduce a stop-controlled intersection along Fairlawn Avenue, thereby negatively impacting the community by introducing long distance interstate through trips onto a local collector roadway. Vehicles would then need to travel north on Fairlawn Avenue to access eastbound Pennsylvania Avenue, SE.

Due to significant negative impacts associated with this alternative, it is not being recommended for further study.

Costs: The estimated cost to construct these improvements would range from **$5 million to $8 million dollars*.**

* Note: Cost does not include construction cost administration/overhead, engineering costs, escalation costs, or right-of-way costs.

5. OVERALL CIRCULATION OF PENNSYLVANIA AVENUE, SE: Interchange – Place an Interchange at Pennsylvania Avenue, SE/Minnesota Avenue

The intersection of Pennsylvania Avenue, SE/Minnesota Avenue is very congested, especially during the peak hours. The community asked that an interchange be considered at this location. The project would primarily consist of bridging one road over the other and the construction of on and off ramps. There are a variety of interchange types that could potentially be used for this intersection. However, the best option for this particular intersection is a single point urban interchange (SPUI). This type of interchange is typically used in tight urban areas.

Benefits: The addition of an SPUI will increase the capacity of this intersection. Motorists will be able to enter and leave the interchange more efficiently. Drivers making right turns will have a smooth transition onto the other roadway, sometimes even without stopping. Most SPUIs need a minimal amount of right of way when compared to a conventional type design such as the existing interchange at Pennsylvania Avenue, SE/Anacostia Freeway (I-295). Each on and off ramp typically ranges from approximately 400-1200 feet in length. The allowance of concurrent left turns, using a three phase traffic signal allows for greater vehicular capacity.

Anticipated Issues: There are numerous issues associated with the construction of an SPUI at this location. The fact that one road would be elevated over the other road would have a visual impact to the community, which would act as a barrier and literally divide the community. The addition of an interchange in this location may have the undesired effect of increasing the speed and volume of traffic on this section of Minnesota Avenue. The layout of the interchange would result in a number of displacements to the properties in the immediate vicinity of the intersection. The construction cost of the alternative may be prohibitively high. These facilities typically cost 20 to 25 million dollars, which excludes the cost of additional right-of-way and maintenance of traffic. Finally, the properties in the immediate vicinity of the interchange would not be allowed access from the major road, thereby having a significant impact on a major economic development target area.

In light of the numerous issues and the severity of the issues associated with this concept, no lay out or costs were developed for this option and it is not being recommended for further study.

November, 2003

Pennsylvania Avenue, SE Transportation Study

APPENDICES

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District of Columbia Government Department of Transportation

d.
DISTRICT DEPARTMENT OF TRANSPORTATION

APPENDIX A
Level of Service Definition

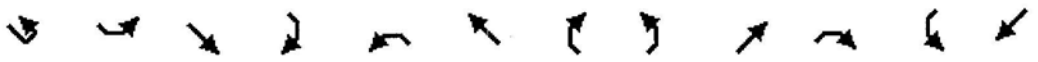
"Level of Service - a qualitative measure that incorporates the collective factors of speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs provided by a highway facility under a particular condition."

- Transportation and Traffic Engineering Handbook - Second Edition, Institute of Transportation Engineers, 1984.

Six Levels of Service (LOS) are defined for each type of facility for which analysis procedures are available. They are given a letter designation from "A" to "F" with "A" representing the best operating conditions and "F" the worst. For signalized intersection LOS analysis, average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersection as a whole. LOS is directly related to the control delay value. The criteria are listed below.

LOS	Control Delay Per Vehicle (s)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

APPENDIX B
Existing Capacity Analysis

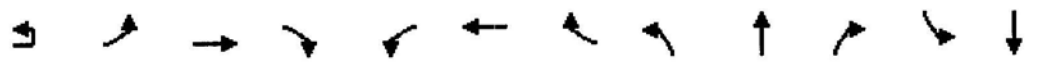


Movement	SEU	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0		4.0	4.0			
Lane Util. Factor		1.00	0.91			*0.85		0.91	0.91			
Frpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Flpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Frt		1.00	1.00			1.00		1.00	0.99			
Flt Protected		0.95	1.00			1.00		0.95	0.97			
Satd. Flow (prot)		1770	5085			6329		1610	3249			
Flt Permitted		0.95	1.00			1.00		0.95	0.97			
Satd. Flow (perm)		1770	5085			6329		1610	3249			
Volume (vph)	100	255	1105	0	0	3275	10	625	110	15	0	0
Peak-hour factor, PHF	0.74	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94
Adj. Flow (vph)	135	297	1201	0	0	3680	16	658	136	25	0	0
Lane Group Flow (vph)	0	432	1201	0	0	3696	0	329	490	0	0	0
Confl. Peds. (#/hr)		11					11	3		17		
Turn Type	custom	Prot						Split				
Protected Phases	2	2	2 1			1		5	5			
Permitted Phases	2		1			1			5			
Actuated Green, G (s)		11.0	90.0			70.0		26.0	26.0			
Effective Green, g (s)		14.0	93.0			75.0		29.0	29.0			
Actuated g/C Ratio		0.11	0.72			0.58		0.22	0.22			
Clearance Time (s)		7.0				9.0		7.0	7.0			
Vehicle Extension (s)		3.0				3.0		3.0	3.0			
Lane Grp Cap (vph)		191	3638			3651		359	725			
v/s Ratio Prot		c0.24	0.24			c0.58		c0.20	0.15			
v/s Ratio Perm												
v/c Ratio		2.26	0.33			1.01		0.92	0.87dl			
Uniform Delay, d1		58.0	6.9			27.5		49.3	46.2			
Progression Factor		0.79	0.30			1.22		1.00	1.00			
Incremental Delay, d2		583.0	0.0			14.3		27.3	2.5			
Delay (s)		629.1	2.1			47.8		76.6	48.7			
Level of Service		F	A			D		E	D			
Approach Delay (s)			168.0			47.8			59.9			0.0
Approach LOS			F			D			E			A

Intersection Summary			
HCM Average Control Delay	81.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.4%	ICU Level of Service	G

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SWR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	3
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

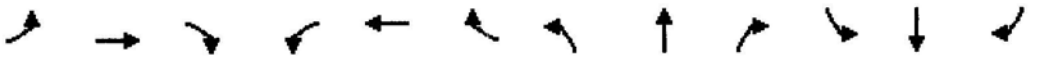


Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0		4.0		4.0	4.0			
Lane Util. Factor			0.95	1.00		0.91		0.95	0.95			
Frpb, ped/bikes			1.00	0.95		1.00		1.00	1.00			
Flpb, ped/bikes			1.00	1.00		1.00		1.00	1.00			
Frt			1.00	0.85		1.00		1.00	0.99			
Flt Protected			1.00	1.00		1.00		0.95	0.96			
Satd. Flow (prot)			3522	1508		5063		1681	1686			
Flt Permitted			1.00	1.00		1.00		0.95	0.96			
Satd. Flow (perm)			3522	1508		5063		1681	1686			
Volume (vph)	20	45	795	35	0	2740	15	545	25	10	0	0
Peak-hour factor, PHF	0.73	0.73	0.94	0.51	1.00	0.90	0.30	0.96	0.52	0.69	1.00	1.00
Adj. Flow (vph)	27	62	846	69	0	3044	50	568	48	14	0	0
Lane Group Flow (vph)	0	0	935	69	0	3094	0	313	317	0	0	0
Confl. Peds. (#/hr)		26		7	7		26			17		
Turn Type	Perm	Perm		Perm				Perm				
Protected Phases			2			6			4			
Permitted Phases	2	2	2	2		6		4	4			
Actuated Green, G (s)			99.0	99.0		99.0		19.0	19.0			
Effective Green, g (s)			101.0	101.0		101.0		21.0	21.0			
Actuated g/C Ratio			0.78	0.78		0.78		0.16	0.16			
Clearance Time (s)			6.0	6.0		6.0		6.0	6.0			
Vehicle Extension (s)			3.0	3.0		3.0		3.0	3.0			
Lane Grp Cap (vph)			2736	1172		3934		272	272			
v/s Ratio Prot			0.27			c0.61			c0.19			
v/s Ratio Perm				0.05				0.19				
v/c Ratio			0.34	0.06		0.79		1.15	1.17			
Uniform Delay, d1			4.4	3.4		8.3		54.5	54.5			
Progression Factor			1.66	4.31		0.35		1.00	1.00			
Incremental Delay, d2			0.3	0.1		0.1		101.6	106.9			
Delay (s)			7.6	14.7		3.0		156.1	161.4			
Level of Service			A	B		A		F	F			
Approach Delay (s)			8.1			3.0			158.8			0.0
Approach LOS			A			A			F			A

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	113.4%	ICU Level of Service	G

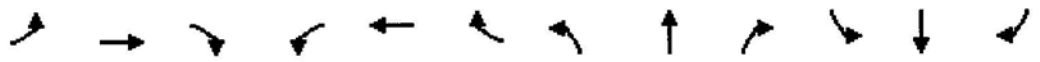
c Critical Lane Group

Movement	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑↱		↰	↕			↕↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95	1.00		0.95		0.95	0.95			0.95	
Frt		1.00	0.85		1.00		1.00	1.00			0.99	
Flt Protected		1.00	1.00		1.00		0.95	0.97			0.99	
Satd. Flow (prot)		3539	1583		3535		1681	1712			3478	
Flt Permitted		1.00	1.00		1.00		0.95	0.97			0.99	
Satd. Flow (perm)		3539	1583		3535		1681	1712			3478	
Volume (vph)	0	580	300	0	1445	5	1300	255	5	20	105	10
Peak-hour factor, PHF	1.00	0.86	0.83	0.92	0.96	0.38	0.93	0.76	0.25	0.79	0.80	0.92
Adj. Flow (vph)	0	674	361	0	1505	13	1398	336	20	25	131	11
Lane Group Flow (vph)	0	674	361	0	1518	0	857	897	0	0	167	0
Turn Type			Perm				Split			Split		
Protected Phases		2			6		8	8		4	4	
Permitted Phases			2									
Actuated Green, G (s)		59.8	59.8		58.8		42.0	42.0			11.2	
Effective Green, g (s)		60.8	60.8		60.8		44.0	44.0			13.2	
Actuated g/C Ratio		0.47	0.47		0.47		0.34	0.34			0.10	
Clearance Time (s)		5.0	5.0		6.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		1655	740		1653		569	579			353	
v/s Ratio Prot		0.19			c0.43		0.51	c0.52			c0.05	
v/s Ratio Perm			0.23									
v/c Ratio		0.41	0.49		0.92		1.51	1.55			0.47	
Uniform Delay, d1		22.8	23.9		32.3		43.0	43.0			55.1	
Progression Factor		1.32	5.28		1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.7	2.2		9.7		236.8	255.6			1.0	
Delay (s)		30.8	128.2		42.0		279.8	298.6			56.1	
Level of Service		C	F		D		F	F			E	
Approach Delay (s)		64.8			42.0			289.4			56.1	
Approach LOS		E			D			F			E	

Intersection Summary			
HCM Average Control Delay	144.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.9%	ICU Level of Service	F
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		0.95			0.95	
Frt		0.98			1.00	0.85		1.00			1.00	
Flt Protected		1.00			1.00	1.00		0.99			0.99	
Satd. Flow (prot)		3473			3528	1583		3501			3491	
Flt Permitted		1.00			1.00	1.00		0.99			0.99	
Satd. Flow (perm)		3473			3528	1583		3501			3491	
Volume (vph)	0	240	40	10	355	95	175	1200	20	90	425	5
Peak-hour factor, PHF	1.00	0.79	0.93	0.34	0.81	0.83	0.78	0.93	0.54	0.81	0.87	0.25
Adj. Flow (vph)	0	304	43	29	438	114	224	1290	37	111	489	20
Lane Group Flow (vph)	0	347	0	0	467	114	0	1551	0	0	620	0
Turn Type				Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases				8	8	8						
Actuated Green, G (s)		17.5			17.5	17.5		49.8			20.7	
Effective Green, g (s)		17.5			17.5	17.5		49.8			20.7	
Actuated g/C Ratio		0.18			0.18	0.18		0.50			0.21	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		608			617	277		1743			723	
v/s Ratio Prot		0.10			c0.13			c0.44			c0.18	
v/s Ratio Perm						0.07						
v/c Ratio		0.57			0.76	0.41		0.89			0.86	
Uniform Delay, d1		37.8			39.2	36.7		22.6			38.2	
Progression Factor		1.00			1.00	1.00		0.50			0.92	
Incremental Delay, d2		1.3			5.3	1.0		5.5			9.7	
Delay (s)		39.1			44.5	37.7		16.9			44.9	
Level of Service		D			D	D		B			D	
Approach Delay (s)		39.1			43.2			16.9			44.9	
Approach LOS		D			D			B			D	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	D
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3464			3526	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.55			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1923			3526	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	40	365	50	95	1300	80	40	350	70	20	240	55
Peak-hour factor, PHF	0.75	0.85	0.84	0.84	0.93	0.79	0.64	0.77	0.76	0.75	0.88	0.78
Adj. Flow (vph)	53	429	60	113	1398	101	62	455	92	27	273	71
Lane Group Flow (vph)	0	542	0	0	1511	101	62	455	92	27	273	71
Turn Type	Prot			Prot		custom	Prot		Perm	Prot		Perm
Protected Phases	1	6		9	2 9		7	4		3	8	
Permitted Phases					2	2		4	4			8
Actuated Green, G (s)		34.1			59.1	34.1	4.8	25.3	25.3	3.6	24.1	24.1
Effective Green, g (s)		34.1			59.1	34.1	4.8	25.3	25.3	3.6	24.1	24.1
Actuated g/C Ratio		0.34			0.59	0.34	0.05	0.25	0.25	0.04	0.24	0.24
Clearance Time (s)		4.0				4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0				3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		656			2084	540	85	471	400	64	449	382
v/s Ratio Prot					c0.43		c0.04	c0.24		0.02	0.15	
v/s Ratio Perm		c0.28				0.06			0.06			0.04
v/c Ratio		0.83			0.73	0.19	0.73	0.97	0.23	0.42	0.61	0.19
Uniform Delay, d1		30.2			14.6	23.2	47.0	36.9	29.6	47.2	33.7	30.2
Progression Factor		0.34			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.3			1.3	0.8	26.6	32.5	0.3	4.4	2.3	0.2
Delay (s)		15.5			15.9	24.0	73.6	69.4	29.9	51.6	36.1	30.4
Level of Service		B			B	C	E	E	C	D	D	C
Approach Delay (s)		15.5			16.4			63.9			36.1	
Approach LOS		B			B			E			D	

Intersection Summary			
HCM Average Control Delay	27.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	97.8%	ICU Level of Service	E
c Critical Lane Group			

Movement	EBU	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations							
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		
Lane Util. Factor		0.97	0.86	0.91	1.00		
Frt		1.00	1.00	1.00	0.85		
Flt Protected		0.95	1.00	1.00	1.00		
Satd. Flow (prot)		3433	6408	5085	1583		
Flt Permitted		0.95	1.00	1.00	1.00		
Satd. Flow (perm)		3433	6408	5085	1583		
Volume (vph)	55	1475	3705	1340	485	0	0
Peak-hour factor, PHF	0.55	0.96	0.94	0.97	0.89	1.00	1.00
Adj. Flow (vph)	100	1536	3941	1381	545	0	0
Lane Group Flow (vph)	0	1636	3941	1381	545	0	0
Turn Type	Prot	Prot			Perm		
Protected Phases	7	7	2	6			
Permitted Phases				6	6		
Actuated Green, G (s)		47.0	73.0	73.0	73.0		
Effective Green, g (s)		48.0	74.0	74.0	74.0		
Actuated g/C Ratio		0.37	0.57	0.57	0.57		
Clearance Time (s)		5.0	5.0	5.0	5.0		
Vehicle Extension (s)		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		1268	3648	2895	901		
v/s Ratio Prot		c0.48	c0.62	0.27			
v/s Ratio Perm					0.34		
v/c Ratio		1.29	1.08	0.48	0.60		
Uniform Delay, d1		41.0	28.0	16.6	18.4		
Progression Factor		1.00	1.00	1.20	1.31		
Incremental Delay, d2		136.6	41.9	0.4	2.1		
Delay (s)		177.6	69.9	20.3	26.1		
Level of Service		F	E	C	C		
Approach Delay (s)			101.5	21.9		0.0	
Approach LOS			F	C		A	

Intersection Summary			
HCM Average Control Delay	81.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	D
c Critical Lane Group			

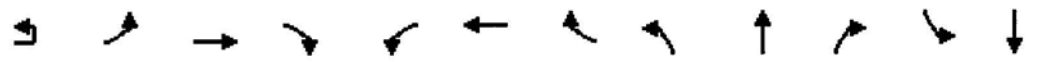
Movement	SEU	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0		4.0	4.0			
Lane Util. Factor		1.00	0.91			*0.78		0.91	0.91			
Frpb, ped/bikes		1.00	1.00			1.00		1.00	0.99			
Flpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Frt		1.00	1.00			1.00		1.00	0.97			
Flt Protected		0.95	1.00			1.00		0.95	1.00			
Satd. Flow (prot)		1770	5085			5789		1610	3257			
Flt Permitted		0.95	1.00			1.00		0.95	1.00			
Satd. Flow (perm)		1770	5085			5789		1610	3257			
Volume (vph)	5	560	2565	0	0	1270	20	285	305	60	0	0
Peak-hour factor, PHF	0.74	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94
Adj. Flow (vph)	7	651	2788	0	0	1427	32	300	377	100	0	0
Lane Group Flow (vph)	0	658	2788	0	0	1459	0	256	521	0	0	0
Confl. Peds. (#/hr)		11					11	3		17		
Turn Type	custom	Prot						Split				
Protected Phases	2	2	2 1			1		5	5			
Permitted Phases	2		1			1			5			
Actuated Green, G (s)		57.2	91.2			28.0		26.8	26.8			
Effective Green, g (s)		59.2	93.2			30.0		28.8	28.8			
Actuated g/C Ratio		0.46	0.72			0.23		0.22	0.22			
Clearance Time (s)		6.0				6.0		6.0	6.0			
Vehicle Extension (s)		3.0				3.0		3.0	3.0			
Lane Grp Cap (vph)		806	3646			1336		357	722			
v/s Ratio Prot		c0.37	0.55			c0.25		0.16	c0.16			
v/s Ratio Perm												
v/c Ratio		0.82	0.76			1.09		0.72	0.72			
Uniform Delay, d1		30.7	11.5			50.0		46.8	46.9			
Progression Factor		0.51	0.26			0.97		1.00	1.00			
Incremental Delay, d2		3.6	0.4			52.8		6.7	3.6			
Delay (s)		19.3	3.4			101.4		53.6	50.5			
Level of Service		B	A			F		D	D			
Approach Delay (s)			6.4			101.4			51.5			0.0
Approach LOS			A			F			D			A

Intersection Summary			
HCM Average Control Delay	37.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	D

c Critical Lane Group

Movement	SWR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	3
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

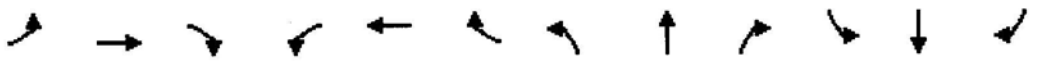


Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0		4.0		4.0	4.0			
Lane Util. Factor			0.91	1.00		0.95		0.95	0.95			
Frpb, ped/bikes			1.00	0.95		1.00		1.00	1.00			
Flpb, ped/bikes			1.00	1.00		1.00		1.00	1.00			
Frt			1.00	0.85		0.99		1.00	0.99			
Flt Protected			1.00	1.00		1.00		0.95	0.97			
Satd. Flow (prot)			5078	1508		3498		1681	1687			
Flt Permitted			1.00	1.00		1.00		0.95	0.97			
Satd. Flow (perm)			5078	1508		3498		1681	1687			
Volume (vph)	5	45	2160	140	15	1055	15	240	25	10	0	0
Peak-hour factor, PHF	0.73	0.73	0.94	0.51	1.00	0.90	0.30	0.96	0.52	0.69	1.00	1.00
Adj. Flow (vph)	7	62	2298	275	15	1172	50	250	48	14	0	0
Lane Group Flow (vph)	0	0	2367	275	0	1237	0	155	157	0	0	0
Confl. Peds. (#/hr)		26		7	7		26			17		
Turn Type	Perm	Perm		Perm	Perm			Perm				
Protected Phases			2			6			4			
Permitted Phases	2	2	2	2	6	6		4	4			
Actuated Green, G (s)			102.0	102.0		102.0		16.0	16.0			
Effective Green, g (s)			104.0	104.0		104.0		18.0	18.0			
Actuated g/C Ratio			0.80	0.80		0.80		0.14	0.14			
Clearance Time (s)			6.0	6.0		6.0		6.0	6.0			
Vehicle Extension (s)			3.0	3.0		3.0		3.0	3.0			
Lane Grp Cap (vph)			4062	1206		2798		233	234			
v/s Ratio Prot			c0.47			0.35			c0.09			
v/s Ratio Perm				0.18				0.09				
v/c Ratio			0.58	0.23		0.44		0.67	0.67			
Uniform Delay, d1			4.9	3.2		4.0		53.1	53.2			
Progression Factor			0.17	0.06		0.58		1.00	1.00			
Incremental Delay, d2			0.4	0.3		0.1		7.0	7.4			
Delay (s)			1.2	0.5		2.4		60.1	60.5			
Level of Service			A	A		A		E	E			
Approach Delay (s)			1.1			2.4			60.3			0.0
Approach LOS			A			A			E			A

Intersection Summary			
HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	101.0%	ICU Level of Service	F

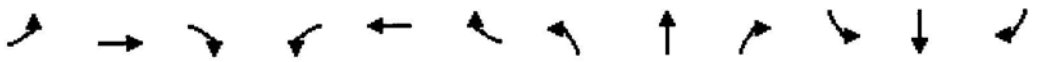
c Critical Lane Group

Movement	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↑↑↱		↰	✣			↕↕↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0			4.0	
Lane Util. Factor		0.91	1.00		0.95		0.95	0.95			0.95	
Frt		1.00	0.85		0.98		1.00	0.98			1.00	
Flt Protected		1.00	1.00		1.00		0.95	1.00			0.99	
Satd. Flow (prot)		5085	1583		3467		1681	1718			3492	
Flt Permitted		1.00	1.00		1.00		0.95	1.00			0.99	
Satd. Flow (perm)		5085	1583		3467		1681	1718			3492	
Volume (vph)	0	1520	555	0	725	45	350	205	15	70	285	10
Peak-hour factor, PHF	1.00	0.86	0.83	0.92	0.96	0.38	0.93	0.76	0.25	0.79	0.80	0.92
Adj. Flow (vph)	0	1767	669	0	755	118	376	270	60	89	356	11
Lane Group Flow (vph)	0	1767	669	0	873	0	346	360	0	0	456	0
Turn Type			Perm				Split			Split		
Protected Phases		2			6		8	8		4	4	
Permitted Phases			2									
Actuated Green, G (s)		76.0	76.0		75.0		24.0	24.0			13.0	
Effective Green, g (s)		77.0	77.0		77.0		26.0	26.0			15.0	
Actuated g/C Ratio		0.59	0.59		0.59		0.20	0.20			0.12	
Clearance Time (s)		5.0	5.0		6.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		3012	938		2054		336	344			403	
v/s Ratio Prot		0.35			0.25		0.21	c0.21			c0.13	
v/s Ratio Perm			0.42									
v/c Ratio		0.59	0.71		0.43		1.03	1.05			1.13	
Uniform Delay, d1		16.6	18.7		14.4		52.0	52.0			57.5	
Progression Factor		1.39	6.26		1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.7	3.9		0.6		57.0	61.2			85.7	
Delay (s)		23.7	121.1		15.1		109.0	113.2			143.2	
Level of Service		C	F		B		F	F			F	
Approach Delay (s)		50.5			15.1			111.1			143.2	
Approach LOS		D			B			F			F	

Intersection Summary			
HCM Average Control Delay	62.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	C
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		0.95			0.95	
Frt		0.97			1.00	0.85		0.99			1.00	
Flt Protected		1.00			0.99	1.00		0.99			0.99	
Satd. Flow (prot)		3437			3516	1583		3479			3509	
Flt Permitted		1.00			0.99	1.00		0.99			0.99	
Satd. Flow (perm)		3437			3516	1583		3479			3509	
Volume (vph)	0	320	90	25	385	130	75	500	25	145	1325	10
Peak-hour factor, PHF	1.00	0.79	0.93	0.34	0.81	0.83	0.78	0.93	0.54	0.81	0.87	0.25
Adj. Flow (vph)	0	405	97	74	475	157	96	538	46	179	1523	40
Lane Group Flow (vph)	0	502	0	0	549	157	0	680	0	0	1742	0
Turn Type				Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases				8	8	8						
Actuated Green, G (s)		18.3			18.3	18.3		22.7			47.0	
Effective Green, g (s)		18.3			18.3	18.3		22.7			47.0	
Actuated g/C Ratio		0.18			0.18	0.18		0.23			0.47	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		629			643	290		790			1649	
v/s Ratio Prot		0.15			c0.16			c0.20			c0.50	
v/s Ratio Perm						0.10						
v/c Ratio		0.80			0.85	0.54		0.86			1.06	
Uniform Delay, d1		39.1			39.6	37.0		37.1			26.5	
Progression Factor		1.00			1.00	1.00		0.86			0.87	
Incremental Delay, d2		7.0			10.7	2.1		11.4			37.0	
Delay (s)		46.1			50.2	39.1		43.4			60.1	
Level of Service		D			D	D		D			E	
Approach Delay (s)		46.1			47.8			43.4			60.1	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM Average Control Delay	52.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	110.6%	ICU Level of Service	G
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.99			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3509			3508	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.51			0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1802			3508	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	60	1320	60	95	485	100	45	390	115	70	485	70
Peak-hour factor, PHF	0.75	0.85	0.84	0.84	0.93	0.79	0.64	0.77	0.76	0.75	0.88	0.78
Adj. Flow (vph)	80	1553	71	113	522	127	70	506	151	93	551	90
Lane Group Flow (vph)	0	1704	0	0	635	127	70	506	151	93	551	90
Turn Type	Prot			Prot		Free	Prot		Free	Prot		Perm
Protected Phases	1	6		9	2 9		7	4		3	8	
Permitted Phases					2	Free		4	Free			8
Actuated Green, G (s)		42.2			56.2	100.0	4.8	25.8	100.0	6.0	27.0	27.0
Effective Green, g (s)		42.2			56.2	100.0	4.8	25.8	100.0	6.0	27.0	27.0
Actuated g/C Ratio		0.42			0.56	1.00	0.05	0.26	1.00	0.06	0.27	0.27
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		760			1971	1583	85	481	1583	106	503	427
v/s Ratio Prot					c0.18		0.04	0.27		c0.05	c0.30	
v/s Ratio Perm		c0.95				0.08			0.10			0.06
v/c Ratio		2.24			0.32	0.08	0.82	1.05	0.10	0.88	1.10	0.21
Uniform Delay, d1		28.9			11.7	0.0	47.2	37.1	0.0	46.6	36.5	28.3
Progression Factor		0.94			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		559.3			0.1	0.1	44.9	55.4	0.1	50.3	68.6	0.2
Delay (s)		586.5			11.8	0.1	92.1	92.5	0.1	97.0	105.1	28.5
Level of Service		F			B	A	F	F	A	F	F	C
Approach Delay (s)		586.5			9.9			73.3			94.7	
Approach LOS		F			A			E			F	

Intersection Summary			
HCM Average Control Delay	287.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	111.5%	ICU Level of Service	G
c Critical Lane Group			

APPENDIX C
Accident Summary

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: SA

Location: PENNSYLVANIA AVE And 33RD PL

Quadrant: SE

Summary for the time period of: 1/1/2000 To: 12/31/2002

Total Number of Accident 1

Total Number of Injuries 7

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
1	100.00%	0	0.00%	0	0.00%	0	0.00%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
0	0	0	0	0	1	0

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
0	0	0	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	0	0.00%
09:30-11:30	0	0.00%
11:30-13:30	0	0.00%
13:30-16:00	0	0.00%
16:00-18:30	0	0.00%
18:30-07:30	1	100.00%
Weekday:	0	0.00%
Weekend:	1	100.00%

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: SA

Location: Quadrant:

PENNSYLVANIA AVE And **TEXAS AVE** **SE**

Summary for the time period of: **1/1/2000** To: **12/31/2002**

Total Number of Accident **6**

Total Number of Injuries **11**

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
2	33.33%	0	0.00%	0	0.00%	4	66.67%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
2	0	0	2	0	0	1

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
1	0	0	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	1	16.67%
09:30-11:30	1	16.67%
11:30-13:30	0	0.00%
13:30-16:00	0	0.00%
16:00-18:30	1	16.67%
18:30-07:30	3	50.00%
Weekday:	5	83.33%
Weekend:	1	16.67%

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: SA

Location: PENNSYLVANIA AVE And 38TH ST

Quadrant: SE

Summary for the time period of: 1/1/2000 To: 12/31/2002

Total Number of Accident 9

Total Number of Injuries 11

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
6	66.67%	0	0.00%	1	11.11%	2	22.22%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
1	0	0	5	1	1	0

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
1	0	0	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	2	22.22%
09:30-11:30	0	0.00%
11:30-13:30	0	0.00%
13:30-16:00	2	22.22%
16:00-18:30	2	22.22%
18:30-07:30	3	33.33%
Weekday:	7	77.78%
Weekend:	2	22.22%

DCDPW: Accident Summary Report (R-4)

Date: 4/13
Prepared By: HA

Location: PENNSYLVANIA AVE And FORT DAVIS DR

Quadrant: SE

Summary for the time period of: 1/1/2000 To: 12/31/2002

Total Number of Accident 13

Total Number of Injuries 7

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
6	46.15%	0	0.00%	0	0.00%	7	53.85%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
3	0	0	5	1	0	0

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
1	0	1	0	1	0

Accident Times:

Time	Number	Percent
07:30-09:30	2	15.38%
09:30-11:30	2	15.38%
11:30-13:30	1	7.69%
13:30-16:00	0	0.00%
16:00-18:30	2	15.38%
18:30-07:30	6	46.15%
Weekday:	10	76.92%
Weekend:	3	23.08%

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: SA

Location: Quadrant:

PENNSYLVANIA AVE And **SOUTHERN AVE** **SE**

Summary for the time period of: **1/1/2000** To: **12/31/2002**

Total Number of Accident **15**

Total Number of Injuries **8**

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
8	53.33%	0	0.00%	0	0.00%	5	33.33%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
3	0	0	5	4	0	3

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
0	0	0	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	2	13.33%
09:30-11:30	1	6.67%
11:30-13:30	1	6.67%
13:30-16:00	0	0.00%
16:00-18:30	3	20.00%
18:30-07:30	8	53.33%
Weekday:	8	53.33%
Weekend:	6	40.00%

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: SA

Location: PENNSYLVANIA AVE And BRANCH AVE

Quadrant: SE

Summary for the time period of: 1/1/2000 To: 12/31/2002

Total Number of Accident ~~80~~ 79

Total Number of Injuries 44

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
39	48.75%	1	1.25%	4	5.00%	32	40.00%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
15	7	0	27	17	1	2

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
4	0	2	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	8	10.00%
09:30-11:30	13	16.25%
11:30-13:30	3	3.75%
13:30-16:00	16	20.00%
16:00-18:30	15	18.75%
18:30-07:30	24	30.00%
Weekday:	62	77.50%
Weekend:	17	21.25%

DCDPW: Accident Summary Report (R-4)

Date: 4/14
Prepared By: SA

Location: Quadrant:

PENNSYLVANIA AVE And **MINNESOTA AVE** **SE**

Summary for the time period of: **1/1/2000** To: **12/31/2002**

Total Number of Accident **125**

Total Number of Injuries **58**

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
64	51.20%	1	0.80%	5	4.00%	41	32.80%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
26	9	0	45	37	0	1

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
3	0	3	0	0	1

Accident Times:

Time	Number	Percent
07:30-09:30	17	13.60%
09:30-11:30	9	7.20%
11:30-13:30	12	9.60%
13:30-16:00	20	16.00%
16:00-18:30	21	16.80%
18:30-07:30	46	36.80%
Weekday:	100	80.00%
Weekend:	25	20.00%

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: [illegible]

Location: PENNSYLVANIA AVE And P ST

Quadrant: SE

Summary for the time period of: 1/1/2000 To: 12/31/2002

Total Number of Accident 1

Total Number of Injuries 1

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
0	0.00%	0	0.00%	0	0.00%	1	100.00%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
0	0	0	0	1	0	0

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
0	0	0	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	0	0.00%
09:30-11:30	0	0.00%
11:30-13:30	0	0.00%
13:30-16:00	0	0.00%
16:00-18:30	1	100.00%
18:30-07:30	0	0.00%
Weekday:	1	100.00%
Weekend:	0	0.00%

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: JA

Location:

PENNSYLVANIA AVE And **31ST ST**

Quadrant: **SE**

Summary for the time period of: **1/1/2000** To: **12/31/2002**

Total Number of Accident **14**

Total Number of Injuries **7**

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
8	57.14%	0	0.00%	0	0.00%	4	28.57%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
1	2	0	7	3	0	0

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
1	0	0	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	2	14.29%
09:30-11:30	1	7.14%
11:30-13:30	2	14.29%
13:30-16:00	0	0.00%
16:00-18:30	5	35.71%
18:30-07:30	4	28.57%
Weekday:	9	64.29%
Weekend:	5	35.71%

DCDPW: Accident Summary Report (R-4)

Date: 4/19
Prepared By: SMT

Location:

PENNSYLVANIA AVE And **33RD ST**

Quadrant: **SE**

Summary for the time period of: **1/1/2000** To: **12/31/2002**

Total Number of Accident **10**

Total Number of Injuries **10**

Contributing Factors:

Driver:		Vehicle:		Roadway:		Unknown:	
4	40.00%	0	0.00%	1	10.00%	5	50.00%

Collision Types:

Right Angle:	Left Turn:	Right Turn:	Rear End:	Side Swiped:	Head On:	Parked
2	2	0	3	1	0	0

Fixed Object	Ran Off Road:	Pedestrian:	Backing	Non Collision:	Other:
1	1	0	0	0	0

Accident Times:

Time	Number	Percent
07:30-09:30	2	20.00%
09:30-11:30	1	10.00%
11:30-13:30	1	10.00%
13:30-16:00	0	0.00%
16:00-18:30	3	30.00%
18:30-07:30	3	30.00%
Weekday:	7	70.00%
Weekend:	3	30.00%

APPENDIX D
Transit Ridership Data

WEEKDAY BUS STOP USAGE ON PENNSYLVANIA AVENUE SE

The following data represent weekday boardings and alightings for all Metrobus routes on Pennsylvania Avenue SE between Sousa Bridge and Southern Avenue. The data was collected in the spring of 2001 and is the most recent data available at the stop level.

Westbound stops on Pennsylvania Avenue SE at:

40th St.	19 on, 16 off
Fort Davis St.	36 on, 41 off
Texas Ave.	13 on, 0 off
Carpenter St.	22 on, 3 off
Branch Ave.	106 on, 48 off
31st St.	28 on, 20 off
30th St.	67 on, 7 off
28th St.	122 on, 41 off
O St.	16 on, 45 off
L'Enfant Sq.	1,055 on, 434 off

Eastbound stops on Pennsylvania Avenue SE at:

L'Enfant Sq.	938 on, 777 off
27th St.	90 on, 113 off
28th St.	27 on, 138 off
30th St.	12 on, 137 off
31st St.	12 on, 64 off
Branch Ave. (near side)	18 on, 105 off
Branch Ave. (far side)	14 on, 50 off
33rd St.	9 on, 15 off
Texas Ave.	2 on, 33 off
Alabama Ave.	43 on, 36 off
40th St.	51 on, 42 off

T:\RDEV\DC\Pennsylvania Ave stops.wpd

APPENDIX E
2025 No Build Capacity Analysis

Movement	EBU	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations							
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		
Lane Util. Factor		0.97	0.86	0.91	1.00		
Frt		1.00	1.00	1.00	0.85		
Flt Protected		0.95	1.00	1.00	1.00		
Satd. Flow (prot)		3433	6408	5085	1583		
Flt Permitted		0.95	1.00	1.00	1.00		
Satd. Flow (perm)		3433	6408	5085	1583		
Volume (vph)	20	975	1975	4480	525	0	0
Peak-hour factor, PHF	0.55	0.96	0.94	0.97	0.89	1.00	1.00
Adj. Flow (vph)	36	1016	2101	4619	590	0	0
Lane Group Flow (vph)	0	1052	2101	4619	590	0	0
Turn Type	Prot	Prot			Perm		
Protected Phases	7	7	2	6			
Permitted Phases				6	6		
Actuated Green, G (s)		35.0	105.0	105.0	105.0		
Effective Green, g (s)		36.0	106.0	106.0	106.0		
Actuated g/C Ratio		0.24	0.71	0.71	0.71		
Clearance Time (s)		5.0	5.0	5.0	5.0		
Vehicle Extension (s)		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		824	4528	3593	1119		
v/s Ratio Prot		c0.31	0.33	c0.91			
v/s Ratio Perm					0.37		
v/c Ratio		1.28	0.46	1.29	0.53		
Uniform Delay, d1		57.0	9.6	22.0	10.3		
Progression Factor		1.00	1.00	0.29	0.08		
Incremental Delay, d2		133.9	0.3	128.7	0.2		
Delay (s)		190.9	9.9	135.2	1.0		
Level of Service		F	A	F	A		
Approach Delay (s)			70.3	120.0		0.0	
Approach LOS			E	F		A	

Intersection Summary				
HCM Average Control Delay	101.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	125.9%	ICU Level of Service	H
c Critical Lane Group			

Movement	SEU	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0		4.0	4.0			
Lane Util. Factor		1.00	0.91			*0.85		0.91	0.91			
Frpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Flpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Frt		1.00	1.00			1.00		1.00	0.99			
Flt Protected		0.95	1.00			1.00		0.95	0.97			
Satd. Flow (prot)		1770	5085			6322		1610	3245			
Flt Permitted		0.95	1.00			1.00		0.95	0.97			
Satd. Flow (perm)		1770	5085			6322		1610	3245			
Volume (vph)	150	275	1400	0	0	3420	25	650	125	20	0	0
Peak-hour factor, PHF	0.74	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94
Adj. Flow (vph)	203	320	1522	0	0	3843	40	684	154	33	0	0
Lane Group Flow (vph)	0	523	1522	0	0	3883	0	342	529	0	0	0
Confl. Peds. (#/hr)		11					11	3		17		
Turn Type	custom	Prot						Split				
Protected Phases	2	2	2 1			1		5	5			
Permitted Phases	2		1			1			5			
Actuated Green, G (s)		31.0	113.0			73.0		23.0	23.0			
Effective Green, g (s)		34.0	116.0			78.0		26.0	26.0			
Actuated g/C Ratio		0.23	0.77			0.52		0.17	0.17			
Clearance Time (s)		7.0				9.0		7.0	7.0			
Vehicle Extension (s)		3.0				3.0		3.0	3.0			
Lane Grp Cap (vph)		401	3932			3287		279	562			
v/s Ratio Prot		c0.30	0.30			c0.61		c0.21	0.16			
v/s Ratio Perm												
v/c Ratio		1.30	0.39			1.18		1.23	1.16dl			
Uniform Delay, d1		58.0	5.5			36.0		62.0	61.2			
Progression Factor		0.88	0.03			0.79		1.00	1.00			
Incremental Delay, d2		152.2	0.1			83.4		129.2	24.2			
Delay (s)		203.3	0.2			111.8		191.2	85.5			
Level of Service		F	A			F		F	F			
Approach Delay (s)			52.1			111.8			127.0			0.0
Approach LOS			D			F			F			A

Intersection Summary			
HCM Average Control Delay	95.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	120.9%	ICU Level of Service	H

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SWR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	3
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0		4.0		4.0	4.0			
Lane Util. Factor			0.95	1.00		0.91		0.95	0.95			
Frpb, ped/bikes			1.00	0.95		1.00		1.00	1.00			
Flpb, ped/bikes			1.00	1.00		1.00		1.00	1.00			
Frt			1.00	0.85		1.00		1.00	0.99			
Flt Protected			1.00	1.00		1.00		0.95	0.96			
Satd. Flow (prot)			3523	1501		5054		1681	1681			
Flt Permitted			1.00	1.00		1.00		0.95	0.96			
Satd. Flow (perm)			3523	1501		5054		1681	1681			
Volume (vph)	30	50	1000	40	5	2840	20	575	30	15	0	0
Peak-hour factor, PHF	0.73	0.73	0.94	0.51	1.00	0.90	0.30	0.96	0.52	0.69	1.00	1.00
Adj. Flow (vph)	41	68	1064	78	5	3156	67	599	58	22	0	0
Lane Group Flow (vph)	0	0	1173	78	0	3228	0	340	339	0	0	0
Confl. Peds. (#/hr)		26		7	7		26			17		
Turn Type	Perm	Perm		Perm	Perm			Perm				
Protected Phases			2			6			4			
Permitted Phases	2	2	2	2	6	6		4	4			
Actuated Green, G (s)			105.1	105.1		105.1		32.9	32.9			
Effective Green, g (s)			107.1	107.1		107.1		34.9	34.9			
Actuated g/C Ratio			0.71	0.71		0.71		0.23	0.23			
Clearance Time (s)			6.0	6.0		6.0		6.0	6.0			
Vehicle Extension (s)			3.0	3.0		3.0		3.0	3.0			
Lane Grp Cap (vph)			2515	1072		3609		391	391			
v/s Ratio Prot			0.33			c0.64			0.20			
v/s Ratio Perm				0.05				0.20				
v/c Ratio			0.47	0.07		0.89		0.87	0.87			
Uniform Delay, d1			9.2	6.5		17.0		55.4	55.3			
Progression Factor			0.94	0.95		0.32		1.00	1.00			
Incremental Delay, d2			0.6	0.1		0.3		18.2	17.9			
Delay (s)			9.2	6.3		5.7		73.5	73.2			
Level of Service			A	A		A		E	E			
Approach Delay (s)			9.1			5.7			73.4			0.0
Approach LOS			A			A			E			A

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	124.0%	ICU Level of Service	H

c Critical Lane Group

Movement	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor		0.95	1.00		0.95		0.95	0.95			1.00	1.00
Frt		1.00	0.85		0.99		1.00	0.99			1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	0.97			0.99	1.00
Satd. Flow (prot)		3539	1583		3498		1681	1712			1849	1583
Flt Permitted		1.00	1.00		1.00		0.95	0.97			0.99	1.00
Satd. Flow (perm)		3539	1583		3498		1681	1712			1849	1583
Volume (vph)	0	625	375	0	1500	50	1325	300	10	25	150	15
Peak-hour factor, PHF	1.00	0.86	0.83	0.92	0.96	0.38	0.93	0.76	0.25	0.79	0.80	0.92
Adj. Flow (vph)	0	727	452	0	1562	132	1425	395	40	32	188	16
Lane Group Flow (vph)	0	727	452	0	1694	0	912	948	0	0	220	16
Turn Type			pm+ov				Split			Split		Perm
Protected Phases		2	8		6		8	8		4	4	
Permitted Phases			2									4
Actuated Green, G (s)		56.0	117.0		55.0		61.0	61.0			16.0	16.0
Effective Green, g (s)		57.0	120.0		57.0		63.0	63.0			18.0	18.0
Actuated g/C Ratio		0.38	0.80		0.38		0.42	0.42			0.12	0.12
Clearance Time (s)		5.0	6.0		6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1345	1309		1329		706	719			222	190
v/s Ratio Prot		0.21	0.15		c0.48		0.54	c0.55			c0.12	
v/s Ratio Perm			0.14									0.01
v/c Ratio		0.54	0.35		1.27		1.29	1.32			0.99	0.08
Uniform Delay, d1		36.3	4.1		46.5		43.5	43.5			65.9	58.7
Progression Factor		1.07	0.91		0.73		1.00	1.00			1.00	1.00
Incremental Delay, d2		1.4	0.1		128.7		141.8	153.0			57.7	0.2
Delay (s)		40.2	3.9		162.6		185.3	196.5			123.6	58.9
Level of Service		D	A		F		F	F			F	E
Approach Delay (s)		26.3			162.6			191.0			119.2	
Approach LOS		C			F			F			F	

Intersection Summary			
HCM Average Control Delay	138.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	120.0%	ICU Level of Service	H
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↰↑↑	↱		↰↑↑↱			↰↑↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		0.95			0.95	
Frt		0.98			1.00	0.85		1.00			0.99	
Flt Protected		1.00			0.99	1.00		0.99			0.99	
Satd. Flow (prot)		3462			3519	1583		3498			3473	
Flt Permitted		1.00			0.99	1.00		0.99			0.99	
Satd. Flow (perm)		3462			3519	1583		3498			3473	
Volume (vph)	0	275	55	20	375	100	200	1280	25	115	440	10
Peak-hour factor, PHF	1.00	0.79	0.93	0.34	0.81	0.83	0.78	0.93	0.54	0.81	0.87	0.25
Adj. Flow (vph)	0	348	59	59	463	120	256	1376	46	142	506	40
Lane Group Flow (vph)	0	407	0	0	522	120	0	1678	0	0	688	0
Turn Type				Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases				8	8	8						
Actuated Green, G (s)		25.0			25.0	25.0		80.4			32.6	
Effective Green, g (s)		25.0			25.0	25.0		80.4			32.6	
Actuated g/C Ratio		0.17			0.17	0.17		0.54			0.22	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		577			587	264		1875			755	
v/s Ratio Prot		0.12			c0.15			c0.48			c0.20	
v/s Ratio Perm						0.08						
v/c Ratio		0.71			0.89	0.45		0.89			0.91	
Uniform Delay, d1		59.0			61.1	56.4		31.0			57.3	
Progression Factor		1.00			1.00	1.00		0.39			1.04	
Incremental Delay, d2		3.9			15.2	1.2		5.0			15.0	
Delay (s)		62.9			76.4	57.6		17.1			74.6	
Level of Service		E			E	E		B			E	
Approach Delay (s)		62.9			72.9			17.1			74.6	
Approach LOS		E			E			B			E	

Intersection Summary			
HCM Average Control Delay	44.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	101.4%	ICU Level of Service	F
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↑↑	↱	↰	↑	↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3454			3523	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.51			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1771			3523	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	50	400	65	125	1400	100	45	400	90	30	300	60
Peak-hour factor, PHF	0.75	0.85	0.84	0.84	0.93	0.79	0.64	0.77	0.76	0.75	0.88	0.78
Adj. Flow (vph)	67	471	77	149	1505	127	70	519	118	40	341	77
Lane Group Flow (vph)	0	615	0	0	1654	127	70	519	118	40	341	77
Turn Type	Prot			Prot		custom	Prot		Perm	Prot		Perm
Protected Phases	1	6		9	2 9		7	4		3	8	
Permitted Phases					2	2		4	4			8
Actuated Green, G (s)		82.2			90.2	82.2	13.6	43.8	43.8	4.0	34.2	34.2
Effective Green, g (s)		82.2			90.2	82.2	13.6	43.8	43.8	4.0	34.2	34.2
Actuated g/C Ratio		0.55			0.60	0.55	0.09	0.29	0.29	0.03	0.23	0.23
Clearance Time (s)		4.0				4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0				3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		971			2118	867	160	544	462	47	425	361
v/s Ratio Prot					c0.47		0.04	c0.28		0.02	c0.18	
v/s Ratio Perm		0.35				0.08			0.07			0.05
v/c Ratio		1.06dl			0.78	0.15	0.44	0.95	0.26	0.85	0.80	0.21
Uniform Delay, d1		23.5			22.5	16.7	64.6	52.1	40.6	72.7	54.7	47.0
Progression Factor		0.26			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.7			1.9	0.4	1.9	27.3	0.3	77.3	10.5	0.3
Delay (s)		6.8			24.4	17.0	66.5	79.4	40.9	150.0	65.2	47.3
Level of Service		A			C	B	E	E	D	F	E	D
Approach Delay (s)		6.8			23.9			71.7			69.6	
Approach LOS		A			C			E			E	

Intersection Summary			
HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.4%	ICU Level of Service	F

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBU	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations							
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		
Lane Util. Factor		0.97	0.86	0.91	1.00		
Frt		1.00	1.00	1.00	0.85		
Flt Protected		0.95	1.00	1.00	1.00		
Satd. Flow (prot)		3433	6408	5085	1583		
Flt Permitted		0.95	1.00	1.00	1.00		
Satd. Flow (perm)		3433	6408	5085	1583		
Volume (vph)	60	1300	4390	1650	575	0	0
Peak-hour factor, PHF	0.55	0.96	0.94	0.97	0.89	1.00	1.00
Adj. Flow (vph)	109	1354	4670	1701	646	0	0
Lane Group Flow (vph)	0	1463	4670	1701	646	0	0
Turn Type		Prot			Perm		
Protected Phases		7	2	6			
Permitted Phases				6	6		
Actuated Green, G (s)		43.0	77.0	77.0	77.0		
Effective Green, g (s)		44.0	78.0	78.0	78.0		
Actuated g/C Ratio		0.34	0.60	0.60	0.60		
Clearance Time (s)		5.0	5.0	5.0	5.0		
Vehicle Extension (s)		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		1162	3845	3051	950		
v/s Ratio Prot		c0.43	c0.73	0.33			
v/s Ratio Perm					0.41		
v/c Ratio		1.26	1.21	0.56	0.68		
Uniform Delay, d1		43.0	26.0	15.6	17.6		
Progression Factor		1.00	1.00	0.44	0.60		
Incremental Delay, d2		123.7	99.1	0.1	0.4		
Delay (s)		166.7	125.1	7.0	10.9		
Level of Service		F	F	A	B		
Approach Delay (s)			135.0	8.1		0.0	
Approach LOS			F	A		A	

Intersection Summary			
HCM Average Control Delay	99.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	D
c Critical Lane Group			

Movement	SEU	SEL	SET	SER	NWL	NWT	NWR	NEU	NET	NER	SWL	SWT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0		4.0	4.0			
Lane Util. Factor		1.00	0.91			*0.78		0.91	0.91			
Frpb, ped/bikes		1.00	1.00			1.00		1.00	0.99			
Flpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Frt		1.00	1.00			0.99		1.00	0.98			
Flt Protected		0.95	1.00			1.00		0.95	1.00			
Satd. Flow (prot)		1770	5085			5775		1610	3268			
Flt Permitted		0.95	1.00			1.00		0.95	1.00			
Satd. Flow (perm)		1770	5085			5775		1610	3268			
Volume (vph)	25	650	3115	0	0	1500	40	340	400	65	0	0
Peak-hour factor, PHF	0.74	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94
Adj. Flow (vph)	34	756	3386	0	0	1685	63	358	494	108	0	0
Lane Group Flow (vph)	0	790	3386	0	0	1748	0	311	649	0	0	0
Confl. Peds. (#/hr)		11					11	3		17		
Turn Type	custom	Prot						Split				
Protected Phases	2	2	2 1			1		5	5			
Permitted Phases	2		1			1			5			
Actuated Green, G (s)		43.0	78.0			29.0		17.0	17.0			
Effective Green, g (s)		45.0	80.0			31.0		19.0	19.0			
Actuated g/C Ratio		0.35	0.62			0.24		0.15	0.15			
Clearance Time (s)		6.0				6.0		6.0	6.0			
Vehicle Extension (s)		3.0				3.0		3.0	3.0			
Lane Grp Cap (vph)		613	3129			1377		235	478			
v/s Ratio Prot		c0.45	0.67			c0.30		0.19	c0.20			
v/s Ratio Perm												
v/c Ratio		1.29	1.08			1.27		1.32	1.36			
Uniform Delay, d1		42.5	25.0			49.5		55.5	55.5			
Progression Factor		0.53	0.20			1.12		1.00	1.00			
Incremental Delay, d2		131.1	37.6			126.2		172.0	174.2			
Delay (s)		153.5	42.6			181.5		227.5	229.7			
Level of Service		F	D			F		F	F			
Approach Delay (s)			63.5			181.5			229.0			0.0
Approach LOS			E			F			F			A

Intersection Summary			
HCM Average Control Delay	116.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	35.0
Intersection Capacity Utilization	102.2%	ICU Level of Service	F

c Critical Lane Group

Movement	SWR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	3
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0		4.0		4.0	4.0			
Lane Util. Factor			0.91	1.00		0.95		0.95	0.95			
Frpb, ped/bikes			1.00	0.95		0.99		1.00	0.99			
Flpb, ped/bikes			1.00	1.00		1.00		1.00	1.00			
Frt			1.00	0.85		0.99		1.00	0.97			
Flt Protected			1.00	1.00		1.00		0.95	0.99			
Satd. Flow (prot)			5078	1508		3494		1681	1675			
Flt Permitted			1.00	1.00		1.00		0.95	0.99			
Satd. Flow (perm)			5078	1508		3494		1681	1675			
Volume (vph)	5	50	2525	150	20	1275	20	260	70	35	0	0
Peak-hour factor, PHF	0.73	0.73	0.94	0.51	1.00	0.90	0.30	0.96	0.52	0.69	1.00	1.00
Adj. Flow (vph)	7	68	2686	294	20	1417	67	271	135	51	0	0
Lane Group Flow (vph)	0	0	2761	294	0	1504	0	228	229	0	0	0
Confl. Peds. (#/hr)		26		7	7		26			17		
Turn Type	Perm	Perm		Perm	Perm			Perm				
Protected Phases			2			6			4			
Permitted Phases	2	2	2	2	6	6		4	4			
Actuated Green, G (s)			95.7	95.7		95.7		22.3	22.3			
Effective Green, g (s)			97.7	97.7		97.7		24.3	24.3			
Actuated g/C Ratio			0.75	0.75		0.75		0.19	0.19			
Clearance Time (s)			6.0	6.0		6.0		6.0	6.0			
Vehicle Extension (s)			3.0	3.0		3.0		3.0	3.0			
Lane Grp Cap (vph)			3816	1133		2626		314	313			
v/s Ratio Prot			c0.54			0.43			c0.14			
v/s Ratio Perm				0.20				0.14				
v/c Ratio			0.72	0.26		0.57		0.73	0.73			
Uniform Delay, d1			8.8	5.0		7.0		49.7	49.8			
Progression Factor			0.09	0.00		0.09		1.00	1.00			
Incremental Delay, d2			0.1	0.1		0.2		8.1	8.5			
Delay (s)			0.9	0.1		0.8		57.8	58.3			
Level of Service			A	A		A		E	E			
Approach Delay (s)			0.8			0.8			58.1			0.0
Approach LOS			A			A			E			A

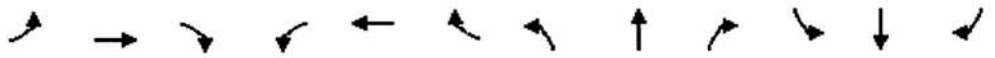
Intersection Summary			
HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	118.4%	ICU Level of Service	G

c Critical Lane Group

Movement	SBR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↑↑↱		↰	↕			↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor		0.91	1.00		0.95		0.95	0.95			1.00	1.00
Frt		1.00	0.85		0.98		1.00	0.98			1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)		5085	1583		3455		1681	1724			1845	1583
Flt Permitted		1.00	1.00		1.00		0.95	1.00			0.99	1.00
Satd. Flow (perm)		5085	1583		3455		1681	1724			1845	1583
Volume (vph)	0	1725	725	0	800	60	450	300	20	85	350	15
Peak-hour factor, PHF	1.00	0.86	0.83	0.92	0.96	0.38	0.93	0.76	0.25	0.79	0.80	0.92
Adj. Flow (vph)	0	2006	873	0	833	158	484	395	80	108	438	16
Lane Group Flow (vph)	0	2006	873	0	991	0	471	488	0	0	546	16
Turn Type			pm+ov				Split			Split		Perm
Protected Phases		2	8		6		8	8		4	4	
Permitted Phases			2									4
Actuated Green, G (s)		47.0	79.0		46.0		32.0	32.0			34.0	34.0
Effective Green, g (s)		48.0	82.0		48.0		34.0	34.0			36.0	36.0
Actuated g/C Ratio		0.37	0.63		0.37		0.26	0.26			0.28	0.28
Clearance Time (s)		5.0	6.0		6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1878	1047		1276		440	451			511	438
v/s Ratio Prot		c0.39	0.22		0.29		0.28	c0.28			c0.30	
v/s Ratio Perm			0.33									0.01
v/c Ratio		1.07	0.83		0.78		1.07	1.08			1.07	0.04
Uniform Delay, d1		41.0	18.7		36.3		48.0	48.0			47.0	34.3
Progression Factor		0.51	0.04		0.74		1.00	1.00			1.00	1.00
Incremental Delay, d2		39.1	4.3		4.6		63.0	66.3			59.4	0.0
Delay (s)		60.1	5.0		31.6		111.0	114.3			106.4	34.4
Level of Service		E	A		C		F	F			F	C
Approach Delay (s)		43.4			31.6			112.6			104.3	
Approach LOS		D			C			F			F	

Intersection Summary			
HCM Average Control Delay	59.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	103.9%	ICU Level of Service	F
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		0.95			0.95	
Frt		0.97			1.00	0.85		0.99			1.00	
Flt Protected		1.00			0.99	1.00		0.99			0.99	
Satd. Flow (prot)		3429			3512	1583		3477			3505	
Flt Permitted		1.00			0.99	1.00		0.99			0.99	
Satd. Flow (perm)		3429			3512	1583		3477			3505	
Volume (vph)	0	375	115	35	450	155	100	610	30	170	1495	15
Peak-hour factor, PHF	1.00	0.79	0.93	0.34	0.81	0.83	0.78	0.93	0.54	0.81	0.87	0.25
Adj. Flow (vph)	0	475	124	103	556	187	128	656	56	210	1718	60
Lane Group Flow (vph)	0	599	0	0	659	187	0	840	0	0	1988	0
Turn Type				Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases				8	8	8						
Actuated Green, G (s)		22.0			22.0	22.0		30.0			66.0	
Effective Green, g (s)		22.0			22.0	22.0		30.0			66.0	
Actuated g/C Ratio		0.17			0.17	0.17		0.23			0.51	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		580			594	268		802			1779	
v/s Ratio Prot		0.17			c0.19			c0.24			c0.57	
v/s Ratio Perm						0.12						
v/c Ratio		1.03			1.11	0.70		1.05			1.12	
Uniform Delay, d1		54.0			54.0	50.9		50.0			32.0	
Progression Factor		1.00			1.00	1.00		0.89			0.49	
Incremental Delay, d2		46.1			70.7	7.7		43.6			59.6	
Delay (s)		100.1			124.7	58.6		88.1			75.2	
Level of Service		F			F	E		F			E	
Approach Delay (s)		100.1			110.0			88.1			75.2	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM Average Control Delay	88.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.9%	ICU Level of Service	H
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑			↑↑	↱	↰	↑	↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.99			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3508			3507	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.48			0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1697			3507	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	75	1500	70	120	600	125	60	450	140	85	550	80
Peak-hour factor, PHF	0.75	0.85	0.84	0.84	0.93	0.79	0.64	0.77	0.76	0.75	0.88	0.78
Adj. Flow (vph)	100	1765	83	143	645	158	94	584	184	113	625	103
Lane Group Flow (vph)	0	1948	0	0	788	158	94	584	184	113	625	103
Turn Type	Prot			Prot		custom	Prot		Perm	Prot		Perm
Protected Phases	1	6		9	2 9		7	4		3	8	
Permitted Phases					2	2		4	4			8
Actuated Green, G (s)		74.0			83.0	74.0	6.0	28.0	28.0	7.0	29.0	29.0
Effective Green, g (s)		74.0			83.0	74.0	6.0	28.0	28.0	7.0	29.0	29.0
Actuated g/C Ratio		0.57			0.64	0.57	0.05	0.22	0.22	0.05	0.22	0.22
Clearance Time (s)		4.0				4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0				3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		966			2239	901	82	401	341	95	416	353
v/s Ratio Prot					c0.22		0.05	c0.31		0.06	c0.34	
v/s Ratio Perm		c1.15				0.10			0.12			0.07
v/c Ratio		2.02			0.35	0.18	1.15	1.46	0.54	1.19	1.50	0.29
Uniform Delay, d1		28.0			11.0	13.4	62.0	51.0	45.3	61.5	50.5	42.0
Progression Factor		0.29			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		457.8			0.1	0.4	144.3	218.8	1.6	152.0	238.4	0.5
Delay (s)		466.0			11.1	13.8	206.3	269.8	46.9	213.5	288.9	42.4
Level of Service		F			B	B	F	F	D	F	F	D
Approach Delay (s)		466.0			11.5			215.3			248.5	
Approach LOS		F			B			F			F	

Intersection Summary			
HCM Average Control Delay	285.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.76		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.7%	ICU Level of Service	H
c Critical Lane Group			

APPENDIX F
Public Comments and Meeting Minutes

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
SCOPING MEETING
APRIL 28, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

The residents in ANC 7A07 (Fairlawn Avenue and M Street) have expressed disapproval of any walk-way or other structure (or roadway) to be constructured in that neighborhood.

Due to the current climate of drug activity, illicit the harmful problems and illegal dumping that exists we do not consider the above as a viable solution to access into Anacostia Park.

Entrances at Good Hope Road and Naylor Road need to be redesigned to accept traffic flow into the park.

NAME:

ADDRESS:

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
SCOPING MEETING
APRIL 28, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

I would like to see Fairlawn Ave SE (2300 - 2900 block) included in the ~~Study~~.

We experience an inordinate amount of drop-off traffic from Minnesota Ave. (ie 6:30 - 9:30 AM RUSH HOUR).

Fairlawn Ave is adjacent to the CSX Transportation railroad line. We have NO sidewalks or developed infrastructure - a huge pedestrian nightmare.

I'd like to have the patterns of traffic reviewed, documented and perhaps implement a plan that will: (1) traffic calm; (2) keep the lead road - Minnesota Ave. more accessible for residents (wider or stripping); slow down traffic

* Metro buses stop @ RR Tracks (wait for 10-20secs)

NAME: Dolly Davis, Commissioner ANC 7A07
ADDRESS: 2727 FAIRLAWN AVE SE #102
WASH DC 20019 home# 202/581-2707
email drdolly@aol.com

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
SCOPING MEETING
APRIL 28, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

One means to deter speeding on Pa. Ave., SE:
1) Placement of traffic cameras at designated points of speeding

Relief of traffic congestion - one means:
1) Travel of commercial vehicles + trucks to commence at 9:30 AM

- Survey to look at cut through traffic into the neighborhood, especially during rush hours (AM + PM) on Pa. Ave.

NAME: Mrs. Sallie Thornton
ADDRESS: 3267 "O" St., SE
Wash., DC 20020-2315

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
SCOPING MEETING
APRIL 28, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

ON PENN. AVE during rush hour. Would like to see lights which light up, and tell how many lanes during rush hour. vs. non Rush hour. i.e. Capitol Hill and Conn Ave. N.W.

NAME: PAT TERRELL

ADDRESS: 3318-B W St SE WDC 20020

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
PUBLIC MEETING NO. 3
JULY 14, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

1. THE GOAL OF HELPING RESIDENTS GET AROUND IN THE COMMUNITY / IT IS UNCLEAR HOW WAYFINDING SIGNS SERVE THAT PURPOSE.
2. AT THE INTERSECTION OF TEXAS AVE & PA. AVE, A STOP SIGN OR LIGHT AT THIS LOCATION WILL HELP RESIDENTS.
3. PEDESTRIAN ~~ACCESS~~ ACCESSIBILITY AT PA. AVE & BRANCH WILL BE SEVERELY RESTRICTED WITH A CONTINUOUS TURNING LANE
4. A GREAT DEAL OF SHORT TERM SOLUTIONS LEAD TO LONG TERM PROBLEMS. ADDITIONAL TURNING LANES AT SOUTHERN ETC. INCREASE TRAFFIC FLOW ETC.
5. THE AREA AT PA. AVE & BRANCH AVE SHOULD BE MORE PEDESTRIAN FRIENDLY. THE EXISTING PROPOSALS DON'T HELP THIS PROBLEM.
6. WILL THE PROPOSED INTERCHANGE AT PA AVE & FREEWAY INTERFERE WITH ACCESS TO D.C. STADIUM?
7. PEDESTRIAN FRIENDLY VERSUS COMMUNITY INTEREST?

NAME:
ADDRESS:

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
PUBLIC MEETING NO. 3
JULY 14, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

* Close off the driveway entrance exit @ Citgo @ the 2300 Fairlawn Ave SE.

HOLD THIS THOUGHT →

* I like the idea of Closing 2300 blk of Fairlawn to the alley. Traffic illegally uses this roadway to dump out onto Penn. Ave. (pg. 61) * (will need to consult with constituents)

* I like the idea of the Single Point Urban Diamond interchange @ Anacostia Freeway / Penn Ave (pg. 97).

* I like the overhead reversible lane signs. (pg. 90)

* Transit - Bus pullover - Metro buses are notorious for blocking traffic anyway regardless of the pullover lane (pg. 87)

* I like enabling 29th Street to get across to 28th place easier (pg. 86).

* What will happen to the tracks when CSX leaves the light rail through (pg. 71)

NAME: Dolly Dennis, Commissioner ANC 7A07

ADDRESS: dcdolly@aol.com

* It is no mystery that Minn. + PA. Ave. has had many traffic (vehicle) accidents. Any improvement would be welcomed.

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
PUBLIC MEETING NO. 3
JULY 14, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

- Complete sidewalk ASAP missing between 31st & Branch Ave SE. This needs to be done w/in the next 12 mos - even if the other missing sidewalks along Penn Ave SE cannot be done due to cost.
- West Way finding Signs - HCCA worked w/ Downtown BID on locations where way finding signs are needed east of Sousa Bridge
- Do Something to control Eastbound Penn Ave SE left turns @ I-295 Northbound ASAP. Hate to wait 12 mos to get something done here.
- Fix Crosswalk walk button @ 31st & Penn Ave SE on Both sides of Penn Ave SE -.

NAME: Vince Spaulding
ADDRESS: 3180 Westover Dr, SE
Wash DC 20020
(202) 575-6101 (H) (202) 441-3585 (Gen)

PENNSYLVANIA AVENUE, SE
TRANSPORTATION STUDY
PUBLIC MEETING NO. 3
JULY 14, 2003

COMMENT FORM

PLEASE PROVIDE ANY GENERAL COMMENTS OR SUGGESTIONS IN THE SPACE PROVIDED BELOW.

"Corridor Options
Overall Circulation of Penn. Ave.
Long term options
Place overhead Signs"

Comments: Signs and sign holders should be attractive and not commercial-looking. They should be residential in character

NAME: Mary F. Ross
ADDRESS: 2901 Park Dr., S.E.
Washington, DC 20020-3348

Pennsylvania Avenue, SE Transportation Study
Notes from Public Meeting No. 1: April 28, 2003

The Pennsylvania Avenue, SE Transportation Study scoping meeting was presented as an agenda point at the April, 2003 monthly meeting of the East of Sousa Bridge Pennsylvania Avenue Revitalization Task Force meeting.

Attached are copies of the handouts provided at the meeting with regards to the Pennsylvania Avenue, SE Transportation Study. This includes the agenda, the presentation, completed comment forms, completed sign in sheets, draft scope of service (as provided by the District Department of Transportation – DDOT), and the consolidated community response (as provided by DDOT from the May 29, 2002 presentation).

Below is a summary of the comments heard at the April 28, 2003 meeting regarding the Pennsylvania Avenue, SE Transportation Study.

Need to Serve Local Community as well as Commuters

- Pennsylvania Avenue, SE needs to serve the residents better with left turning maneuvers as well as crossing from one side of Pennsylvania Avenue, SE to the other side.
- Pennsylvania Avenue, SE is unsafe for pedestrians due to volume, speed of traffic, and cut-through traffic.

Need to Reduce Speeding and Improve Safety along Pennsylvania Avenue, SE

- One suggestion to help with speeding is to use a portable Speed Signs that shows the posted speed as well as the speed at which the driver is traveling.
- Speed bumps are requested to be installed along 28th Street.
- One suggestion to reduce speeds along Pennsylvania Avenue, SE is to add more coordinated signals between Branch Avenue and 28th Street.
- The use of red light cameras was questioned in this area as to whether the existing cameras were operational. Additionally it was suggested to determine if the incorporation of additional red light cameras could be beneficial to the area.

Need to Handle Congestion More Efficiently

- Minnesota Avenue northbound is congested during the morning peak from Good Hope Road to Pennsylvania Avenue, SE. This congestion directly impacts the residents there who have stated that they are unable to get out of their driveways due to this congestion.
- Need to discourage commuting patterns from utilizing the cross streets and cutting through neighborhoods.
- Traffic from Minnesota Avenue is cutting over to Fairlawn Avenue to access the ramp onto 295. These vehicles are usually speeding which is a concern as Fairlawn Avenue does not have sidewalks for pedestrians. Fairlawn Avenue also uses amber lighting which makes it difficult to see pedestrians.

- One of the pressure points along Pennsylvania Avenue, SE is at Branch Avenue (EB) when three lanes merge into two lanes.
- Eliminate commercial vehicles during the rush hour
- Add more lanes during the rush hour. Currently in the morning rush there are three lanes heading westbound and two eastbound, which then reverses in the evening peak (two lanes heading westbound and three lanes heading eastbound). The suggestion was for the morning rush hour to provide four lanes westbound and one lane eastbound, and for the evening rush hour to provide one lane westbound and four lanes eastbound.
- It was stated that one of the primary sources of congestion is due to the fact that there are too few crossings over the river.
- A suggestion was made to utilize overhead signals above the reversible lane.

Need to Improve the Intersection with I-295 North including the CSX Rail Crossing

- Congestion to gain access to the 295 North on ramp is an issue. Due to this congestion there are aggressive drivers who will drive next to the turn lanes and cut in towards the signal. This also blocks other through lanes. The suggestion was made that some type of structure could be installed to stop the aggressive driving.
- All Metrobuses stop at the train tracks which creates a backup for other travelers.
- It was stated that the CSX Rail Lines are not in use at this location. The suggestion was made that the rail lines should be used to incorporate light rail into the area from Anacostia to Massachusetts Avenue. This will help with the commercial redevelopment along the corridor.

It was stated that there will be coordination between the Anacostia River Waterfront Initiative Project and the Pennsylvania Avenue, SE Transportation Study.

It was also stated that some of the short-term solutions coming out of this study could potentially be implemented within 12 months of completion of the study.

Pennsylvania Avenue, SE Transportation Study
Notes from Public Meeting No. 2: June 2, 2003

The Pennsylvania Avenue, SE Transportation Study second public meeting was held on June 2, 2003 from 6:30PM – 8:30PM at the Pennsylvania Avenue Baptist Church. The purpose of this meeting was to present the findings from the data collection and analyses completed to date as well as present preliminary short-term and long-term options.

Attached are copies of the handouts provided at the meeting with regards to the Pennsylvania Avenue, SE Transportation Study. This includes the agenda, the presentation, and completed sign in sheets.

Below is a summary of the comments heard at the June 2, 2003 meeting regarding the Pennsylvania Avenue, SE Transportation Study.

Need to Improve Pedestrian Safety

- Pedestrian safety at the intersection of Pennsylvania Avenue/31st Street is poor. It was stated that this is a major crossing for school children attending Randall Highlands Elementary School and many motorists speed through this intersection as well as run the red light.

- Due to the volume of traffic as well as the speed of traffic, it is currently unsafe for pedestrians, specifically the school children in the area, to cross Pennsylvania Avenue, SE.

- Motorists traveling north along Minnesota Avenue tend to pick up speed after they pass through the intersection of Pennsylvania Avenue/Minnesota Avenue. This is an area of concern due to the school in the area.

- It was stated that Pennsylvania Avenue, SE is classified as a Scenic Byway and as such, the preference along the corridor should be for pedestrians.

Need to Better Serve Local Community as well as Commuters

- Pennsylvania Avenue, SE physically splits the neighborhoods and detracts from the sense of "community." The proposed options should address this concern of bringing both sides of Pennsylvania Avenue, SE together to create the sense of a single community.

- It was stated that to better understand the impacts of the traffic along the Pennsylvania Avenue, SE corridor, an understanding of the major feeder routes should be gained. These feeder routes include, but are not limited to; Good Hope Road, Minnesota Avenue, Branch Avenue, and Alabama Avenue.

- One suggestion to improve mobility along the Pennsylvania Avenue, SE corridor is to provide for transit incentives and/or high occupancy vehicles (HOV) incentives.

Need to Deter Cut-Through Traffic from the Local Community

- It was stated that motorists cut across residential roads to pick up Fairlawn Avenue. Motorists travel southbound on Fairlawn Avenue, often ignoring the signs indicating that the road is one-way northbound during peak hours. The motorists either exit Fairlawn Avenue to access the Anacostia Freeway northbound, or cut through the Citgo parking lot to access Pennsylvania Avenue, SE westbound.

- It was stated that if one-way flow pattern is considered that it should not cut the residents off from gaining access to their houses during the evening peak hours.

- Minnesota Avenue and 25th Street are both used as cut-throughs to gain access to Naylor Road.

Need to Improve Traffic Operations along Pennsylvania Avenue, SE

- It was stated that the timing of the traffic signal at Pennsylvania Avenue, SE/Branch Avenue does not adequately provide for motorists wishing to turn left onto northbound Branch Avenue.

- A bottleneck occurs just east of the intersection of Pennsylvania Avenue, SE/Branch Avenue due to vehicles turning into the Penn Branch shopping center. It was stated that these left turns should be minimized. It was also stated that a portion of these left turns are motorists who were unable to complete the left turn onto Branch Avenue northbound at the intersection and are using the shopping center as a cut-through.

- One suggestion to increase safety and potentially improve overall traffic operations is to provide for left-turn pockets along Pennsylvania Avenue, SE, potentially through the use of a median.

It was stated that the preliminary short-term and long-term options are in the process of being analyzed and will be presented at the next public meeting.

Pennsylvania Avenue, SE Transportation Study
Notes from Public Meeting No. 3: July 14, 2003

The Pennsylvania Avenue, SE Transportation Study's third public meeting was held on July 14, 2003 from 6:30 PM – 8:30 PM at the Pennsylvania Avenue Baptist Church. The purpose of this meeting was to present the short-term and long-term options that had been developed and analyzed and to receive citizen comments regarding the options.

Many of the residents have received a copy of the technical report. This report documents to DDOT that the proposed improvements are technically sound. Before improvements are approved, they also need to obtain community support.

Attached are copies of the handouts provided at the meeting with regards to the Pennsylvania Avenue, SE Transportation Study. This includes the agenda, presentation, options matrix, completed comment forms, and completed sign in sheets.

Below is a summary of the comments heard at the July 14, 2003 meeting regarding the Pennsylvania Avenue, SE Transportation Study.

General Comments

- There was an overall concern with the amount of support for this project from several citizens. Representatives from DDOT stated that there is a commitment behind this project and the District is moving forward with their efforts.

- Traffic Calming – Representatives from DDOT stated that their policy on placing traffic calming devices is to have the community petition through their ANC for a specific location. Once the petition has been completed, DDOT will then evaluate the location for a traffic calming device.

- Bicycle Lanes – It was suggested that signage for bicycles should be placed such that bicyclists are encouraged to use Massachusetts Avenue to Randle Circle. At Randle Circle, bicyclists can come south along Fairlawn Avenue to access the bicycle facilities along the Sousa Bridge to cross the Anacostia River.

Corridor Improvements

- Variable Speed Display – Citizens stated that the sign does reinforce the posted speed to the driver, but overall it was felt that the sign would not be enough. It was stated that law enforcement is the real solution, and enforcement within this area needs to be increased. Another option stated by a citizen to help with the speeding issue is to examine the possibility of attaining speed cameras (similar to red light running cameras).

- Red Light Running Cameras – The report specifies a 35-mm camera as the standard for these systems. One suggestion was to research further what type

of system would require the least amount of maintenance. It was stated by the consultant team that the cameras that will be recommended for placement will be similar to what is already utilized to maintain consistency.

- Transit Amenities – It was stated that before transit amenities are placed at a bus stop, the surrounding area should be examined to ensure that the amenities will not be mis-used. It was suggested that if a bus shelter is recommended to be installed, no benches should be included.

Pennsylvania Avenue, SE/Southern Avenue Area Options

- Parking – It was stated that the parking along Pennsylvania Avenue, SE at the west end should be eliminated. This area is currently signed such that the parking is not permitted during the AM peak period in the westbound direction and not permitted during the PM peak period in the eastbound direction; however there are violators to these conditions.

- It was suggested that an aesthetically pleasing gateway treatment be placed east of the intersection of Pennsylvania Avenue, SE/Southern Avenue to help promote to motorists that they are entering a residential area.

Pennsylvania Avenue, SE/Branch Avenue Area Options

- Signal Timing: Pennsylvania Avenue, SE/Branch Avenue – It was stated by a citizen that signal timing at the Pennsylvania Avenue, SE/Branch Avenue intersection needs to be improved.

- Signals: Pennsylvania Avenue, SE/Texas Avenue – It was stated that it is very difficult to access Pennsylvania Avenue, SE in either direction from Texas Avenue. According to the citizens, there have been several accidents at this location due to the high speed of vehicles along Pennsylvania Avenue, SE and the number of vehicles accessing the neighborhoods off of Texas Avenue. It was suggested that this location be analyzed for a traffic signal. In addition, it was stated that this intersection is approximately half-way between the traffic signal to the east and west, both of which are a considerable distance away. This distance between signals tends to promote speeding.

- Signals: Pennsylvania Avenue, SE/Texas Avenue – It was stated that if nothing can be done at this location, then law enforcement needs to be increased to handle the speeding problem.

- Signals: Texas Avenue/Carpenter Street – A citizen stated that there are several safety issues at this location including a number of accidents within the past several years.

- Pavement Options – Representatives from DDOT stated that this option to re-mark the northbound approach of Branch Avenue to a separate left turn lane

and a shared left/thru/right turn lane is supposed to be in existence today according to DDOT plans.

- Sidewalks: Pennsylvania Avenue, SE/Branch Avenue – It was requested by a citizen that the missing sidewalk on the south side of Pennsylvania Avenue, SE west of Branch Avenue be installed with some type of railing between the sidewalk and the roadway to increase safety for the pedestrians due to the lack of buffer in the area.

- Roadway Improvements: Pennsylvania Avenue, SE/Branch Avenue – It was stated that the free flowing right turn lane from eastbound Pennsylvania Avenue, SE to southbound Branch Avenue is not pedestrian friendly. There is a bus stop on the near side at this location that is highly used. Currently the pedestrians have a difficult time crossing this location. It was suggested to possibly incorporate the bus stop with the signal such that when a bus stops to drop off passengers, the pedestrian signal comes up allowing for safe crossing of Branch Avenue.

Randle Highlands Elementary School Area Options

- Randle Highlands Elementary School – It was stated that the pedestrian signals need to be repaired at the intersection of Pennsylvania Avenue, SE/31st Street. In addition, this is a major crossing for the school children in the area. It was suggested that a countdown board, modified for children to easily see and understand, be placed at this location.

Pennsylvania Avenue, SE/29th Street/28th Place Area Options

- Pennsylvania Avenue, SE/29th Street/28th Place – It was stated that there is a red light that will be installed in front of Engine Company Number 19. According to the Strategic Neighborhood Action Plan for Neighborhood Cluster 34, it was stated that DDOT will install the traffic signal during the third quarter of fiscal year 2003.

- Intersection Improvements: Pennsylvania Avenue, SE/29th Street/28th Place – It was stated that the consultant team should look at the access points of the places along the roadways that would be altered to ensure that we are not negatively impacting these access points.

Pennsylvania Avenue, SE/27th Street Area Options

- Turn Lane Lengths: Pennsylvania Avenue, SE/27th Street – It was stated that the apartment complex, Marvin Gardens, at this location has no parking other than on-street parking. This option would negatively impact a certain amount of this parking. The citizens at the meeting stated that this option should be removed because of the negative impact the elimination of parking would have on the residents along this roadway.

Pennsylvania Avenue, SE/Minnesota Avenue Area Options

- Intersection Improvements: Pennsylvania Avenue, SE/Minnesota Avenue – It was recommended that if this location does get realigned, the configuration of the intersection should allow for vehicles traveling westbound on Pennsylvania Avenue, SE to turn left onto southbound Minnesota Avenue. This will be looked into in the future. In addition, the community strongly endorsed the unification of the parklands that would occur with this option.

- Intersection Improvements: It was questioned how 25th Street would be tied into the traffic signal with the realignment of this intersection. This will be looked into in the future.

- Intersection Improvements: Pennsylvania Avenue, SE/Minnesota Avenue – It was stated that the realignment of the intersection would hurt the pedestrians by bringing all of the traffic to one location and forcing the pedestrians to cross at the same place.

- Transit: Westbound Pennsylvania Avenue, SE/L'Enfant Square – It was suggested to provide a bus pull-over lane for the bus stop located just west of the intersection with L'Enfant Square.

- Transit: Bus Pull-Over Lane – It was stated that bus pull-over lanes are not fully utilized or recommended because if a bus does pull all the way into the pull-over lanes, then it is very difficult for the bus to get back in to traffic, therefore several buses will still remain partially within the roadway to ensure that they will be able to pull back into traffic. This eliminates the usefulness of the bus pull-over lane.

- Pedestrians – It was stated that pedestrians are at danger crossing anywhere on the west end of Pennsylvania Avenue, SE. At the west end of the study area, pedestrians tend to cross anywhere, not just at the intersections. This is a safety issue.

Pennsylvania Avenue, SE/Fairlawn Avenue Area Options

- Channelization: Pennsylvania Avenue, SE/Fairlawn Avenue – It was suggested that a barrier be placed along the eastbound left turn lanes for the length of the median opening at Pennsylvania Avenue, SE/Anacostia Freeway (I-295) to provide even more barriers in addition to the channelized island.

- Traffic Calming: Pennsylvania Avenue, SE/Fairlawn Avenue – It was stated that the citizens along Fairlawn Avenue may not like this option of closing off Fairlawn Avenue from south of L'Enfant Square to Pennsylvania Avenue, SE, but was acknowledged that it will improve safety along the roadway. Dolly Davis stated that she would discuss this issue with residents of Fairlawn Avenue.

Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange Area Options

- Pavement Markings: Pennsylvania Avenue/Anacostia Freeway (I-295) – It was suggested that flexi-poles be installed to further channelize the left-turns from eastbound Pennsylvania Avenue, SE onto the on-ramp.

- Interchange Configuration: Pennsylvania Avenue, SE/Anacostia Freeway (I-295) – It was stated that this is the biggest problem along Pennsylvania Avenue, SE and this is the best solution.

Pennsylvania Avenue, SE Transportation Study
Notes from Public Meeting No. 4: August 18, 2003

The Pennsylvania Avenue, SE Transportation Study's fourth public meeting was held on August 18, 2003 from 6:30 PM – 8:30 PM at the Pennsylvania Avenue Baptist Church. The purpose of this meeting was to present revisions to the short-term and long-term options based on community input from the July 14, 2003 Public Meeting and to receive any additional citizen comments regarding the options.

Attached are copies of the handouts provided at the meeting with regards to the Pennsylvania Avenue, SE Transportation Study. This includes the agenda, presentation, options matrix, and completed sign in sheets.

Below is a summary of the comments heard at the August 18, 2003 meeting regarding the Pennsylvania Avenue, SE Transportation Study.

Corridor Improvements

- There were several locations in which citizens from the community have recommended consideration for traffic calming devices to either slow traffic down or deter the cut-through traffic that is occurring. It was stated that these requests need to be made to the ANC's through the traffic calming process (which can be found on the DDOT website at http://ddot.dc.gov/services/traffic_calming/policies.shtm).

- A suggestion was made that all crosswalks along Pennsylvania Avenue, SE be fitted with in-street blinking lights that are activated by the pedestrian to increase awareness to the motorists of the crosswalk as well as safety for the pedestrian during the evening hours. It was stated by the consultant team that this technology has not been used in geographic areas that have snow due to the maintenance issues when the snow plows run over the in-street crosswalk lights.

- It was stated that DDOT is placing sidewalks throughout the City to fill in the sidewalk gaps. It was suggested by a citizen that DDOT should prioritize the sidewalks within the study area to first fill in any gaps along Pennsylvania Avenue, SE and then fill in the sidewalk gaps along the side streets.

- There are several intersections along Pennsylvania Avenue, SE in which citizens requested a left turn arrow be utilized during non-peak hours to aid the access of these communities. The specific intersections with Pennsylvania Avenue, SE called out in the meeting were 28th Street, 30th Street, and 31st Street.

- There are several locations in which conditional one-way signs have been placed on local roads to deter cut-through traffic. These conditional one-way signs are in effect from 7:00 AM until 9:30 AM. It was stated that for the

community south of Pennsylvania Avenue, SE in the vicinity of Alabama Avenue and Branch Avenue there are several streets in which these signs allow the residents to exit their homes but prohibit access back into the community during 7:00 AM until 9:30 AM. It should be noted that these locations are outside of the Pennsylvania Avenue, SE Transportation Study area.

Pennsylvania Avenue, SE/38th Street

- It was stated that the Church of Jesus Christ, Inc. located at the northwest corner of the intersection of Pennsylvania Avenue, SE/38th Street places cones on the street to delineate several on-street parking spaces in an area where westbound motorists do not anticipate parked vehicles. It was recommended that the parking signs be clarified and enforcement be emphasized. It should be noted that both of these have been previously presented as corridor options.

Pennsylvania Avenue, SE/Branch Avenue Area Options

- It was recommended by several citizens that a left turn phase be added to the existing signal at the intersection of Pennsylvania Avenue, SE/Branch Avenue in the eastbound direction. It was stated that currently it is very difficult to access northbound Branch Avenue from eastbound Pennsylvania Avenue, SE during the PM peak period. Due to this difficulty, motorists are driving through the intersection and then turning into the Penn-Branch shopping center to gain access to northbound Branch Avenue which leads motorists to their communities.

- It was requested by a citizen that the access to the Penn-Branch shopping center be evaluated for improvements. It was stated that it is difficult to access the shopping center from eastbound Pennsylvania Avenue, SE due to the volume of traffic on the roadway. This access creates congestion for eastbound through traffic.

- It was requested by a citizen that the lanes in the vicinity of the intersection of Pennsylvania Avenue, SE/Branch Avenue on the west side of the intersection be narrowed to allow for a wider sidewalk section along the eastbound Pennsylvania Avenue, SE travel lanes. At this location sidewalk has been proposed between the curb and the retaining wall. It was stated that pedestrians often walk in the roadway due to the ivy that grows over the retaining wall. It was stated that a wider area for the sidewalk placement would be beneficial. It was stated that any changes to the existing retaining wall would be costly. It was stated that the property owner should maintain the ivy to better accommodate pedestrians utilizing the sidewalk. The property owner has not yet been determined.

Pennsylvania Avenue, SE/Texas Avenue Area Options

- It was stated that the recommendation of a traffic signal warrant analysis and potential traffic signal at this location would be very beneficial. If a signal is

warranted, it would be able to act as a traffic calming device, slowing vehicles through one of the higher speed areas along the corridor. In addition, if this location becomes signalized, then crosswalks would also be placed, allowing for ease of access to the bus stop located on the south side of the intersection.

Pennsylvania Avenue, SE/Minnesota Avenue Area Options

- It was recommended that the median break along Pennsylvania Avenue, SE just east of the intersection of Pennsylvania Avenue, SE/Minnesota Avenue be closed.

Pennsylvania Avenue, SE/L'Enfant Square Area Options

- It was recommended that if the realignment of Pennsylvania Avenue, SE/Minnesota Avenue does not occur, then the signage for the intersections of Pennsylvania Avenue, SE/southbound Minnesota Avenue and Pennsylvania Avenue, SE/southbound L'Enfant Square be evaluated for safety and clarification. Currently the intersection with southbound Minnesota Avenue is signal controlled and the intersection with southbound L'Enfant Square (immediately to the west of southbound Minnesota Avenue) is stop sign controlled. It was stated that motorists on L'Enfant Square often confuse the traffic signal for southbound Minnesota Avenue to be directing them. It was felt that this area should be re-evaluated and signage clarified if feasible.

Pennsylvania Avenue, SE/Anacostia Freeway (I-295) Interchange Area Options

- The CSX rail lines crossing is a concern due to the buses currently stopping at this location. The consultant team presented the option to either pave over the CSX rail line or at least remove the pavement markings and signage for the rail lines. By doing either of these options, the bus drivers no longer need to recognize the rail lines by stopping at them. It was recommended that if neither of these options could be accomplished then warning signs be placed at the crossing warning motorists of the stopping buses.

APPENDIX G
CSX Corporation Letter

CSX CORPORATION

One James Center
Richmond, VA 23219
(804) 782-6737

Robert W. Shinn
Vice President and
Executive Assistant to the Chairman

November 4, 2003

Mr. Michael J. Rothenheber, PE
Vice President
Johnson, Mirmiran & Thompson
72 Loveton Circle
Sparks, MD 21152-0949

Dear Mr. Rothenheber:

You have asked for a letter from CSX, as the owner of the Shepard spur branch railroad line that bisects Pennsylvania Avenue in SE Washington, D.C., stating that the railroad line is out of service. Since October 2001, there have been no commercial railroad shipments along the line. The only customer prior to that time was the water treatment facility, but they no longer need chlorine cars from CSX, so there is no existing customer or traffic. As a technical matter, the line is not formally abandoned with the federal regulatory agency, and we are in negotiations with WAMATA regarding a possible sale of the line.

Regarding the closing of the median opening, you can address a request letter to our engineering department in Jacksonville. The letter should be addressed to:

Mr. Carl Roe
Public Projects – Engineering Department
CSX Transportation
500 Water Street
Jacksonville, FL 32202

Thank you very much.

Sincerely,

Robert W. Shinn

• Post Office Box 85629, Richmond, Virginia 23285-5629 •
• Fax (804) 782-6734 •

APPENDIX H
Signalized Analysis at Pennsylvania Avenue, SE/Minnesota Avenue

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future

Over 30 Years of Engineering Excellence

Offices in: Baltimore, Maryland
Sparks, Maryland
Newark, Delaware
Lake Mary, Florida
Pittsburgh, Pennsylvania
York, Pennsylvania
Chantilly, Virginia
Richmond, Virginia
Charleston, West Virginia

MEMORANDUM

TO: Matt Wolniak
DATE: August 19, 2003
FROM: Sarah Schulte Gary
PROJECT: Pennsylvania Avenue
JMT JOB NO.: 302-203.01
RE: Pennsylvania Avenue/Minnesota Avenue intersection lane configurations from August 18, 2003 presentation will require more capacity.

As part of the Pennsylvania Avenue Transportation study, the Pennsylvania Avenue/Minnesota Avenue/25th Street intersection was proposed as a simplified intersection. Existing conditions and proposed conditions are shown on Figure 1. The proposed "simplified" intersection was presented as a long term option at the August 18th public meeting and was chosen as one of the projects the citizens of Pennsylvania Avenue wished to pursue.

The simplified intersection presented at the August 18th public meeting was analyzed using turning movements from the traffic counts conducted in the spring of 2003. For the analysis, only the AM peak was analyzed since it is the worst case scenario. The following is a summary of the assumptions made for the signalized intersection analysis:

1. Westbound left turns will be permitted along Pennsylvania Avenue. It was assumed that there will be approximately 65 left turns for this movement, assuming that this movement would reciprocate the northbound left turn movement during the PM peak.

2. Eastbound U-turns will be prohibited on Pennsylvania Avenue. This will allow pedestrians to cross the north side of the west leg of Pennsylvania Avenue without conflicts.

3. No right turn on red will be implemented on southbound Minnesota Avenue and eastbound Pennsylvania Avenue.

The proposed lane configurations from the August 18th public meeting and the estimated AM peak turning movement volumes are displayed on Figure 2. The analysis revealed that the intersection will operate at LOS F and the intersection delay will increase to 208 seconds. Currently, this intersection operates at LOS F (81.3 seconds). The proposed lane configurations will result in a 256% increase in delay compared to existing conditions.

Capacity improvements would be required in order for the proposed simplified intersection to operate at or better than current conditions. In order to determine what improvements were required, two additional alternatives were analyzed. Lane configurations and results of the capacity analysis of Alternative 1 and 2 are displayed on Figure 3. Compared to the proposed simplified intersection from the August 18th public meeting (Alternative 1), Alternatives 2 and 3 provide less intersection delay but require additional capacity. Alternative 2 results in the least amount of delay, however this alternative requires a southbound Minnesota Avenue free-flow right. This situation could create a weave section on Pennsylvania Avenue between Minnesota Avenue and the I-295 northbound ramp.

It should be noted that the required number of lanes across Pennsylvania Avenue under Alternative 1 will be 13 and therefore, the total width across Pennsylvania Avenue would be approximately 155 feet. The total

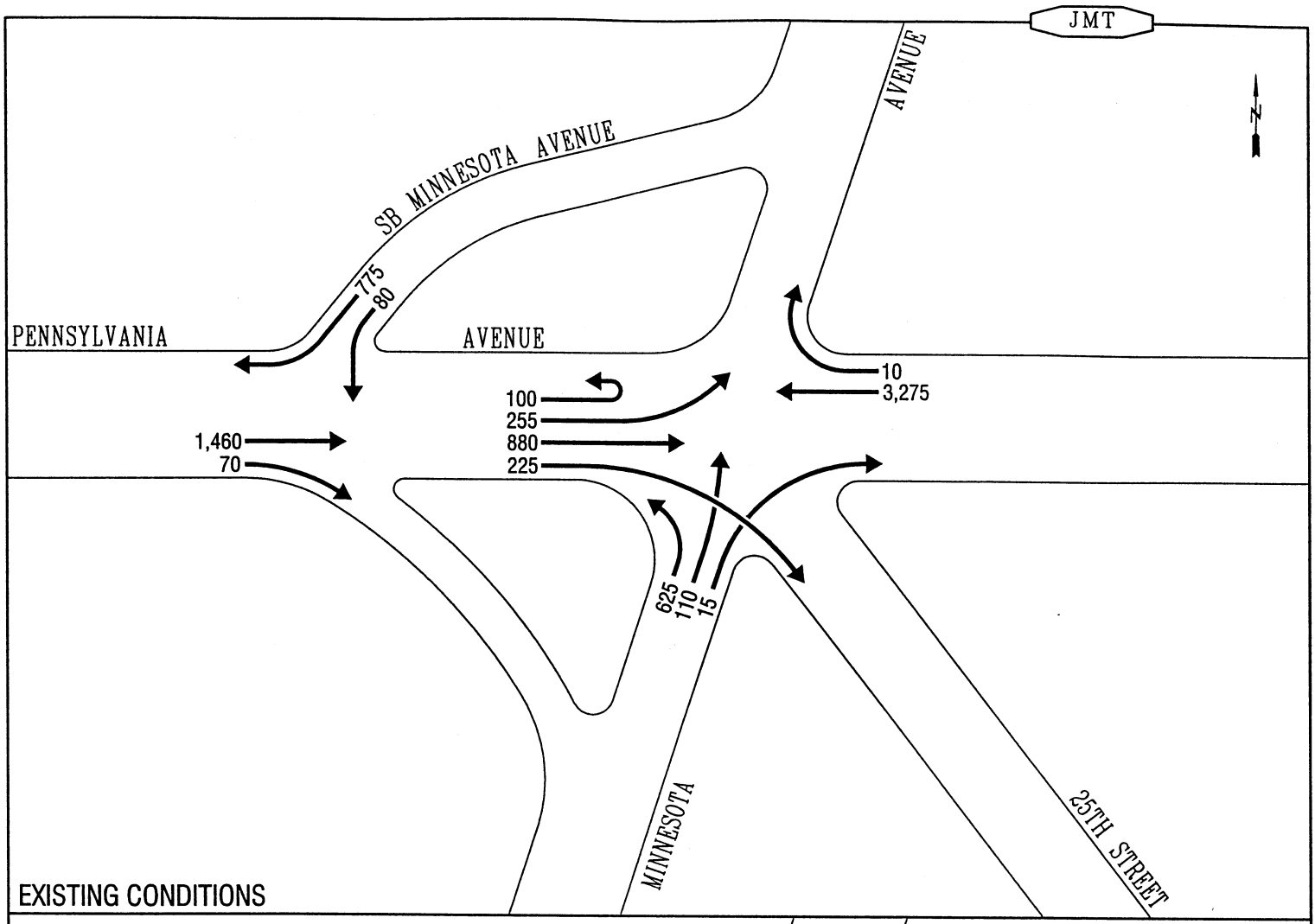
time for pedestrians to traverse Pennsylvania Avenue (assuming a walking speed of 4 ft/second) would be approximately 40 seconds. Introducing an exclusive pedestrian phase in which no movements are allowed except for pedestrians, would be detrimental to intersection operations. It is recommended that pedestrians cross over Pennsylvania Avenue in two phases on the east side of Minnesota Avenue.

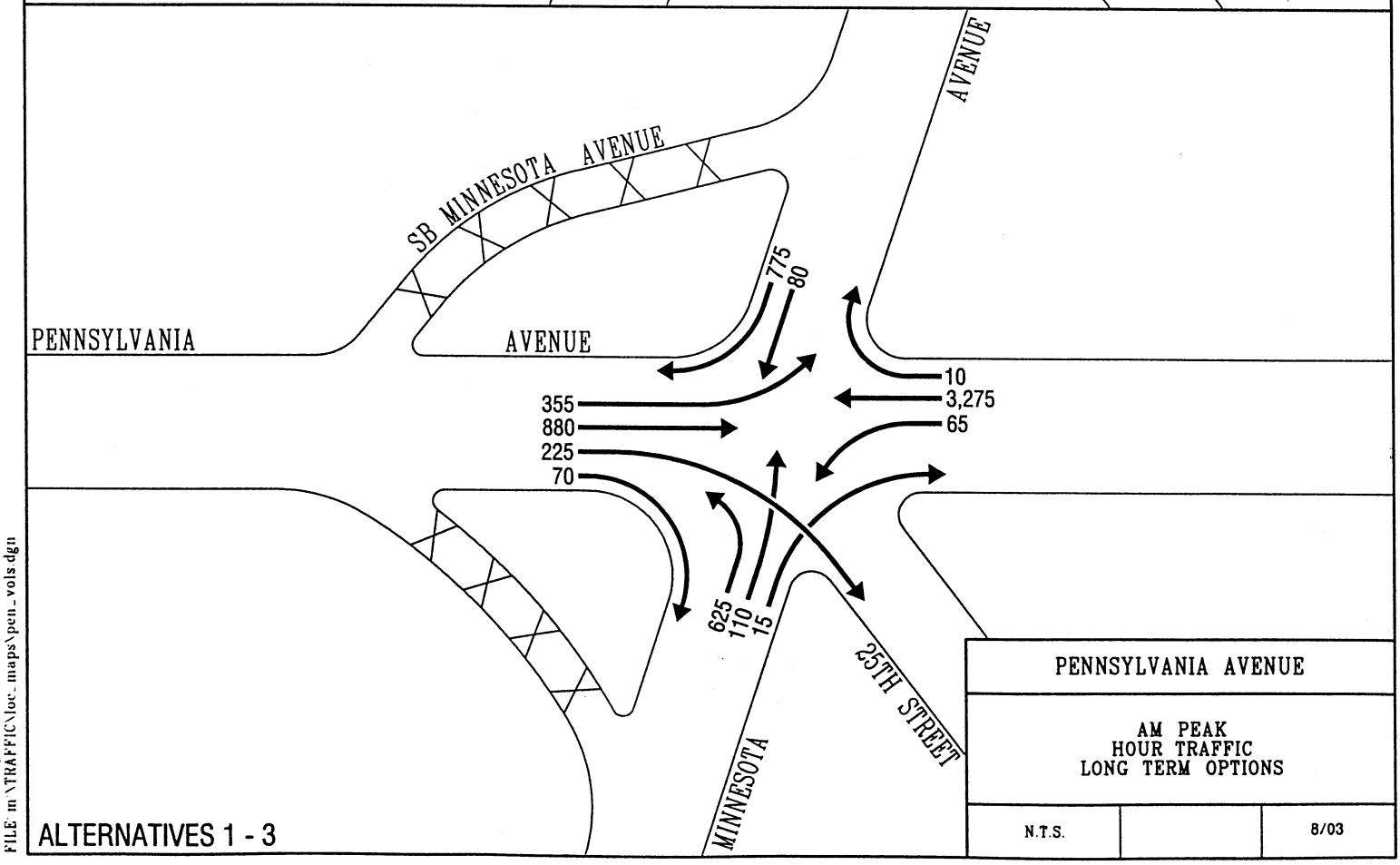
It should also be noted that the simplified intersection will slow turning movements compared to the existing condition. This will cause vehicles to take longer to pass through the intersection.

---

cc: Jennifer Hodorovich
Jim Renaud
Mike Rothenheber
Gene Straub

___ Please Reply
___ No Reply Necessary





PENNSYLVANIA AVENUE

AM PEAK
HOUR TRAFFIC
LONG TERM OPTIONS

N.T.S.		8/03

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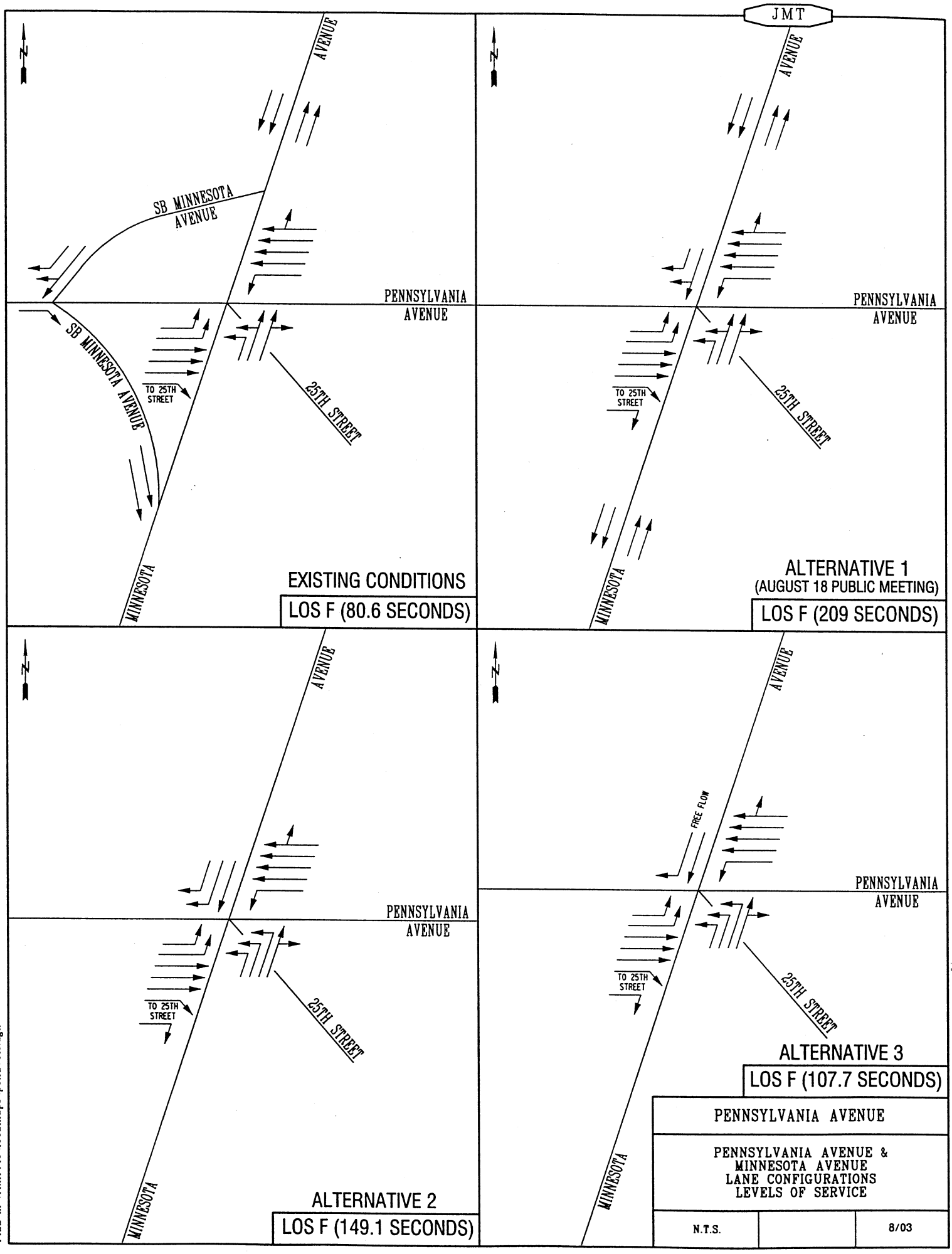

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2: Pennsylvania Ave & Minnesota Ave 8/20/2003

Movement	SEU	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0		4.0	4.0			
Lane Util. Factor		1.00	0.91			*0.85		0.91	0.91			
Frpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Flpb, ped/bikes		1.00	1.00			1.00		1.00	1.00			
Frt		1.00	1.00			1.00		1.00	0.99			
Flt Protected		0.95	1.00			1.00		0.95	0.97			
Satd. Flow (prot)		1770	5085			6329		1610	3249			
Flt Permitted		0.95	1.00			1.00		0.95	0.97			
Satd. Flow (perm)		1770	5085			6329		1610	3249			
Volume (vph)	100	255	1105	0	0	3275	10	625	110	15	0	0
Peak-hour factor, PHF	0.74	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94
Adj. Flow (vph)	135	297	1201	0	0	3680	16	658	136	25	0	0
Lane Group Flow (vph)	0	432	1201	0	0	3696	0	329	490	0	0	0
Confl. Peds. (#/hr)		11					11	3		17		
Turn Type	custom	Prot						Split				
Protected Phases	2	2	2 1			1		5	5			
Permitted Phases	2		1			1			5			
Actuated Green, G (s)		11.0	90.0			70.0		26.0	26.0			
Effective Green, g (s)		14.0	93.0			75.0		29.0	29.0			
Actuated g/C Ratio		0.11	0.72			0.58		0.22	0.22			
Clearance Time (s)		7.0				9.0		7.0	7.0			
Vehicle Extension (s)		3.0				3.0		3.0	3.0			
Lane Grp Cap (vph)		191	3638			3651		359	725			
v/s Ratio Prot		c0.24	0.24			c0.58		c0.20	0.15			
v/s Ratio Perm												
v/c Ratio		2.26	0.33			1.01		0.92	0.87dl			
Uniform Delay, d1		58.0	6.9			27.5		49.3	46.2			
Progression Factor		0.79	0.30			1.17		1.00	1.00			
Incremental Delay, d2		583.0	0.0			14.3		27.3	2.5			
Delay (s)		629.1	2.1			46.6		76.6	48.7			
Level of Service		F	A			D		E	D			
Approach Delay (s)			168.0			46.6			59.9			0.0
Approach LOS			F			D			E			A

Intersection Summary			
HCM Average Control Delay	80.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.4%	ICU Level of Service	G

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SWR
Lane Configurations	
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Volume (vph)	0
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	3
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	*0.85		0.91	0.91			0.95	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			0.97	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.99			0.88	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.97			1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	6327		1610	3248			1509	1504
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.97			1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	6327		1610	3248			1509	1504
Volume (vph)	355	880	290	65	3275	10	625	110	15	0	80	775
Peak-hour factor, PHF	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94	0.93
Adj. Flow (vph)	413	957	315	65	3680	16	658	136	25	0	85	833
Lane Group Flow (vph)	413	957	315	65	3696	0	329	490	0	0	497	421
Confl. Peds. (#/hr)	11					11	3		17			3
Turn Type	Prot		Prot	Prot			Split					Prot
Protected Phases	1	6	6	5	2		3	3			4	4
Permitted Phases					2			3				
Actuated Green, G (s)	33.0	171.4	171.4	17.6	156.0		53.0	53.0			89.0	89.0
Effective Green, g (s)	33.0	171.4	171.4	17.6	156.0		56.0	56.0			89.0	89.0
Actuated g/C Ratio	0.09	0.49	0.49	0.05	0.45		0.16	0.16			0.25	0.25
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		7.0	7.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	324	2490	1365	89	2820		258	520			384	382
v/s Ratio Prot	c0.12	0.19	0.11	0.04	c0.58		c0.20	0.15			c0.33	0.28
v/s Ratio Perm												
v/c Ratio	1.27	0.38	0.23	0.73	1.31		1.28	1.22dl			1.29	1.10
Uniform Delay, d1	158.5	56.1	51.4	163.9	97.0		147.0	145.4			130.5	130.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	145.5	0.1	0.1	26.2	142.4		150.4	25.7			150.6	76.5
Delay (s)	304.0	56.2	51.5	190.1	239.4		297.4	171.1			281.1	207.0
Level of Service	F	E	D	F	F		F	F			F	F
Approach Delay (s)		116.1			238.6			221.9			247.1	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	209.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	350.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	118.8%	ICU Level of Service	G

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

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2: Pennsylvania Ave & Minnesota Ave 8/20/2003

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	*0.85		0.94	1.00			0.91	0.91
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.99			0.98	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.98			0.89	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	7910		4990	1805			1480	2882
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	7910		4990	1805			1480	2882
Volume (vph)	355	880	290	65	3275	10	625	110	15	0	80	775
Peak-hour factor, PHF	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94	0.93
Adj. Flow (vph)	413	957	315	65	3680	16	658	136	25	0	85	833
Lane Group Flow (vph)	413	957	315	65	3696	0	658	161	0	0	340	578
Confl. Peds. (#/hr)	11					11	3		17			3
Turn Type	Prot		Prot	Prot			Split					custom
Protected Phases	1	6	6	5	2		3	3			4	4
Permitted Phases					2			3				4
Actuated Green, G (s)	19.0	84.5	84.5	11.5	77.0		18.0	18.0			37.0	37.0
Effective Green, g (s)	19.0	84.5	84.5	11.5	77.0		21.0	21.0			37.0	37.0
Actuated g/C Ratio	0.11	0.50	0.50	0.07	0.45		0.12	0.12			0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		7.0	7.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	384	2528	1385	120	3583		616	223			322	627
v/s Ratio Prot	c0.12	0.19	0.11	0.04	c0.47		c0.13	0.09			c0.23	0.20
v/s Ratio Perm												
v/c Ratio	1.08	0.38	0.23	0.54	1.03		1.07	0.72			1.06	0.92
Uniform Delay, d1	75.5	26.5	24.2	76.7	46.5		74.5	71.7			66.5	65.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	67.6	0.1	0.1	4.9	23.9		55.8	10.9			65.6	19.1
Delay (s)	143.1	26.6	24.3	81.6	70.4		130.3	82.6			132.1	84.2
Level of Service	F	C	C	F	E		F	F			F	F
Approach Delay (s)		54.7			70.6			121.0			102.0	
Approach LOS		D			E			F			F	

Intersection Summary			
HCM Average Control Delay	76.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	170.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.4%	ICU Level of Service	E

c Critical Lane Group

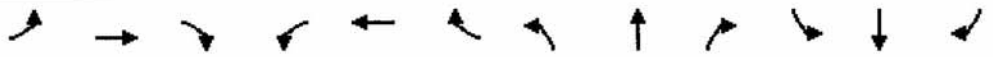
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	*0.85		0.94	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.99			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	4746		4990	1803			1863	1563
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	4746		4990	1803			1863	1563
Volume (vph)	355	880	290	65	3275	10	625	110	15	0	80	775
Peak-hour factor, PHF	0.86	0.92	0.92	1.00	0.89	0.63	0.95	0.81	0.60	0.92	0.94	0.93
Adj. Flow (vph)	413	957	315	65	3680	16	658	136	25	0	85	833
Lane Group Flow (vph)	413	957	315	65	3696	0	658	161	0	0	85	833
Confl. Peds. (#/hr)	11					11	3		17			3
Turn Type	Prot		Prot	Prot			Split					Free
Protected Phases	1	6	6	5	2		3	3			4	
Permitted Phases					2			3				Free
Actuated Green, G (s)	17.0	120.2	120.2	11.8	115.0		16.0	16.0			13.0	180.0
Effective Green, g (s)	17.0	120.2	120.2	11.8	115.0		19.0	19.0			13.0	180.0
Actuated g/C Ratio	0.09	0.67	0.67	0.07	0.64		0.11	0.11			0.07	1.00
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		7.0	7.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	324	3396	1861	116	3032		527	190			135	1563
v/s Ratio Prot	c0.12	0.19	0.11	0.04	c0.78		c0.13	0.09			0.05	
v/s Ratio Perm												0.53
v/c Ratio	1.27	0.28	0.17	0.56	1.22		1.25	0.85			0.63	0.53
Uniform Delay, d1	81.5	12.2	11.2	81.6	32.5		80.5	79.1			81.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	145.5	0.0	0.0	6.1	101.7		127.0	27.8			8.9	1.3
Delay (s)	227.0	12.3	11.2	87.6	134.2		207.5	106.9			90.0	1.3
Level of Service	F	B	B	F	F		F	F			F	A
Approach Delay (s)		64.7			133.4			187.7			9.5	
Approach LOS		E			F			F			A	

Intersection Summary			
HCM Average Control Delay	107.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.4%	ICU Level of Service	G
c Critical Lane Group			

APPENDIX I
Signalized Analysis at Pennsylvania Avenue, SE/Branch Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑↱		↰	↕			↕	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor		0.95	1.00		0.95		0.95	0.95			1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00			1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	0.97			0.99	1.00
Satd. Flow (prot)		3539	1583		3535		1681	1712			1848	1583
Flt Permitted		1.00	1.00		1.00		0.95	0.97			0.99	1.00
Satd. Flow (perm)		3539	1583		3535		1681	1712			1848	1583
Volume (vph)	0	580	300	0	1445	5	1300	255	5	20	105	10
Peak-hour factor, PHF	1.00	0.86	0.83	0.92	0.96	0.38	0.93	0.76	0.25	0.79	0.80	0.92
Adj. Flow (vph)	0	674	361	0	1505	13	1398	336	20	25	131	11
Lane Group Flow (vph)	0	674	361	0	1518	0	857	897	0	0	156	11
Turn Type			Free				Split			Split		Perm
Protected Phases		2			6		8	8		4	4	
Permitted Phases			Free									4
Actuated Green, G (s)		55.6	130.0		54.6		42.0	42.0			15.4	15.4
Effective Green, g (s)		56.6	130.0		56.6		44.0	44.0			17.4	17.4
Actuated g/C Ratio		0.44	1.00		0.44		0.34	0.34			0.13	0.13
Clearance Time (s)		5.0			6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1541	1583		1539		569	579			247	212
v/s Ratio Prot		0.19			c0.43		0.51	c0.52			c0.08	
v/s Ratio Perm			0.23									0.01
v/c Ratio		0.44	0.23		0.99		1.51	1.55			0.63	0.05
Uniform Delay, d1		25.6	0.0		36.3		43.0	43.0			53.3	49.1
Progression Factor		1.29	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		0.9	0.3		19.9		236.8	255.6			5.2	0.1
Delay (s)		33.9	0.3		56.2		279.8	298.6			58.5	49.2
Level of Service		C	A		E		F	F			E	D
Approach Delay (s)		22.2			56.2			289.4			57.8	
Approach LOS		C			E			F			E	

Intersection Summary			
HCM Average Control Delay	139.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	108.5%	ICU Level of Service	F
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↑↑↱		↰	✣			↓↱	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor		0.91	1.00		0.95		0.95	0.95			1.00	1.00
Frt		1.00	0.85		0.98		1.00	0.97			1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)		5085	1583		3467		1681	1718			1844	1583
Flt Permitted		1.00	1.00		1.00		0.95	1.00			0.99	1.00
Satd. Flow (perm)		5085	1583		3467		1681	1718			1844	1583
Volume (vph)	0	1520	555	0	725	45	350	205	15	70	285	10
Peak-hour factor, PHF	1.00	0.86	0.83	0.92	0.96	0.38	0.93	0.76	0.25	0.79	0.80	0.92
Adj. Flow (vph)	0	1767	669	0	755	118	376	270	60	89	356	11
Lane Group Flow (vph)	0	1767	669	0	873	0	347	359	0	0	445	11
Turn Type			Free				Split			Split		Perm
Protected Phases		2			6		8	8		4	4	
Permitted Phases			Free									4
Actuated Green, G (s)		51.8	130.0		50.8		28.3	28.3			32.9	32.9
Effective Green, g (s)		52.8	130.0		52.8		30.3	30.3			34.9	34.9
Actuated g/C Ratio		0.41	1.00		0.41		0.23	0.23			0.27	0.27
Clearance Time (s)		5.0			6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		2065	1583		1408		392	400			495	425
v/s Ratio Prot		c0.35			0.25		0.21	c0.21			c0.24	
v/s Ratio Perm			0.42									0.01
v/c Ratio		0.86	0.42		0.62		0.89	0.90			0.90	0.03
Uniform Delay, d1		35.1	0.0		30.6		48.2	48.3			45.9	35.0
Progression Factor		1.21	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		4.1	0.7		2.1		20.5	22.0			18.9	0.0
Delay (s)		46.7	0.7		32.7		68.7	70.3			64.7	35.1
Level of Service		D	A		C		E	E			E	D
Approach Delay (s)		34.0			32.7			69.5			64.0	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	D
c Critical Lane Group			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