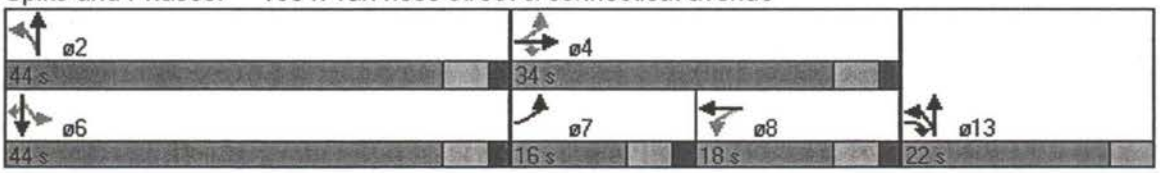
Optimized Signal Timings
1634: van ness street & connecticut avenue 6/3/2003

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR	ø2
Lane Configurations											
Volume (vph)	237	49	178	48	43	105	1161	23	942	179	
Turn Type	pm+pt		pm+ov	Perm		custom		Perm		Perm	
Protected Phases	7	4	13		8	13	2 13		6		2
Permitted Phases	4		4	8		2		6		6	
Detector Phases	7	4	13	8	8	13	2 13	6	6	6	
Minimum Initial (s)	4.0	5.0	6.0	5.0	5.0	6.0		6.0	6.0	6.0	6.0
Minimum Split (s)	10.0	27.0	10.0	27.0	27.0	10.0		25.0	25.0	25.0	25.0
Total Split (s)	16.0	34.0	22.0	18.0	18.0	22.0	66.0	44.0	44.0	44.0	44.0
Total Split (%)	16%	34%	22%	18%	18%	22%	66%	44%	44%	44%	44%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	0.0	2.0	2.0	0.0		2.0	2.0	2.0	2.0
Lead/Lag	Lead			Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes						
Recall Mode	Max	Max	Max	Max	Max	Max		Max	Max	Max	Max
Act Effct Green (s)	31.0	31.0	53.0		15.0		60.0		41.0	41.0	
Actuated g/C Ratio	0.31	0.31	0.53		0.15		0.60		0.41	0.41	
v/c Ratio	0.68	0.09	0.24		0.69		1.01		1.02	0.31	
Uniform Delay, d1	27.9	24.5	12.6		34.5		15.2		29.5	19.9	
Delay	29.3	24.9	12.9		40.1		26.1		56.8	19.4	
LOS	C	C	B		D		C		E	B	
Approach Delay		22.5			40.1		26.1		51.0		
Approach LOS		C			D		C		D		

Intersection Summary
Cycle Length: 100
Offset: 67 (67%), Referenced to phase 13:NBTL, Start of Green
Natural Cycle: 120
Control Type: Pretimed
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 35.5 Intersection LOS: D
Intersection Capacity Utilization 101.7% ICU Level of Service F

Splits and Phases: 1634: van ness street & connecticut avenue



Board of Zoning Adjustment
District of Columbia
CASE NO. 17022
EXHIBIT NO. 62A8

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø6
Lane Configurations										
Volume (vph)	31	164	53	169	158	16	1121	118	913	
Turn Type	Perm		Perm		pm+ov	Perm		custom		
Protected Phases		4		8	13		2	13	6 13	6
Permitted Phases	4		8		8	2		6		
Detector Phases	4	4	8	8	13	2	2	13	6 13	
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0
Minimum Split (s)	28.0	28.0	28.0	28.0	10.0	30.0	30.0	10.0		30.0
Total Split (s)	36.0	36.0	36.0	36.0	18.0	46.0	46.0	18.0	64.0	46.0
Total Split (%)	36%	36%	36%	36%	18%	46%	46%	18%	64%	46%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0		2.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max		Max
Act Effct Green (s)	33.0	33.0	33.0	33.0	51.0		43.0		58.0	
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.51		0.43		0.58	
v/c Ratio	0.10	0.40	0.19	0.35	0.22		0.98		0.95	
Uniform Delay, d1	23.2	24.6	23.9	25.4	11.7		28.0		14.1	
Delay	23.8	25.2	24.7	25.9	12.0		33.5		26.4	
LOS	C	C	C	C	B		C		C	
Approach Delay		25.0		20.0			33.5		26.4	
Approach LOS		C		B			C		C	

Intersection Summary

Cycle Length: 100

Offset: 54 (54%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

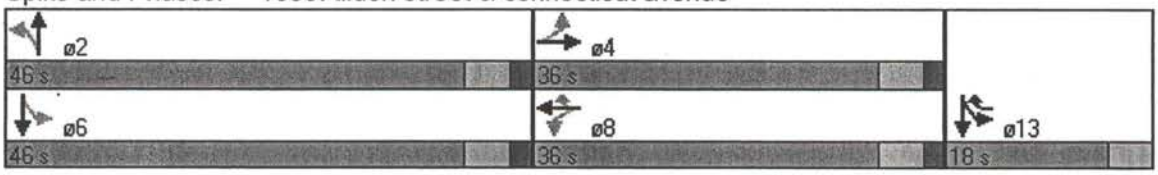
Control Type: Pretimed

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 28.4 Intersection LOS: C

Intersection Capacity Utilization 90.0% ICU Level of Service E

Splits and Phases: 1639: tilden street & connecticut avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	68	70	62	73	63	1050	11	977
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	28.0	28.0	28.0	28.0	21.0	21.0	21.0	21.0
Total Split (s)	31.0	31.0	31.0	31.0	69.0	69.0	69.0	69.0
Total Split (%)	31%	31%	31%	31%	69%	69%	69%	69%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	28.0	28.0	28.0	28.0		66.0		66.0
Actuated g/C Ratio	0.28	0.28	0.28	0.28		0.66		0.66
v/c Ratio	0.22	0.53	0.28	0.23		0.77		0.58
Uniform Delay, d1	27.6	30.4	28.1	24.0		11.6		9.4
Delay	28.3	31.2	29.2	24.5		7.2		9.6
LOS	C	C	C	C		A		A
Approach Delay		30.5		26.4		7.2		9.6
Approach LOS		C		C		A		A

Intersection Summary

Cycle Length: 100

Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 70

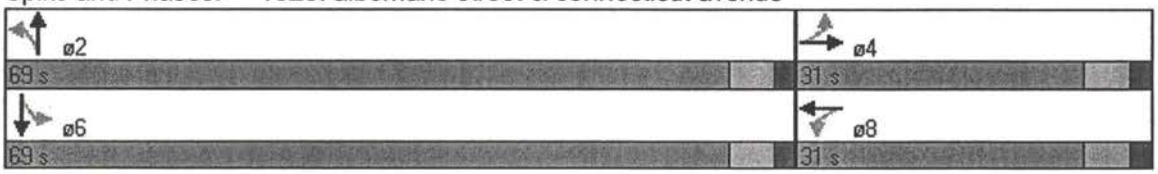
Control Type: Pretimed

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 11.6 Intersection LOS: B

Intersection Capacity Utilization 100.5% ICU Level of Service F

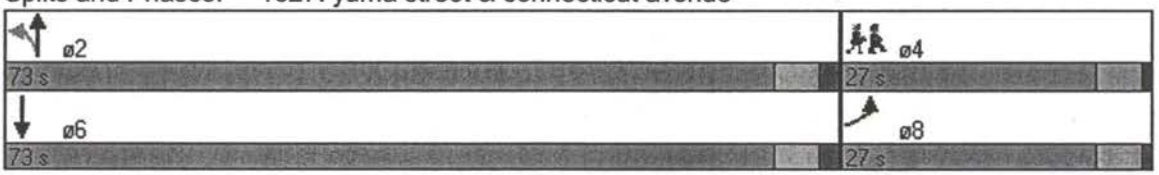
Splits and Phases: 1623: albemarle street & connecticut avenue



Lane Group	EBL	NBL	NBT	SBT	ø4
Lane Configurations					
Volume (vph)	50	58	1220	1078	
Turn Type		Perm			
Protected Phases	8		2	6	4
Permitted Phases		2			
Detector Phases	8	2	2	6	
Minimum Initial (s)	8.0	29.0	29.0	29.0	8.0
Minimum Split (s)	13.0	35.0	35.0	35.0	23.0
Total Split (s)	27.0	73.0	73.0	73.0	27.0
Total Split (%)	27%	73%	73%	73%	27%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	1.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	Max
Act Effct Green (s)	24.0		70.0	70.0	
Actuated g/C Ratio	0.24		0.70	0.70	
v/c Ratio	0.33		0.76	0.56	
Uniform Delay, d1	15.1		9.6	7.3	
Delay	16.4		2.4	4.2	
LOS	B		A	A	
Approach Delay	16.4		2.4	4.2	
Approach LOS	B		A	A	

Intersection Summary
Cycle Length: 100
Offset: 14 (14%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 4.0 Intersection LOS: A
Intersection Capacity Utilization 94.1% ICU Level of Service E

Splits and Phases: 1627: yuma street & connecticut avenue

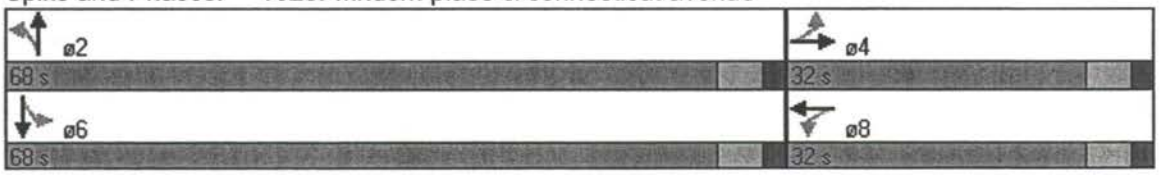


Optimized Signal Timings
1628: windom place & connecticut avenue 6/3/2003

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	24	3	52	3	28	1098	52	1023
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	6
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	20.0	20.0	20.0	20.0
Minimum Split (s)	23.0	23.0	23.0	23.0	34.0	34.0	34.0	34.0
Total Split (s)	32.0	32.0	32.0	32.0	68.0	68.0	68.0	68.0
Total Split (%)	32%	32%	32%	32%	68%	68%	68%	68%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		29.0		29.0		65.0		65.0
Actuated g/C Ratio		0.29		0.29		0.65		0.65
v/c Ratio		0.19		0.30		0.71		0.57
Uniform Delay, d1		26.6		14.1		11.3		9.7
Delay		27.2		15.3		1.2		4.1
LOS		C		B		A		A
Approach Delay		27.2		15.3		1.2		4.1
Approach LOS		C		B		A		A

Intersection Summary
Cycle Length: 100
Offset: 16 (16%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 3.9 Intersection LOS: A
Intersection Capacity Utilization 83.7% ICU Level of Service D

Splits and Phases: 1628: windom place & connecticut avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø6
Lane Configurations		↔		↔		↔↑		↔↑	
Volume (vph)	7	5	44	0	7	1097	54	1025	
Turn Type	Perm		Perm		Perm		custom		
Protected Phases		4		8		2	13	6 13	6
Permitted Phases	4		8		2		6		
Detector Phases	4	4	8	8	2	2	13	6 13	
Minimum Initial (s)	4.0	4.0	6.0	6.0	6.0	6.0	5.0		6.0
Minimum Split (s)	25.0	25.0	25.0	25.0	17.0	17.0	9.0		17.0
Total Split (s)	29.0	29.0	29.0	29.0	58.0	58.0	13.0	71.0	58.0
Total Split (%)	29%	29%	29%	29%	58%	58%	13%	71%	58%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	0.0		2.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	Max	Max		Max
Act Effct Green (s)		26.0		26.0		55.0		65.0	
Actuated g/C Ratio		0.26		0.26		0.55		0.65	
v/c Ratio		0.06		0.28		0.74		0.71	
Uniform Delay, d1		27.8		11.1		16.9		9.3	
Delay		28.2		13.2		12.0		8.2	
LOS		C		B		B		A	
Approach Delay		28.2		13.2		12.0		8.2	
Approach LOS		C		B		B		A	

Intersection Summary

Cycle Length: 100

Offset: 7 (7%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Pretimed

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 10.5 Intersection LOS: B

Intersection Capacity Utilization 84.2% ICU Level of Service D

Splits and Phases: 1631: veazey terrace & connecticut avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR	ø2
Lane Configurations											
Volume (vph)	131	46	131	42	40	132	979	21	954	112	
Turn Type	pm+pt		pm+ov	Perm		custom		Perm		Perm	
Protected Phases	7	4	13		8	13	2 13		6		2
Permitted Phases	4		4	8		2		6		6	
Detector Phases	7	4	13	8	8	13	2 13	6	6	6	
Minimum Initial (s)	4.0	5.0	6.0	5.0	5.0	6.0		6.0	6.0	6.0	6.0
Minimum Split (s)	10.0	27.0	10.0	27.0	27.0	10.0		25.0	25.0	25.0	25.0
Total Split (s)	10.0	37.0	10.0	27.0	27.0	10.0	63.0	53.0	53.0	53.0	53.0
Total Split (%)	10%	37%	10%	27%	27%	10%	63%	53%	53%	53%	53%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	0.0	2.0	2.0	0.0		2.0	2.0	2.0	2.0
Lead/Lag	Lead			Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes						
Recall Mode	Max	Max	Max	Max	Max	Max		Max	Max	Max	Max
Act Effct Green (s)	34.0	34.0	44.0		24.0		57.0		50.0	50.0	
Actuated g/C Ratio	0.34	0.34	0.44		0.24		0.57		0.50	0.50	
v/c Ratio	0.36	0.08	0.21		0.39		1.09		0.73	0.16	
Uniform Delay, d1	23.7	22.4	17.2		26.1		18.9		19.7	13.5	
Delay	24.3	22.7	17.6		26.8		65.0		15.3	10.7	
LOS	C	C	B		C		E		B	B	
Approach Delay		21.2			26.8		65.0		14.8		
Approach LOS		C			C		E		B		

Intersection Summary

Cycle Length: 100

Offset: 12 (12%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 110

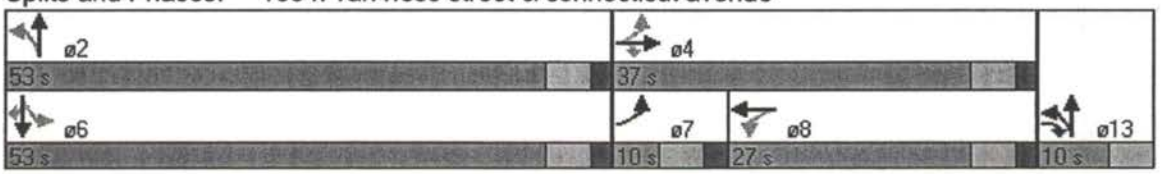
Control Type: Pretimed

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 37.9 Intersection LOS: D

Intersection Capacity Utilization 90.9% ICU Level of Service E

Splits and Phases: 1634: van ness street & connecticut avenue



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø6
Lane Configurations										
Volume (vph)	18	134	57	162	153	25	966	128	943	
Turn Type	Perm		Perm		pm+ov	Perm		custom		
Protected Phases		4		8	13		2	13	6 13	6
Permitted Phases	4		8		8	2		6		
Detector Phases	4	4	8	8	13	2	2	13	6 13	
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0
Minimum Split (s)	28.0	28.0	28.0	28.0	10.0	30.0	30.0	10.0		30.0
Total Split (s)	29.0	29.0	29.0	29.0	10.0	61.0	61.0	10.0	71.0	61.0
Total Split (%)	29%	29%	29%	29%	10%	61%	61%	10%	71%	61%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0		2.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max		Max
Act Effct Green (s)	26.0	26.0	26.0	26.0	36.0		58.0		65.0	
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.36		0.58		0.65	
v/c Ratio	0.08	0.41	0.25	0.42	0.27		0.67		0.88	
Uniform Delay, d1	28.0	29.1	29.2	30.7	9.6		14.3		11.7	
Delay	28.6	29.8	30.2	31.4	10.7		4.1		19.3	
LOS	C	C	C	C	B		A		B	
Approach Delay		29.6		22.7			4.1		19.3	
Approach LOS		C		C			A		B	

Intersection Summary

Cycle Length: 100

Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

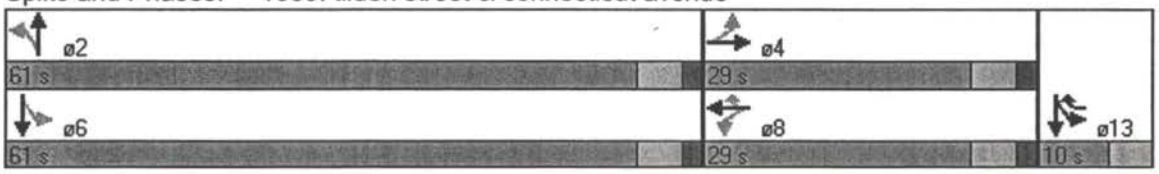
Control Type: Pretimed

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 14.5 Intersection LOS: B

Intersection Capacity Utilization 93.6% ICU Level of Service E

Splits and Phases: 1639: tilden street & connecticut avenue



APPENDIX J
CONNECTICUT AVENUE
REVERSIBLE LANE STUDY

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INTRODUCTION

This report presents the findings of a study that evaluated the adequacy of the existing traffic control system for the reversible lane on Connecticut Avenue in the District of Columbia. The District of Columbia Division of Transportation Traffic Services Administration (TSA) Staff conducted the study. Connecticut Avenue is a major arterial and commuter route serving Northwest Washington as well as Montgomery County, Maryland. It passes through the neighborhoods of Chevy Chase and Cleveland Park, as well as the University of D.C. and the National Zoo.

Different jurisdictions use various systems to communicate to the drivers the information about the reversible lane operations. The goals of this study were to assess whether or not the existing system on Connecticut Avenue is adequate with respect to safety and improved traffic flow, and to determine if safety and traffic flow could be improved with changes to the existing signs and signals in the corridor.

EXISTING SYSTEM

The reversible lane section of Connecticut Avenue is approximately 2.7 miles long. It extends from Garfield Street in the south to Legation Street in the north. The entire roadway has a six-lane cross section throughout this area.

Between the hours of 7:00 AM and 9:30 AM, Connecticut Avenue operates with four inbound (southbound) lanes and two outbound (northbound) lanes. From 4:00 PM until 6:30 PM, it operates with four outbound and two inbound lanes. At all other times, there are three lanes in each direction.

Information on lane operations during the peak periods is presented to the drivers by the use of pole and post mounted static signs, and illuminated signs placed on signals and light poles on the side of the road. The illuminated signs are operated by time of day schedules that are programmed into nearby traffic signal controllers. As shown in Figures 1 and 2, the illuminated signs display the number of available lanes depending on direction of travel and time period. Figure 3 displays a sign used at the beginning of the reversible lane corridor and Figure 4 shows the most prevalent static sign used to communicate to the drivers the information on the reversible lane operation. As Figure 5 indicates, there are numerous signs and signals currently used to communicate to the drivers the operation of the reversible lane. As Figure 5 shows, most of the signals are placed at the intersections of Connecticut Avenue and the side streets, with a few signs placed mid-block at critical locations.

Figure 1
Illuminated Sign on Northbound Connecticut Avenue at Van Ness Street



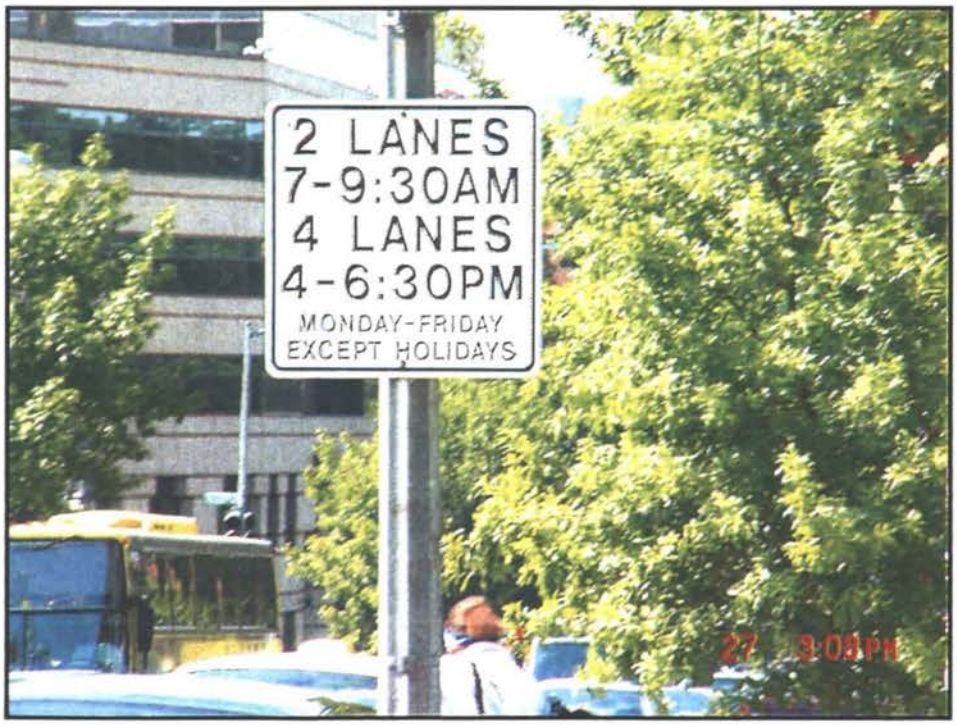
Figure 2
Illuminated Sign on Connecticut Avenue at Jenifer Street

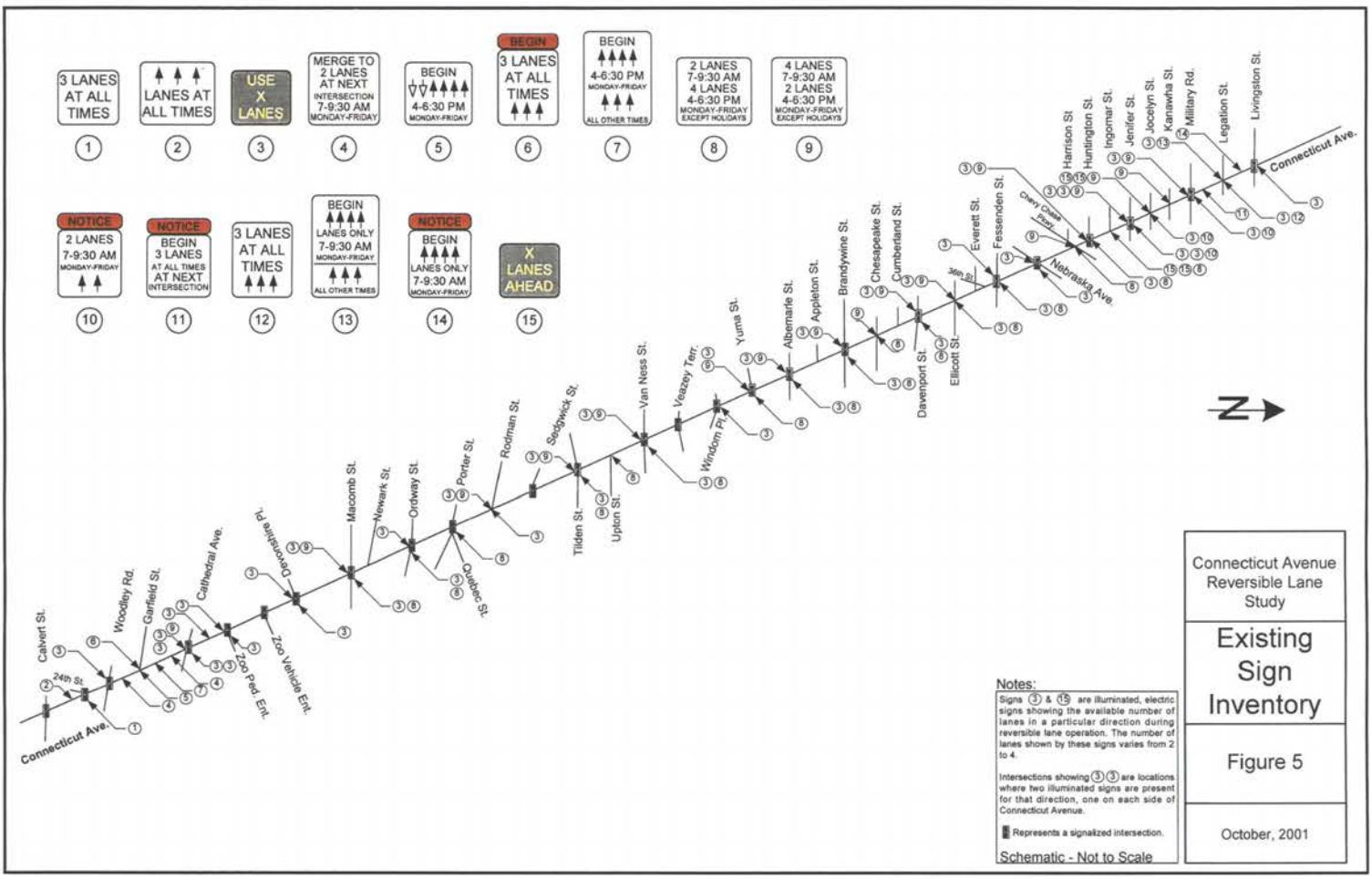


Figure 3
Static Sign at the Entrance to the Reversible Lane Corridor



Figure 4
Typical Static Sign Used in the Reversible Lane Section of Connecticut Avenue





Notes:

Signs (3) & (15) are illuminated, electric signs showing the available number of lanes in a particular direction during reversible lane operation. The number of lanes shown by these signs varies from 2 to 4.

Intersections showing (3) (3) are locations where two illuminated signs are present for that direction, one on each side of Connecticut Avenue.

Represents a signalized intersection.

Schematic - Not to Scale

Connecticut Avenue Reversible Lane Study

Existing Sign Inventory

Figure 5

October, 2001

TRAFFIC COUNTS AND ENCROACHMENTS

The effectiveness of the existing reversible lane information system, with signs and signals mounted on the side of the road, can be assessed by evaluating compliance with the signs and signals during the peak periods. TSA Staff evaluated compliance with the existing sign/signal system by counting the number of violations, or encroachments into the reversible lane, i.e., vehicles traveling in the opposite direction of the allowed direction of travel, during the peak hour.

TSA Staff used accident data on Connecticut Avenue from Garfield Street to Legation Street to determine the critical locations where traffic data should be collected. TSA Staff reviewed the last three years of available accident reports, from January 1, 1997 until December 31, 1999, to identify the critical locations in the corridor. The key factors from the accident reports used in the analysis were the total number of accidents for each intersection and the number taking place during reversible lane operations (7:00 AM - 9:30 AM and 4:00 PM - 6:30 PM). The types of accidents most attributable to reversible lane operation are head-on collisions and sideswipes. The summary of accident data for the Connecticut Avenue intersections in the study corridor is presented in Appendix A. Based on the accident reports, TSA Staff determined that critical locations in the corridor are the intersections of Connecticut Avenue with the following streets:

- Cathedral Avenue,
- Porter/Quebec Street,
- Tilden Street,
- Yuma Street,
- Nebraska Avenue and
- Military Road.

While Macomb and Ordway Streets had more accidents than either Yuma Street or Military Road, TSA Staff decided to count the latter intersections in order to more accurately represent the entire length of the reversible lane corridor.

TSA staff performed manual traffic counts at the above intersections/blocks along Connecticut Avenue on September 26, 2001. TSA Staff counted peak direction traffic (inbound during the AM peak period and outbound during the PM peak period), non-peak direction traffic, and the number of vehicles encroaching into opposing traffic during the first hour of operations of the reversible lane, 7:00 AM – 8:00 AM and 4:00 PM – 5:00 PM. As Table 1 indicates, at three of the locations, Porter/Quebec Streets, Nebraska Avenue and Military Road, a large percentage of the vehicles traveling in the off-peak direction between 4:00 PM and 5:00 PM encroach into the reversible lane in the wrong direction of travel. The field observations conducted by TSA Staff indicate that some of the violators encroach because they are defiant of traffic regulations and others encroach into the reversible lane because the signs of the reversible lanes do not communicate clearly to them the traffic operation during the peak hours.

Table 1
Violation Rates at Critical Locations

First Hour of AM Reversible Lane Operations (7:00 AM – 8:00 AM)				
Location	Peak Direction Volume	Off-peak Direction volume	Number of Encroachments	Violation Rate (1)
Garfield Street	1,626	680	18	2.6%
Porter/Quebec Streets	2,140	852	7	0.8%
Tilden Street	2,013	884	0	0.0%
Yuma Street	2,210	780	1	0.1%
Nebraska Avenue	1,989	544	0	0.0%
Military Road	1,991	664	5	0.8%

First Hour of PM Reversible Lane Operations (4:00 PM – 5:00 PM)				
Location	Peak Direction Volume	Off-peak Direction volume	Number of Encroachments	Violation Rate (1)
Garfield Street	1,193	920	0	0.0%
Porter/Quebec Streets	1,504	948	55	5.8%
Tilden Street	1,594	956	4	0.4%
Yuma Street	1,688	748	5	0.7%
Nebraska Avenue	1,586	928	60	6.5%
Military Road	1,481	660	44	6.7%

(1) Violation rate indicates the percentage of vehicles traveling in the off-peak direction that encroach into the reversible lane in the wrong direction of travel during the peak hour.

* Additional encroachment information can be found in Appendix B.

VIDEO DATA

In order to document the types of encroachment observed, TSA staff mounted portable video cameras and recorders at locations along Connecticut Avenue. The system consisted of a battery-powered wide-angle, color video camera and VCR. TSA Staff mounted the cameras at five of the following intersections:

1. Garfield Street
2. Porter/Quebec Streets
3. Yuma Street
4. Nebraska Avenue
5. Military Road

The intersection of Connecticut Avenue and Tilden Street was not chosen for video monitoring due to its low number of observed encroachments. The cameras were

installed the week of October 1, 2001. They were programmed to record during the hours of reversible lane operation.

The accompanying videotape shows encroachments during the peak hours at the five locations on Connecticut Avenue where video data was recorded. TSA Staff edited the original videotapes to include only the occurrences of encroachments during the times of operations of the reversible lanes. The major findings from the review of the videotapes are the following:

- At some locations there are constant violations, with drivers using the reversible lanes at times when they are not supposed to be using them.
- The reversible lane violations result in major safety problems.
- The potential for collisions is increased significantly by the reversible lane violations.
- Because drivers traveling in the peak direction are aware of the frequency of violations, the use of the reversible lane in the peak direction is significantly less than the use of the regular lanes during the peak periods.
- Violators often block traffic traveling in the peak direction; reducing the capacity of the reversible lane.

REVERSIBLE LANE RECOMMENDED PRACTICE

Traffic control devices on all streets and highways open to public travel shall be in substantial conformance with standards issued or endorsed by the Federal Highway Administration. The Manual on Uniform Traffic Control Devices (MUTCD) is the adopted document with national standard for streets and highways.

The principal aspects of the regulations in the MUTCD with respect to reversible lanes control signs are the following:

- Reversible lane control signs may be either static type or changeable message type.
- Reversible lane control signs may be either ground or overhead mounted.
- Ground mounted reversible lane control signs shall be used only as a supplement to overhead signs or signals.
- Where it is determined by an engineering study that the lane-use control signals are not necessary, the lane shall be controlled by overhead reversible lane control signs.
- Reversing traffic flow may be controlled with reversible lane control signs (without the use of lane control signals) when all the following conditions are met:

A. Only one lane is being reversed
B. An engineering study indicates that sign operation alone would result in a level of safety and efficiency that is acceptable.
C. There are no unusual or complex operations in the reversible lane pattern.

- A reversible lane control sign shall be mounted over the center of the lane that is being reversed.
- Transitions at the entry to and exit from the section of roadway with the reversible lanes shall be carefully reviewed and advanced signs shall be installed to notify drivers of the boundaries of the reversible lane controls.

A review of the reversible lane control sign requirements indicates that the existing system on Connecticut Avenue is not in compliance with the MUTCD regulations for the following reasons:

1. Reversible lane control signs are permitted when an engineering study indicates that sign operation alone would result in a level of safety and efficiency that is acceptable. The data collected on encroachments and the videotape recordings performed for this study indicate that there is not an acceptable level of efficiency and safety without overhead signals.
2. The MUTCD requires that the reversible lane control signs be mounted over the center of the lane that is being reversed. The existing system does not include a lane control sign mounted over the center of the lane that is being reversed.

REVERSIBLE LANE OPERATION IN AN ADJACENT JURISDICTION - GEORGIA AVENUE IN MONTGOMERY COUNTY

The section of Georgia Avenue in Montgomery County, MD between 16th Street and the Capital Beltway operates with reversible lanes. The roadway has a seven-lane cross-section through this area. During the AM peak period, it operates with four inbound lanes and three outbound lanes. During the PM peak period, it operates with three inbound and four outbound lanes. Left turns from Georgia Avenue are prohibited both mid-block and at intersections during the peak periods. At off-peak times, there are three lanes in each direction, with the center lane used as a two-way left turn lane.

As Figure 6 indicates, lane control on Georgia Avenue is accomplished by the use of overhead signals and signs supported with span wire. A solid green arrow over a lane, shown in Figure 7, indicates that the lane is available for through traffic in that direction. A solid red X indicates the lane is unavailable. A flashing yellow X allows for left turns from that lane.

Figure 6
Overhead Signal Support on Georgia Avenue



Figure 7
Overhead Signals for Reversible Lane on Georgia Avenue



This type of lane control scheme is consistent with the MUTCD requirements for reversible lane operations. TSA Staff conducted spot field observation of traffic operations on the reversible lane section of Georgia Avenue. The observations clearly indicate that there is a much better understanding on the part of the drivers with respect to which lanes are to be used during different periods of the day. The red X and the green arrow over the reversible lane make it very clear which is the direction of operation of this lane at any given time. Overhead signals do not require the driver to correlate lane assignments with the current time of day, increasing the likelihood of compliance.

EXISTING SYSTEM OF STATIC SIGNS AND ILLUMINATED SIGNALS ON THE SIDE OF THE ROAD VERSUS OVERHEAD LANE USE SIGNAL AND SIGN SYSTEM

The use of an overhead lane use signal system would improve safety and traffic operations in the corridor. As noted in a study conducted by United States Department of Transportation Federal Highway Administration (FHWA)[1], the newer control systems with improved information displays help to reduce accident rates. With respect to motorist compliance, the data included in the FHWA report indicates that during the PM peak hour the highest violation rate at a location with sign control only was 7.2 percent, while the highest violation rate at a location with lane use signal system was 3.6 percent.

The installation of an overhead signal system would provide the necessary infrastructure to implement unscheduled changes in the reversible lane operation such as in the case of an emergency evacuation from the District. The overhead signals could be easily reprogrammed to allow the use of the reversible lane during off-peak hours to accommodate an emergency evacuation plan.

The capital and maintenance cost of overhead lane use signal and sign system is much higher than the cost of sign controlled system. As documented in the FHWA report, the Georgia Avenue System cost $365,120 per mile in capital cost[2] and $23,000 per mile per year[2] in maintenance cost. Based on this information and taking into consideration the constraints along the Connecticut Avenue corridor, TSA Staff estimates that a new system with overhead signals and signs on Connecticut Avenue could cost 1.5 to 2.0 million dollars.

The change to a system of overhead signals to control the reversible lane operation would require the implementation of measures to reduce the aesthetic impacts on the corridor. *Signal head supports that are architecturally pleasing and compatible with the* architecture of the corridor could be used to help avoid negative effects on the aesthetics of the corridor.

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[1] Traffic Control for Reversible Flow Two-Way Left Turn Lanes; U.S. Department of Transportation Federal Highway Administration; October 1984.
[2] 1984 Dollars.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

TSA Staff recommends the implementation of a system of overhead signals and signs in the reversible lane section of Connecticut Avenue. As documented in this report and in the accompanying videotape, the current system has high levels of violations. These violations result in the deterioration of safety in the corridor and reduce the overall capacity of the roadway.

The existing system is not in compliance with the requirements of the Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD states that reversible lane control signs are permitted when an engineering study indicates that sign operation alone would result in a level of safety and efficiency that is acceptable. The traffic data and video recordings collected for this study indicate that there is not an acceptable level of efficiency and safety without overhead signals. Furthermore, the MUTCD requires that the reversible lane control signs be mounted over the center of the lane that is being reversed. The existing system does not include a lane control sign mounted over the center of the lane that is being reversed.

Some of the reversible lane violations are not related to the efficiency of the existing information system. Aggressive drivers disregard the lane restrictions on the reversible lane not because of lack of understanding of the information on lane restrictions but because of their disrespect towards traffic laws. A change in information system will not have an effect on these aggressive drivers but will facilitate enforcement and imposition of fines on the aggressive driver violators. The field observations and a review of the videotape recordings clearly indicate that many of the violators are drivers who do not understand the operations of the reversible lane. Many drivers enter the corridor not at the entry points on Connecticut Avenue but through side streets in the corridor. The need to concentrate on traffic maneuvers prevents many drivers from observing immediately upon entering the corridor the static signs and illuminated signals describing the lane usage located on the side of the road.

The implementation of a system of overhead signals and signs will help communicate better to drivers the operation of the reversible lane. While the majority of the drivers using Connecticut Avenue during the peak periods are commuters familiar with the reversible lane operations, it is likely that many of the drivers using the street are not familiar with the system. Tourists use Connecticut Avenue to reach District attractions in the Central Business District as well as attractions along Connecticut Avenue such as the National Zoo. Signal and signing improvements will help tourists to better understand the operation of the reversible lanes.

Moreover, a system of overhead signals would provide the necessary infrastructure to implement changes to the reversible lane operation during off-peak hours in case of an emergency evacuation plan. If an evacuation plan is implemented during off-peak hours, the green arrow would indicate to the driver unequivocally that the lane can be used at that time. This would improve the flow of traffic and therefore would facilitate the evacuation of the District in the case of an emergency evacuation.

If overhead signals and signs directly above the reversible lane cannot be installed because of aesthetics and/or cost factors, it may be necessary to eliminate the operation of the reversible lane to improve the safety of the corridor. The corridor would have to operate with three lanes in each direction throughout the day. This would have detrimental effects on the capacity of the corridor during the peak hours. Even though the reversible lane does not carry as much traffic as the adjacent lanes, it provides critical capacity to accommodate the commuting needs.

TSA Staff evaluated reversible lane usage at two critical locations in the corridor using the videotaped data. As Table 2 shows, at Nebraska Avenue during the AM peak hour the reversible lane traffic is approximately 80 percent of the traffic on the adjacent peak direction lane. Moreover, during the AM peak hour at Porter Street and Nebraska Avenue the reversible lane carries more than 350 vehicles per hour. It is important to note that as shown in Table 1, the number of observed violations on Nebraska Avenue in the morning was 0 and the number of observed violations in the afternoon was 60. This indicates that drivers generally stay away from the reversible lane in the sections with large number of violations and use the reversible lane adequately at locations where they know there are few violations. Violations can be reduced significantly with the installation of a system of overhead signals.

Table 2
Reversible Lane Usage

	First Hour of AM Peak Period (7:00 AM – 8:00 AM)		First Hour of PM Peak Period (4:00 PM – 5:00 PM)	
Location	Reversible Lane Volume	Adjacent Lane Volume in Peak Direction	Reversible Lane Volume	Adjacent Lane Volume in Peak Direction
Porter Street	374	774	252	657
Nebraska Avenue	476	582	132	521

Note: Based on counts performed by TSA Staff using the videotape recordings conducted the week of October 1, 2001.

Thus, TSA Staff recommends that a system of overhead signs and signals be installed to improve safety and traffic flow. The installation of an overhead system will bring the corridor operation into compliance with the requirement of the MUTCD. It will also allow for easier implementation of an emergency evacuation plan during off-peak hours providing clear information to the drivers with respect to lane usage during the evacuation period.

APPENDIX K
CITIZENS' COMMENTS

Connecticut Avenue Transportation Study
Public Meeting Notes

INTRODUCTION

The first public meeting was held with representatives of the Advisory Neighborhood Commission, local community groups, stakeholders, and the citizens to discuss the proposed scope of work and schedule for the traffic study, and to serve as a forum for the public to provide input. The meeting was held on September 26, 2002.

Karen Perry (ANC-3F) introduced the Study Team, and Colleen Smith (DDOT) introduced the Consultants.

The list of meeting participants is attached at the end of the document.

CITIZENS COMMENTS/QUESTIONS

Citizens Comments/Questions about Transportation Issues

Traffic

- It was asked if it was a "given" that the Van Ness area is the most congested area of Connecticut Avenue. The response was that there are no givens in this study.
- The issue of speeding on alleys was raised.
- Drop-offs at the nursery school on northbound Connecticut at Albemarle Street cause congestion.
- Eight DC school buses (school at 4401 Connecticut) idle on Windom Place or Connecticut Avenue.
- The signal at Windom Place is not coordinated with the signal at Veazey Terrace.
- Citizens commented on the large number of accidents at Upton Street and Connecticut Avenue.
- Truck restriction enforcement was requested.
- Additional signage on northbound Reno Road at 36th Street was requested in an effort to slow traffic.
- Emergency vehicle access on Van Ness Street is difficult because of congestion, double parking, traffic exiting embassies, etc.
- The flower planter at the Israeli Embassy on Van Ness Street east of Reno Road is placed in a dangerous location and needs to be fitted with some sort of retro-reflective material.
- Vehicles lined up for the carwash (southbound Connecticut at Albemarle Street) create congestion on Connecticut Avenue.
- Trucks create congestion in the alley behind Van Ness Street.
- General mid-day gridlock in the Van Ness area.
- A citizen inquired about the possibility of a "jug-handle" (New Jersey style) left turn from southbound Connecticut to Veazey Terrace. Or at least the possibility of a protected left turn phase.

Transit

- Reduced effectiveness of Metrobuses due to idling, parking, etc of tour and charter buses in the study area.

Pedestrians

- Prohibiting right turns from northbound Connecticut to eastbound Van Ness was suggested in order to improve pedestrian safety.
- There is a lot of jaywalking on Connecticut between Windom Place and Van Ness Street.
- There is concern about traffic operations associated with the Sheridan School
- Citizens would like to see exclusive pedestrian phases at some intersections on Connecticut Avenue, particularly Van Ness Street and Veazey Terrace.
- Pedestrian phases on Connecticut Avenue generally aren't long enough.
- The possibility of installing pedestrian countdown timers was raised.

Bikes

- Area bicyclists do not pay attention to traffic signals.

Parking

- More parking enforcement was requested.
- Double parking on Van Ness Street.
- Would like to see the generally unused "Diplomat parking" space at 4301 Connecticut replaced with metered parking.
- Occupants of the Fannie May office building have taken away many public parking spaces.

Citizens Comments/Questions about Project Scope

- The study area map presented during the meeting needs to be modified to reflect the study area as it is presented in the scope.
- Citizens asked if longer traffic counts (i.e. after the reversible lane use ends) can be taken. Traffic counts after the reversible lane use ends are included in the scope.

Citizens Comments/Questions about Land Use/Developments

- There are concerns about schools on Upton Street looking to expand and the associated impacts on Upton Street.
- A citizen noted that the issue of institutional expansions needs to be assessed in the study.

Citizens Comments/Questions about environmental impacts

- Bus (tour, charter, Metro) idling and parking and the pollution emissions resulting from it.

General Issues

- Citizens asked how traffic generation sources outside the study area would be identified. It was indicated that this information will be collected in coordination with the District of Columbia Office of Planning.

ACTION ITEMS

- Comments received from public meeting and other sources will be taken into consideration.
- The Study Area map will be changed to show clearly the boundaries of the Study Area.

Connecticut Avenue Transportation Study
Public Meeting Notes
April 1, 2003

INTRODUCTION

The second public meeting was held with representatives of the Advisory Neighborhood Commission, local community groups, stakeholders, and the citizens to discuss the transportation issues identified by the Study Team, suggested improvement options, and to serve as a forum for the public to provide input. The meeting was held on April 1, 2003.

Karen Perry (ANC-3F) introduced the Study Team, and Colleen Smith (DDOT) introduced the Consultants. Colleen's introduction focused on the draft nature of the report and the Study Team's desire for public comment and participation.

Abi Lerner (DMJM+HARRIS) presented a summary of the findings of the draft existing conditions report. He presented the list of preliminary issues and suggestions compiled by the Study Team. Throughout the meeting, the preliminary nature of all issues and recommendations was strongly reinforced.

CITIZENS COMMENTS/QUESTIONS

Citizens Comments/Questions about Transportation Issues

Traffic

- Some of the meeting participants indicated that they want the alley between Van Ness and Veazey to run northbound. They also do not want the alley between Upton and Van Ness to run northbound.
- It was asked if AM post-peak hour traffic is a significant problem.
- Signage and striping are poor for left turns from Tilden Street to Reno Road.
- Residents of 36th Street support the suggestion to close 36th Street between Reno Road and Warren Street.
- Yuma Street residents are generally opposed to closing 36th Street between Reno Road and Warren Street. They feel that cut through traffic would be diverted to Yuma Street. The hill on Yuma approaching 36th Street is steep. The corner of Yuma and Reno is dangerous. They suggested a stop sign at 36th and Warren.
- Can Sheridan School get warning signs and/or lights? Colleen will check District policy on school zone signage for private schools.
- Several questions/comments supporting the installation of a protected left turn phase on southbound Connecticut Avenue at Van Ness Street.
- Why is Reno Road striped as two lanes in each direction between Tilden and Van Ness, when it is one lane with a center turning lane elsewhere?
- Requested an all-way stop at 35th and Yuma. Claim there has never been a stop sign at the intersection, and only placing a stop on 35th Street will increase speeds on Yuma and decrease pedestrian safety.

- Citizens noted that changes to reversible lane signing and striping should be implemented throughout the entire reversible lane section.
- Signals at Windom are not coordinated properly.
- Spot speed data and accident information at Reno Road and 36th Street should be included in the report.
- A citizen suggested that left turn lanes the entire length of Connecticut Avenue should be considered. Make Connecticut look like it does in Montgomery County – 3 lanes in each direction with a median and left turn lanes.
- Can the alley between Veazey and Van Ness be closed by gates between certain hours?
- A citizen suggested that the Study Team find out whether or not truck restrictions exist on Yuma Street between Reno Road and 35th Street.
- Left turns are very difficult on all approaches of Reno and Van Ness.
- Some residents do not like suggestions for car wash at Connecticut and Albemarle, yet they admit they do not have other ideas at this time.
- Cut-through traffic in the alley between Albemarle and Yuma.
- A citizen requested that replacing existing reversible lane signs with flashing signs or more noticeable signage be evaluated.
- Look at characteristics of Reno Road north of Nebraska Avenue. (One lane in each direction with one parking lane.) Could this be done to Reno within the study area?
- Look at 38th and Wisconsin. Similar geometry to 36th and Reno. They partially closed the roadway with Jersey barriers to reduce the speed of right turns. Could something similar be done on 36th Street?
- One resident spoke out against taking away some of the Tilden Street median to construct a left turn lane. However, there was support for the elimination of parking to provide a right turn lane. Some of Tilden Street median is owned by NPS.

<u>Pedestrians</u>

- Request for more "yield to pedestrians while turning" signs, on Reno Road in particular.
- Remove the pedestrian push buttons on Connecticut at Yuma and Windom. Buttons at Windom do not work properly.
- Install sidewalk on both sides of Yuma Street from Connecticut Avenue to 35th Street. South side seems to need it more.
- Corridor-wide pedestrian issues. The sidewalk contractor isn't doing its job repairing the sidewalk. Colleen suggested they call 727-1000 for these types of issues. Where would the ideal crossing points be along Connecticut Avenue from a purely pedestrian standpoint? Why aren't more pedestrians using the Metro underpass?
- More sidewalks on Reno Road. Particularly the west side between Tilden and Upton and the east side to the south of Tilden.
- What is the policy on mid-block crossings? Some residents want them on Connecticut Avenue.

- Some citizens would like a crosswalk on the south side of Windom Place.

Parking

- Illegal parking on Van Ness Street by the Bank of America building.
- Install "no double parking" signs on Van Ness.
- Would a ban on parking until 7:00 PM be along the entire Connecticut Avenue Corridor (at least from Calvert to Chevy Chase Circle)?
- Bank of America should install a sign on Van Ness encouraging their customers to use the parking garage on Veazey.

Citizens Comments/Questions about Land Use/Developments

- Get information on new apartment building at 3883 Connecticut Avenue.

ACTION ITEMS

- Comments received from public meeting and other sources will be taken into consideration.
- The draft existing conditions report will be revised to reflect additional pedestrian comments, suggestions and questions.
- All of the preliminary suggestions will be evaluated and a list of preliminary recommendations to address existing transportation issues will be developed.
- Future traffic conditions will be analyzed, taking into account background traffic growth and new developments within the study area.
- A draft final report will be prepared. Copies of the draft final report will be distributed to libraries in the Study Area. Also, the draft final report will be posted on the DDOT web site: http://www.ddot.dc.gov.

APPENDIX L
PRELIMINARY PLANNING COST ESTIMATE

Draft Connecticut Avenue Preliminary Planning Cost Estimate

Location	Description	Unit	Qty	Improvement Type(A)	Unit Price (B)	Short-Term Total	Long-Term Total
Area-Wide	Signal timing optimization	EA	9	Short-Term	$ 3,500.00	$ 31,500	
					Location Sub-Total:	**$ 31,500**	**$ -**
Connecticut Avenue General	Replace no parking signs on east side	SF	30	Short-Term	$ 85.27	$ 2,558	
	Upgrade reversible lane signals and signs thoughtout the entire corridor(C)	LS	1	Long-Term	$ 3,800,000.00		$ 3,800,000
	Pedestrian underpass signs	SF	25	Short-Term	$ 85.27	$ 2,132	
	"Yield to Pedestrians in Crosswalk" signs (how many)	SF	100	Short-Term	$ 85.27	$ 8,527	
					Location Sub-Total:	**$ 13,216**	**$ 3,800,000**
Connecticut Avenue & Tilden Street	No parking signs	SF	3	Short-Term	$ 85.27	$ 256	
	Left turn lane construction	LF	100	Long-Term	$ 267.41		$ 26,741
	Crosswalks	EA	1	Short-Term	$ 210.00	$ 210	
					Location Sub-Total:	**$ 466**	**$ 26,741**
Connecticut Avenue & Upton Street	"No Left Turn" Signs	SF	8	Short-Term	$ 85.27	$ 682	
					Location Sub-Total:	**$ 682**	
Alley between Veazey Terrace and Upton Street	"Do Not Enter" Signs	SF	12.5	Short-Term	$ 85.27	$ 1,066	
	"One Way" Signs	SF	12	Short-Term	$ 85.27	$ 1,023	
	"No Trucks" Signs	SF	8	Short-Term	$ 85.27	$ 682	
	Speed Humps	EA	2	Short-Term	$ 8,040.57	$ 16,081	
					Location Sub-Total:	**$ 18,852**	**$ -**
Connecticut Avenue & Van Ness Street	"No Turn on Red" Sign	SF	5	Short-Term	$ 85.27	$ 426	
	Pavement markings/striping	LS	1	Short-Term	$ 2,500.00	$ 2,500	
	Signal Upgrade	LS	1	Short-Term	$ 15,000.00	$ 15,000	
	"No Parking" Signs	SF	3	Short-Term	$ 85.27	$ 256	
					Location Sub-Total:	**$ 18,182**	**$ -**
Connecticut Avenue & Veazey Terrace	"Pedestrian Crossing" Sign	SF	12.5	Short-Term	$ 85.27	$ 1,066	
	Restripe Crosswalk	EA	1	Short-Term	$ 210.00	$ 210	
					Location Sub-Total:	**$ 1,276**	**$ -**
Connecticut Avenue & Windom Place	"No Parking" Signs	SF	4.5	Short-Term	$ 85.27	$ 384	
	Pedestrian Signals	EA	4	Short-Term	$ 2,500.00	$ 10,000	
	Signal Upgrade	LS	1	Short-Term	$ 100,000.00	$ 100,000	
	Crosswalks	EA	4	Short-Term	$ 210.00	$ 840	
					Location Sub-Total:	**$ 111,224**	**$ -**
Connecticut Avenue & Yuma Street	*Pedestrian Signals*	*EA*	*4*	*Short-Term*	*$ 2,500.00*	*$ 10,000*	
	Signal Upgrade	LS	1	Short-Term	$ 100,000.00	$ 100,000	
	Crosswalks	EA	3	Short-Term	$ 210.00	$ 630	
	Pavement markings/striping	LS	1	Short-Term	$ 1,500.00	$ 1,500	
					Location Sub-Total:	**$ 112,130**	**$ -**
Connecticut Avenue & Albemarle Street	Reverse car wash operation	LS		Long-Term	To be negotiated between DDOT and the car wash owner.		
	Police to direct traffic	LS		Short-Term			
					Location Sub-Total:	**$ -**	**$ -**
Alley between Albemarle & Yuma Streets	"One Way" Sign	SF	3	Short-Term	$ 85.27	$ 256	
	"Stop" Sign	SF	6.25	Short-Term	$ 85.27	$ 533	
	Speed Bumps	EA	2	Short-Term	$ 6,500.00	$ 13,000	
					Location Sub-Total:	**$ 13,789**	**$ -**
Reno Road and Tilden Street/Springland Lane	Crosswalks	EA	1	Short-Term	$ 210.00	$ 210	
	Remove pedestrian pushbuttons	LS	1	Short-Term	$ 1,000.00	$ 1,000	
	ADA curb ramps	EA	1	Short-Term	$ 787.50	$ 788	
	gravel path on island	SY	100	Long-Term	$ 19.14		$ 1,914
	Pavement markings/striping	LS	1	Short-Term	$ 5,000.00	$ 5,000	
					Location Sub-Total:	**$ 6,998**	**$ 1,914**
Reno Road between Van Ness Street and Albemarle Street	Speed Limit signs	SF	20	Short-Term	$ 85.27	$ 1,705	
					Location Sub-Total:	**$ 1,705**	**$ -**

Draft Connecticut Avenue Preliminary Planning Cost Estimate

Location	Description	Unit	Qty	Improvement Type(A)	Unit Price (B)	Short-Term Total	Long-Term Total
Reno Road and Upton Street	Sidewalk	SY	350	Long-Term	$ 42.00		$ 14,700
	Crosswalks	EA	2	Short-Term	$ 210.00	$ 420	
	ADA curb ramps	EA	2	Short-Term	$ 787.50	$ 1,575	
					Location Sub-Total:	**$ 1,995**	**$ 14,700**
Reno Road and Van Ness Street	Pedestrian bus pad	EA	1	Short-Term	$ 1,000.00	$ 1,000	
	"No Trucks" sign	SF	4	Short-Term	$ 85.27	$ 341	
					Location Sub-Total:	**$ 1,341**	**$ -**
36th Street between Reno Road and Alton Place	Traffic chokers	EA	3	Short-Term	$ 11,390.81	$ 34,172	
	Remove rumble strips	SY	250	Short-Term	$ 8.17	$ 2,042	
	Close 36th Street between Reno and Warren	LS	1	Long-Term	$ 100,000.00		$ 100,000
					Location Sub-Total:	**$ 36,214**	**$ 100,000**
Yuma Street General	Sidewalk	SY	250	Short-Term	$ 42.00	$ 10,500	
					Location Sub-Total:	**$ 10,500**	
Yuma Street & 35th Street	ADA curb ramps	EA	2	Short-Term	$ 787.50	$ 1,575	
	"Stop" signs	SF	18.8	Short-Term	$ 85.27	$ 1,599	
	"All-Way" plates	SF	2.25	Short-Term	$ 85.27	$ 192	
					Location Sub-Total:	**$ 3,366**	**$ -**
Yuma Street & 36th Street	ADA curb ramps	EA	4	Short-Term	$ 787.50	$ 3,150	
					Location Sub-Total:	**$ 3,150**	
Tilden Street & Sedgwick Street	Crosswalks	EA	2	Short-Term	$ 210.00	$ 420	
	ADA curb ramps	EA	1	Short-Term	$ 787.50	$ 788	
	"No Left Turn" sign	SF	4	Short-Term	$ 85.27	$ 341	
					Location Sub-Total:	**$ 1,549**	**$ -**
Van Ness Street between Reno Road and Connecticut Avenue	Pavement markings/striping	LS	1	Short-Term	$ 5,000.00	$ 5,000	
	Crash attenuator	EA	1	Short-Term	$ 10,500.00	$ 10,500	
	Crosswalks	EA	8	Short-Term	$ 210.00	$ 1,680	
					Location Sub-Total:	**$ 17,180**	**$ -**
Van Ness Street and the UDC exit driveway	Traffic mirror	EA	1	Short-Term	$ 1,000.00	$ 1,000	
	"No Parking" signs	SF	3	Short-Term	$ 85.27	$ 256	
	"Hidden Driveway" signs	SF	12.5	Short-Term	$ 85.27	$ 1,066	
	Driveway consolidation (includes signing, stripring, booth relocation)	LS	1	Long-Term	$ 15,000.00		$ 15,000
	signalization of UDC entrance driveway and International Drive	LS	1	Long-Term	$ 100,000.00		$ 100,000
					Location Sub-Total:	**$ 2,322**	**$ 115,000**
Van Ness Street east of Connecticut Avenue	"No Double Parking" signs	SF	9	Short-Term	$ 85.27	$ 767	
					Location Sub-Total:	**$ 767**	**$ -**
					Short-term Sub-total:	$ 408,404	$ 4,058,356
					15% Engineering & Design:	$ 61,261	$ 608,753
					15% Contingency:	$ 61,261	$ 608,753
					Total:	**$ 530,925**	**$ 5,275,862**

Notes:
A) Short-term improvements can be implemented within one year. Long-term improvements to take two+ years to implement.
B) Unit prices developed based on information provided by the District of Columbia Department of Public Works and other recent metro-area construction pricing sources
C) See Appendix J for reversible lane cost information
Sketch-plan cost estimates. Actual improvement cost estimates to be calculated upon design completion of each improvement.
All costs exclusive of Right-of-Way acquisition costs