Memorandum

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Subject: K Street NW Traffic Analysis
REVISED Volume Balancing Technical Memo

Date: February 5, 2020

Introduction

This memorandum presents the unbalanced vehicle volumes collected as part of the Data Collection Plan for the K Street NW Traffic Analysis and the volume balancing methodology with the resulting balanced volumes to be used in the VISSIM microsimulation model.

Study Area

The study area for the VISSIM microsimulation model, shown on **Figure 1**, includes 25 study intersections total. The 16 K Street NW Corridor study intersections are the following:

1. 22nd Street & K Street NW
2. 21st Street and K Street NW
3. 20th Street & K Street NW
4. 19th Street & K Street NW
5. 18th Street & K Street NW
6. 17th Street, Connecticut Avenue & K Street NW
7. 17th Street & K Street NW (east side of Farragut Square)
8. 16th Street and K Street NW
9. 15th Street & K Street NW (west side of McPherson Square)
10. 15th Street, Vermont Avenue & K Street NW (east side of McPherson Square)
11. 14th Street & K Street NW
12. 13th Street & K Street NW
13. 11th Street & K Street NW
14. 12th Street & K Street NW
15. 10th Street & K Street NW
16. 9th Street, New York Avenue & K Street NW (west side of Mt Vernon Square)

13-Hour TMC (6:30AM-7:30PM)
(Vehicles, Pedestrians, Bicycles, Heavy Vehicles)

Data Collection Plan

☐ Area of Simulation (VISSIM)

Turn Movement Counts

Ⓞ Peak Period TMCs – 5 Locations (7:00-10:00AM & 4:00-7:00PM)
(Vehicles, Pedestrians, Bicycles, Heavy Vehicles)

Ⓞ Peak Hour TMCs – 10 Locations (Specific Hours Pending Peak Period Volumes)
(Vehicles, Pedestrians, Bicycles, Heavy Vehicles)

Ⓞ Peak Hour Volumes – 9 Locations (Based on Synchro files provided by DDOT)
(Vehicles, Pedestrians, Bicycles, Heavy Vehicles)

— 48-Hour Automatic Traffic Recorder (Pneumatic Tubes) Location

Travel Time Runs

— Eastbound 21st Street to 10th Street
— Westbound 10th Street to 21st Street

Visual Observations Throughout Study Area (for VISSIM Calibration)
1) Maximum Queues
2) Transit Stop Operations
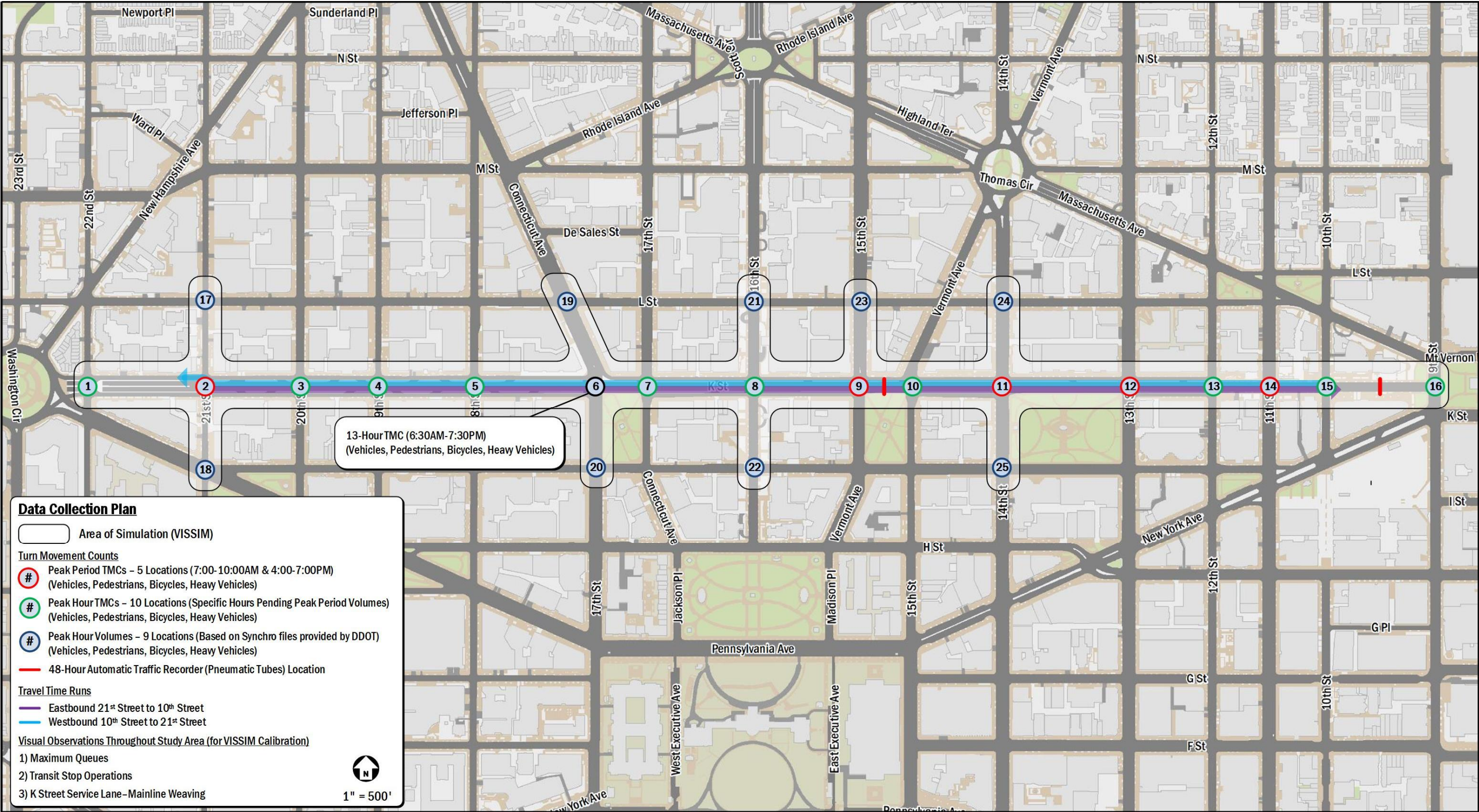3) K Street Service Lane–Mainline Weaving

1" = 500'

Figure 1: Study Area

In addition to the study intersections along K Street, nine (9) cross-street intersections adjacent to K Street NW that process significant volume interacting with the study corridor were also identified to be included in the analysis. Of note, the volumes at these intersections were provided by DDOT and were not part of volume data collection. The K Street NW adjacent cross-street study intersections are:

17. 21st Street & L Street NW
18. 21st Street, Pennsylvania Avenue & I Street NW
19. Connecticut Avenue & L Street NW
20. 17th Street & I Street NW
21. 16th Street & L Street NW
22. 16th Street & I Street NW
23. 15th Street & L Street NW
24. 14th Street & L Street NW
25. 14th Street & I Street NW

Unbalanced Volumes

Data collection took place along the K Street NW corridor in the form of 24-hour video recordings for Turning Movement Counts (TMCs) on Wednesday December 4, 2019.

With approval from DDOT, one intersection, 17th Street, Connecticut Avenue & K Street NW, was processed for 13-hour TMC data (6:30AM-7:30PM) and five (5) intersections were processed for 6-hours of peak period TMC data (7:00AM-10:00AM and 4:00PM-7:00PM). Based on these intersections, system peak hours were determined to then process the remaining K Street NW intersections for one hour during the AM and PM peak periods (8:30AM-9:30AM and 4:45PM-5:45PM). The processed intersection categories for TMC data are outlined below:

13-hours (6:30AM-7:30PM) TMC data:
- 17th Street, Connecticut Avenue & K Street NW

6-hours (7:00AM-10:00AM and 4:00PM-7:00PM) TMC data:
- 21st Street and K Street NW
- 15th Street & K Street NW (west side of McPherson Square)
- 14th Street & K Street NW
- 13th Street & K Street NW
- 11th Street & K Street NW

2-hours (8:30AM-9:30AM and 4:45PM-5:45PM) TMC data:
- 22nd Street & K Street NW
- 20th Street & K Street NW
- 19th Street & K Street NW
- 18th Street & K Street NW
- 17th Street & K Street NW (east side of Farragut Square)
- 16th Street and K Street NW
- 15th Street, Vermont Avenue & K Street NW (east side of McPherson Square)
- 12th Street & K Street NW
- 10th Street & K Street NW
- 9th Street, New York Avenue & K Street NW (west side of Mt Vernon Square)

In addition to the collected TMC data, field observations were also conducted at midblock slip ramps, where present, between study intersections along K Street NW during the morning and afternoon peak periods (7:00-10:00AM and 4:00-7:00PM). Observations included a 10-minute

sample of vehicle interactions to and from the slip ramps. The 10-minute samples did not necessarily coincide with the peak hours, but counts were used to extrapolate an initial hourly equivalent volume of traffic moving through the slip ramps. The extrapolated values were revised as necessary during volume balancing to minimize adjusting intersection volumes.

Attachment A presents a schematic of the unbalanced volumes for both the morning and afternoon peak hours (8:30AM-9:30AM and 4:45PM-5:45PM) vehicle volumes. These schematics do not include the estimated midblock slip ramp volumes. **Table 1** and **Table 2** summarize the combined mainline and service lane volumes entering and departing at each study intersection with the corresponding imbalances along K Street NW for the morning and afternoon peak hours, respectively. The volumes presented were not adjusted to account for midblock vehicle interactions via the slip ramps and the imbalances represent total vehicle differences between intersections.

Table 1: AM Approach and Departure Summary

Cross Street	Block Length (ft)	Unbalanced AM							
		WB Departure (combines ML & SL volumes)	WB Delta		WB Approach (combines ML & SL volumes)	EB Approach (combines ML & SL volumes)	EB Delta		EB Departure (combines ML & SL volumes)
			Imbalance	%			Imbalance	%	
22nd St									
delta (SL ONLY)	530		-97	-24%			-118	-27%	
21st St		936			788	1,140			1,072
delta	415		223	39%			-189	-18%	
20th St		565			660	883			961
delta	322		7	1%			4	0%	
19th St		653			603	965			845
delta	410		-113	-16%			-135	-16%	
18th St		716			789	710			798
delta	520		-168	-18%			-98	-12%	
17th W St /CT Ave		957			949	700			667
delta	160		88	10%			-78	-12%	
17th E St		861			800	589			556
delta	460		41	5%			1	0%	
16th St		759			778	557			603
delta	445		-117	-13%			28	5%	
15th W St		895			1,036	631			544
delta	160		-69	-6%			-28	-5%	
15th E/VT Ave		1,105			928	516			582
delta	355		-60	-6%			-24	-4%	
14th St		988			822	558			517
delta	540		76	10%			-42	-8%	
13th St		746			602	475			396
delta	330		30	5%			32	8%	
12th St		572			391	428			418
delta	200		-12	-3%			-66	-16%	
11th St		403			257	352			238
delta	190		-10	-4%			-6	-3%	
10th St		267			112	232			123
delta	480		-12	-10%			-58	-47%	
9th St		124			0	65			0

Note: The unbalanced volumes above do not reflect midblock sinks and generators

Highlighting Key: [%] absolute percent change is 10% or greater.

Table 2: PM Approach and Departure Summary

Cross Street	Block Length (ft)	WB Departure (combines ML & SL volumes)	WB Delta Imbalance	WB Delta %	WB Approach (combines ML & SL volumes)	EB Approach (combines ML & SL volumes)	EB Delta Imbalance	EB Delta %	EB Departure (combines ML & SL volumes)
22nd St									
delta (SL ONLY)	530		42	3%			28	13%	
21st St		1,504			1,264	527			524
delta	415		211	20%			-58	-11%	
20th St		1,053			1,102	466			569
delta	322		39	4%			85	15%	
19th St		1,063			952	654			535
delta	410		-2	0%			-10	-2%	
18th St		954			917	525			631
delta	520		-143	-13%			239	38%	
17th W St /CT Ave		1,060			1,121	870			796
delta	160		206	23%			-133	-17%	
17th E St		915			862	663			666
delta	460		10	1%			-9	-1%	
16th St		852			898	657			771
delta	445		55	7%			50	6%	
15th W St		843			890	821			809
delta	160		-76	-8%			20	2%	
15th E/VT Ave		966			840	829			877
delta	355		-127	-13%			6	1%	
14th St		967			860	883			731
delta	540		18	2%			-48	-7%	
13th St		842			587	683			627
delta	330		57	11%			21	3%	
12th St		530			394	648			584
delta	200		67	20%			-36	-6%	
11th St		327			186	548			427
delta	190		-20	-10%			17	4%	
10th St		206			132	444			212
delta	480		49	59%			-30	-14%	
9th St		83			0	182			0

Note: The unbalanced volumes above do not reflect midblock sinks and generators

Highlighting Key: % absolute percent change is 10% or greater.

Balanced Volumes

Despite processing traffic volume data for the same peak hours, midblock activity, including on-street parking, alleys, and garage driveways in between study intersections, and minor variation in the equipment used for traffic counts, such as variations in video time stamps, can cause fluctuations in volumes between intersections. As an initial step in overcoming these challenges, video data collected as part of the TMC data collection effort was reviewed for a second time at a handful of locations to verify the outcome of the manual post-processing efforts. These locations were identified based upon an assessment of volume imbalances between blocks. Locations that were re-processed included the following:

- 21st Street & K Street NW, all approaches, 8:30-9:30AM
- 17th Street, Connecticut Avenue & K Street NW, westbound approach, 4:45-5:45PM

- 17th Street (east side of Farragut Square) & K Street NW, all approaches, 8:30-9:30AM and 4:45-5:45PM
- 15th Street, Vermont Avenue & K Street NW (east side of McPherson Square), westbound approach, 8:30-9:30AM and 4:45-5:45PM

Note that the volume summaries in **Table 1** and **Table 2** reflect the re-processed TMC data. The revised data did result in reductions in imbalances to the east and west of these intersections; however, comprehensive volume balancing was necessary in order to build a microsimulation model for use in evaluating the operational performance of existing conditions and establish baseline conditions that will be part of forecasting future demand. Volume balancing across all study intersections was conducted to eliminate volume imbalances while considering all segment entry and exit points or midblock "sinks" and "generators".

Sinks and generators along the K Street NW corridor include 1) on-street parking, 2) garage driveways, and 3) alley access points. An inventory of garages and valet parking locations along K Street NW with their respective size, if available, was provided to the analysis team by DDOT and is included in **Attachment B**.

Volume Balancing Methodology

The volume balancing methodology used in this effort was as follows:

1. All illegal midblock maneuvers (midblock left-turns on K Street NW) were reassigned as legal maneuvers (right-turns)
2. Where recorded TMC data show a volume imbalance between two intersections, the imbalance was attributed to midblock generators and sinks. Where segment configuration such as the absence of midblock slip ramps or on-street parking, and/or field observations did not justify the midblock addition/removal of vehicles, vehicle trips were proportionally added or removed to the movements entering/exiting each link;
   a. For example, if the distribution of vehicles entering a link was 10% SBR, 80% WBT, and 10% NBL, vehicles were added/removed using those proportions.
3. Where intersection volumes were revised to achieve balance, volumes were adjusted upward to match the higher of the two volumes (entering or exiting volumes between segments) as a conservative measure (where possible);
4. Volumes to/from study intersections paralleling K Street NW (L Street and I Street NW), which are based on volumes included in the DDOT-provided Synchro files, were balanced to align with the volumes entering and exiting the adjacent K Street NW intersection.
5. Illegal turning maneuvers recorded as part of a peak hour TMC at a signalized intersection were not reassigned to legal movements

Summary of Balanced Volumes – AM Peak Hour

Attachment C presents the balanced peak hour vehicle volumes for the morning peak hour. **Figure 2** presents a comparison between the unbalanced and balanced volume scenarios of the block-to-block vehicle difference between K Street NW study intersections.

In **Figure 2**, the differences shown in the balanced volume scenario (the bottom chart in the figure) are attributed to midblock sinks and generators. Where the block-to-block vehicle difference is the same in the unbalanced and balanced scenarios, the unbalanced differences were attributed solely to midblock sinks and generators. Where the block-to-block vehicle difference does not match in the two charts, turning movement volume adjustments were made at specific intersections to achieve a balanced network. The volume adjustments at specific intersections change the adjacent block-to-block vehicle difference. These locations with high variance are the following:

- 21st Street & K Street NW
- 17th Street (East) & K Street NW
- 15th Street (West) & K Street NW
- 15th Street (East)/Vermont Avenue & K Street NW
- 13th Street & K Street NW
- 12th Street & K Street NW

Intersection turning movement volumes for the unbalanced and balanced scenarios are detailed in **Attachment D**. **Attachment D** includes the slip ramp volumes and the number vehicles generated or removed midblock due to sinks and generators. Details outlining the volume adjustments made to specific intersections (identified above as "high variance" locations) are provided in **Attachment E**.

Attachment F presents a tabular comparison of the approach and departure volumes with the midblock volumes attributed to sinks and generators between the unbalanced and balanced scenarios.

Table 3 summarizes the volume adjustments with the percent change at each K Street NW study intersection. As **Table 3** shows, the volume change to balance in the morning peak hour was greatest at the intersection 21st Street NW and K Street NW. This change was necessary to account for the high number of illegal midblock maneuvers from the eastbound mainline travel lanes between 22nd Street NW and 21st Street NW. Field observations noted a high number of eastbound left-turns traveling onto the westbound service lane. In total 348 vehicles, a 14 percent change, were removed from this intersection. 174 vehicles were removed from entering the eastbound mainline and 174 were removed from exiting the westbound service lane. While the volume of this adjustment represents a 14 percent change, the number of network trips removed is actually half that if you consider these vehicles represent two trips through the intersection to complete their intended route.

All adjustments made at these intersections are shown in **Attachment D** and explained in **Attachment E**. Given the high variability in traffic flow between these "high variance" intersections, further volume adjustments may be considered during microsimulation modeling to achieve calibration. These adjustments will be recorded, if made, during calibration.

Figure 2: Block-to-Block Differences in Vehicle Volumes, AM Peak Hour

Table 3: Volume Adjustments Summary, AM Peak Hour

Intersection Name	AM Peak TMC Adjustments (Difference Between Unbalanced and Balanced Volumes; adjustment value and percent change)																										
	SBR (to SL)	SBR (to ML)	SBT	SBL (to SL)	SBL (to ML)	SL WBR	SL WBT	WBL (to ML)	SL WBL	ML WBR	ML WBR (to SL)	ML WBT	ML WBL	NBL (to ML)	NBL (to SL)	NBT	NBR (to ML)	NBR (to SL)	ML EBL	ML EBT	ML EBR (to SL)	ML EBR	SL EBL	SL EBL (to ML)	SL EBT	SL EBR	Intersection Overall Input Changes
22nd St & K St	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0%	0 / 0%	0 / 0%	-- / --	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
21st St & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	-10 / -20%	0 / 0%	-174 / -63%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0%	-158 / -20%	0 / 0%	0 / 0%	0 / 0%	-6 / -21%	0 / 0%	0 / 0%	348 / 14%
20th St & K St	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
19th St & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
18th St & K St	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
17th W St/Connecticut Ave & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
17th E St & K St	5 / 14%	7 / 11%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	1 / 14%	0 / 0%	0 / 0%	0 / 0%	74 / 11%	0 / 0%	1 / 33%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	62 / 13%	4 / 15%	12 / 14%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	166 / 9%
16th St & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
15th W St & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	1 / 25%	2 / 15%	136 / 18%	4 / 17%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	143 / 7%
15th E St & K St	2 / 9%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	7 / 7%	0 / 0%	0 / 0%	0 / 0%	3 / 8%	51 / 7%	0 / 0%	0 / 0%	4 / 8%	0 / 0%	0 / 0%	0 / 0%	2 / 5%	23 / 5%	3 / 7%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	95 / 5%
14th St & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
13th St & K St	0 / 0%	5 / 8%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	1 / 33%	0 / 0%	0 / 0%	0 / 0%	36 / 9%	0 / 0%	11 / 8%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	30 / 9%	0 / 0%	12 / 9%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	95 / 4%
12th St & K St	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	27 / 77%	0 / 0%	0 / 0%	0 / 0%	28 / 78%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	55 / 3%
11th St & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
10th St & K St	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%	0 / 0%
9th St & K St	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0%

AM Peak Hour Overall Network Input Changes — 902 / 3%

Summary of Balanced Volumes – PM Peak Hour

Attachment C also presents the balanced peak hour vehicle volumes for the afternoon peak hour. **Figure 3** presents a comparison between the unbalanced and balanced volume scenarios of the block-to-block vehicle difference between K Street NW study intersections.

In **Figure 3**, the differences shown in the balanced volume scenario (the bottom chart in the figure) are again attributed to midblock sinks and generators, and as with AM peak hour volume adjustments, where the block-to-block vehicle difference is the same in the unbalanced and balanced scenarios, the unbalanced differences were attributed to midblock sinks and generators. Where the vehicle difference does not match, turning movement volume adjustments were made at specific intersections to achieve a balanced network. The volume adjustments at specific intersections change the adjacent block-to-block vehicle difference. These locations with high variance are the following:

- 21st Street & K Street NW
- 19th Street & K Street NW
- 17th Street (East) & K Street NW
- 15th Street (West) & K Street NW

- 15th Street (East)/Vermont Avenue & K Street NW
- 13th Street & K Street NW
- 12th Street & K Street NW
- 11th Street & K Street NW

Intersection turning movement volumes for the unbalanced and balanced scenarios are detailed in **Attachment G**. **Attachment G** includes the slip ramp volumes and the of number vehicles generated or removed midblock due to sinks and generators. Details outlining the volume adjustments made to specific intersections (identified above as "high variance" locations) are provided in **Attachment H**.

Attachment I presents a tabular comparison of the approach and departure volumes with the midblock volumes attributed to sinks and generators between the unbalanced and balanced scenarios.

Table 4 summarizes the volume adjustments with the percent change at each K Street NW study intersection. As **Table 4** shows, the volume change to balance in the afternoon peak hour was greatest at the intersection of 17th Street (East) and K Street NW. This change was necessary to account for the absence of midblock sinks and generators between this intersection and the adjacent intersection of 17th Street (West)/Connecticut Avenue and K Street NW to the west. A total of 339 vehicles, a 17 percent change, were added to this intersection, of which 206 vehicles were added to the movements entering the westbound mainline and service lanes, and the remaining 133 vehicles were added in the opposite direction to the eastbound approach movements.

All adjustments made at these intersections are shown in **Attachment G** and explained in **Attachment H**. Given the high variability in traffic flow between these "high variance" intersections, further volume adjustments may be considered during microsimulation modeling to achieve calibration. These adjustments will be recorded, if made, during calibration.
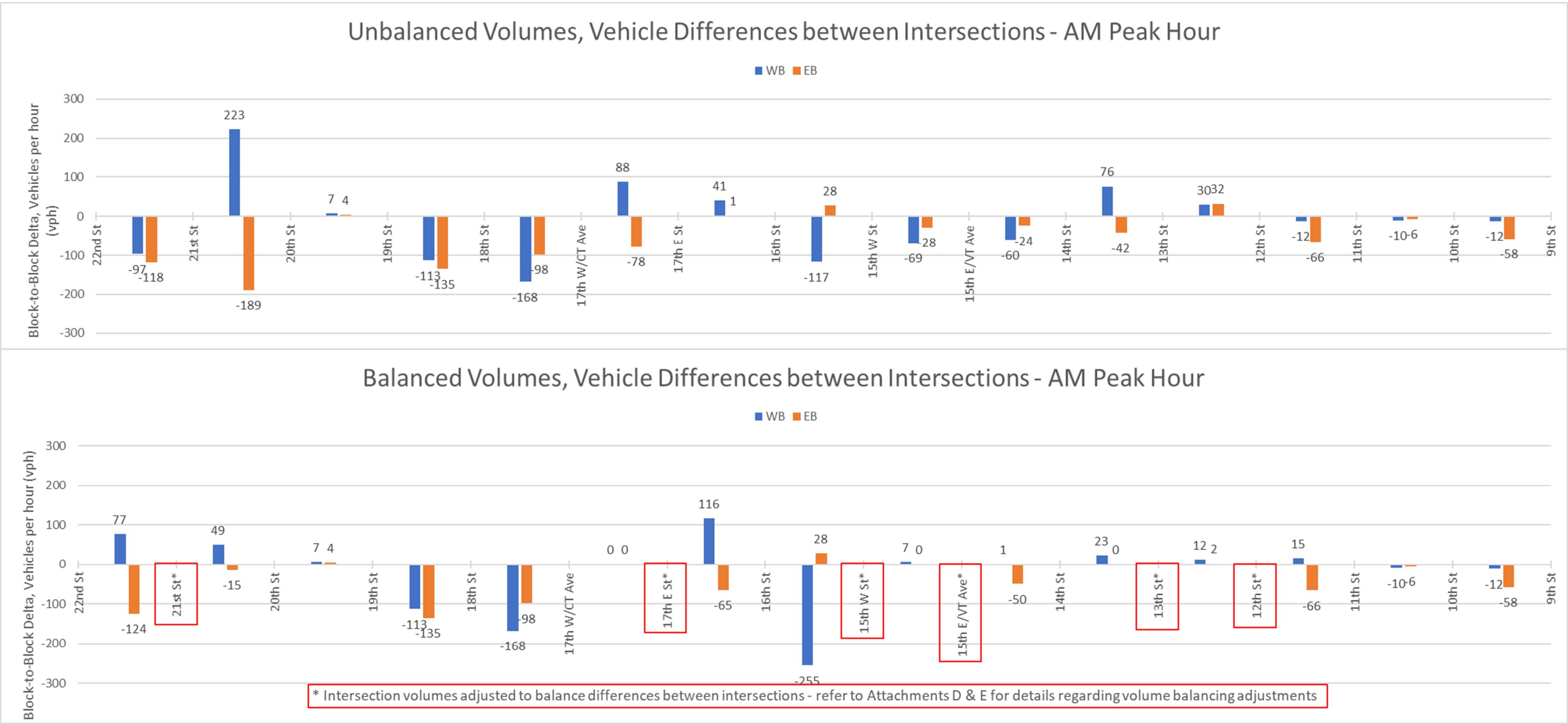
Figure 3: Block-to-Block Differences in Vehicle Volumes, PM Peak Hour

Table 4: Volume Adjustments Summary, AM Peak Hour

Intersection Name	PM Peak TMC Adjustments (Difference Between Unbalanced and Balanced Volumes; adjustment value and percent change)																										
	SBR (to SL)	SBR (to ML)	SBT	SBL (to SL)	SBL (to ML)	SL WBR	SL WBT	WBL (to ML)	SL WBL	ML WBR	ML WBR (to SL)	ML WBT	ML WBL	NBL (to ML)	NBL (to SL)	NBT	NBR (to ML)	NBR (to SL)	ML EBL	ML EBT	ML EBR (to SL)	ML EBR	SL EBL	SL EBL (to ML)	SL EBT	SL EBR	Intersection Overall Input Changes
22nd St & K St	--	--	--	--	--	0	0	0	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	--	--	--	--	--	0%	0%	0%	--	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21st St & K St	0	0	0	0	-7	0	0	0	0	0	0	0	0	--	--	--	--	--	0	-31	0	0	0	-5	0	0	43
	0%	0%	0%	0%	-10%	0%	0%	0%	0%	0%	0%	0%	0%	--	--	--	--	--	0%	-11%	0%	0%	0%	-10%	0%	0%	2%
20th St & K St	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	--	--	--	--	--	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19th St & K St	9	0	0	0	0	0	15	0	0	0	4	0	0	--	--	--	--	--	0	0	0	0	0	0	0	0	28
	16%	0%	0%	0%	0%	0%	17%	0%	0%	0%	18%	0%	0%	--	--	--	--	--	0%	0%	0%	0%	0%	0%	0%	0%	1%
18th St & K St	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	--	--	--	--	--	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17th W St/Connecticut Ave & K St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17th E St & K St	10	16	0	0	0	0	23	0	0	0	8	142	0	5	2	0	0	0	0	118	3	12	0	0	0	0	339
	53%	22%	0%	0%	0%	0%	26%	0%	0%	0%	26%	21%	0%	22%	29%	0%	0%	0%	0%	20%	23%	20%	0%	0%	0%	0%	17%
16th St & K St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15th W St & K St	0	0	0	0	0	17	4	0	0	2	10	140	9	0	0	0	0	0	0	20	0	0	0	0	0	0	202
	0%	0%	0%	0%	0%	13%	13%	0%	0%	29%	21%	22%	22%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	9%
15th E St & K St	0	0	0	0	0	7	13	0	0	0	4	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118
	0%	0%	0%	0%	0%	13%	13%	0%	0%	0%	14%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%
14th St & K St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13th St & K St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	41	0	6	0	0	0	0	48
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	7%	0%	7%	0%	0%	0%	0%	2%
12th St & K St	--	--	--	--	--	0	0	0	0	0	24	0	0	0	16	0	0	0	2	5	0	0	0	0	0	0	47
	--	--	--	--	--	0%	0%	0%	0%	0%	65%	0%	0%	0%	64%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	2%
11th St & K St	0	14	0	0	0	0	0	0	0	0	0	39	0	31	0	0	0	0	0	0	0	0	0	0	0	0	84
	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
10th St & K St	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--	--	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--	--	--	--	--	0%	0%	0%	0%	0%	0%	0%	0%	0%
9th St & K St	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0%
PM Peak Hour Overall Network Input Changes																											909
																											3%

Overall Balanced Network

As previously noted, volume adjustments were made at locations where the unbalanced volumes showed a high variance between intersections that cannot be attributed to midblock sinks and generators. The locations that were adjusted in both the morning and afternoon peak hours are the following:

- 21st Street & K Street NW
- 17th Street (East) & K Street NW
- 15th Street (West) & K Street NW

- 15th Street (East)/Vermont Avenue & K Street NW
- 13th Street & K Street NW
- 12th Street & K Street NW

Overall, the adjustments made to balance volumes along the K Street NW corridor result in an absolute volume input change of 902 vehicles, a 3 percent change to the unbalanced network turning movement volume total of 32,522 in the morning peak hour. An absolute volume input change of 909 vehicles, also a 3 percent change to the unbalanced network turning movement volume total of 34,140 in the afternoon peak hour. These network volume adjustments are summarized in **Table 5**. Considering the systematic and consistent approach to balancing network volumes, the resultant balanced peak hour volumes provide a solid foundation from which to move forward with microsimulation analyses of existing conditions and future traffic forecasting efforts.

Table 5: K Street NW Intersection Total Volume Balance Summary

K Street Intersection Total Volume Balance Summary				
Totals for K Street NW Intersections	Unbalanced Volume	Absolute Volume Change Total	Percent Change	Balanced Volume
AM Peak Hour	32,522	902	3%	32,728
PM Peak Hour	34,140	909	3%	34,963

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Transportation Planners and Engineers

Volume Balance Memorandum Technical Attachments

A: Unbalanced Volumes
B: Parking Garage Information Provided by DDOT
C: Balanced Volumes
D: AM Intersection Movements Comparison
E: AM Balancing Notes
F: AM Approach and Departure Summary and Comparison
G: PM Intersection Movements Comparison
H: PM Balancing Notes
I: PM Approach and Departure Summary and Comparison

Attachment A:
Unbalanced Volumes

K Street Service Lane

K Street

K Street Service Lane

22nd Street · 21st Street · 20th Street · 19th Street · 18th Street · Connecticut Avenue · 17th Street · 16th Street

ONE WAY

EXCEPT BUSES AND TAXICABS

2019 Existing Peak Hour Vehicle
Unbalanced Volumes (22nd St - 16th St)

— Study Intersection

→ Turning Movements to and from Mainline K Street

→ Turning Movements to and from Service Lanes

123/456 — AM/PM Peak Hour Volume

Peak hours are 8:30-9:30am and 4:45-5:45pm.
Right turns prohibited from main roadway.

N — Not to Scale

Kimley»Horn   **GOROVE / SLADE** Transportation Planners and Engineers

15th Street · Vermont Avenue · 14th Street · 13th Street · 12th Street ONE WAY · 11th Street · 10th Street ONE WAY · 9th Street ONE WAY

K Street Service Lane

9 · 10 · 11 · 12 · **K Street Service Lane** · 13

22/24
181/135
57/30
0/0

23/28
63/56
104/99
10/1

26/30
102/66
73/116
0/1

36/42
100/46
47/52
3/4

9/8
51/19
60/27
29/18
36/25

K Street

9 · 10 · 11 · 12 · 13 · 14 · 15 · **K Street** · 16

16/64
77/148
5/8

4/7
13/47
757/630
24/41

50/62
24/47

1/0
37/28
713/656

40/23
567/629
31/28

4/2
24/12
617/660
2/3

60/74
854/552
20/26

5/2
20/19
418/463
9/1

46/49
35/37
310/308

105/53
435/437
13/34

21/20
197/153
39/13

164/111
260/302
24/32

103/95
9/37

124/83
941/781

71/1
520/785
1/17

21/40
364/310
16/16

43/84
429/673
44/72

117/73
199/135
33/30

3/4
433/658
22/19

148/98
617/565
50/39

0/14
342/584
133/85

133/170
384/473
33/14

90/140
327/505

161/160
574/606
80/76

72/67
178/342
102/139

101/121
214/239
47/51

99/180
133/264

65/182

12/33
0/0

K Street Service Lane

9 · 10 · **K Street Service Lane** · 11 · 12 · **K Street Service Lane** · 13

4/0
3/0
32/18

40/22

3/6
97/196

1/3

11/3

15th Street · 15th Street ONE WAY · 14th Street · 13th Street · 12th Street ONE WAY · 11th Street · 10th Street ONE WAY · 9th Street ONE WAY

2019 Existing Peak Hour Vehicle
Unbalanced Volumes (15th St W – 9th St)

Study Intersection
→ Turning Movements to and from Mainline K Street
→ Turning Movements to and from Service Lanes
123/456 AM/PM Peak Hour Volume

Peak hours are 8:30-9:30am and 4:45-5:45pm.
Right turns prohibited from main roadway.

N
Not to Scale

Attachment B:
Parking Garage Information Provided by DDOT

ADDRESS	OPERATOR NAME	# of Spots	24 Hours?
1601 K ST NW	NATION PARKING	200	No
1666 K ST NW	COLONIAL PARKING	300	No
1667 K ST NW	PARK AMERICA	300	No
1700 K ST NW	COLONIAL PARKING	250	No
1717 K ST NW	COLONIAL PARKING	279	No
1750 K ST NW	MID-TOWN PARKING	183	No
1776 K ST NW	MID-TOWN PARKING	200	No
1800 K ST NW	COLONIAL PARKING	150	No
1825 K ST NW	C&C PARKING	200	No
1850 K ST NW	ONE PARKING	300	No
1875 K ST NW	LAZ PARKING	200	No
1900 K ST NW	ONE PARKING	200	No
1909 K ST NW	MONUMENT PARKING	300	No
1990 K ST NW	ATLANTIC PARKING	225	No
1999 K ST NW	COLONIAL PARKING	30	No
2000 K ST NW	COLONIAL PARKING	145	No
2020 K ST NW	ATLANTIC PARKING	200	No
2021 K ST NW	SP+ PARKING	200	No
2033 K ST NW	QUIK PARK	150	No
2121 K ST NW	SP+ PARKING	116	No
2131 K ST NW	MID-ATLANTIC PARKING	80	No
2141 K ST NW	SP+ PARKING	150	No
2175 K St NW	COLONIAL PARKING	100	No

2

Parking Garage Data November 18, 2019

Address	Company	Building Name	Number of Spots	K Street access location	Who has access?	All Access Points
1501 K Street	Atlantic	The Investment Building	114	15th block, northside, entrance mid-block	Public	K and L Streets
1030 15th Street	Penn Parking	The Executive Building	186	15th block, northside, entrance mid-block	Public	K and L Streets
1601 K Street	Nation Parking		38	16th block, northside, entrance eastern end of block	Public	K Street
1522 K Street	Towne Park	Hyatt Place Washington DC/ White House	8	15th block, southside, entrance mid-block	Employees	K Street
1400 K Street	Impark		280	14th block, southside, entrance mid-block	Public	K and I (Eye) Streets
1401 I (Eye) Street	Impark		150	14th block, southside, entrance mid-block	Public	K, I (Eye), 15th Streets
901 15th Street	Impark	The McPherson Building	154	14th block, southside, entrance mid-block	Public	K and I (Eye) Streets

Called 11/22/19. The garage under the hotel is small and only for employees. This number is an estimate from a hotel employee. The valet takes cars to a different parking garage but it is unknown which garage they go to.

Attachment C:
Balanced Volumes

Street labels (top): 22nd Street (ONE WAY), 21st Street (ONE WAY), 20th Street (ONE WAY), 19th Street (ONE WAY), 18th Street (ONE WAY), Connecticut Avenue, 17th Street, 16th Street

K Street Service Lane (top row) — Intersections 1, 2, 3, 4, 5, 6, 7, 8

Top service lane turning movements:
- 144/92, 101/179, 67/71
- 103/42
- 104/214, 4/1
- 165/176, 36/40, 2/1
- 56/64
- 60/102, 0/0
- 138/94, 29/10, 0/0
- 110/81
- 132/188
- 41/29
- 46/70, 63/111, 8/2
- 51/35
- 146/158, 42/77, 1/2

Middle vertical movements:
- 3/13, 251/255
- 22/11
- 9/1
- 3/9
- 1/0

K Street (mainline) — Intersections 2, 3, 4, 5, 6, 7, 8

Mainline turning movements:
- 72/203, 357/516, 41/63
- 28/44, 451/1000, 27/5
- 10/6, 2/5, 445/874
- 26/74, 383/683, 42/54
- 6/26, 505/825, 32/18
- 1/1, 615/811
- 34/74, 478/712, 6/12
- 3/2, 76/96, 737/807, 1/28
- 73/90, 181/169, 37/38
- 0/0, 25/39, 732/813, 1/0
- 78/70, 453/331, 67/113
- 5/0, 23/53, 561/607, 0/1

- 621/258, 39/0, 6/0
- 14/18, 733/369, 14/5
- 58/122, 792/385, 41/62
- 730/429, 7/6, 8/3
- 5/1, 652/467, 10/8
- 57/131, 788/486, 47/70
- 1/1, 604/728, 1/6
- 0/2, 710/589, 54/56
- 2/2, 535/706, 31/16, 99/72
- 4/28, 38/120, 7/10
- 3/6, 495/606, 5/3, 2/0
- 2/8, 308/280, 16/23

Vertical: 21/33, 15/6, 5/3, 0/2

K Street Service Lane (bottom row) — Intersections 1, 2, 3, 4, 5, 6, 7, 8

Bottom service lane turning movements:
- 49/21, 301/107
- 205/247, 66/32
- 22/44, 154/83, 134/106
- 7/3, 115/71
- 51/59
- 6/0, 45/40, 169/176
- 3/3, 40/46
- 46/37
- 3/0, 91/135
- 1/2, 11/3, 40/37
- 7/14
- 8/19

Street labels (bottom): 22nd Street (ONE WAY), 21st Street (ONE WAY), 20th Street (ONE WAY), 19th Street (ONE WAY), 18th Street (ONE WAY), 17th Street, 17th Street, 16th Street

Signs: "NO LEFT TURN EXCEPT BUSES", "NO LEFT TURN 7-9:30AM 4-6:30PM MONDAY-FRIDAY EXCEPT BUSES", "NO LEFT TURN EXCEPT BUSES AND TAXICABS", "NO LEFT TURN 4-6:30PM MONDAY-FRIDAY"

2019 Existing Peak Hour Vehicle Balanced Volumes (22nd St - 16th St)

- # — Study Intersection
- → — Turning Movements to and from Mainline K Street
- → — Turning Movements to and from Service Lanes
- 123/456 — AM/PM Peak Hour Volume

Peak hours are 8:30-9:30am and 4:45-5:45pm.
Right turns prohibited from main roadway.

N — Not to Scale

2019 Existing Peak Hour Vehicle Balanced Volumes (15th St W – 9th St)

| Study Intersection
→ | Turning Movements to and from Mainline K Street
→ | Turning Movements to and from Service Lanes
123/456 | AM/PM Peak Hour Volume

Peak hours are 8:30-9:30am and 4:45-5:45pm.
Right turns prohibited from main roadway.

Not to Scale

Attachment D:
AM Intersection Movements Comparison

Intersection	Approach Direction	AM							
		Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
		Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
22nd St & K St	WB	144	312	0	0	0%	0%	144	312
		101		0		0%		101	
		0		0		0%		0	
		67		0		0%		67	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
	NB	0	271	0	0	0%	0%	0	271
		3		0		0%		3	
		202		0		0%		202	
		0		0		0%		0	
		66		0		0%		66	
	EB	0	350	0	0	0%	0%	0	350
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		49		0		0%		49	
		0		0		0%		0	
		301		0		0%		301	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-124	--	--	0	-124
	Vehicles Exiting System	--		-124		--		-124	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	77	77	--	--	77	77
	Vehicles Exiting System	--		0		--		0	
21st St & K St	SB	103	604	0	-10	0%	-2%	103	594
		72		0		0%		72	
		357		0		0%		357	
		21		0		0%		21	
		51		-10		-20%		41	
	WB	0	788	0	-174	0%	-22%	0	614
		278		-174		-63%		104	
		4		0		0%		4	
		0		0		0%		0	
		0		0		0%		0	
		28		0		0%		28	
		451		0		0%		451	
		27		0		0%		27	
	EB	0	1,140	0	-164	0%	-14%	0	976
		779		-158		-20%		621	
		39		0		0%		39	
		6		0		0%		6	
		0		0		0%		0	
		28		-6		-21%		22	
		154		0		0%		154	
		134		0		0%		134	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-15	--	--	0	-15
	Vehicles Exiting System	--		-15		--		-15	
EB Slip Ramp Volumes	ML to SL	60	--	60	--	--	--	60	--
	SL to ML	36	--	137	--	--	--	137	--
WB Slip Ramp Volumes	ML to SL	72	--	54	--	--	--	54	--
	SL to ML	12	--	55	--	--	--	55	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	49	49	--	--	49	49
	Vehicles Exiting System	--		0		--		0	
20th St & K St	WB	165	660	0	0	0%	0%	165	660
		36		0		0%		36	
		2		0		0%		2	
		0		0		0%		0	
		10		0		0%		10	
		2		0		0%		2	
		445		0		0%		445	
		0		0		0%		0	
	NB	58	964	0	0	0%	0%	58	964
		22		0		0%		22	
		792		0		0%		792	
		41		0		0%		41	
		51		0		0%		51	
	EB	14	883	0	0	0%	0%	14	883
		733		0		0%		733	
		14		0		0%		14	
		0		0		0%		0	
		0		0		0%		0	
		7		0		0%		7	
		115		0		0%		115	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	4	4	--	--	4	4
	Vehicles Exiting System	--		0		--		0	
EB Slip Ramp Volumes	ML to SL	18	--	48	--	--	--	48	--
	SL to ML	12	--	12	--	--	--	12	--
WB Slip Ramp Volumes	ML to SL	6	--	74	--	--	--	74	--
	SL to ML	0	--	0	--	--	--	0	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	7	7	--	--	7	7
	Vehicles Exiting System	--		0		--		0	

Intersection	Approach Direction	Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
		Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
19th St & K St	SB	56	522	0	0	0%	0%	56	522
		26		0		0%		26	
		383		0		0%		383	
		15		0		0%		15	
		42		0		0%		42	
	WB	0	603	0	0	0%	0%	0	603
		60		0		0%		60	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		6		0		0%		6	
		505		0		0%		505	
		32		0		0%		32	
	EB	0	965	0	0	0%	0%	0	965
		730		0		0%		730	
		7		0		0%		7	
		8		0		0%		8	
		0		0		0%		0	
		6		0		0%		6	
		45		0		0%		45	
		169		0		0%		169	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-135	--	--	0	-135
	Vehicles Exiting System	--		-135		--		-135	
EB Slip Ramp Volumes	ML to SL	36	--	117	--	--	--	117	--
	SL to ML	6	--	6	--	--	--	6	--
WB Slip Ramp Volumes	ML to SL	36	--	135	--	--	--	135	--
	SL to ML	6	--	6	--	--	--	6	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-113	--	--	0	-113
	Vehicles Exiting System	--		-113		--		-113	
18th St & K St	WB	138	789	0	0	0%	0%	138	789
		29		0		0%		29	
		0		0		0%		0	
		0		0		0%		0	
		1		0		0%		1	
		6		0		0%		6	
		615		0		0%		615	
		0		0		0%		0	
	NB	57	947	0	0	0%	0%	57	947
		9		0		0%		9	
		788		0		0%		788	
		47		0		0%		47	
		46		0		0%		46	
	EB	5	710	0	0	0%	0%	5	710
		652		0		0%		652	
		10		0		0%		10	
		0		0		0%		0	
		0		0		0%		0	
		3		0		0%		3	
		40		0		0%		40	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-98	--	--	0	-98
	Vehicles Exiting System	--		-98		--		-98	
EB Slip Ramp Volumes	ML to SL	90	--	138	--	--	--	138	--
	SL to ML	42	--	42	--	--	--	42	--
WB Slip Ramp Volumes	ML to SL	90	--	167	--	--	--	167	--
	SL to ML	36	--	18	--	--	--	18	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	12	-168	--	--	12	-168
	Vehicles Exiting System	--		-180		--		-180	
17th W St/Connecticut Ave & K St	SB	110	628	0	0	0%	0%	110	628
		34		0		0%		34	
		478		0		0%		478	
		0		0		0%		0	
		6		0		0%		6	
	WB	132	949	0	0	0%	0%	132	949
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		3		0		0%		3	
		76		0		0%		76	
		737		0		0%		737	
		1		0		0%		1	
	NB	0	764	0	0	0%	0%	0	764
		0		0		0%		0	
		710		0		0%		710	
		54		0		0%		54	
		0		0		0%		0	
	EB	1	700	0	0	0%	0%	1	700
		604		0		0%		604	
		0		0		0%		0	
		1		0		0%		1	
		0		0		0%		0	
		3		0		0%		3	
		0		0		0%		0	
		91		0		0%		91	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	0	--	--	0	0
	Vehicles Exiting System	--		0		--		0	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	0	--	--	0	0
	Vehicles Exiting System	--		0		--		0	

Intersection	Approach Direction	AM							
		Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
		Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
17th E St & K St	SB	36	325	5	12	14%	4%	41	337
		66		7		11%		73	
		181		0		0%		181	
		5		0		0%		5	
		37		0		0%		37	
	WB	46	800	0	75	0%	9%	46	875
		63		0		0%		63	
		7		1		14%		8	
		0		0		0%		0	
		0		0		0%		0	
		25		0		0%		25	
		658		74		11%		732	
		1		0		0%		1	
	NB	3	58	1	1	33%	2%	4	59
		3		0		0%		3	
		38		0		0%		38	
		7		0		0%		7	
		7		0		0%		7	
	EB	2	589	0	78	0%	13%	2	667
		473		62		13%		535	
		27		4		15%		31	
		87		12		14%		99	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-65	--	--	0	-65
	Vehicles Exiting System	--		-65		--		-65	
EB Slip Ramp Volumes	ML to SL	6	--	98	--	--	--	98	--
	SL to ML	24	--	24	--	--	--	24	--
WB Slip Ramp Volumes	ML to SL	78	--	0	--	--	--	0	--
	SL to ML	12	--	116	--	--	--	116	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	116	116	--	--	116	116
	Vehicles Exiting System	--		0		--		0	
16th St & K St	SB	51	649	0	0	0%	0%	51	649
		78		0		0%		78	
		453		0		0%		453	
		0		0		0%		0	
		67		0		0%		67	
	WB	146	778	0	0	0%	0%	146	778
		42		0		0%		42	
		1		0		0%		1	
		0		0		0%		0	
		5		0		0%		5	
		23		0		0%		23	
		561		0		0%		561	
		0		0		0%		0	
	NB	2	335	0	0	0%	0%	2	335
		1		0		0%		1	
		308		0		0%		308	
		16		0		0%		16	
		8		0		0%		8	
	EB	3	557	0	0	0%	0%	3	557
		495		0		0%		495	
		5		0		0%		5	
		2		0		0%		2	
		0		0		0%		0	
		1		0		0%		1	
		11		0		0%		11	
		40		0		0%		40	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	28	28	--	--	28	28
	Vehicles Exiting System	--		0		--		0	
EB Slip Ramp Volumes	ML to SL	12	--	12	--	--	--	12	--
	SL to ML	12	--	25	--	--	--	25	--
WB Slip Ramp Volumes	ML to SL	198	--	347	--	--	--	347	--
	SL to ML	6	--	6	--	--	--	6	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-255	--	--	0	-255
	Vehicles Exiting System	--		-255		--		-255	

Intersection	Approach Direction	AM							
		Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
		Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
15th W St & K St	SB	22		0		0%		22	
		16		0		0%		16	
		77	120	0	0	0%	0%	77	120
		0		0		0%		0	
		5		0		0%		5	
	WB	181		0		0%		181	
		57		0		0%		57	
		0		0		0%		0	
		0	1,036	0	143	0%	14%	0	1,179
		4		1		25%		5	
		13		2		15%		15	
		757		136		18%		893	
		24		4		17%		28	
	NB	21		0		0%		21	
		9		0		0%		9	
		364	410	0	0	0%	0%	364	410
		16		0		0%		16	
		0		0		0%		0	
	EB	71		0		0%		71	
		520		0		0%		520	
		0		0		0%		0	
		1	631	0	0	0%	0%	1	631
		4		0		0%		4	
		3		0		0%		3	
		0		0		0%		0	
		32		0		0%		32	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	0	--	--	0	0
	Vehicles Exiting System	--		0		--		0	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	7	7	--	--	7	7
	Vehicles Exiting System	--		0		--		0	
15th E St & K St	SB	23		2		9%		25	
		50		0		0%		50	
		0	109	0	2	0%	2%	0	111
		12		0		0%		12	
		24		0		0%		24	
	WB	63		0		0%		63	
		104		7		7%		111	
		10		0		0%		10	
		0	928	0	61	0%	7%	0	989
		1		0		0%		1	
		37		3		8%		40	
		713		51		7%		764	
		0		0		0%		0	
	NB	117		0		0%		117	
		51		4		8%		55	
		199	440	0	4	0%	1%	199	444
		33		0		0%		33	
		40		0		0%		40	
	EB	43		2		5%		45	
		429		23		5%		452	
		44		3		7%		47	
		0	516	0	28	0%	5%	0	544
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-50	--	--	0	-50
	Vehicles Exiting System	--		-50		--		-50	
EB Slip Ramp Volumes	ML to SL	12	--	63	--	--	--	63	--
	SL to ML	12	--	12	--	--	--	12	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	1	1	--	--	1	1
	Vehicles Exiting System	--		0		--		0	

Intersection	Approach Direction	AM							
		Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
		Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
14th St & K St	SB	26		0		0%		26	
		40		0		0%		40	
		567	664	0	0	0%	0%	567	664
		0		0		0%		0	
		31		0		0%		31	
	WB	102		0		0%		102	
		73		0		0%		73	
		0		0		0%		0	
		0	822	0	0	0%	0%	0	822
		4		0		0%		4	
		24		0		0%		24	
		617		0		0%		617	
		2		0		0%		2	
	NB	148		0		0%		148	
		60		0		0%		60	
		617	875	0	0	0%	0%	617	875
		50		0		0%		50	
		0		0		0%		0	
	EB	3		0		0%		3	
		433		0		0%		433	
		0		0		0%		0	
		22	558	0	0	0%	0%	22	558
		0		0		0%		0	
		3		0		0%		3	
		0		0		0%		0	
		97		0		0%		97	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	0	--	--	0	0
	Vehicles Exiting System	--		0		--		0	
WB Slip Ramp Volumes	ML to SL	24		20		--		20	
	SL to ML	0		0		--		0	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	23	23	--	--	23	23
	Vehicles Exiting System	--		0		--		0	
13th St & K St	SB	36		0		0%		36	
		60		5		8%		65	
		854	970	0	5	0%	1%	854	975
		0		0		0%		0	
		20		0		0%		20	
	WB	100		0		0%		100	
		47		0		0%		47	
		3		1		33%		4	
		0	602	0	37	0%	6%	0	639
		5		0		0%		5	
		20		0		0%		20	
		418		36		9%		454	
		9		0		0%		9	
	NB	133		11		8%		144	
		29		0		0%		29	
		384	580	0	11	0%	2%	384	591
		33		0		0%		33	
		1		0		0%		1	
	EB	0		0		0%		0	
		342		30		9%		372	
		0		0		0%		0	
		133	475	12	42	9%	9%	145	517
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	11	2	--	--	11	2
	Vehicles Exiting System	--		-9		--		-9	
EB Slip Ramp Volumes	ML to SL	6	--	20	--	--	--	20	--
	SL to ML	12	--	12	--	--	--	12	--
WB Slip Ramp Volumes	ML to SL	18	--	13	--	--	--	13	--
	SL to ML	0	--	0	--	--	--	0	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	12	12	--	--	12	12
	Vehicles Exiting System	--		0		--		0	
12th St & K St	WB	0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0	391	0	27	0%	7%	0	418
		46		0		0%		46	
		35		27		77%		62	
		310		0		0%		310	
		0		0		0%		0	
	NB	191		0		0%		191	
		36		28		78%		64	
		574	881	0	28	0%	3%	574	909
		80		0		0%		80	
		0		0		0%		0	
	EB	90		0		0%		90	
		327		0		0%		327	
		0		0		0%		0	
		0	428	0	0	0%	0%	0	428
		0		0		0%		0	
		11		0		0%		11	
		0		0		0%		0	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-66	--	--	0	-66
	Vehicles Exiting System	--		-66		--		-66	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	15	15	--	--	15	15
	Vehicles Exiting System	--		0		--		0	

Intersection	Approach Direction	AM							
		Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
		Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
11th St & K St	SB	0	553	0	0	0%	0%	0	553
		105		0		0%		105	
		435		0		0%		435	
		0		0		0%		0	
		13		0		0%		13	
	WB	0	257	0	0	0%	0%	0	257
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		21		0		0%		21	
		0		0		0%		0	
		197		0		0%		197	
		39		0		0%		39	
	NB	101	362	0	0	0%	0%	101	362
		0		0		0%		0	
		214		0		0%		214	
		47		0		0%		47	
		0		0		0%		0	
	EB	72	352	0	0	0%	0%	72	352
		178		0		0%		178	
		0		0		0%		0	
		102		0		0%		102	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-6	--	--	0	-6
	Vehicles Exiting System	--		-6		--		-6	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-10	--	--	0	-10
	Vehicles Exiting System	--		-10		--		-10	
10th St & K St	SB	0	448	0	0	0%	0%	0	448
		164		0		0%		164	
		260		0		0%		260	
		0		0		0%		0	
		24		0		0%		24	
	WB	0	112	0	0	0%	0%	0	112
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		103		0		0%		103	
		9		0		0%		9	
	EB	0	232	0	0	0%	0%	0	232
		99		0		0%		99	
		0		0		0%		0	
		133		0		0%		133	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-58	--	--	0	-58
	Vehicles Exiting System	--		-58		--		-58	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	0	-12	--	--	0	-12
	Vehicles Exiting System	--		-12		--		-12	
9th St & K St	SB	0	1,065	0	0	0%	0%	0	1,065
		124		0		0%		124	
		941		0		0%		941	
		0		0		0%		0	
		0		0		0%		0	
	EB	0	65	0	0	0%	0%	0	65
		0		0		0%		0	
		0		0		0%		0	
		65		0		0%		65	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	
		0		0		0%		0	

K Street Intersection Total Volume Balance Summary				
	AM Unbalanced Volume	AM Volume Input Change Total	AM Percent Change	AM Balanced Volume
K Street NW Intersections only Total Volume Balance Summary	33,512	902	3%	32,728

Attachment E:
AM Balancing Notes

Attachment E - Location-Specific Volume Balancing Adjustments, AM Peak Hour

General Methodology:

The volume balancing methodology used in this effort was as follows:

1. Where recorded TMCs show a volume imbalance between two intersections, the imbalance was attributed to midblock generators and sinks. Where segment configuration, existing conditions such as the absence of midblock slip ramps and on-street parking, and/or field observations did not justify the midblock addition/removal of vehicles, vehicle trips were proportionally added or removed to the movements entering/exiting each link;

2. Where TMCs were revised to achieve balance between intersections, TMCs were adjusted upward to match the higher of the two volumes as a conservative measure (where possible);

3. Volumes on adjacent cross-street study intersections (I Street and L Street) were revised to match corresponding balanced volumes to or from K Street.

Main Line – "ML" and Service Lane – "SL"

Notes on Volume Balancing along Segments with Large Volume Variances by Intersection

AM Peak Hour

- Between 21st Street and 20th Street
  - Field observations showed a significant number of illegal midblock left-turn maneuvers from the EB ML into the WB SL
    - These maneuvers were removed from the network to achieve balanced volumes and due to how proximate this segment is to the western "edge" of the network
  - WB
    - Unbalanced Volumes:
      - *20th Street*: 505 vehicles entering ML and 60 vehicles entering SL
      - *21st Street:* 506 vehicles exiting ML and 282 vehicles exiting SL
      - *Imbalance:* +1 ML difference, +222 SL difference; net +223
    - ML Balancing:
      - 1 additional vehicle generated midblock
    - SL Balancing:
      - 174 vehicles (removed from the EB ML to account for illegal left-turn maneuvers) were removed from the SL WBT movement at the 21st Street intersection;
      - 48 vehicles generated midblock
  - EB
    - Unbalanced Volumes:
      - *21st Street:* 858 vehicles entering ML and 214 vehicles entering SL
      - *20th Street:* 761 vehicles exiting ML and 122 vehicles exiting SL
      - *Imbalance:* -97 ML difference, -92 SL difference; net -189

- ML Balancing:
  - Field observations indicate a significant number of EB ML traffic turns left midblock into the WB SL; therefore, 174 vehicles were proportionally removed from turning movements into the ML from the 21st Street intersection
- SL Balancing:
  - 15 vehicles were removed from system (on-street parking)
- Between 17th Street W and 17th Street E
  - WB
    - Unbalanced Volumes:
      - *17th Street E:* 734 vehicles entering ML and 127 vehicles entering SL,
      - *17th Street W:* 817 vehicles exiting ML and 132 vehicles exiting SL
      - *Imbalance:* +83 ML difference, +5 SL difference; net +88
    - ML Balancing:
      - 83 vehicles were proportionally added to turning movements entering the WB ML from the 17th Street E intersection
    - SL Balancing:
      - 5 vehicles added to volumes entering SL from 17th Street E intersection
  - EB
    - Unbalanced Volumes:
      - *17th Street W:* 667 vehicles entering segment, and
      - *17th Street E:* 589 vehicles exiting
      - *Imbalance:* -78 difference
    - ML Balancing:
      - 78 vehicles were proportionally added to turning movements approaching 17th Street E intersection
- Between 15th Street W and 15th Street E
  - WB
    - Unbalanced Volumes:
      - *15th Street E:* 890 vehicles entering ML and 215 vehicles entering SL,
      - *15th Street W:* 798 vehicles exiting ML and 238 vehicles exiting SL
      - *Imbalance:* -92 ML difference, +23 SL difference; net -69
    - ML Balancing:
      - Upstream volume balancing between 15th Street E and 14th Street increases ML difference by 51 vehicles (existing imbalance -92, imbalance attributed to upstream balancing -51; -143 net)
      - 143 vehicles proportionally added to turning movements exiting segment at 15th Street W intersection
    - SL Balancing:
      - Upstream volume balancing between 15th Street E and 14th Street decreases SL difference by 3 vehicles
      - 7 vehicles generated midblock from on-street parking

- 13 proportionally added to movements entering SL from 15th Street E
  - o EB
    - ▪ Unbalanced Volumes:
      - *15th Street W:* 544 vehicles entering ML
      - *15th Street E:* 516 vehicles exiting ML
      - *Imbalance:* -28 vehicle difference
    - ▪ Balancing:
      - 28 vehicles proportionally added to turning movements exiting segment at the 15th Street E intersection
- ▪ Between 15th Street E and 14th Street
  - o WB
    - ▪ Unbalanced Volumes:
      - *14th Street:* 805 vehicles entering ML and 183 vehicles entering SL
      - *15th Street E:* 751 vehicles exiting ML and 177 vehicles exiting SL
      - *Imbalance:* -54 vehicle ML difference, -6 SL difference; net -60
    - ▪ ML Balancing:
      - 54 vehicles proportionally added to turning movements exiting segment at 15th Street E intersection
    - ▪ SL Balancing:
      - Volume balancing downstream decreases SL difference by 7 vehicles (existing SL imbalance -6, imbalance attributed to downstream balancing +7; net 1)
      - 1 vehicle generated midblock from on-street parking
  - o EB
    - ▪ Unbalanced Volumes:
      - *15th Street E:* 486 entering ML and 96 entering SL
      - *14th Street:* 458 exiting ML and 100 exiting SL
      - *Imbalance:* -28 ML difference, +4 SL difference; net -24
    - ▪ ML Balancing:
      - Volume balancing upstream of intersection (between 15th Street W and 15th Street E) increases volume imbalance in ML by 23 vehicles (existing ML imbalance -28, imbalance attributed to upstream balancing -23; net -51)
    - ▪ SL Balancing:
      - Volume balancing upstream of intersection (between 15th Street W and 15th Street E) decreases volume imbalance in SL by 3 vehicles (existing SL imbalance +4, imbalance attributed to upstream balancing -3; net +1)
      - 50 vehicles were removed from ML and system
- ▪ Between 14th Street and 13th Street
  - o WB
    - ▪ Unbalanced Volumes:
      - *13th Street:* 614 entering ML and 132 entering SL

- *14th Street:* 647 exiting ML and 175 exiting SL
- *Imbalance:* +33 ML difference, +43 in the SL difference; net +76
  - ML Balancing:
    - 53 vehicles added proportionally to turning movements entering the ML from 13th Street intersection
    - 20 vehicles routed to SL
  - SL Balancing:
    - 23 vehicles generated midblock from on-street parking
    - ML balancing decreases SL imbalance by 20 vehicles
    - Vehicles were not added to movements entering SL to maintain consistency with field observations in which travel from the SL to the ML was minimal
  - o EB
    - Unbalanced Volumes:
      - *14th Street:* 517 entering ML
      - *13th Street:* 475 exiting ML
      - *Imbalance:* -42 difference
    - Balancing:
      - 42 vehicles proportionally added to turning movements exiting segment at the 13th Street intersection
- Between 13th Street and 12th Street
  - o WB
    - Unbalanced Volumes:
      - *12th Street:* 501 entering ML and 71 entering SL,
      - *13th Street:* 452 exiting ML and 150 exiting SL
      - *Imbalance:* -49 ML difference, +79 SL difference; net +30
    - ML Balancing:
      - Downstream balancing (between 14th Street and 13th Street) decreases ML difference by 36 (existing ML balance -49, imbalance attributed to downstream balancing +36; net -13)
      - Midblock lefts and ML difference routed to the SL (13 vehicles from ML to SL)
    - SL Balancing:
      - Downstream balancing (between 14th Street and 13th Street) increases SL difference by 1 (existing SL imbalance +79, imbalance attributed to downstream balancing +1; net +80)
      - ML balancing decreases imbalance by 13 vehicles
      - 12 vehicles generated from on-street parking
      - 55 vehicles proportionally added to TMCs entering the SL link from the 12th Street intersection

Attachment F:
AM Approach and Departure Summary and Comparison

Highlighting Key: `%` absolute percent change is 10% or greater.

Cross Street	Block Length (ft)	Unbalanced AM								Balanced AM										North Side of K St (WB Direction of Travel) Midblock Notes*	South Side of K St (EB Direction of Travel) Midblock Notes*
		WB Departure (combines ML & SL volumes)	WB Delta Difference	WB Delta %	WB Approach (combines ML & SL volumes)	EB Approach (combines ML & SL volumes)	EB Delta Difference	EB Delta %	EB Departure (combines ML & SL volumes)	WB Midblock Vehicles Added/Removed	WB Departure (combines ML & SL volumes)	WB Delta Difference	WB Delta %	WB Approach (combines ML & SL volumes)	EB Midblock Vehicles Added/Removed	EB Approach (combines ML & SL volumes)	EB Delta Difference	EB Delta %	EB Departure (combines ML & SL volumes)		
22nd																					
delta (*SL ONLY*)	530		-97	-24%			-118	-27%		77		0	0%		-124		0	0%		Two garage driveways and one alley driveway/266 spaces	Two garage driveways/unknown # of spaces
21st		936			788	1,140			1,072		762			614		976			898		
delta	415		223	39%			-189	-18%		49		0	0%		-15		0	0%		One garage driveway/200 spaces	No midblock driveways.
20th		565			660	883			961		565			660		883			961		
delta	322		7	1%			4	0%		7		0	0%		4		0	0%		No midblock driveways.	One garage driveway, and one alley driveway present/225 spaces
19th		653			603	965			845		653			603		965			845		
delta	410		-113	-16%			-135	-16%		-113		0	0%		-135		0	0%		One garage driveway/200 spaces	Two separate and adjacent garage driveways present/300 spaces
18th		716			789	710			798		716			789		710			798		
delta	520		-168	-18%			-98	-12%		-168		0	0%		-98		0	0%		One garage driveway and one alley driveway/279 spaces	Two garage driveways and one alley driveway/433 spaces
17th W/CT		957			949	700			667		957			949		700			667		
delta	160		88	10%			-78	-12%		0		0	0%		0		0	0%		No midblock driveways.	No midblock driveways.
17th E		861			800	589			556		949			875		667			622		
delta	460		41	5%			1	0%		116		0	0%		-65		0	0%		One garage driveway and one alley driveway/200 spaces	One alley driveway.
16th		759			778	557			603		759			778		557			603		
delta	445		-117	-13%			28	5%		-255		0	0%		28		0	0%		One alley/garage driveway/114 spaces	One alley driveway.
15th W		895			1,036	631			544		1,033			1,179		631			544		
delta	160		-69	-6%			-28	-5%		7		0	0%		0		0	0%		No midblock driveways.	No midblock driveways.
15th E/VT		1,105			928	516			582		1,172			989		544			608		
delta	355		-60	-6%			-24	-4%		1		0	0%		-50		0	0%		No midblock driveways.	One alley/garage driveway/430 spaces
14th		988			822	558			517		988			822		558			517		
delta	540		76	10%			-42	-8%		23		0	0%		0		0	0%		No midblock driveways.	No midblock driveways.
13th		746			602	475			396		799			639		517			426		
delta	330		30	5%			32	8%		12		0	0%		2		0	0%		No midblock driveways.	No midblock driveways.
12th		572			391	428			418		627			418		428			418		
delta	200		-12	-3%			-66	-16%		15		0	0%		-66		0	0%		No midblock driveways.	One garage driveway/unknown # of spaces
11th		403			257	352			238		403			257		352			238		
delta	190		-10	-4%			-6	-3%		-10		0	0%		-6		0	0%		No midblock driveways.	One alley driveway
10th		267			112	232			123		267			112		232			123		
delta	480		-12	-10%			-58	-47%		-12		0	0%		-58		0	0%		No midblock driveways.	One garage driveway/154 spaces
9th		124			0	65			0		124			0		65			0		

*Note: number of garage spaces based on "LoadingZones_Transitway" and "Parking Garages" files shared with G/S and if garage found to have midblock access point on K Street

Attachment G:
PM Intersection Movements Comparison

Intersection	Approach Direction	Movement	PM							
			Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
			Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
22nd St & K St	WB	SL WBR	92	342	0	0	0%	0%	92	342
		SL WBT	179		0		0%		179	
		WBL (to ML)	0		0		0%		0	
		SL WBU to EB SL	71		0		0%		71	
		ML WBR	0		0		0%		0	
		ML WBR (to SL)	0		0		0%		0	
		ML WBT	0		0		0%		0	
		ML WBL	0		0		0%		0	
	NB	NBL (to ML)	0	292	0	0	0%	0%	0	292
		NBL (to SL)	13		0		0%		13	
		NBT	247		0		0%		247	
		NBR (to ML)	0		0		0%		0	
		NBR (to SL)	32		0		0%		32	
	EB	ML EBL	0	128	0	0	0%	0%	0	128
		ML EBT	0		0		0%		0	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	0		0		0%		0	
		SL EBL	21		0		0%		21	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	107		0		0%		107	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	23	23	--	--	23	23
	Vehicles Exiting System	--	--		0		--		0	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	42	42	--	--	42	42
	Vehicles Exiting System	--	--		0		--		0	
21st St & K St	SB	SBR (to SL)	42	864	0	-7	0%	-1%	42	857
		SBR (to ML)	203		0		0%		203	
		SBT	516		0		0%		516	
		SBL (to SL)	33		0		0%		33	
		SBL (to ML)	70		-7		-10%		63	
	WB	SL WBR	0	1,264	0	0	0%	0%	0	1,264
		SL WBT	214		0		0%		214	
		WBL (to ML)	1		0		0%		1	
		SL WBL	0		0		0%		0	
		ML WBR	0		0		0%		0	
		ML WBR (to SL)	44		0		0%		44	
		ML WBT	1,000		0		0%		1,000	
		ML WBL	5		0		0%		5	
	EB	ML EBL	0	527	0	-36	0%	-7%	0	491
		ML EBT	289		-31		-11%		258	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	0		0		0%		0	
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	49		-5		-10%		44	
		SL EBT	83		0		0%		83	
		SL EBR	106		0		0%		106	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	-15	--	--	0	-15
	Vehicles Exiting System	--	--		-15		--		-15	
EB Slip Ramp Volumes	ML to SL	--	48	--	25	--	--	--	25	--
	SL to ML	--	48		52	--	--	--	52	--
WB Slip Ramp Volumes	ML to SL	--	54		54	--	--	--	54	--
	SL to ML	--	126		106	--	--	--	106	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	211	211	--	--	211	211
	Vehicles Exiting System	--	--		0		--		0	
20th St & K St	WB	SL WBR	176	1,102	0	0	0%	0%	176	1,102
		SL WBT	40		0		0%		40	
		WBL (to ML)	1		0		0%		1	
		SL WBL	0		0		0%		0	
		ML WBR	6		0		0%		6	
		ML WBR (to SL)	5		0		0%		5	
		ML WBT	874		0		0%		874	
		ML WBL	0		0		0%		0	
	NB	NBL (to ML)	122	639	0	0	0%	0%	122	639
		NBL (to SL)	11		0		0%		11	
		NBT	385		0		0%		385	
		NBR (to ML)	62		0		0%		62	
		NBR (to SL)	59		0		0%		59	
	EB	ML EBL	18	466	0	0	0%	0%	18	466
		ML EBT	369		0		0%		369	
		ML EBR (to SL)	5		0		0%		5	
		ML EBR	0		0		0%		0	
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	3		0		0%		3	
		SL EBT	71		0		0%		71	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	85	85	--	--	85	85
	Vehicles Exiting System	--	--		0		--		0	
EB Slip Ramp Volumes	ML to SL	--	36	--	36	--	--	--	36	--
	SL to ML	--	24	--	40	--	--	--	40	--
WB Slip Ramp Volumes	ML to SL	--	42	--	44	--	--	--	44	--
	SL to ML	--	42	--	30	--	--	--	30	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	11	11	--	--	11	11
	Vehicles Exiting System	--	--		0		--		0	

Intersection	Approach Direction	Movement	PM							
			Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
			Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
19th St & K St	SB	SBR (to SL)	55	872	9	9	16%	1%	64	881
		SBR (to ML)	74		0		0%		74	
		SBT	683		0		0%		683	
		SBL (to SL)	6		0		0%		6	
		SBL (to ML)	54		0		0%		54	
	WB	SL WBR	0	952	0	19	0%	2%	0	971
		SL WBT	87		15		17%		102	
		WBL (to ML)	0		0		0%		0	
		SL WBL	0		0		0%		0	
		ML WBR	0		0		0%		0	
		ML WBR (to SL)	22		4		18%		26	
		ML WBT	825		0		0%		825	
		ML WBL	18		0		0%		18	
	EB	ML EBL	0	654	0	0	0%	0%	0	654
		ML EBT	429		0		0%		429	
		ML EBR (to SL)	6		0		0%		6	
		ML EBR	3		0		0%		3	
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	40		0		0%		40	
		SL EBR	176		0		0%		176	
EB Midblock Sinks/Generators		Vehicles Entering System	--	--	15	-10	--	--	15	-10
		Vehicles Exiting System	--	--	-25		--		-25	
EB Slip Ramp Volumes		ML to SL	--	18	43	--	--	--	43	--
		SL to ML	--	36	36	--	--	--	36	--
WB Slip Ramp Volumes		ML to SL	--	54	107	--	--	--	107	--
		SL to ML	--	30	34	--	--	--	34	--
WB Midblock Sinks/Generators		Vehicles Entering System	--	--	70	17	--	--	70	17
		Vehicles Exiting System	--	--	-53		--		-53	
18th St & K St	WB	SL WBR	94	917	0	0	0%	0%	94	917
		SL WBT	10		0		0%		10	
		WBL (to ML)	0		0		0%		0	
		SL WBL	0		0		0%		0	
		ML WBR	1		0		0%		1	
		ML WBR (to SL)	1		0		0%		1	
		ML WBT	811		0		0%		811	
		ML WBL	0		0		0%		0	
	NB	NBL (to ML)	131	725	0	0	0%	0%	131	725
		NBL (to SL)	1		0		0%		1	
		NBT	486		0		0%		486	
		NBR (to ML)	70		0		0%		70	
		NBR (to SL)	37		0		0%		37	
	EB	ML EBL	1	525	0	0	0%	0%	1	525
		ML EBT	467		0		0%		467	
		ML EBR (to SL)	8		0		0%		8	
		ML EBR	0		0		0%		0	
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	3		0		0%		3	
		SL EBT	46		0		0%		46	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators		Vehicles Entering System	--	--	239	239	--	--	239	239
		Vehicles Exiting System	--	--	0		--		0	
EB Slip Ramp Volumes		ML to SL	--	30	30	--	--	--	30	--
		SL to ML	--	48	225	--	--	--	225	--
WB Slip Ramp Volumes		ML to SL	--	36	70	--	--	--	70	--
		SL to ML	--	108	0	--	--	--	0	--
WB Midblock Sinks/Generators		Vehicles Entering System	--	--	0	-143	--	--	0	-143
		Vehicles Exiting System	--	--	-143		--		-143	
17th W St/Connecticut Ave & K St	SB	SBR (to SL)	81	879	0	0	0%	0%	81	879
		SBR (to ML)	74		0		0%		74	
		SBT	712		0		0%		712	
		SBL (to SL)	0		0		0%		0	
		SBL (to ML)	12		0		0%		12	
	WB	SL WBR	188	1,121	0	0	0%	0%	188	1,121
		SL WBT	0		0		0%		0	
		WBL (to ML)	0		0		0%		0	
		SL WBL	0		0		0%		0	
		ML WBR	2		0		0%		2	
		ML WBR (to SL)	96		0		0%		96	
		ML WBT	807		0		0%		807	
		ML WBL	28		0		0%		28	
	NB	NBL (to ML)	2	647	0	0	0%	0%	2	647
		NBL (to SL)	0		0		0%		0	
		NBT	589		0		0%		589	
		NBR (to ML)	56		0		0%		56	
		NBR (to SL)	0		0		0%		0	
	EB	ML EBL	1	870	0	0	0%	0%	1	870
		ML EBT	728		0		0%		728	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	6		0		0%		6	
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	135		0		0%		135	
EB Midblock Sinks/Generators		Vehicles Entering System	--	--	0	0	--	--	0	0
		Vehicles Exiting System	--	--	0		--		0	
WB Midblock Sinks/Generators		Vehicles Entering System	--	--	0	0	--	--	0	0
		Vehicles Exiting System	--	--	0		--		0	

Intersection	Approach Direction	Movement	PM							
			Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
			Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
17th E St & K St	SB	SBR (to SL)	19	303	10	26	53%	9%	29	329
		SBR (to ML)	74		16		22%		90	
		SBT	169		0		0%		169	
		SBL (to SL)	3		0		0%		3	
		SBL (to ML)	38		0		0%		38	
	WB	SL WBR	70	862	0	173	0%	20%	70	1,035
		SL WBT	88		23		26%		111	
		WBL (to ML)	2		0		0%		2	
		SL WBL	0		0		0%		0	
		ML WBR	0		0		0%		0	
		ML WBR (to SL)	31		8		26%		39	
		ML WBT	671		142		21%		813	
		ML WBL	0		0		0%		0	
	NB	NBL (to ML)	23	174	5	7	22%	4%	28	181
		NBL (to SL)	7		2		29%		9	
		NBT	120		0		0%		120	
		NBR (to ML)	10		0		0%		10	
		NBR (to SL)	14		0		0%		14	
	EB	ML EBL	2	663	0	133	0%	20%	2	796
		ML EBT	588		118		20%		706	
		ML EBR (to SL)	13		3		23%		16	
		ML EBR	60		12		20%		72	
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	-130	-130	--	--	-130	-130
	Vehicles Exiting System	--	--		0		--		0	
EB Slip Ramp Volumes	ML to SL	--	24	--	151	--	--	--	151	--
	SL to ML	--	12	--	12	--	--	--	12	--
WB Slip Ramp Volumes	ML to SL	--	120	--	0	--	--	--	0	--
	SL to ML	--	36	--	165	--	--	--	165	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	183	183	--	--	183	183
	Vehicles Exiting System	--	--		0		--		0	
16th St & K St	SB	SBR (to SL)	35	551	0	0	0%	0%	35	551
		SBR (to ML)	70		0		0%		70	
		SBT	331		0		0%		331	
		SBL (to SL)	2		0		0%		2	
		SBL (to ML)	113		0		0%		113	
	WB	SL WBR	158	898	0	0	0%	0%	158	898
		SL WBT	77		0		0%		77	
		WBL (to ML)	2		0		0%		2	
		SL WBL	0		0		0%		0	
		ML WBR	0		0		0%		0	
		ML WBR (to SL)	53		0		0%		53	
		ML WBT	607		0		0%		607	
		ML WBL	1		0		0%		1	
	NB	NBL (to ML)	8	330	0	0	0%	0%	8	330
		NBL (to SL)	0		0		0%		0	
		NBT	280		0		0%		280	
		NBR (to ML)	23		0		0%		23	
		NBR (to SL)	19		0		0%		19	
	EB	ML EBL	6	657	0	0	0%	0%	6	657
		ML EBT	606		0		0%		606	
		ML EBR (to SL)	3		0		0%		3	
		ML EBR	0		0		0%		0	
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	2		0		0%		2	
		SL EBT	3		0		0%		3	
		SL EBR	37		0		0%		37	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	82	70	--	--	82	70
	Vehicles Exiting System	--	--		-12		--		-12	
EB Slip Ramp Volumes	ML to SL	--	18	--	18	--	--	--	18	--
	SL to ML	--	6	--	97	--	--	--	97	--
WB Slip Ramp Volumes	ML to SL	--	120	--	213	--	--	--	213	--
	SL to ML	--	144	--	0	--	--	--	0	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	-99	--	--	0	-99
	Vehicles Exiting System	--	--		-99		--		-99	

Intersection	Approach Direction	Movement	PM							
			Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
			Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
15th W St & K St	SB	SBR (to SL)	24		0		0%		24	
		SBR (to ML)	64		0		0%		64	
		SBT	148	244	0	0	0%	0%	148	244
		SBL (to SL)	0		0		0%		0	
		SBL (to ML)	8		0		0%		8	
	WB	SL WBR	135		17		13%		152	
		SL WBT	30		4		13%		34	
		WBL (to ML)	0		0		0%		0	
		SL WBL	0	890	0	182	0%	20%	0	1,072
		ML WBR	7		2		29%		9	
		ML WBR (to SL)	47		10		21%		57	
		ML WBT	630		140		22%		770	
		ML WBL	41		9		22%		50	
	NB	NBL (to ML)	40		0		0%		40	
		NBL (to SL)	8		0		0%		8	
		NBT	310	374	0	0	0%	0%	310	374
		NBR (to ML)	16		0		0%		16	
		NBR (to SL)	0		0		0%		0	
	EB	ML EBL	1		0		0%		1	
		ML EBT	785		20		3%		805	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	17	821	0	20	0%	2%	17	841
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	18		0		0%		18	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	0	--	--	0	0
	Vehicles Exiting System	--	--		0		--		0	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	-5	--	--	0	-5
	Vehicles Exiting System	--	--		-5		--		-5	
15th E St & K St	SB	SBR (to SL)	28		0		0%		28	
		SBR (to ML)	62		0		0%		62	
		SBT	0	170	0	0	0%	0%	0	170
		SBL (to SL)	33		0		0%		33	
		SBL (to ML)	47		0		0%		47	
	WB	SL WBR	56		7		13%		63	
		SL WBT	99		13		13%		112	
		WBL (to ML)	1		0		0%		1	
		SL WBL	0	840	0	118	0%	14%	0	958
		ML WBR	0		0		0%		0	
		ML WBR (to SL)	28		4		14%		32	
		ML WBT	656		94		14%		750	
		ML WBL	0		0		0%		0	
	NB	NBL (to ML)	73		0		0%		73	
		NBL (to SL)	19		0		0%		19	
		NBT	135	279	0	0	0%	0%	135	279
		NBR (to ML)	30		0		0%		30	
		NBR (to SL)	22		0		0%		22	
	EB	ML EBL	84		0		0%		84	
		ML EBT	673		0		0%		673	
		ML EBR (to SL)	72		0		0%		72	
		ML EBR	0	829	0	0	0%	0%	0	829
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	69	6	--	--	69	6
	Vehicles Exiting System	--	--		-63		--		-63	
EB Slip Ramp Volumes	ML to SL	--	12	--	675	--	--	--	675	--
	SL to ML	--	6	--	6	--	--	--	6	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	-9	--	--	0	-9
	Vehicles Exiting System	--	--		-9		--		-9	

Intersection	Approach Direction	Movement	PM							
			Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
			Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
14th St & K St	SB	SBR (to SL)	30		0		0%		30	
		SBR (to ML)	23		0		0%		23	
		SBT	629	710	0	0	0%	0%	629	710
		SBL (to SL)	0		0		0%		0	
		SBL (to ML)	28		0		0%		28	
	WB	SL WBR	66		0		0%		66	
		SL WBT	116		0		0%		116	
		WBL (to ML)	1		0		0%		1	
		SL WBL	0		0		0%		0	
		ML WBR	2	860	0	0	0%	0%	2	860
		ML WBR (to SL)	12		0		0%		12	
		ML WBT	660		0		0%		660	
		ML WBL	3		0		0%		3	
	NB	NBL (to ML)	98		0		0%		98	
		NBL (to SL)	27		0		0%		27	
		NBT	565	729	0	0	0%	0%	565	729
		NBR (to ML)	39		0		0%		39	
		NBR (to SL)	0		0		0%		0	
	EB	ML EBL	4		0		0%		4	
		ML EBT	658		0		0%		658	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	19	883	0	0	0%	0%	19	883
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	6		0		0%		6	
		SL EBT	0		0		0%		0	
		SL EBR	196		0		0%		196	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	0	--	--	0	0
	Vehicles Exiting System	--	--		0		--		0	
WB Slip Ramp Volumes	ML to SL	--	78		35		--		35	
	SL to ML	--	6		1		--		1	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	18	18	--	--	18	18
	Vehicles Exiting System	--	--		0		--		0	
13th St & K St	SB	SBR (to SL)	42		0		0%		42	
		SBR (to ML)	74		0		0%		74	
		SBT	552	694	0	0	0%	0%	552	694
		SBL (to SL)	0		0		0%		0	
		SBL (to ML)	26		0		0%		26	
	WB	SL WBR	46		0		0%		46	
		SL WBT	52		0		0%		52	
		WBL (to ML)	4		0		0%		4	
		SL WBL	0		0		0%		0	
		ML WBR	2	587	0	0	0%	0%	2	587
		ML WBR (to SL)	19		0		0%		19	
		ML WBT	463		0		0%		463	
		ML WBL	1		0		0%		1	
	NB	NBL (to ML)	170		0		0%		170	
		NBL (to SL)	18		0		0%		18	
		NBT	473	678	0	0	0%	0%	473	678
		NBR (to ML)	14		0		0%		14	
		NBR (to SL)	3		0		0%		3	
	EB	ML EBL	14		1		7%		15	
		ML EBT	584		41		7%		625	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	85	683	6	48	7%	7%	91	731
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	3	-13	--	--	3	-13
	Vehicles Exiting System	--	--		-16		--		-16	
EB Slip Ramp Volumes	ML to SL	--	6	--	19	--	--	--	19	--
	SL to ML	--	6	--	6	--	--	--	6	--
WB Slip Ramp Volumes	ML to SL	--	42	--	13	--	--	--	13	--
	SL to ML	--	30	--	30	--	--	--	30	--
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	17	17	--	--	17	17
	Vehicles Exiting System	--	--		0		--		0	
12th St & K St	WB	SL WBR	0		0		0%		0	
		SL WBT	0		0		0%		0	
		WBL (to ML)	0		0		0%		0	
		SL WBL	0		0		0%		0	
		ML WBR	49	394	0	24	0%	6%	49	418
		ML WBR (to SL)	37		24		65%		61	
		ML WBT	308		0		0%		308	
		ML WBL	0		0		0%		0	
	NB	NBL (to ML)	160		0		0%		160	
		NBL (to SL)	25		16		64%		41	
		NBT	606	867	0	16	0%	2%	606	883
		NBR (to ML)	76		0		0%		76	
		NBR (to SL)	0		0		0%		0	
	EB	ML EBL	140		2		1%		142	
		ML EBT	505		5		1%		510	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	0	648	0	7	0%	1%	0	655
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	3		0		0%		3	
		SL EBT	0		0		0%		0	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	-41	--	--	0	-41
	Vehicles Exiting System	--	--		-41		--		-41	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	7	7	--	--	7	7
	Vehicles Exiting System	--	--		0		--		0	

Intersection	Approach Direction	Movement	PM							
			Unbalanced Volume		Volume Change		Percent Change		Balanced Volume	
			Volume	Approach Total	Volume	Approach Total	Volume	Approach Total	Volume	Approach Total
11th St & K St	SB	SBR (to SL)	0		0		0%		0	
		SBR (to ML)	53		14		26%		67	
		SBT	437	524	0	14	0%	3%	437	538
		SBL (to SL)	0		0		0%		0	
		SBL (to ML)	34		0		0%		34	
	WB	SL WBR	0		0		0%		0	
		SL WBT	0		0		0%		0	
		WBL (to ML)	0		0		0%		0	
		SL WBL	0	186	0	39	0%	21%	0	225
		ML WBR	20		0		0%		20	
		ML WBR (to SL)	0		0		0%		0	
		ML WBT	153		39		25%		192	
		ML WBL	13		0		0%		13	
	NB	NBL (to ML)	121		31		26%		152	
		NBL (to SL)	0		0		0%		0	
		NBT	239	411	0	31	0%	8%	239	442
		NBR (to ML)	51		0		0%		51	
		NBR (to SL)	0		0		0%		0	
	EB	ML EBL	67		0		0%		67	
		ML EBT	342		0		0%		342	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	139	548	0	0	0%	0%	139	548
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	17	17	--	--	17	17
	Vehicles Exiting System	--	--	--	0		--		0	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	19	19	--	--	19	19
	Vehicles Exiting System	--	--	--	0		--		0	
10th St & K St	SB	SBR (to SL)	0		0		0%		0	
		SBR (to ML)	111		0		0%		111	
		SBT	302	445	0	0	0%	0%	302	445
		SBL (to SL)	0		0		0%		0	
		SBL (to ML)	32		0		0%		32	
	WB	SL WBR	0		0		0%		0	
		SL WBT	0		0		0%		0	
		WBL (to ML)	0		0		0%		0	
		SL WBL	0	132	0	0	0%	0%	0	132
		ML WBR	0		0		0%		0	
		ML WBR (to SL)	0		0		0%		0	
		ML WBT	95		0		0%		95	
		ML WBL	37		0		0%		37	
	EB	ML EBL	0		0		0%		0	
		ML EBT	180		0		0%		180	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	264	444	0	0	0%	0%	264	444
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	0		0		0%		0	
EB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	0	-30	--	--	0	-30
	Vehicles Exiting System	--	--	--	-30		--		-30	
WB Midblock Sinks/Generators	Vehicles Entering System	--	--	--	49	49	--	--	49	49
	Vehicles Exiting System	--	--	--	0		--		0	
9th St & K St	SB	SBR (to SL)	0		0		0%		0	
		SBR (to ML)	83		0		0%		83	
		SBT	781	864	0	0	0%	0%	781	864
		SBL (to SL)	0		0		0%		0	
		SBL (to ML)	0		0		0%		0	
	EB	ML EBL	0		0		0%		0	
		ML EBT	0		0		0%		0	
		ML EBR (to SL)	0		0		0%		0	
		ML EBR	182	182	0	0	0%	0%	182	182
		SL EBL	0		0		0%		0	
		SL EBL (to ML)	0		0		0%		0	
		SL EBT	0		0		0%		0	
		SL EBR	0		0		0%		0	

K Street Intersection Total Volume Balance Summary

	PM Unbalanced Volume	PM Volume Input Change Total	PM Percent Change	PM Balanced Volume
K Street NW Intersections only Total Volume Balance Summary	35,586	909	3%	34,963

Attachment H:
PM Balancing Notes

Attachment H - Location-Specific Volume Balancing Adjustments, PM Peak Hour

General Methodology:

The volume balancing methodology used in this effort was as follows:

1. Where recorded TMCs show a volume imbalance between two intersections, the imbalance was attributed to midblock generators and sinks. Where segment configuration, existing conditions such as the absence of midblock slip ramps and on-street parking, and/or field observations did not justify the midblock addition/removal of vehicles, vehicle trips were proportionally added or removed to the movements entering/exiting each link;

2. Where TMCs were revised to achieve balance between intersections, TMCs were adjusted upward to match the higher of the two volumes as a conservative measure (where possible);

3. Volumes on adjacent cross-street study intersections (I Street and L Street) were revised to match corresponding balanced volumes to or from K Street.

Main Line – "ML" and Service Lane – "SL"

Notes on Volume Balancing along Segments with Large Volume Variances by Intersection

PM Peak Hour

- Between 21st Street and 20th Street
  - Field observations showed a significant number of illegal midblock left-turn maneuvers from the EB ML into the WB SL
  - WB
    - Unbalanced Volumes:
      - *20th Street:* 997 vehicles entering ML and 56 vehicles entering SL,
      - *21st Street:* 1049 vehicles exiting ML and 215 vehicles exiting SL
      - *Imbalance:* +52 ML difference, +159 SL difference; net +211
    - ML Balancing:
      - 80 vehicles generated midblock from garage and routed to ML
      - 26 vehicles from SL routed to ML
      - 54 vehicles from ML routed to SL
    - SL Balancing:
      - 131 vehicles generated midblock from garage and routed to SL
  - EB
    - Unbalanced Volumes:
      - *21st Street:* 408 vehicles entering ML and 116 vehicles entering SL
      - *20^{tS} Street:* 392 vehicles exiting ML and 74 vehicles exiting SL
      - *Imbalance:* -16 ML difference, -42 SL difference; net -58
    - ML Balancing:
      - Field observations indicate a significant number of EB ML traffic turns left midblock into the WB SL; therefore, 43 vehicles were proportionally removed from turning movements into the ML from the 21st Street intersection

- 25 vehicles routed from ML to SL
- 52 vehicles routed from SL to ML
  - <u>SL Balancing:</u>
    - 15 vehicles were removed from system (on-street parking)
- Between 20th Street and 19th Street
  - o WB
    - <u>Unbalanced Volumes:</u>
      - *19th Street:* 899 vehicles entering ML and 164 vehicles entering SL
      - *20th Street:* 885 vehicles exiting ML and 217 vehicles exiting SL
      - *Imbalance:* -14 ML difference, +53 SL difference; net +39
    - <u>ML Balancing:</u>
      - 6 vehicles generated midblock from on-street parking and routed to ML
      - 30 vehicles from SL routed to ML
      - 50 vehicles from ML routed to SL
    - <u>SL Balancing:</u>
      - 5 vehicles generated midblock from on-street parking and routed to SL
      - 30 vehicles from SL routed to ML
      - 50 vehicles from ML routed to SL
      - 28 vehicles added to turning movements entering SL from the 19th Street intersection
  - o EB
    - <u>Unbalanced Volumes:</u>
      - *20th Street:* 408 vehicles entering ML and 116 vehicles entering SL
      - *19th Street:* 392 vehicles exiting ML and 74 vehicles exiting SL
      - *Imbalance:* -16 ML difference, -42 SL difference; net -58
    - <u>ML Balancing:</u>
      - Field observations indicate a significant number of EB ML traffic turns left midblock into the WB SL, therefore 43 vehicles were proportionally removed from turning movements into the ML from the 21st Street intersection
      - 25 vehicles routed from ML to SL
      - 52 vehicles routed from SL to ML
    - <u>SL Balancing:</u>
      - 15 vehicles were removed from system (on-street parking)
- Between 17th Street W and 17th Street E
  - o WB
    - <u>Unbalanced Volumes:</u>
      - *17th Street E:* 770 vehicles entering ML and 145 vehicles entering SL
      - *17th Street W:* 933 vehicles exiting ML and 188 vehicles exiting SL
      - *Imbalance:* +163 ML difference, +43 SL difference; net +206

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- ML Balancing:
  - 163 vehicles were proportionally added to turning movements entering the WB ML from the 17th Street E intersection
- SL Balancing:
  - 43 vehicles were proportionally added to turning movements entering the WB SL from the 17th Street E intersection
- o EB
  - Unbalanced Volumes:
    - *17th Street W:* 796 vehicles entering segment
    - *17th Street E*: 663 vehicles exiting
    - *Imbalance*: -133 difference
  - ML Balancing:
    - 133 vehicles were proportionally added to turning movements approaching 17th Street E intersection
- Between 15th Street W and 15th Street E
  - o WB
    - Unbalanced Volumes:
      - *15th Street E:* 792 vehicles entering ML and 174 vehicles entering SL
      - *15th Street W:* 725 vehicles exiting ML and 165 vehicles exiting SL
      - *Imbalance:* -67 ML difference, -9 SL difference; net -76
    - ML Balancing:
      - Upstream volume balancing between 15th Street E and 14th Street increases ML difference by 94 vehicles (existing imbalance -67, imbalance attributed to upstream balancing -94; -161 net)
      - 161 vehicles proportionally added to turning movements exiting segment at 15th Street W intersection
    - SL Balancing:
      - Upstream volume balancing between 15th Street E and 14th Street increases SL difference by 17 vehicles (existing imbalance -9, imbalance attributed to upstream balancing -17, net -26)
      - 5 vehicles removed midblock from system to on-street parking
      - 21 vehicles added to turning movements exiting SL at 15th Street W intersection
  - o EB
    - Unbalanced Volumes:
      - *15th Street W:* 809 vehicles entering ML
      - *15th Street E:* 829 vehicles exiting ML
      - *Imbalance:* 20 vehicle difference
    - Balancing:
      - 20 vehicles proportionally added to turning movements entering segment from the 15th Street W intersection

- Between 15th Street E and 14th Street
    - WB
        - Unbalanced Volumes:
            - *14th Street:* 792 vehicles entering ML and 174 vehicles entering SL
            - *15th Street E:* 725 vehicles exiting ML and 165 vehicles exiting SL
            - *Imbalance:* -98 vehicle ML difference, -29 SL difference; net -127
        - ML Balancing:
            - 98 vehicles proportionally added to turning movements exiting segment at 15th Street E intersection
        - SL Balancing:
            - 14 vehicles removed from system midblock (on-street parking)
            - 20 vehicles proportionally added to turning movements exiting SL segment at the 15th E Street intersection
    - EB
        - Unbalanced Volumes:
            - *15th Street E:* 750 entering ML and 127 entering SL
            - *14th Street:* 681 exiting ML and 202 exiting SL
            - *Imbalance:* -69 ML difference, +75 SL difference; net +6
        - ML Balancing:
            - 75 vehicles routed to SL
                - 63 removed from system (to alley)
                - 12 traveling from ML to SL
                - 6 traveling from SL to ML
                - Net 69 removed from ML
        - SL Balancing:
            - 12 vehicles routed from ML to SL
            - 69 vehicles generated midblock from alley (configuration restricts travel from alley to ML)
            - 6 vehicles routed from SL to ML (value consistent with extrapolated slip-ramp field observations
- Between 14th Street and 13th Street
    - WB
        - Unbalanced Volumes:
            - *13th Street:* 711 entering ML and 131 entering SL
            - *14th Street:* 677 exiting ML and 183 exiting SL
            - *Imbalance:* -34 ML difference, +52 in the SL difference; net +18
        - ML Balancing:
            - 35 vehicles routed from ML to SL
            - 1 vehicle routed from SL to ML
        - SL Balancing:
            - 18 vehicles generated midblock from on-street parking
            - 35 vehicles routed from ML to SL

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- 1 vehicle routed from SL to ML
  - o EB
    - Unbalanced Volumes:
      - *14th Street:* 731 entering ML
      - *13th Street:* 683 exiting ML
      - *Imbalance:* -48 difference
    - Balancing:
      - 48 vehicles proportionally added to turning movements exiting segment at the 13th Street intersection
- Between 13th Street and 12th Street
  - o WB
    - Unbalanced Volumes:
      - *12th Street:* 468 entering ML and 62 entering SL
      - *13th Street:* 485 exiting ML and 102 exiting SL
      - *Imbalance:* +17 ML difference, +40 in the SL difference; net +57
    - ML Balancing:
      - 13 vehicles routed from ML to SL
      - 30 vehicles routed from SL to ML
    - SL Balancing:
      - 17 vehicles generated midblock from on-street parking
      - 13 vehicles routed from ML to SL
      - 30 vehicles routed from SL to ML
      - 40 vehicles proportionally added to turning movements entering SL from the 12th Street intersection
  - o EB
    - Unbalanced Volumes:
      - *13th Street:* 624 entering ML
      - *12th Street:* 645 exiting ML
      - *Imbalance:* +21 difference
    - Balancing:
      - Upstream balancing decreases imbalance by 41 (existing imbalance +21, imbalance attributed to upstream balancing -41, net -20)
      - 13 vehicles removed from system (on-street parking)
      - 7 vehicles proportionally added to turning movements exiting segment at the 12th Street intersection
- Between 12th Street and 11th Street
  - o WB
    - Unbalanced Volumes:
      - *11th Street:* 327 entering ML
      - *12th Street:* 394 exiting ML
      - *Imbalance:* +67 ML difference

- ML Balancing:
  - Downstream balancing increases imbalance by 24 vehicles (existing imbalance +67, imbalance attributed to downstream balancing +24, net +91)
  - 7 vehicles generated from on-street parking
  - 84 vehicles proportionally added to turning movements entering segment at the 11th Street intersection
- EB
  - Unbalanced Volumes:
    - *12th Street:* 584 entering ML
    - *11th Street:* 548 exiting ML
    - *Imbalance:* -36 difference
  - Balancing:
    - Upstream balancing increases imbalance by 5 (existing imbalance -36, imbalance attributed to upstream balancing -5, net -41)
    - 41 vehicles removed from system (garage)

Attachment I:
PM Approach and Departure Summary and Comparison

Highlighting Key: % absolute percent change is 10% or greater.

Cross Street	Block Length (ft)	Unbalanced PM WB Departure (combines ML & SL volumes)	WB Delta Difference	WB Delta %	WB Approach	EB Approach (combines ML & SL volumes)	EB Delta Difference	EB Delta %	EB Departure (combines ML & SL volumes)	Balanced PM WB Midblock Vehicles Added/Removed	WB Departure (combines ML & SL volumes)	WB Delta Difference	WB Delta %	WB Approach (combines ML & SL volumes)	EB Midblock Vehicles Added/Removed	EB Approach (combines ML & SL volumes)	EB Delta Difference	EB Delta %	EB Departure (combines ML & SL volumes)	North Side of K St (WB Direction of Travel) Midblock Notes*	South Side of K St (EB Direction of Travel) Midblock Notes*
22nd																					
delta (*SL ONLY*)	530		42	3%			28	13%		42		0	0%		23		0	0%		Two garage driveways and one alley driveway/266 spaces	Two garage driveways/unknown # of spaces
21st		1,504			1,264	527			524		1,504			1,264		491			481		
delta	415		211	20%			-58	-11%		211		0	0%		-15		0	0%		One garage driveway/200 spaces	No midblock driveways.
20th		1,053			1,102	466			569		1,053			1,102		466			569		
delta	322		39	4%			85	15%		11		0	0%		85		0	0%		No midblock driveways.	One garage driveway, and one alley driveway present/225 spaces
19th		1,063			952	654			535		1,091			971		654			535		
delta	410		-2	0%			-10	-2%		17		0	0%		-10		0	0%		One garage driveway/200 spaces	Two separate and adjacent garage driveways present/300 spaces
18th		954			917	525			631		954			917		525			631		
delta	520		-143	-13%			239	38%		-143		0	0%		239		0	0%		One garage driveway and one alley driveway/279 spaces	Two garage driveways and one alley driveway/433 spaces
17th W/CT		1,060			1,121	870			796		1,060			1,121		870			796		
delta	160		206	23%			-133	-17%		0		0	0%		0		0	0%		No midblock driveways.	No midblock driveways.
17th E		915			862	663			666		1,121			1,035		796			787		
delta	460		10	1%			-9	-1%		183		0	0%		-130		0	0%		One garage driveway and one alley driveway/200 spaces	One alley driveway.
16th		852			898	657			771		852			898		657			771		
delta	445		55	7%			50	6%		-99		0	0%		70		0	0%		One alley/garage driveway/114 spaces	One alley driveway.
15th W		843			890	821			809		997			1,072		841			829		
delta	160		-76	-8%			20	2%		-5		0	0%		0		0	0%		No midblock driveways.	No midblock driveways.
15th E/VT		966			840	829			877		1,077			958		829			877		
delta	355		-127	-13%			6	1%		-9		0	0%		6		0	0%		No midblock driveways.	One alley/garage driveway/430 spaces
14th		967			860	883			731		967			860		883			731		
delta	540		18	2%			-48	-7%		18		0	0%		0		0	0%		No midblock driveways.	No midblock driveways.
13th		842			587	683			627		842			587		731			668		
delta	330		57	11%			21	3%		17		0	0%		-13		0	0%		No midblock driveways.	No midblock driveways.
12th		530			394	648			584		570			418		655			589		
delta	200		67	20%			-36	-6%		7		0	0%		-41		0	0%		No midblock driveways.	One garage driveway/unknown # of spaces
11th		327			186	548			427		411			225		548			427		
delta	190		-20	-10%			17	4%		19		0	0%		17		0	0%		No midblock driveways.	One alley driveway
10th		206			132	444			212		206			132		444			212		
delta	480		49	59%			-30	-14%		49		0	0%		-30		0	0%		No midblock driveways.	One garage driveway/154 spaces
9th		83			0	182			0		83			0		182			0		

*Note: number of garage spaces based on "LoadingZones_Transitway" and "Parking Garages" files shared with G/S and if garage found to have midblock access point on K Street