Memorandum

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Subject: K Street NW Traffic Analysis
DRAFT Data Collection Plan

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Introduction

This memorandum presents a Data Collection Plan for the K Street NW Traffic Analysis. The collected data will be used in the microsimulation traffic analysis for the K Street NW corridor in Downtown Washington, DC.

The microsimulation model inputs required for this analysis include roadway geometry, traffic controls, traffic volumes, and calibration data. Calibration data will be defined in a separate Framework Document memorandum. The data collection plan presented in this memorandum specifically outlines the automated methods to be used for traffic volume data collection and the field observation methods to be used in the collection of calibration data.

Roadway geometric data will be collected from geographical information system (GIS) files and field surveys. Traffic control data that include signal-timing settings will be provided by DDOT and verified in the field.

A tentative schedule for data collection to be conducted is also included. An inventory of existing turning movement counts (TMCs) available to supplement the model inputs is also included in this memorandum. Existing TMC data provided by DDOT is not ideal for the purposes of the VISSIM microsimulation due to the exclusion of minor movements into and out of service lanes on K Street NW, volume imbalances across the multiple years of data, or not being collected recently enough to reflect changes in travel patterns along the K Street NW corridor. Examples include the following:

- The conversion of K Street NW from 10th Street NW to 9th Street NW from one-way to two-way operations, starting March 30th, 2019.

- The permanent removal of the morning peak reversible lane operation on 17th Street NW from Massachusetts Avenue NW to H Street NW, starting October 21st, 2019.

Automated Data Collection

The automated element of the data collection plan includes using video cameras to record intersection TMCs along the corridor for traffic flow and volumes. TMCs at all locations will include minor movements into and out of service lanes on K Street NW. Video data will be collected from 6:00am to 7:00pm and counts will be processed from those videos for six (6) hours at primary intersections and processed for two (2) hours at all other study area intersections. The two hours at all other study area intersections will encompass morning and afternoon system peak hours based on counts processed at the six primary intersections. The counts will be collected on a typical weekday while public schools and Congress are in session, no special events are scheduled, and no adverse weather conditions are forecasted. Video data will be available to reference for calibration purposes. Automatic Traffic Recorder (ATR) pneumatic tube counts were also considered for automated data collection along the corridor, but their use was determined to be unwarranted after reviewing the data collection scope with the team's VISSIM microsimulation experts. While ATR data is not prudent to the development of a calibrated VISSIM model, it will be needed to calibrate the existing travel demand model, which will be used as a baseline to develop future traffic forecasts. Therefore, ATR data will be collected at locations on and surrounding the study corridor. This will be documented in a separate memo.

Intersection TMCs Peak Period Data at Primary Intersections

At the request of DDOT, a 13-hour multimodal TMC (6:30am-7:30pm) is planned at the intersection of Connecticut Avenue, 17th Street & K Street NW.

Five primary study intersections identified for multimodal peak period (7:00am-10:00am and 4:00pm-7:00pm; 6 hours of data processing at each) TMC data collection are listed below and shown on **Figure 1**:

1. 21st Street and K Street NW
2. 15th Street & K Street NW (west side of McPherson Square)
3. 14th Street & K Street NW
4. 13th Street & K Street NW
5. 11th Street & K Street NW

These intersections have been identified as primary intersections based on cross-street volumes, the number of transit stops at each intersection, the number of bus routes going through the intersection, and location of major destinations in the vicinity of the study area. A relative comparison of multimodal volumes at primary intersections to historical data will be provided. TMCs at all locations will include minor movements into and out of service lanes on K Street NW.

TMC Peak Hour Data at Other Intersections

In addition to the primary intersections identified for full peak period (7:00am-10:00am and 4:00pm-7:00pm) TMC data processing, all other intersections along K Street NW will have TMCs processed for the AM and PM peak hours only (2 hours of data collection at each). Because video cameras will be used in the TMC data collection, the specific AM and PM peak hours processed at these intersections will be guided by the results of the peak period data collection at the primary intersections.

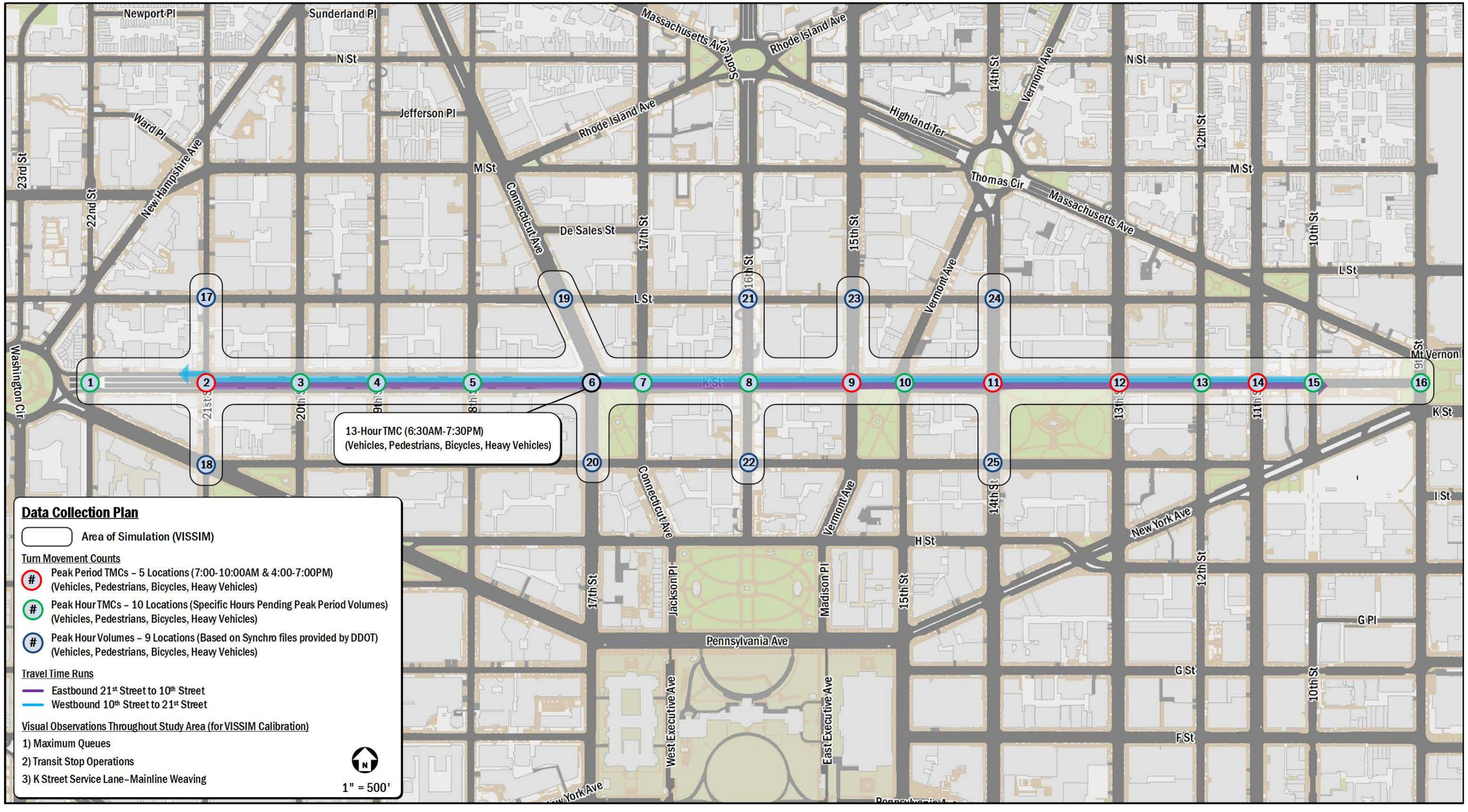

Figure 1: Data Collection Plan

The proposed study intersections identified for multimodal AM and PM peak hours (2 hours at each) TMC data collection are listed below and shown on **Figure 1**:

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

TMC data for the 9 cross-street intersections that are adjacent to K Street NW that process significant volume interacting with the study corridor will be based on peak hour volumes contained in the Synchro files provided by DDOT and adjusted as necessary. Those intersections are:

1. 21st Street & L Street NW
2. Connecticut Avenue & L Street NW
3. 16th Street & L Street NW
4. 15th Street & L Street NW
5. 14th Street & L Street NW
6. 21st Street, Pennsylvania Avenue & I Street NW
7. 17th Street & I Street NW
8. 16th Street & I Street NW
9. 14th Street & I Street NW

Field Corridor Travel Time Runs

Travel time runs along the K Street NW will be conducted. These travel time runs are proposed to be collected on the same day as TMC data collection during the morning and evening peak periods. The travel time runs will be performed with a dashboard camera and the video files will be made available to the VISSIM modeling team for calibration purposes. On the first day of data collection, two personnel in two vehicles (i.e. one person per vehicle) will be assigned to the travel time runs data collection. A minimum of five (5) travel time runs per peak period in each direction are planned. On the second day of data collection, one person in one vehicle will be assigned to perform travel time runs.

The westbound travel time run segment is defined as the time it takes a vehicle to travel between the west side of the 10th Street and K Street NW intersection to the west side of the 21st Street and K Street NW intersection. The eastbound travel time run segment is defined as the time it takes a vehicle to travel between the east side of the 21st Street and K Street NW intersection to the east side of the 10th Street and K Street NW intersection. The start and end points of these runs are shown on **Figure 1**.

Visual Field Observations

Visual field observations by data collection personnel will document (1) maximum back of queue data; (2) transit dwell time and bunching data, and (3) information on weaving behavior between the K Street NW mainline and service roads. These data will be used to calibrate and validate the model.

Personnel Along Corridor

Maximum back of queue data, transit data, and weaving behavior observations are proposed to be collected on the same day as TMC data collection during the morning and evening peak periods. Personnel conducting the field observations will be given an observation field sheet (attached to this memo) to ensure the data is consistent and useful for calibration purposes. Two (2) personnel on the first day of data collection and four (4) on the second day of data collection will be assigned to traverse the study area (K Street NW only) using non-auto modes (e.g. walking, biking, scooter) during the peak periods collecting data at each intersection.

Maximum Back of Queue

Field personnel will record the approximate maximum eastbound and westbound queue lengths using visual observations for at least three full signal cycles at study area intersections. In addition to queue lengths, spillback into the next intersection will also be recorded as a "yes/no" condition when observed.

Field personnel will also record the approximate maximum northbound and southbound queue lengths, limited to one block length north or south, using visual observations for at least three full signal cycles at study area intersections on K Street NW where study area intersections to the north and south of the K Street NW Corridor are included. These are:

1. 21st Street & K Street NW
2. Connecticut Avenue, 17th Street & K Street NW
3. 16th Street & K Street NW
4. 15th Street & K Street NW (west side of McPherson Square; southbound approach)
5. 14th Street & K Street NW

Transit Observations

Field personnel will observe bus stop locations along K Street NW to record approximate bus dwell times and bunching along the corridor. Dwell time is defined as the amount of time it takes for passenger boarding and alighting. Data on transit bunching will be collected as a "yes/no" condition, and when observed, the number of buses in queue will be recorded, and whether buses queueing allow boarding and alighting prior to getting to the bus stop location. When conducting observations at bus stops, personnel will record the approximate number of passengers boarding and alighting. It is expected that DDOT will provide boarding and alighting data from WMATA to supplement transit observations.

Transit dwell time and bunching data will be recorded at the following bus stop locations:

1. 14th Street & EB K Street NW
2. 14th Street & WB K Street NW
3. 17th Street & WB K Street NW
4. 17th Street & EB K Street NW
5. 20th Street & EB K Street NW
6. 15th Street & WB K Street NW

Transit dwell time and bunching data will be recorded at all other bus stop locations if there is transit activity to record as personnel travel along the corridor.

Weaving Behavior Observations

Field personnel will perform spot checks and record the number of vehicles using the mid-block access points between the K Street NW service roads and the K Street NW mainline. These observations will record the number of vehicles weaving, direction of travel, and location. Personnel will observe weaving

behavior at blocks with mainline and service roads access points for 10 minutes during each of the morning and afternoon peak periods. The 10-minute data will then be extrapolated so that it can be used in the peak hour simulation. Where possible, TMC video data at study intersections will be recorded in such a manner as to capture these maneuvers within the field of view.

General Observations

Field personnel will perform and note any observations that may be helpful in understanding and calibrating the VISSIM model. These may include notes on driver and bicycle behavior, pedestrian behavior and crossing patterns, and the impact of traffic control officers at intersections.

Proposed Data Collection Schedule

The proposed data collection schedule programs a day for automated data collection and field observations followed by a second day of field observations. The second day of field observations is proposed to take place after the team conducts a preliminary review of data collected on the first day to allow for adjustments in the collection methods or locations, as necessary.

The tentative dates for the data collection plan schedule were specifically selected to take place during the last two weeks Congress is in session for the year. The extended holiday weekend may have an impact on traffic patterns on Tuesday December 3rd and the National Christmas Tree Lighting Ceremony is scheduled on Thursday December 5th, which may also disrupt traffic patterns in the study area. Therefore, these dates are not viable for data collection. Scheduling the second day of data collection on December 10th provides a buffer window before the end of the Congress December 2019 session with the following two days as options for data collection in the event of inclement weather or other unforeseen circumstances.

Day 1 (Tentative Date 12/4/19):

- Peak Period TMCs at 6 locations (3 hours per peak period; 36 hours total)
- Peak Hour TMCs at 19 locations (1 hour per peak period; 38 hours total)
- Travel Time Runs (2 personnel in each direction; 12 hours total)
- Field Observations (2 personnel along corridor; up to 12 hours total)

Day 2 (Tentative Date 12/10/19):

- Travel Time Runs (1 personnel in each direction; 6 hours total)
- Field Observations (3 personnel along corridor; up to 18 hours total)

Existing Counts

Existing multimodal TMC data are available for several intersections located within or in the vicinity of the study area from the past three years and are listed below. All existing TMCs were collected 7:30am-9:30am, 11:00am-1:00pm, and 4:30pm-6:30pm unless otherwise noted.

Spring 2016

- 10th Street & K Street (7am-9am;4pm-6pm)

Spring 2018

- 9th Street, K Street & New York Ave (7am-7pm)
- 20th Street & H Street
- 11th Street & K Street (7am-7pm)

- 20th Street & K Street
- 21st Street & K Street
- 23rd Street & H Street
- 23rd Street & Eye Street
- 23rd Street & L Street
- 22nd Street, Pennsylvania Ave & K Street

Fall 2018

- 12th Street & K Street
- 24th Street & K Street
- 25th Street & K Street
- 24th Street, Penn & K Street
- 19th Street & L Street
- 19th Street & G Street
- 19th Street & Eye Street
- 19th Street & K Street
- Rock Creek Pkwy & Virginia
- 24th Street & L Street
- Washington Circle NE
- Washington Circle SW
- 13th Street & K Street
- 18th Street & K Street
- 18th Street & L Street
- 18th Street & Washington Parking Garage
- 18th Street & Eye Street
- 17th Street, Connecticut Ave & K Street
- 18th Street & H Street
- Vermont Ave/Madison Pl & H Street
- 18th Street & G Street
- 14th Street & K Street

Winter 2019

- 15th Street, Vermont Ave & K Street
- 16th Street & K Street
- 17th Street & K Street (east)
- 15th Street & K Street (west)

Spring 2019

All collected 7:00am-7:00pm unless otherwise noted.

- 14th Street & G Street
- 14th Street & G Street
- 14th Street & Eye Street
- 14th Street & Eye Street
- 15th Street & H Street
- 15th Street & H Street
- 10th Street & K Street
- 10th Street & K Street
- 10th Street & L Street
- 10th Street & L Street
- 10th Street & Mass Ave
- 10th Street & Mass Ave
- 11th Street & H Street
- 11th Street & H Street
- 11th Street & Eye Street (north)
- 11th Street & Eye Street (south)
- 11th Street & New York Ave
- 11th Street & New York Ave/Eye Street
- 12th Street & G Street
- 12th Street & G Street
- 15th Street & Eye Street
- 15th Street & Eye Street

Sample Field Observation Sheet

Queue Observations:

Please observe queueing patterns for at least **one full signal cycle in each direction**. Record the approximate maximum queue length by shading in boxes to represent the location to which the queue stretches back to in relation to block. For example, 5 shaded boxes would indicate the max queue length stretched back 50% of the block segment between cross streets; 3 shaded boxes would indicate the max queue length stretched back 30% of the block segment between cross streets.

Time of Observation	Direction of Travel	Cross Street	Max Queue Length										Cross Street	Mainline or Service Lane?	Spillback?[1] (Y/N)	Additional/ General Notes[2]

[1] Please note if the maximum queue spills back into the preceding upstream intersection

[2] Please note if the queue from a turn/service lane is spilling back to the mainline thru movement or if cross traffic spills back onto K Street NW

Transit Observations

Please record bus 1) dwell time, 2) the number of passengers boarding and alighting, 3) if bunching occurs, 4) number of buses "bunching" or in queue 5) if bunching buses permit passenger boarding/alighting while in queue, 6) observed door opening/closing time in addition to bus route number.

Time of Observation	Bus Stop Location (Int & Approach)	Route #	Door Open/ Close Time (sec)	Dwell Time[1] (min:sec)	Bunching (Y/N)	# of Passengers Alighting	# of Passengers Boarding	# of Buses in Bunch	Queued Buses Boarding Alighting?

[1] Dwell time begins when doors open and ends when the doors close

Weaving Observations

Please observe weaving behavior between mainline K Street and the K Street service roads at locations where the weaving access exists. Record the number of vehicles observed traveling between mainline and the service roads for **10 minutes at each of the weaving access locations**.

Location	Time of Observation	Direction of Travel	Mainline to Service Road	Service Road to Mainline