Memorandum

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District Department of Transportation (DDOT)

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Subject: K Street NW Traffic Analysis
Framework Document – REVISED

Date: January 16, 2020

Table of Contents

Introduction

This document defines the methodology and assumptions that will be used in the traffic forecasting and operations analysis efforts for the **K Street NW Traffic Analysis**.

Framework Document Consensus

This framework document defines the consultant team's proposed methodology for the **K Street NW Traffic Analysis** and provides the assumptions required to develop traffic volumes, growth rates and future forecast volumes; develop and validate a Metropolitan Washington Council of Governments (MWCOG) project-focused travel demand model; and develop and calibrate a Vissim model for analysis.

The document shall be reviewed and agreed upon with the District Department of Transportation (DDOT) and other stakeholders deemed appropriate by DDOT before the start of the traffic forecasting and analysis effort.

Project Understanding

The K Street NW Corridor is being evaluated for transit alternatives to improve east-west mobility across Downtown Washington, DC. A microsimulation traffic analysis will be completed with associated traffic forecasting for the following three (3) analysis scenarios:

- Existing (2019) conditions;
- Build Alternative 1 (2025); and
- Build Alternative 2 (2025).

The assumed deliverables of this project for DDOT are:

- Documentation of microsimulation traffic analysis and associated traffic forecasting;
- Updated Vissim models corresponding to project documentation; and
- Support to public involvement and interagency coordination.

Study Area Boundary

The study area boundary and included intersections are shown in **Figure 1**. This study area includes 16 intersections on K Street NW and 9 intersections on cross streets. These intersections are listed below.

1. K Street NW and 22nd Street NW
2. K Street NW and 21st Street NW
3. K Street NW and 20th Street NW
4. K Street NW and 19th Street NW
5. K Street NW and 18th Street NW
6. K Street NW and Connecticut Avenue NW
7. K Street NW and 17th Street NW
8. K Street NW and 16th Street NW
9. K Street NW and 15th Street NW
10. K Street NW and Vermont Avenue NW
11. K Street NW and 14th Street NW
12. K Street NW and 13th Street NW
13. K Street NW and 12th Street NW
14. K Street NW and 11th Street NW
15. K Street NW and 10th Street NW
16. K Street NW and 9th Street NW

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

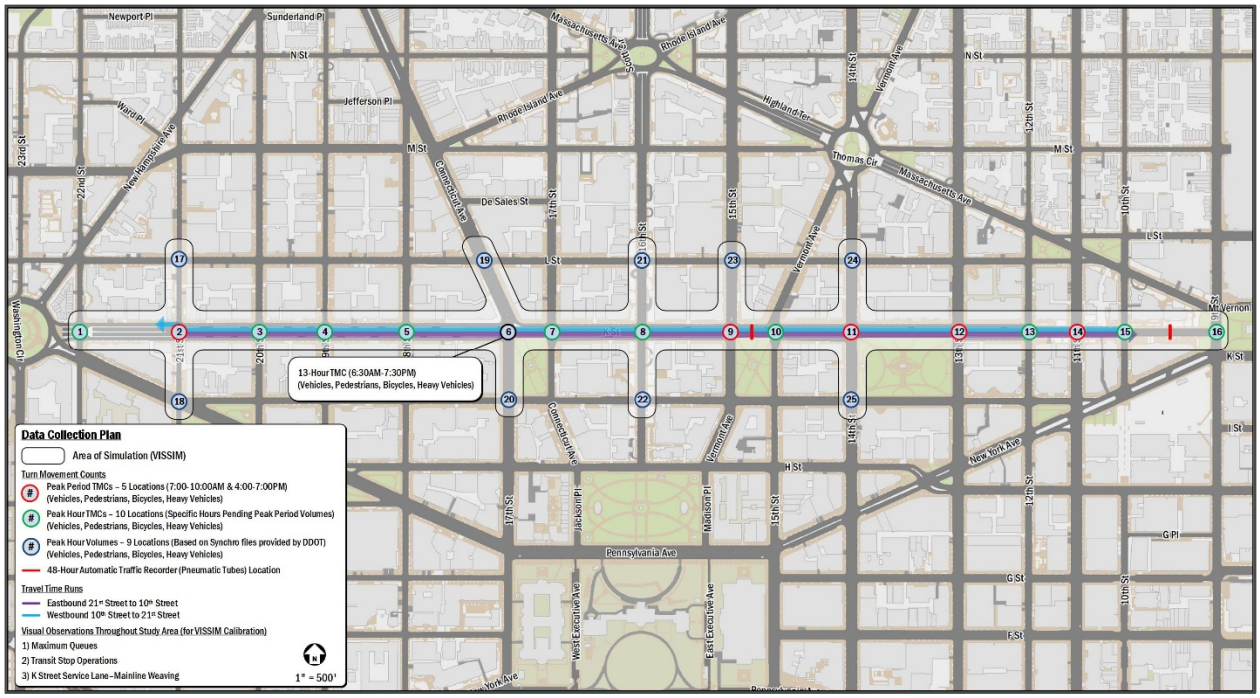

Figure 1: Project Study Area

Analysis Scenarios

All analysis scenarios will be evaluated during the weekday AM peak period and PM peak period. The exact hours of analysis will be determined after assessing collected traffic data.

The three (3) analysis scenarios and their associated assumptions are provided below.

Existing (2019) conditions – Calibrated against December 2019 traffic conditions and the 2017 MWCOG model.

Build Alternatives 1 and 2 (2025) – The 2025 Build scenarios will assume no additional development along the K Street NW corridor, aside from the project build alternative designs. DDOT recently completed an analysis of development potential within the study area for the K Street Transitway and found few buildings have potential for greater density. Therefore, 2025 volume forecasts will be developed from the MWCOG Travel Demand Model regional projected growth. As this corridor is already oversaturated, forecasted growth is likely to be applied as peak-spreading throughout the peak period. This methodology will be established in forecasting efforts in early 2020.

Data Collection and Processing

Field data were collected in December 2019 and supplementary data will be collected in January 2020. The Data Collection Plan was provided to DDOT in a separate memo dated November 27, 2019 and is included here as **Attachment A**.

Turning movement counts (TMCs) were collected at study area intersections for varying time intervals. Travel time runs were conducted along the K Street NW corridor during each peak period. Visual field observations were collected to include spot-checks of maximum back of queue, transit dwell time and bunching, and weaving behavior between the mainline and service lanes. Automatic Traffic Recorder (ATR) counts were collected at two locations on K Street NW within the study area to supplement existing AADT data from DDOT. This included the 900 and 1400 blocks of K Street NW. Complications with ATR data collection equipment in the 1400 block of K Street NW requires that new data be collected in January 2020. This data will be used as a point of comparison to validate volume balancing between intersections and provide an indication of volume fluctuation between the two days of data collection.

Details related to the data collected can be found in **Attachment A**. The completed data collection technical memorandum will be provided to DDOT in January 2020.

Existing Volumes and Balancing

The existing conditions volumes will be balanced from the collected TMCs and validated against the ATR and AADT when applicable. A set of balanced peak hour volumes will be provided for the AM and PM peak hours. The peak period volumes will be developed from the balanced peak hour volumes based on the distribution of volume throughout the study period. Movements between K Street NW and the service lanes will be estimated from the weaving behavior observations conducted during Data Collection. Parallel parking and garage driveways along the corridor will be consolidated and represented as a single driveway between each block as needed based on imbalances between intersections. The volumes will be balanced in such a way to minimize the difference between the unbalanced and balanced counts. Once balancing is complete, all TMCs will be rounded to the nearest five (5) vehicles. The balanced volumes will be documented in a memorandum provided to DDOT in January 2020.

Peak Hour and Peak Period

The network peak hours were selected based on multi-modal volumes (i.e., considering vehicle, pedestrian, and bicycle demand) at key intersections within the study area. A detailed overview of this selection will be provided in the data collection memorandum that will be provided to DDOT in January 2020.

- **AM Peak Hour** | 8:30AM to 9:30AM
- **PM Peak Hour** | 4:45PM to 5:45PM

The AM and PM simulation periods will be 2.5 hours long, with a 30-minute seeding period. The two (2) hour peak period will begin 30 minutes before the peak hour and end 30 minutes after

the peak hour. **Table 1** provides a summary of the simulation periods that will be used in the AM and PM Vissim models.

Table 1: Simulation period

Simulation Time Period	AM	PM
Simulation Time (Simulation Seconds)	7:30 AM – 10:00 AM (0, 9000)	3:45 PM – 6:15 PM (0, 9000)
Seeding Time (Simulation Seconds)	7:30 AM – 8:00 AM (0, 1800)	3:45 PM – 4:15 PM (0, 1800)
Peak Hour (Simulation Seconds)	8:30 AM – 9:30 AM (3600, 7200)	4:45 PM – 5:45 PM (3600, 7200)
Peak Period (Simulation Seconds)	8:00 AM – 10:00 AM (1800, 9000)	4:15 PM – 6:15 PM (1800, 9000)

Travel Demand Forecasting

Travel demand in 2025 will be forecasted using the MWCOG travel demand model (TDM). Following DDOT's assessment of development along K Street NW as part of the K Street Transitway, additional development will not be added beyond what is already included in the regionally-calibrated MWCOG model. The 2025 MWCOG TDM will only be updated to incorporate the build alternative designs along K Street NW.

MWCOG Model Calibration

The latest MWCOG travel demand model version (v2.3.75) based on the 3,722 traffic analysis zone (TAZ) system will be used for the Existing and 2025 model years. The MWCOG model base year is 2019; a project Existing Conditions (i.e., year 2019) model will be prepared, modified, and calibrated to reasonably reflect traffic counts. Modifications will be carried forward into future analysis year model scenarios.

The influence area identified for the K Street NW Traffic Analysis is shown in **Figure 2**. The MWCOG model will be strategically modified with specific alterations to improve the accuracy and reliability of forecasts for this influence area, including roadways connected to the corridor. The MWCOG/TPB Model is already subject to scrutiny as a regional model which has been a subject of FHWA's Transportation Model Improvement Program (TMIP) Peer Review process; therefore, the validation process will focus on the study area and will compare DDOT's average daily traffic (ADT) counts with model forecasts within the pre-defined Influence Area. The model will be calibrated against the FHWA TMIP *Travel Model Validation and Reasonability Checking Manual, Second Edition (2010)* and *VDOT's Travel Demand Modeling Policies and Procedures (2014)*.

Alterations to the MWCOG TDM to improve study area accuracy may include:

- Link refinements such as modifications to facility type and corrections for the number of lanes and one/two-way travel directions.
- Peak period or permanent turning movement restrictions.

Calibration of the MWCOG TDM will be documented in a memorandum provided to DDOT in December 2019.

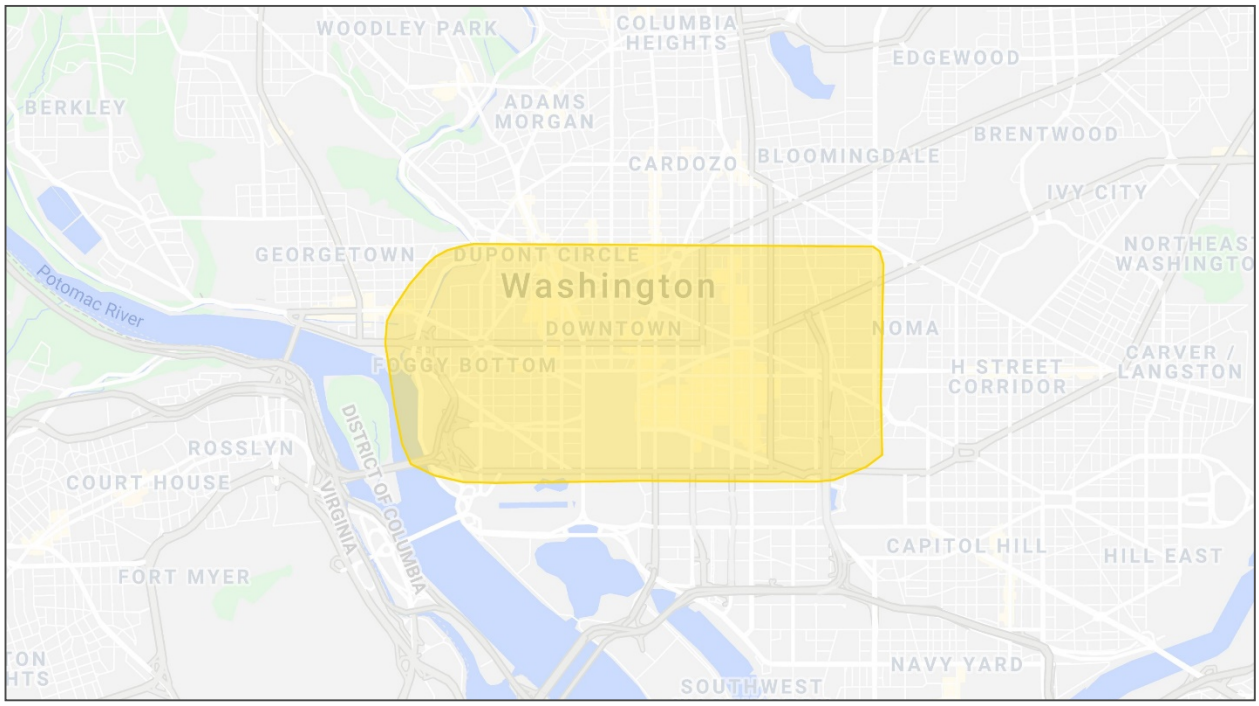

Figure 2: Study Influence Area

Volume Forecasting and Post-Processing

Once the existing conditions TDM is calibrated, the same adjustments made for model calibration will be applied to the 2025 MWCOG TDM that has been adjusted to incorporate the build alternative designs. The relative difference between volumes within the study area will indicate the growth rate in these regions. These growth rates will be applied to the balanced existing conditions volumes and re-balanced to establish 2025 Build Scenario peak hour volumes. Corridor capacity restraints will be considered, and peak hour forecasts will be adjusted accordingly. The latent demand unserviceable during the peak hour will be applied throughout the remainder of the modeled peak period in the form of peak spreading.

Vissim Microsimulation Analysis

The Vissim model will be developed to include the 25 study area intersections and follow the extents shown in **Figure 1**. The existing conditions Vissim model will be calibrated against existing volumes and travel times, while bottleneck and queue lengths will be cross-checked

with the available data from field observations. **Table 2** provides a summary of the calibration thresholds that will be used for model calibration. These thresholds were adapted from the *FHWA Traffic Analysis Toolbox III* for this project.

Table 2: Calibration Criteria and Acceptance Targets

Simulated Measure	Calibration Threshold	Acceptance Target	Calibration Period
Simulated Vehicular Throughput – Individual Links	Within ± 100 vph for <700 vph Within ± 15% for ≥700 vph and <2,700 vph Within ± 400 for ≥2,700 vph	85% of all intersection approaches shall meet these criteria.	Peak Hour
	GEH < 5 for individual link flows		
Simulated Vehicular Throughput – Network Wide	GEH < 4 for total network volume		Peak Hour
	Within 5% of total network volume		
Simulated Travel Time	Within ± 15% of observed travel times on K Street NW		Peak Period
Bottleneck and Queue Impact Verification	Maximum observed queue lengths will be compared with simulated queue lengths at critical intersection approaches. Since full peak period observations of queues were not collected, this comparison will be qualitative.		Peak Period

Modeling Assumptions

The model study area is defined by the following elements:

- This model will be developed in Vissim 11.
- The extents of the study area are K Street NW, from 22nd Street NW to 9th Street NW.
- Additional intersections to either side of K Street are modeled at 21st Street NW, 17th Street NW /Connecticut Avenue NW, 16th Street NW, 15th Street NW (15th and L only), 14th Street NW.
- In total, the study area includes 25 intersections along K Street NW and the aforementioned side streets.
- Service lanes will be modeled as one-lane in each direction (i.e., not considering the second lane used for parallel parking/loading zones). Areas with heavy parking density

will be identified during volume balancing and will be represented as driveways in the Vissim model.

    - Slip lanes between K Street NW and the parallel service lanes will be modeled as "right-in-right-out". Due to a noticeable number of left turn entry and exit movements, this may be adjusted during model calibration.

- Pedestrian crosswalks will be coded, and pedestrian volumes will be included as inputs according to collected data.
- All transit activity and bus dwell times will be included in the model and coded according to available data from WMATA and field-collected data.
- Bicycle and scooter movements will not be included along K Street NW where dedicated cycle lanes are not present. If calibration cannot be achieved, these movements may be added into the model at that point (Reference: DDOT meeting 12/09/2019).
- The cycle track on the west side of 15th Street NW and the bike lanes on 10th Street NW, 11th Street NW, and 12th Street NW will be modeled.
- Signal timings will be developed from the DDOT-provided synchro files and validated against DDOT signal timing cards.
- The model will be developed from the default North American Vehicle Classifications, considering DDOT's truck length restriction of 55 feet. Truck 2D/3D models will be updated based on 48-hour classification counts. Bus 2D/3D models will be updated to match the bus fleet observed in the field. This bus fleet included WMATA buses, DDOT Circulator buses, and Corporate Buses from MTA and Loudon county.
- Traffic routing will be developed based on TMC data at each intersection. Vissim's "combine static routes" will be used to better represent lane changing behavior along the corridor.

Calibration Methodology

The following are a list of pre-defined elements and parameters that may need adjustment during calibration.

- Lane change distances.
- Driving behavior parameters.
- "Keep Clear" Priority Rules at intersections.
- Conflict area and priority rule parameters.
- Left-turning at the K Street NW service lane slip lanes.
    - *This will be considered as a last resort during calibration and confirmed with DDOT before this type of adjustment is made.*

- Bicycle and scooter movements in crosswalks and service lanes.
- Lane blockages or construction activities identified during the field observations.

Required Sample Size

The required sample size (i.e., number of model simulation runs) will be determined from the FHWA Traffic Analysis Toolbox Vol III recommendations. In accordance with these guidelines, four (4) model runs will be performed, and ten (10) MOEs will be tested to determine the number of simulation runs required to obtain a 95 percent confidence level. The MOEs for this evaluation are listed below.

- Eastbound and westbound K Street NW travel times (2).
- Eastbound and westbound volumes on K Street NW between Connecticut Avenue NW and 18th Street NW (2).
- Eastbound and westbound volumes on K Street NW between 13th Street NW and 14th Street NW (2).
- Eastbound and westbound speeds on K Street NW between Connecticut Avenue NW and 18th Street NW (2).
- Eastbound and westbound speeds on K Street NW between 13th Street NW and 14th Street NW (2).

Memorandum

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Subject: K Street NW Traffic Analysis
DRAFT Data Collection Plan

Date: November 27, 2019

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.

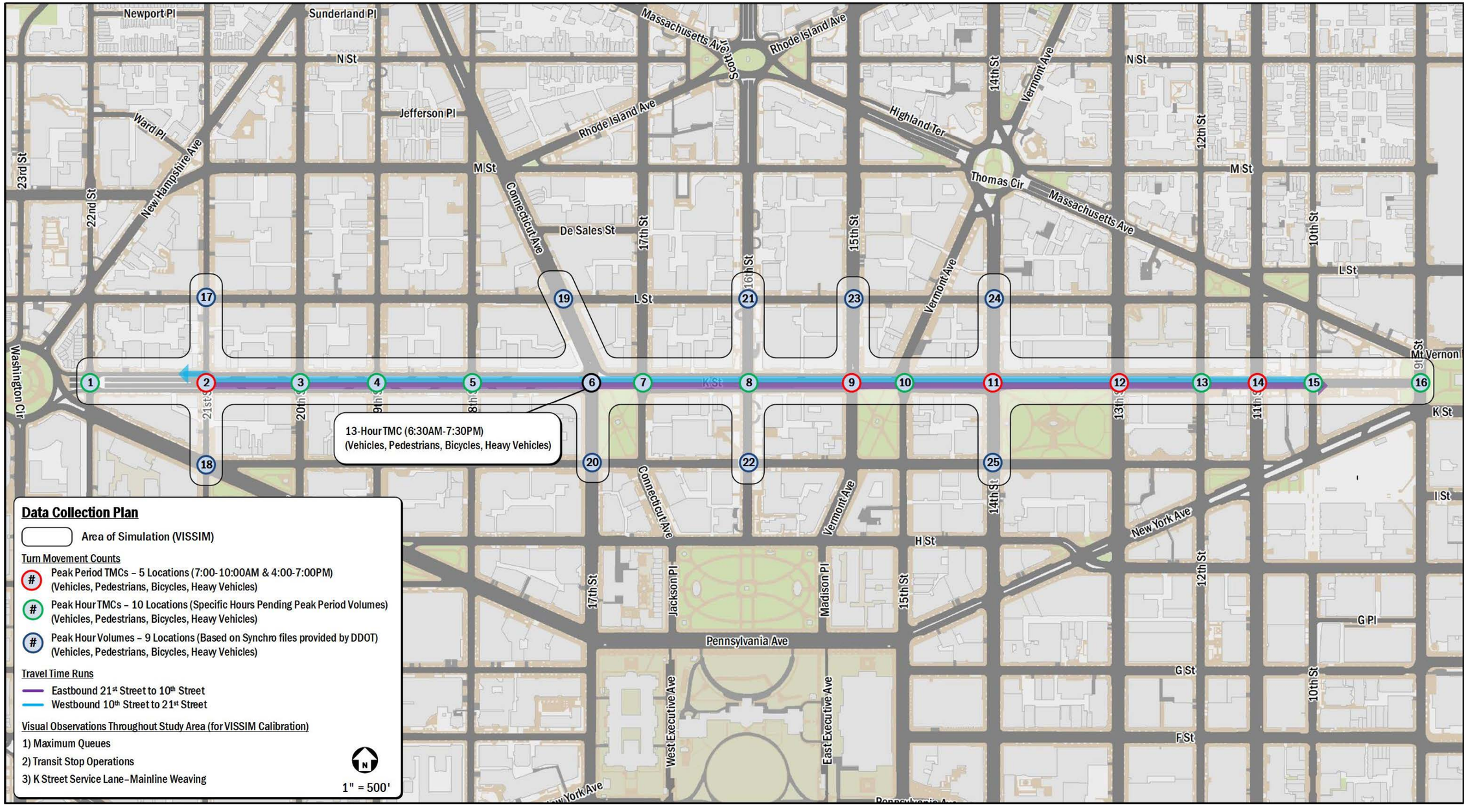

Figure 1: Data Collection Plan

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