National Capital Region Transportation Planning Board

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Item 7

M E M O R A N D U M

May 17, 2010

TO: Transportation Planning Board

FROM: Ronald F. Kirby
Director of Transportation Planning

SUBJECT: Review of Comments Received and Recommended Responses on Project Submissions for Inclusion in the Air Quality Conformity Assessment for the 2010 CLRP and FY 2011-2016 TIP

Background

At the April 21, 2010 meeting, the Board was briefed on the project submissions for the draft 2010 Financially Constrained Long Range Transportation Plan (CLRP) and the FY 2011-2016 Transportation Improvement Program (TIP), which were released for public comment and agency review at the TPB Citizens Advisory Committee (CAC) meeting on April 15, 2010. This public comment period closed on May 16.

Public comments submitted by individuals, organizations, and businesses were posted as they were received on the TPB web site at http://www.mwcog.org/transportation/public/comments.asp. This memorandum provides recommended responses to comments received through the close of the public comment period on May 16.

The Board will be briefed on the comments received and recommended responses at the May 19 meeting.

Comments and Responses

The 351 comments received through the close of the public comment period and recommended responses are grouped and summarized below:

1. Comments on the Proposed Bike Lane Pilot Project in the District of Columbia

Comments (342): Support the bike lanes because they will have a number of positive impacts including:

- encourage bicycle use and offer a viable alternative to driving
- provide a safer environment for cyclists and pedestrians
- improve the quality of life and livability in the city

Comments (3): Do not support the bike lanes on Pennsylvania Avenue because they are confusing to motorists, disrupt traffic and few cyclists are using them.

(1): A letter from the AAA Mid-Atlantic requests DDOT to share with the public and TPB traffic and operational data on the roadways, and information and studies on the projected impacts of the bike lanes. Also states that for this project DDOT is required by federal MPO regulations to develop a participation plan, a congestion management process, environmental consultation and a transportation safety element.

Response: Because this is a pilot project, it will not be considered permanent until the District of Columbia Department of Transportation (DDOT) has evaluated the effectiveness and impacts of the lanes. DDOT has provided the attached letter and supporting materials describing the pilot project, performance measures, and preliminary analysis results. The MPO regulations cited in the letter do not apply to an individual project such as a bike lane, they apply to the entire plan.

2. **Comment**: A general concern is expressed over the safety of bicycling in the District of Columbia, that it is dangerous due to motorists who do not accept the right of bicyclists to be in the road, turn in front of them without signaling, turn right on red without stopping, or just run red lights.

Response: The TPB, through the Bicycle and Pedestrian Subcommittee of the TPB Technical Committee, is working to address the issue of bicyclist safety throughout the region. The regional Street Smart Pedestrian and Bicycle Safety Program, administered by the Council of Governments, uses transit advertising to urge bicyclists to "Obey signs and signals", while instructing motorists to yield to pedestrians and bicyclists when turning. Implicit in these messages is that bicyclists have the right to be on the road. DC police and other police agencies around the region carry out concurrent law enforcement, issuing warnings and citations for offenses related to pedestrian and bicyclist safety, such as failure to yield. Instruction on how to behave around bicyclists has been incorporated into WMATA's bus driver training.

The Commuter Connections program encourages more people to ride through its sponsorships of events such as the regional Bike to Work Day. Building infrastructure such as bicycle lanes also sends the message that bicycling is an important mode, and encourages more bicycling. More bicycling in turn raises motorist awareness and ultimately improves safety.

3. **Comment**: The delay or removal of Virginia projects that are necessary to the sanity, families and regional economic engine are a bad move, and the TPB is encouraged to find creative solutions for transportation needs.

Response: The project delays and removals from the CLRP are due to the projected continuing decline in VDOT transportation revenues over the next decades. In the financial plan for the 2010 CLRP, the TPB will be identifying and discussing potential sources of increased revenues.

4. **Comment**: A letter from the City of Bowie encourages the TPB not to accept MDOT's removal of the US 301 improvements from US 50 to Mount Oak Road from the CLRP.

Response: MDOT has delayed or removed several highway projects, including this US 301 project, from the CLRP because it could not identify sufficient funding to construct them over the life of the plan. Under the metropolitan planning organization (MPO) federal planning regulations, the CLRP must be financially constrained so that the forecast revenues reasonably expected to be available are equal to the estimated costs of expanding and adequately maintaining and operating the highway and transit system in the region through 2040. MDOT did restore the MD 3 project mentioned in the letter to construction status with this submission.

5. **Comment**: There are no Safe Routes to School projects included in the project submissions for the CLRP and TIP.

Response: The purpose of this initial round of project submissions is to capture all of the planned projects that will expand or alter the capacity of the region's transportation system, so that they may be tested for air quality purposes. Projects that use Safe Routes to School funding typically do not increase the capacity of roads or transit systems. Over the next several months, TPB staff will work with member agencies to develop the FY 2011-2016 TIP. The Bicycle and Pedestrian Subcommittee will work with member agencies to make sure they are aware of the availability of Safe Routes to School funding and to encourage the agencies to include these projects in the FY 2011-2016 TIP. The TIP document will include a financial plan that details the amount of funds programmed from each source, including Safe Routes to School funding.

6. **Comment:** TPB staff should do a much better job of promoting the TPB public comment periods, especially on the COG website.

Response: On April 15, the TPB's CLRP home page was updated with an announcement about the public comment period. This was accompanied by newspaper ads in the April 15 editions of the *Washington Post, El Pregonero,* and the *Washington Afro-American,* and an e-mail blast to approximately 600 addresses. In the future, TPB staff will ensure that the mwcog.org home page and the "What's Happening In Transportation" page are updated immediately to reflect the beginning of public comment periods. TPB staff also plan to expand the use of social media such as Facebook to further publicize comment periods and other TPB activities.

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DISTRICT DEPARTMENT OF TRANSPORTATION

POLICY, PLANNING, and SUSTAINABILITY ADMINISTRATION

The Honorable David Snyder, Chairman
National Capital Region Transportation Planning Board
777 North Capitol Street, NE, Suite 300
Washington, DC 20002

May 13, 2010

Dear Mr. Snyder,

As requested at the April TPB meeting, DDOT is providing a description of our evaluation approach for the downtown bike lane pilot project. Below is a project description and our proposed performance measures, as well as some preliminary analysis.

Project Description

The purpose of the project is to improve bicycle safety and access in the downtown area while maintaining the transportation function of downtown Washington. This is particularly important as we expand to a larger, regional, bike sharing system of over 1100 bikes by the end of the year. These bike lanes are also included the 2005 Bicycle Master Plan. Bike lanes are an important part of our goal of expanding transportation choices in the District and the region.

We are planning separated bicycle facilities in the following corridors: Pennsylvania Avenue (3rd to 14th); M Street (15th to 29th) and L Street (25th to 12th); 15th Street (U to Massachusetts); and 9th Street (Massachusetts to Constitution). Experience in other cities shows that separated lanes increase bicycling while decreasing crashes involving bicyclists.

DDOT has determined these corridors have some excess capacity and is proposing to remove motor vehicle lanes to provide additional space for bike lanes. To minimize impacts on traffic, turn lanes are maintained at most intersections, requiring bikes to share the lane with cars. The pilot also includes enhanced enforcement in order to discourage commercial vehicle parking in the travel lanes. (Currently, delivery and tour bus parking is a significant hindrance to traffic flow). There are currently no adjustments to the bus schedule or stops planned for any of these projects.

These lanes are pilot projects. DDOT will monitor the impact to bicyclists, motorists, pedestrians, and make changes as necessary. If these projects prove successful, DDOT may make more improvements such as permanent barriers and/or traffic signal changes.

Performance Measures

DDOT will measure success of the project in the following ways:

- Number of bicyclists – DDOT will count the number of bicyclists on the pilot project streets before and after the installation of the lanes.
- Number of bicycle crashes – DDOT will monitor the number and nature of reported crashes involving cyclists before and after the installation of the lanes.

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- Pedestrian Crashes – DDOT will monitor the number and nature of reported crashes involving pedestrians.
- Traffic Analysis - DDOT will complete a quantitative assessment of traffic impact through 'before' and 'after' evaluations of:
    - Vehicular speed - DDOT will measure the speed of vehicles before and after the installation of the lanes.
    - Volume of traffic – DDOT will measure the volume of traffic on the pilot streets before and after the installation of the bicycle lanes.
    - Motor Vehicle Level of Service – DDOT will perform Level of Service Analysis for key intersections on the pilot streets before and after the installation of the bicycle lanes.
    - Bicycle Level of Service – DDOT will conduct Bicycle Level of Service (BLOS) Analysis before and after the installation of the lanes.
    - Qualitative Analysis of Traffic Flow – in addition to conducting modeling, DDOT will observe key intersections for signs of congestion and gridlock.

Tentatively, the pilot period is set for one year, at which point we believe we will have enough data to complete our analysis.

Preliminary Analysis

As part of the planning process, DDOT has conducted a Motor Vehicle Level of Service analysis for key intersections impacted by the some of these projects. Some of the results are attached.

For Pennsylvania Avenue, the analysis shows minimal degradation in the Level of Service. We had similar results for L Street. I Street showed more degradation, but we have replaced that with M Street. The rest of the corridors are still under analysis.

Thank you for your interest in our innovative downtown bike lane pilot project. We look forward to sharing the results of our analysis with the region.

Sincerely,

Karina Ricks
Associate Director

Sabra, Wang & Associates, Inc.

Engineers • Planners • Analysts

MEMORANDUM

To: Bill Schulthiess, P.E., Toole Design Group

From: Paul Silberman, P.E., PTOE, Sabra, Wang & Associates, Inc

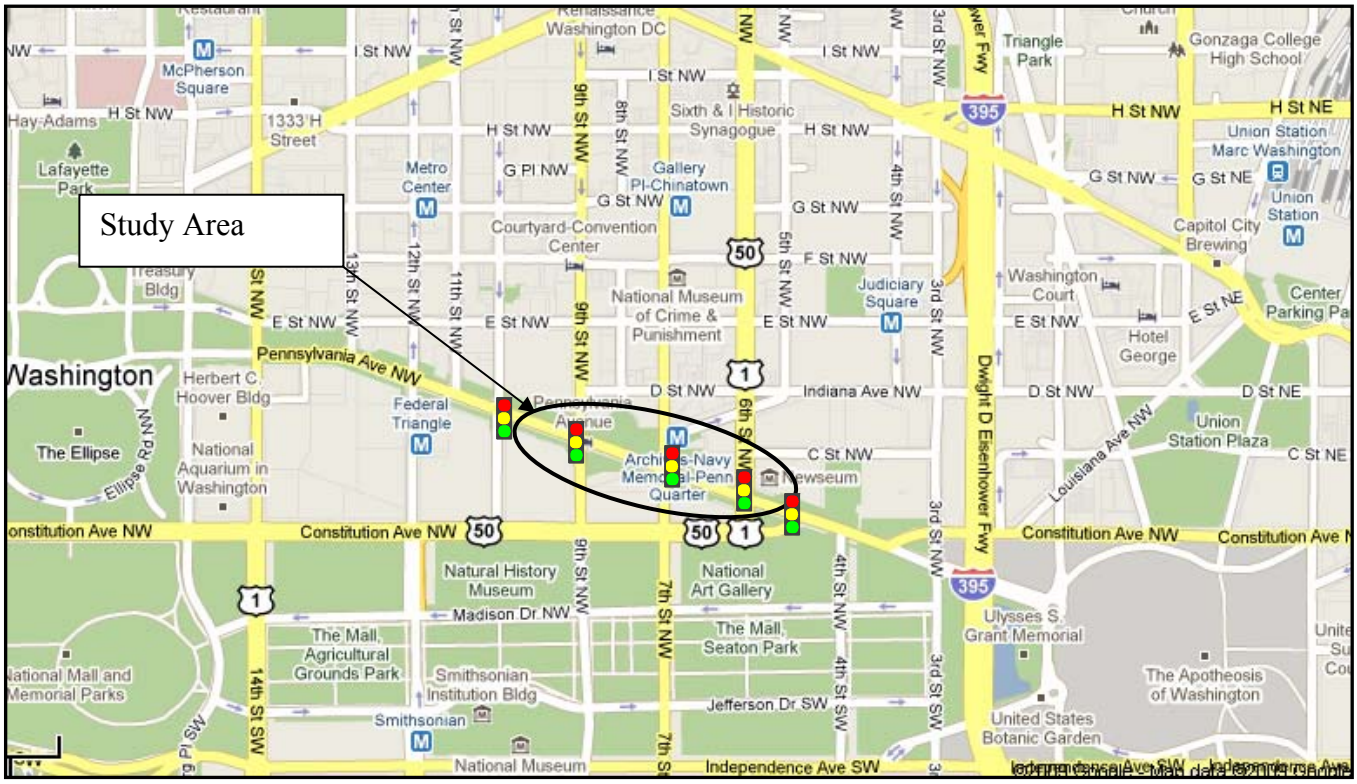
Subject: Pennsylvania Avenue Traffic Analysis

Date: November 12, 2009

A. Introduction

The District of Columbia Department of Transportation (DDOT) requested a traffic analysis be performed for a proposed roadway diet including a full-time bicycle lane to be located on Pennsylvania Ave in the northwest quadrant of Washington, DC. The purpose of this study is to evaluate existing roadway capacity and level of service and analyze the impacts of a bicycle-compatible lane configuration, specifically a road diet lane reduction between 6th and 9th Streets. A location map of the study area is shown in **Figure 1**.

Figure 1. Area Map (Not to Scale)



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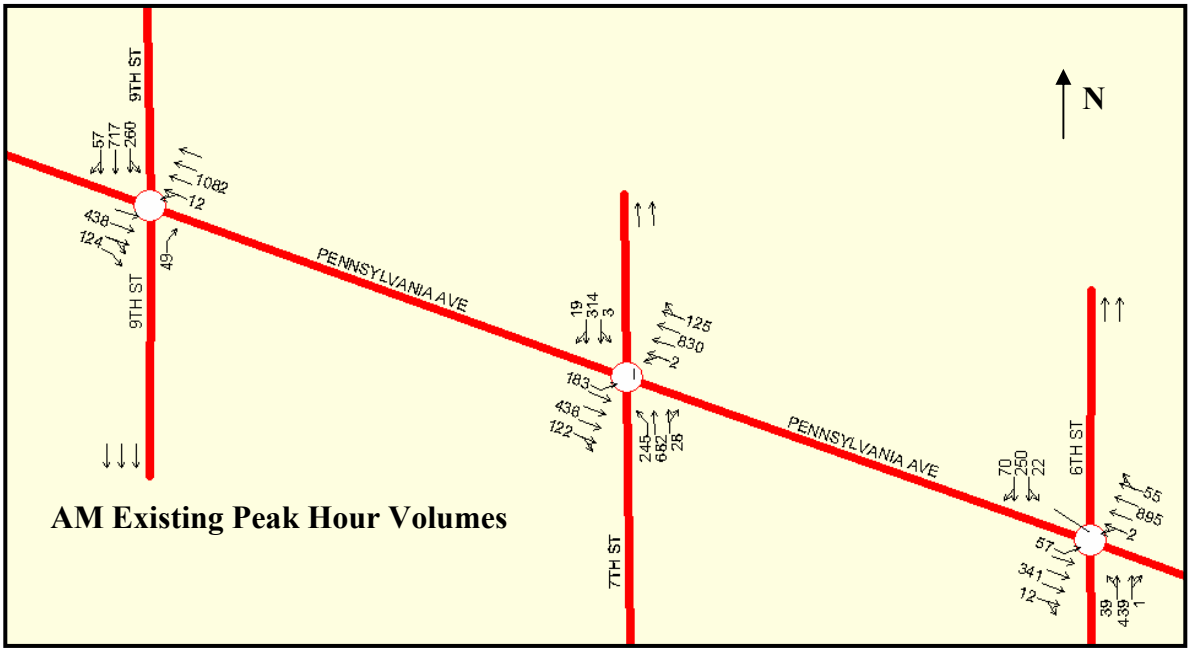
B. Existing Conditions Analysis

Pennsylvania Avenue is currently an eight-lane undivided roadway with a posted speed limit of 25 mph. Limited on-street parking exists along Pennsylvania Avenue and 6th, 7th and 9th Streets, with most on-street parking having peak hour restrictions. The travel lanes are typically 11' wide throughout the study section. Other notable traffic operational characteristics include:

- An existing bicycle lane is currently striped along 9th Street along the west curb.
- The segment of Pennsylvania Avenue is served by over a dozen WMATA bus routes: lines 13A-G (Pentagon-National-DC), 32 and 36 (Pennsylvania Avenue), 34 (Naylor Road), 37 (Wisconsin Avenue Express) 39 (Pennsylvania Ave Express) 63 (Takoma-Petworth), 64 (Fort Totten-Petworth), 70 (Georgia Ave-7th Street), 79 (Georgia Avenue Metro Extra), A42, A46, A48 (Congress Heights-Anacostia), N3 (Massachusetts Ave), P6 (Anacostia-Eckington), S2, S4 (16th Street). Typical rush hour headways range between 5 to 15 minutes, and near-side bus stops are located EB at 6th and 7th Street.
- Private tour bus operators were also noted to occasionally stage in the curb lane of Pennsylvania Avenue, more frequently in the evening peak hours.
- There is one Metro Station, Archives-Navy Memorial-Penn Quarter located in the study area at the intersection of Pennsylvania Avenue and 7th Street NW. Additional pedestrian traffic generators include the National Archives, FBI headquarters, the Old Post Office, the Newseum and the FTC.
- Median refuge islands for pedestrian crossings are provided at all study intersections.

Existing peak hour traffic volumes were collected in October, 2009. Morning and evening peak hour weekday turning movement counts including pedestrians and bicycles were obtained at all study intersections. **Figures 2** summarize the AM, and PM existing peak hour traffic volumes. **Table 1** summarizes pedestrian treatments and amenities.

Figure 2. Existing Peak Hour Traffic Volumes



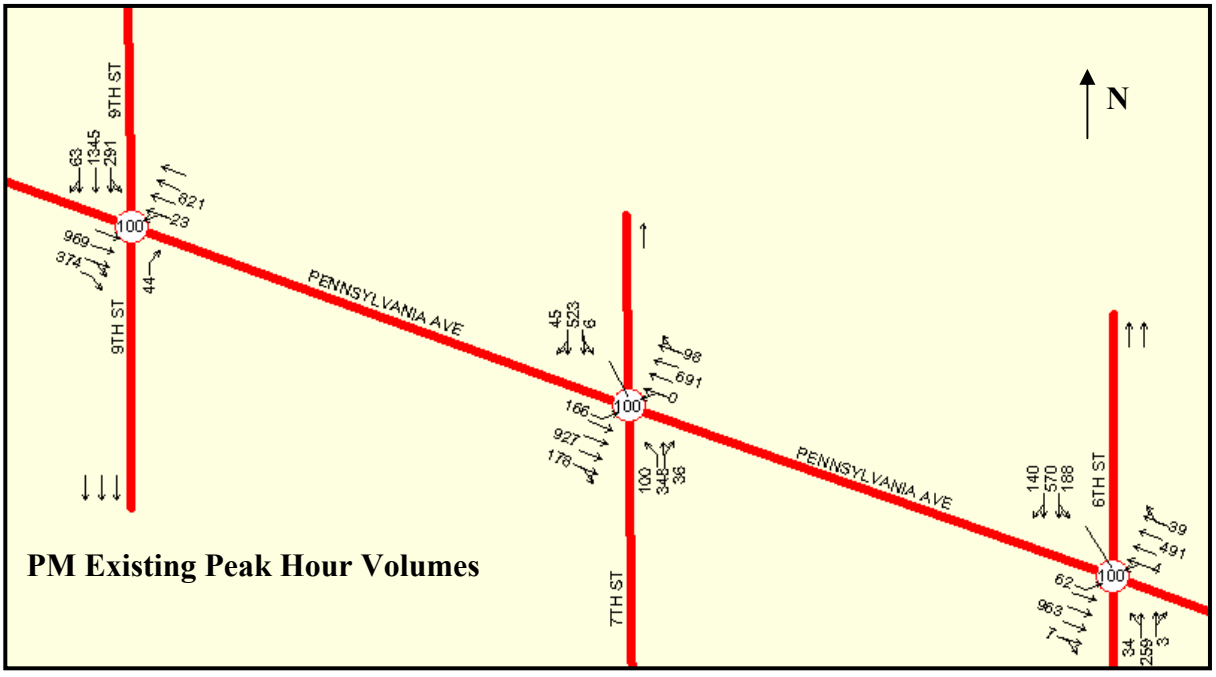


Table 1. Summary of Pennsylvania Avenue Pedestrian Signal Treatment

Intersection	AM (PM)Total Entering Pedestrian Volumes	AM (PM)Total Entering Bicycle Volumes	Countdown Signals & X-walks?	Pedestrian Phasing?	Refuge Island?
Pennsylvania Ave at 6th Street	1200 (1750)	25 (18)	Yes all 4 legs	None	Yes
Pennsylvania Ave at 7th Street	750 (1675)	55 (46)	Yes all 4 legs	Protected NB Left	Yes
Pennsylvania Ave at 9th Street	250 (350)	9 (9)	Yes all 4 legs	EB right NTOR	Yes

Existing signal timing and phasing data, including cycle lengths, splits and offsets, was obtained from the D.C. Department of Transportation in the form of a Synchro traffic model. The signals in the study area operate in a fixed and time-based coordinated mode, primarily running a 100-second cycle length during the AM, Midday and PM peak hours. Clearance intervals (yellow + all red) typically range from 5 to 7 seconds. Pedestrian signal timing, including walk/ flashing walk and flashing don't walk times were also reviewed. Signal phasing, lane configurations, turn lane lengths, turn restrictions, parking regulations and bus stop locations were field-verified by an Engineer.

A capacity analysis was performed for the existing conditions using the Highway Capacity Manual (HCM) methodology. Level of service is defined by the HCM as a "qualitative measure describing operational conditions within a traffic stream". Levels of service range from 'A" to "F" where A represents optimal conditions and F represents saturated or failing conditions. The volume-to-capacity ratio (v/c ratio) is the ratio of current flow rate to the capacity of the intersection. This ratio is often used to determine how sufficient capacity is on a given roadway. Generally speaking, a ratio of 1.0 indicates that the roadway is operating at capacity. A ratio of greater than 1.0 indicates that the facility is failing as the number of vehicles exceeds the roadway capacity.

The existing capacity and level of service is summarized in **Table 2**. . The results of the existing conditions capacity analysis indicate all intersections are currently performing at a ***level of service C or better during both peak hours.***

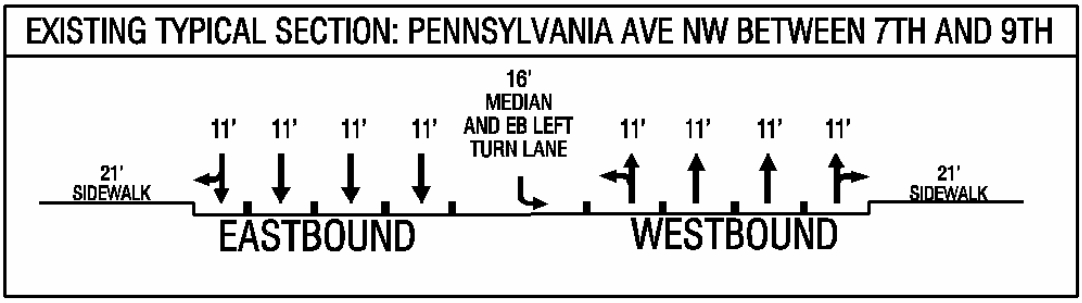
Table 2. Summary of Existing Intersection Capacity – AM (PM)

Intersection	Level of Service	Volume-to-Capacity Ratio	Average Delay
Pennsylvania Avenue at 6th Street	B (C)	0.38 (0.58)	15.2 (27.5)
Pennsylvania Avenue at 7th Street	C (C)	0.66 (0.51)	20.6 (20.7)
Pennsylvania Avenue at 9th Street	B (C)	0.47 (0.69)	10.0 (21.1)

A review of queue lengths for critical movements was performed using the model, and the following observations were noted:

- AM peak hour northbound 7th Street, left-turn lane 95th-percentile queues extend back to Constitution Avenue
- PM peak hour southbound 9th Street queues extend back to D Street
- PM peak hour southbound 6th Street queues extend back to C Street

The existing typical cross-section for Pennsylvania Avenue is shown below:

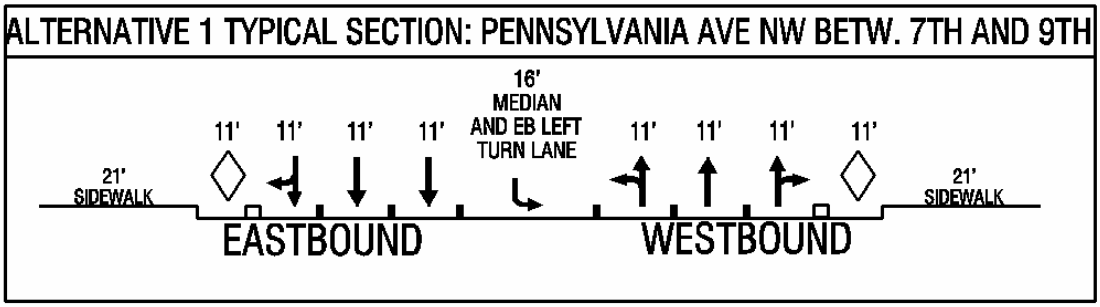


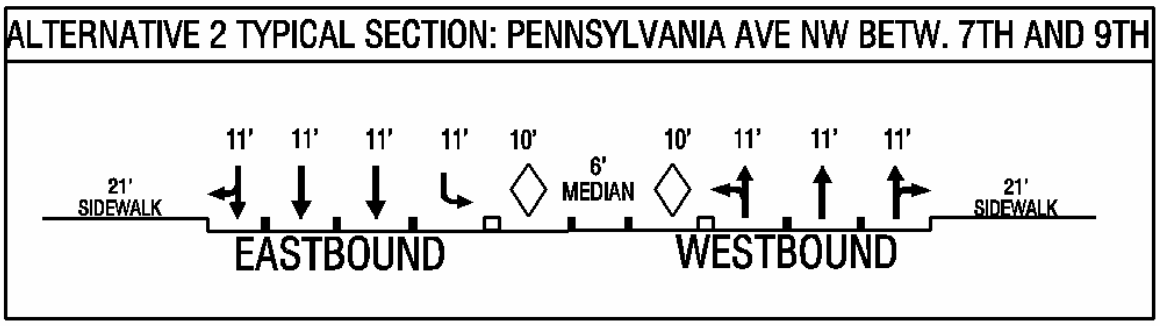
C. Alternatives Conditions Analysis

Alternative bicycle-compatible lane configurations were analyzed to assess the feasibility of the proposed roadway diet including a full-time bicycle lane to be located. Three

- Alternative 1- Elimination of the curb lane in both directions for bicycle track
- Alternative 2 - Elimination of one travel lane in each direction with a median cycle track
- Alternative 3 - Conversion of curb lane in both directions to bicycle and right-turn traffic only

Alternative lane configurations are shown in **Figures 5**.


ALTERNATIVE 1 TYPICAL SECTION: PENNSYLVANIA AVE NW BETW. 7TH AND 9TH
16'
MEDIAN
AND EB LEFT
TURN LANE
11'
11'
11'
11'
11'
11'
11'
11'
21'
SIDEWALK
21'
SIDEWALK
EASTBOUND
WESTBOUND


ALTERNATIVE 2 TYPICAL SECTION: PENNSYLVANIA AVE NW BETW. 7TH AND 9TH
11'
11'
11'
11'
10'
6'
MEDIAN
10'
11'
11'
11'
21'
SIDEWALK
21'
SIDEWALK
EASTBOUND
WESTBOUND

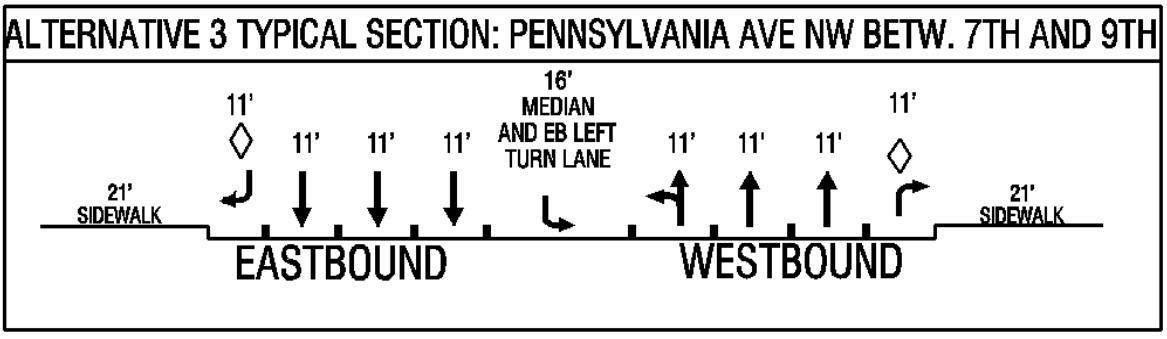

ALTERNATIVE 3 TYPICAL SECTION: PENNSYLVANIA AVE NW BETW. 7TH AND 9TH
16'
MEDIAN
AND EB LEFT
TURN LANE
11'
11'
11'
11'
11'
11'
11'
11'
21'
SIDEWALK
21'
SIDEWALK
EASTBOUND
WESTBOUND

Table 3. Summary of Alternative Intersection Capacity – AM (PM)

Intersection	Level of Service	Volume-to-Capacity Ratio	Average Delay
Existing Conditions			
Pennsylvania Avenue at 6th Street	B (C)	0.38 (0.58)	15.2 (27.5)
Pennsylvania Avenue at 7th Street	C (C)	0.66 (0.51)	20.6 (20.7)
Pennsylvania Avenue at 9th Street	B (C)	0.47 (0.69)	10.0 (21.1)
Alternative 1 - Curb Lane Cycle Track			
Pennsylvania Avenue at 6th Street	B (C)	0.43 (0.65)	18.1 (28.3)
Pennsylvania Avenue at 7th Street	C (C)	0.68 (0.52)	25.4 (24.7)
Pennsylvania Avenue at 9th Street	B (C)	0.53 (0.74)	14.0 (25.0)
Alternative 2 – North Curb Lane Cycle Track with Median Shift			
Pennsylvania Avenue at 6th Street	B (C)	0.43 (0.65)	18.1 (28.3)
Pennsylvania Avenue at 7th Street	C (C)	0.68 (0.52)	25.4 (24.7)
Pennsylvania Avenue at 9th Street	B (C)	0.53 (0.74)	14.0 (25.0)
Alternative 3 – Exclusive Bicycle, Bus and Right-Turn Curb Lane			
Pennsylvania Avenue at 6th Street	B (C)	0.41 (0.64)	18.4 (28.3)
Pennsylvania Avenue at 7th Street	C (C)	0.63 (0.47)	23.8 (27.3)
Pennsylvania Avenue at 9th Street	B (C)	0.53 (0.76)	14.0 (25.0)

The results of the alternatives analysis indicate that any of the bicycle compatible roadway diets would result in acceptable vehicular intersection operations. However, a curb lane cycle track design would need careful consideration of curb side operations such as deliveries, tour bus, and transit bus stop operations, including possible creation of bus bays. Therefore, a median aligned cycle track may be safest and most efficient for bicyclists, and should be explored further for the entire length of the Pennsylvania Avenue NW corridor.

Further analysis of signal timing, phasing and signal equipment location would be necessary with a median cycle track alignment at all intersections to optimize operations and limit conflicts between bicyclists and left turning motorists. It is anticipated that new signal equipment and phasing such as lag and protected left-turn phasing, may be desirable to control the bicycle traffic and left-turning traffic.

Sabra, Wang & Associates, Inc.

Engineers • Planners • Analysts

MEMORANDUM

To: William Schultheiss, P.E., Toole Design Group, LLC

From: Paul Silberman, P.E., PTOE, Sabra, Wang & Associates, Inc.

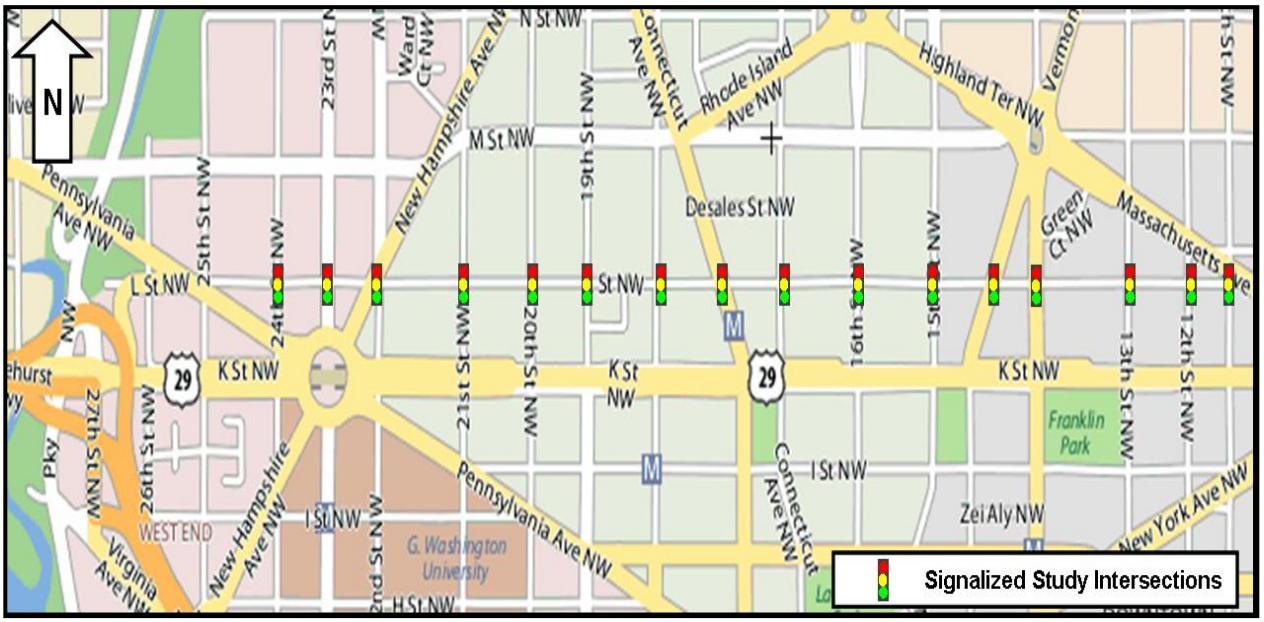
Subject: L Street, NW, Washington, DC Traffic Analysis

Date: December 15, 2008

A. Introduction

The District of Columbia Department of Transportation (DDOT) requested a traffic analysis be performed for a proposed roadway diet including a full-time bicycle lane to be located on the eastbound L Street corridor between Pennsylvania Ave and 11th Street (16 blocks) in the northwest quadrant of Washington, DC. The purpose of this study is to evaluate existing roadway capacity and level of service and analyze the impacts of a bicycle-compatible lane configuration, specifically a road diet lane reduction. A location map of the study area is shown in **Figure 1**.

Figure 1. Area Map (Not to Scale)



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A 3'-5' bicycle lane is proposed to be located along the north side of eastbound L Street NW. The provision of the bicycle lane requires the removal of one vehicular travel and/ or parking lane between L Street at Pennsylvania Avenue and L Street at 11th Street.

The following intersections were included in this Traffic Impact Analysis:

- L Street at 24th Street
- L Street at 23rd Street
- L Street at New Hampshire Ave.
- L Street at 21st Street
- L Street at 20th Street
- L Street at 19th Street
- L Street at 18th Street
- L Street at Connecticut Ave.
- L Street at 17th Street
- L Street at 16th Street
- L Street at 15th Street
- L Street at Vermont Ave.
- L Street at 14th Street
- L Street at 13th Street
- L Street at 12th Street
- L Street at 11th Street

L Street is currently a three to four-lane one-way eastbound roadway with a posted speed limit of 25 mph. Metered parking is typically provided on the south side of the roadway, although there are several blocks where regulated parking is provided on the north side. Along the roadway there are several parking restrictions such as peak hour and time limits, as well as special parking space designations**. Table 1** summarizes on-street parking restrictions for the L Street corridor.

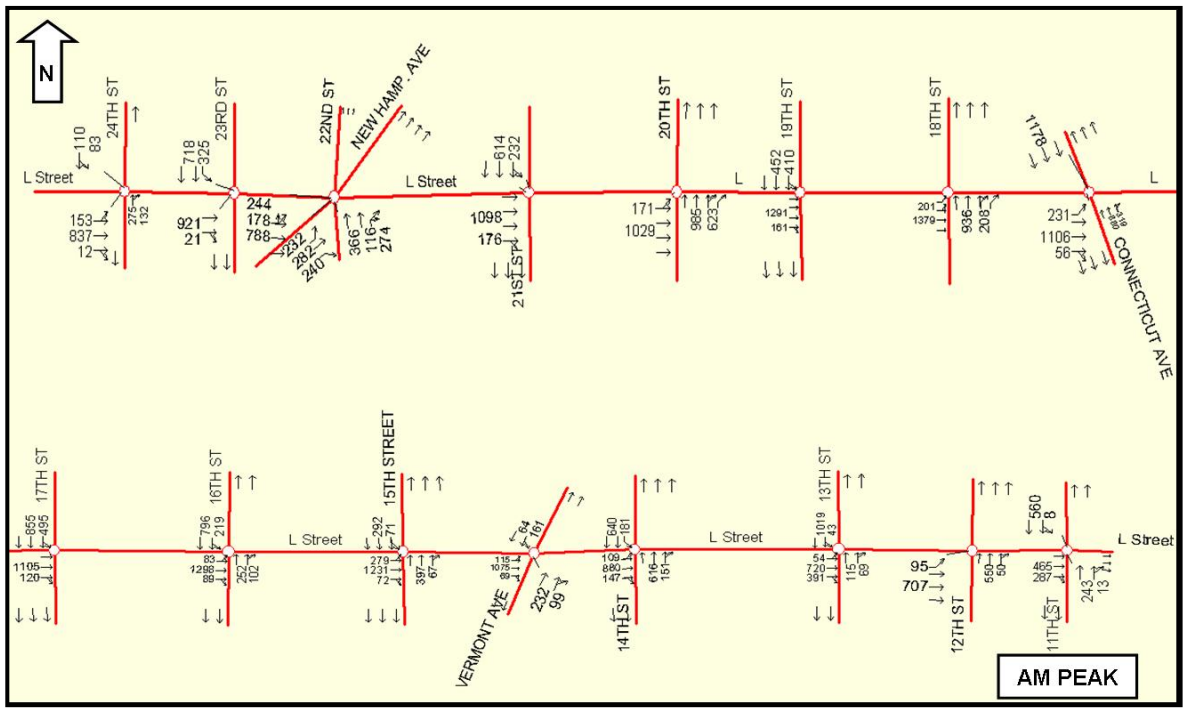
B. Existing Conditions Analysis

Existing peak hour traffic volumes were extracted from a previous study titled *K Street Transitway* by DMJM Harris, Inc. at all study intersections. Morning, midday, and evening peak hour weekday turning movement and pedestrian counts were obtained at all study intersections. **Figures 2** summarize the AM, Midday, and PM existing peak hour traffic volumes. **Table 2** summarizes pedestrian treatments and amenities.

Table 1. Existing Parking Restrictions along L Street Corridor

Segment	North Side of Street	Type of Parking	South Side of Street	Type of Parking
Pennsylvania Avenue to 24th Street	No Parking 7AM-9:30AM	Peak Hour Restricted	No Parking 7AM-6:30 PM	Daytime Restricted
24th Street to 23rd Street	2 Hr Parking Limit 7:00AM-6:30PM	Metered	No Parking 7:30AM-6:30PM	Daytime Restricted
23rd Street to New Hampshire Avenue	No Parking 7:00AM-6:30PM	Daytime Restricted	No Parking Anytime	None
New Hampshire Avenue to 21 Street	No Parking 7:00AM-6:30PM	Daytime Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
21st Street to 20th Street	No Parking 7AM-9:30AM & 4PM-6:30PM	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
20th Street to 19th Street	2 Hr Parking Limit 9:30AM-4:00PM	Metered	2 Hr Parking Limit 9:30AM-4:00PM	Metered
19th Street to 18th Street	No Parking 7AM-9:30AM & 4PM-6:30PM	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
18th Street to Connecticut Avenue	No Parking 7AM-9:30AM & 4PM-6:30PM	Peak Hour Restricted	No Parking 7AM-9:30AM & 4PM-6:30 PM	Peak Hour Restricted
Connecticut Avenue to 17th Street	No Parking 7AM-9:30AM & 4PM-6:30PM	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
17th Street to 16th Street	No Parking Rush Hour (Commericial Veh. Parking Only 9AM-4PM)	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
16th Street to 15th Street	No Parking 7AM-9:30AM & 4PM-6:30PM	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
15th Street to Vermont Avenue	No Parking 7AM-9:30AM & 4PM-6:30PM	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
Vermont Avenue to 14th Street	No Parking Rush Hour (Commercial Veh. Parking Only 9AM-4PM)	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
14th Street to 13th Street	No Parking Rush Hour (Commerical Veh. Parking Only 9AM-4PM)	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
13th Street to 12th Street	No Parking Rush Hour (Commerical Veh. Parking Only 9AM-4PM)	Peak Hour Restricted	2 Hr Parking Limit 9:30AM-4:00PM	Metered
12th Street to 11th Street	No Parking Anytime		No Parking Rush Hour (Commerical Veh. Parking Only 9AM-4PM)	Peak Hour Restricted

Figure 2. Existing Peak Hour Traffic Volumes



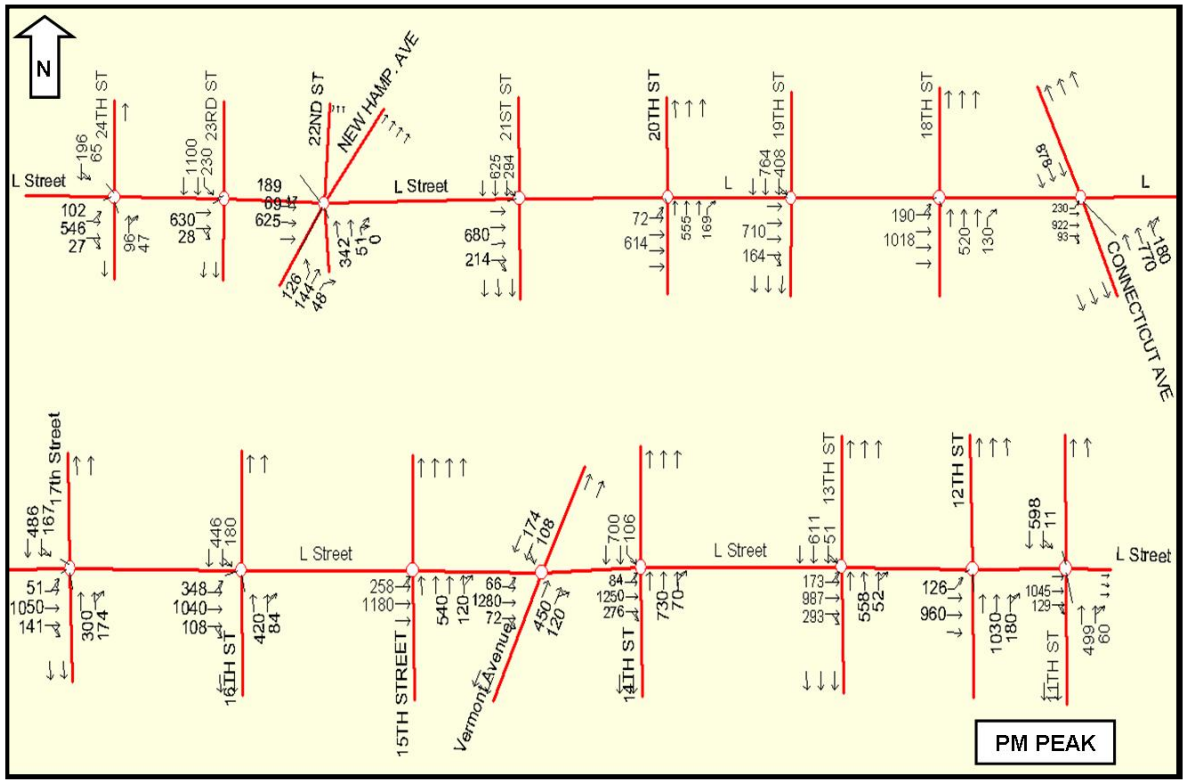


Table 2. Summary of L Street Pedestrian Signal Treatment

Intersection	AM (Mid)[PM] Total Entering Pedestrian Volumes	Signals & X-walks?	Pedestrian Phasing
L Street at 24th Street	400 (440) [400]	Yes all 4 legs	None
L Street at 23rd Street	400 (440) [400]	Yes all 4 legs	None
L Street at New Hampshire Ave.	400 (440) [400]	Yes all 4 legs	NB right NTOR
L Street at 21st Street	460 (500) [460]	Yes all 4 legs	None
L Street at 20th Street	800 (880) [800]	Yes all 4 legs	Advanced Ped - Delayed NB right turn & NTOR
L Street at 19th Street	3417 (2373) [3258]	Yes all 4 legs	None
L Street at 18th Street	2447 (3131) [2911]	Yes all 4 legs	Advanced Ped - Delayed NB right turn EB left turn & NTOR
L Street at Connecticut Ave.	3278 (3145) [2989]	Yes all 4 legs	EB right & NB right NTOR
L Street at 17th Street	2794 (1079) [2410]	Yes all 4 legs	None
L Street at 16th Street	1386 (687) [1580]	Yes all 4 legs	None
L Street at 15th Street	1492 (1264) [1664]	Yes all 4 legs	NB right NTOR
L Street at Vermont Ave.	1528 (1646) [1818]	Yes all 4 legs	None
L Street at 14th Street	960 (952) [948]	Yes all 4 legs	None
L Street at 13th Street	435 (411) [202]	Yes all 4 legs	None
L Street at 12th Street	206 (218) [122]	Yes all 4 legs	None
L Street at 11th Street	317 (42) [105]	Yes at all legs except EB L Street at 11th Street north side.	None

It should be noted that no WMATA intra-city bus routes or bus stops currently exist along the study segment of L Street.

Existing signal timing and phasing data, including cycle lengths, splits and offsets, was obtained from the D.C. Department of Transportation in the form of a Synchro traffic model. The signals in the study area operate in a fixed and time-based coordinated mode, primarily running a 100-second cycle length during the AM, Midday and PM peak hours. Clearance intervals (yellow + all red) typically range from 4 to 7 seconds. ***It should be noted, however, that although L Street is part of the downtown grid network, the vehicular progression on all but one intersection favors the north-south cross street.*** Pedestrian signal timing, including walk/ flashing walk and flashing don't walk times were also reviewed. Signal phasing, lane configurations, turn lane lengths, turn restrictions, parking regulations and bus stop locations were field-verified by an Engineer.

A capacity analysis was performed for the existing conditions using the Highway Capacity Manual (HCM) methodology. Level of service is defined by the HCM as a "qualitative measure describing operational conditions within a traffic stream". Levels of service range from "A" to "F" where A represents optimal conditions and F represents saturated or failing conditions. The volume-to-capacity ratio (v/c ratio) is the ratio of current flow rate to the capacity of the intersection. This ratio is often used to determine how sufficient capacity is on a given roadway. Generally speaking, a ratio of 1.0 indicates that the roadway is operating at capacity. A ratio of greater than 1.0 indicates that the facility is failing as the number of vehicles exceeds the roadway capacity.

The existing capacity and level of service for all study intersections along L Street corridor is summarized in **Table 3**. The results of the existing conditions capacity analysis indicate that one intersection ***(L Street at New Hampshire Avenue/22nd Street) is operating at a failing level of service during the AM Peak.***. All remaining intersections are currently performing at a ***level of service D or better during all peak periods.***

Table 3. Summary of Existing Intersection Capacity Analysis AM [Midday] (PM)

Intersection	Highway Capacity Analysis		
	Level of Service	Average Vehicle Delay (sec/veh.)	V/C Ratio
L Street at 24th Street	C [B] (C)	21.3 [18.1] (21.5)	0.58 [0.38] (0.50)
L Street at 23rd Street	B [B] (B)	14.5 [15.3] (13.6)	0.53 [0.47] (0.58)
L Street at New Hampshire Ave.	**F** [D] (C)	116.3 [42.5] (21.3)	1.18 [0.77] (0.49)
L Street at 21st Street	B [B] (C)	14.3 [18.3] (25.7)	0.49 [0.59] (0.42)
L Street at 20th Street	C [D] (B)	24.8 [36.8] (18.1)	0.72 [0.74] (0.36)
L Street at 19th Street	B [C] (B)	19.9 [24.3] (17.4)	0.59 [0.85] (0.53)
L Street at 18th Street	C [C] (B)	23.5 [24.8] (15.5)	0.66 [0.75] (0.45)
L Street at Connecticut Ave.	B [C] (B)	19.1 [30.6] (13.9)	0.74 [0.82] (0.55)
L Street at 17th Street	C [B] (B)	24.7 [16.8] (18.3)	0.76 [0.71] (0.74)
L Street at 16th Street	C [C] (C)	26.2 [26.4] (30.0)	0.86 [0.72] (0.76)
L Street at 15th Street	B [D] (B)	14.0 [38.8] (13.2)	0.57 [0.75] (0.54)
L Street at Vermont Ave.	A [B] (B)	9.2 [10.2] (13.0)	0.51 [0.55] (0.62)
L Street at 14th Street	B [B] (C)	18.9 [18.1] (20.8)	0.70 [0.71] (0.70)
L Street at 13th Street	C [B] (B)	20.2 [14.6] (14.5)	0.75 [0.51] (0.59)
L Street at 12th Street	B [C] (C)	11.7 [21.0] (21.7)	0.34 [0.39] (0.56)
L Street at 11th Street	B [D] (C)	15.2 [43.1] (26.1)	0.42 [0.42] (0.66)

Field Observations: A Professional Traffic Engineer observed all study intersections along the L Street Corridor. Observations focused on traffic flow, signal operations such as residual queues and cycle failures, driver behavior such as compliance with traffic control devices and turn restrictions, and conflicts with pedestrian, transit, and parked vehicles.

The following summarizes the observations:

- L Street at New Hampshire Avenue
  Residual queues (not all vehicles queued at the beginning of the green interval clearing during the green signal indication) were observed along New Hampshire Avenue during the AM peak hour
- L Street at Connecticut
  Long queues were observed on EB L Street specifically traffic turning left. Vehicle-pedestrian conflicts were observed throughout the peak hours.
- L Street at 16th Street
  Long queues were observed on EB L Street specifically traffic turning left. Vehicle-pedestrian conflicts were observed throughout the peak hours.
- L Street at 14th Street
  Long queues were observed on SB 14th Street due to signal coordination along 14th and K Street. Signals at 14th and L Street and 14th Street and K Street do not appear to be optimally coordinated.

C. Alternatives Conditions Analysis

Alternative bicycle-compatible lane configurations were analyzed to assess the feasibility of the proposed roadway diet including a full-time bicycle lane to be located along the north side of L Street between Pennsylvania Ave and 11th Street. Alternative lane configurations are shown in **Figures 5**.

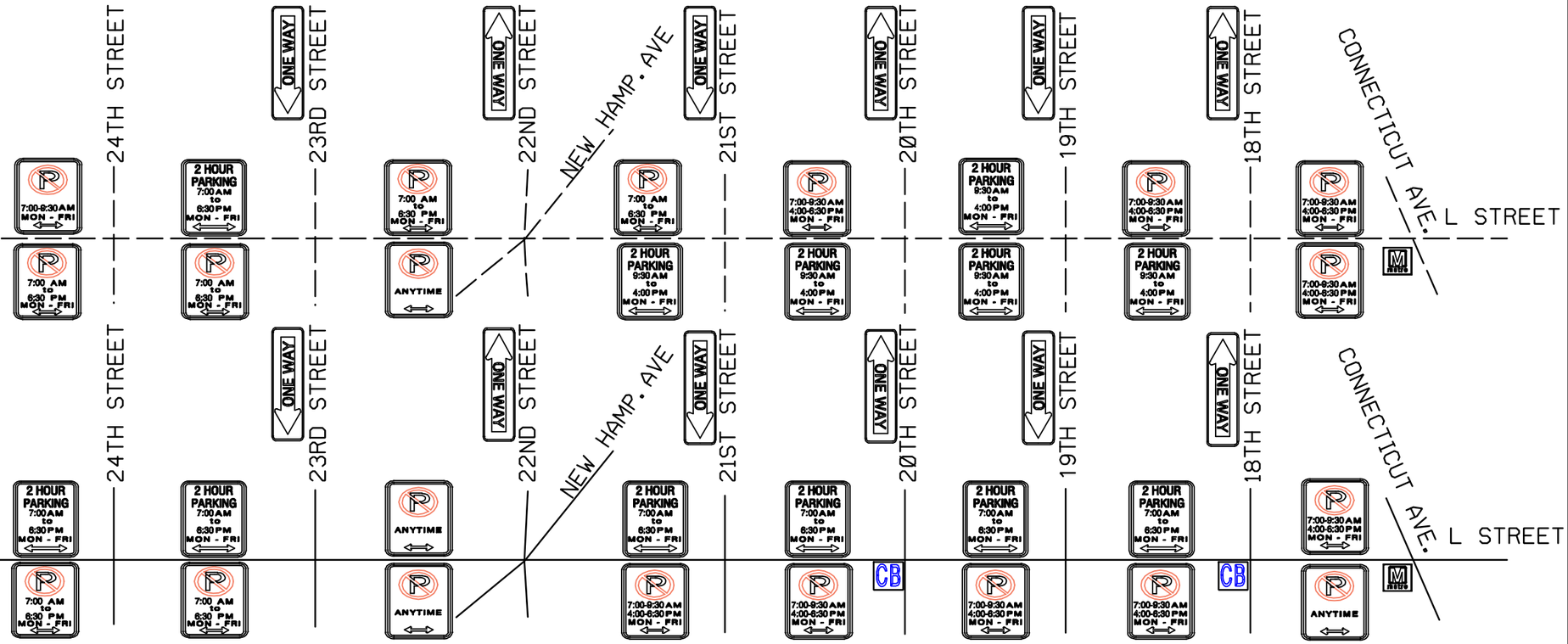
In addition, four near-side commuter bus stops were modeled on the south side of L Street at 20th, 18th, 15th, and 13 th Streets with dwell times of 2 minutes and headways of 4 minutes. Based on conversations with DDOT, it is anticipated that up to XXX bikes per hour will use the bicycle lane.

ALTERNATIVE LANE CONFIGURATIONS & PARKING RESTRICTIONS
L STREET FROM 24TH STREET TO CONNECTICUT AVE.

Figure 5

LEGEND

- CB — COMMUTER BUS STOP
- M — METRO
- ◇ — BICYCLE LANE
- ----- EXISTING
- ——— PROPOSED



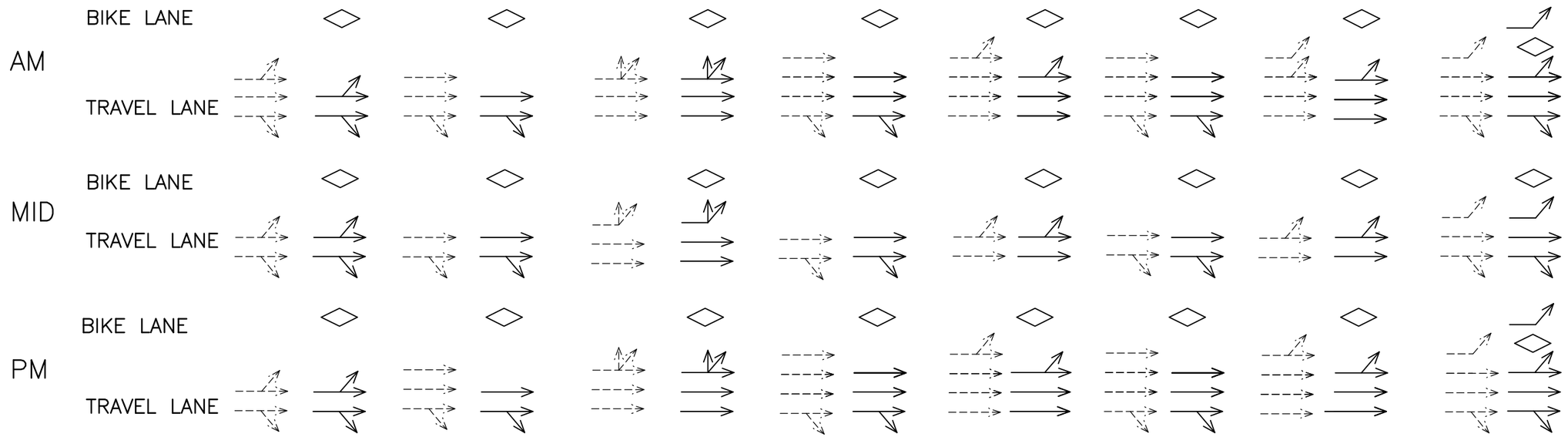


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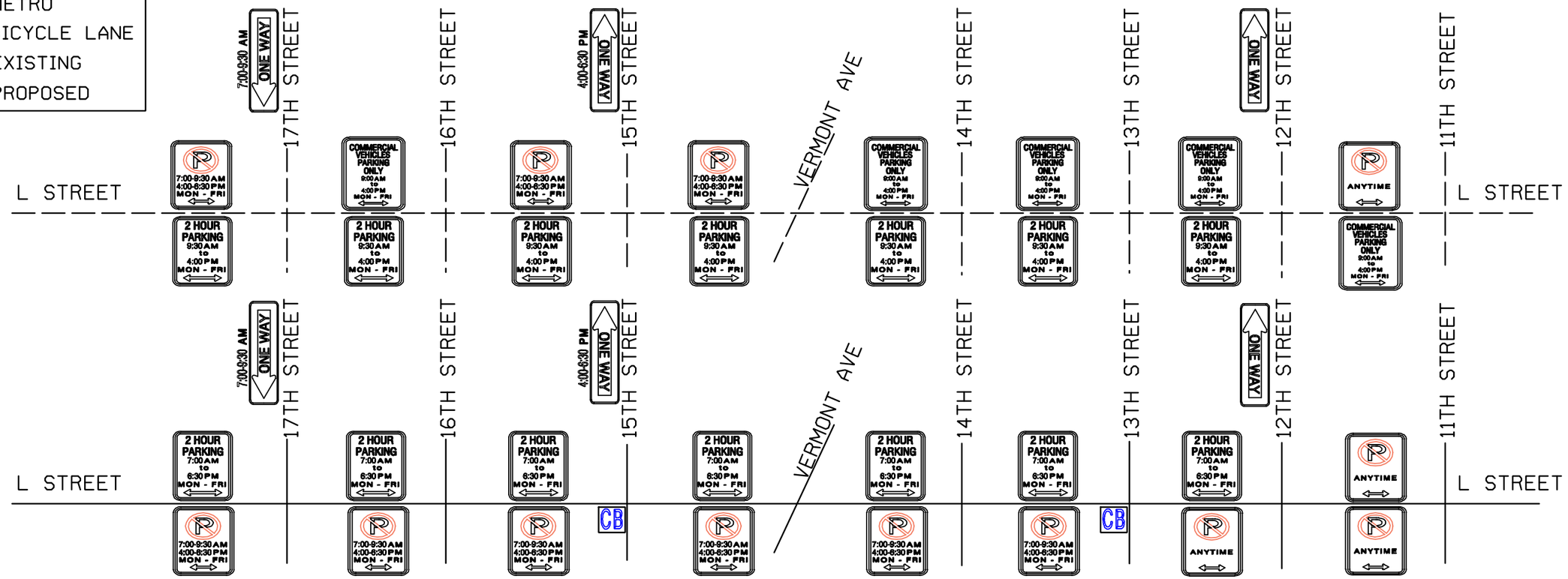
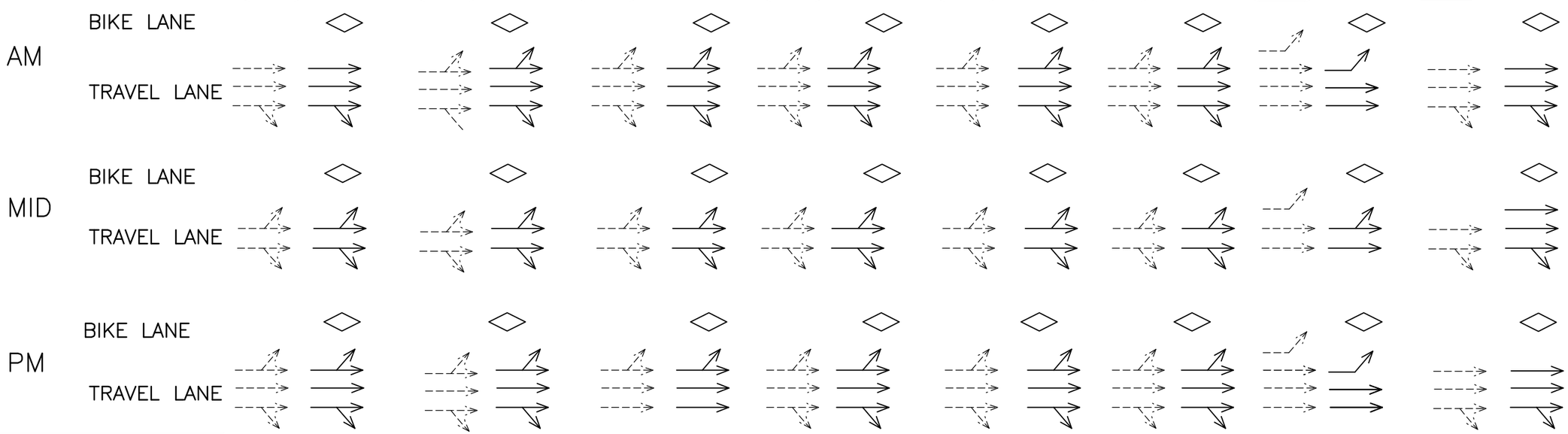
Figure 5 Cont.

ALTERNATIVE LANE CONFIGURATIONS & PARKING RESTRICTIONS
L STREET FROM 17TH STREET TO 11TH STREET

LEGEND
- CB — COMMUTER BUS STOP
- M — METRO
- BICYCLE LANE
- EXISTING
- PROPOSED





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Under alternative bicycle-compatible conditions, peak hour restricted parking is proposed on the south side of the L Street Corridor and full-time parking on the north side for most blocks within the study segment, with the exceptions of ***23rd Street to New Hampshire Avenue*** (both north and south sides) and ***18th Street to Connecticut Avenue*** (both north and south sides). **Table 4** summarizes proposed parking restrictions under alternative conditions.

A capacity analysis was performed for alternative conditions using the Highway Capacity Manual (HCM) methodology and is summarized in **Table 5**. The results of the alternative conditions capacity analysis indicate that ***L Street at New Hampshire Avenue will operate at a level of service F during the AM peak hour***. All remaining intersections will continue to ***operate at a level of service D or better during all peak hours under the alternative lane configurations and parking restrictions***.

In addition, a peak hour queuing analysis was performed along the L Street corridor and is summarized in **Table 6**. The 95th-percentile vehicular queue lengths (defined as the maximum theoretical queue length when the 95th-percentile traffic volumes are present. Thus, the probability of queues in excess of this value is less than five percent) were determined using Synchro, a deterministic and macroscopic signal analysis software. The purpose of the queuing analysis is to evaluate whether or not queues from the study intersections along L Street will spill back and block upstream intersections, and vice versa under alternative conditions as well as to evaluate the need for any exclusive left or right turn lanes and subsequent parking restrictions.

Table 4. Alternative Parking Restrictions along L Street Corridor

Segment	South Side of Street	Type of Parking	North Side of Street	Type of Parking
Pennsylvania Avenue to 24th Street	No Parking 7:00AM-6:30PM	Daytime Restricted	2hr Parking Limit 7:00AM-6:30PM	Unrestricted
24th Street to 23 Street	No Parking 7:00AM-6:30PM	Daytime Restricted	2hr Parking Limit 7:00AM-6:30PM	Unrestricted
23rd Street to New Hampshire Avenue	No Parking Anytime	None	No Parking Anytime	None
New Hampshire Avenue to 21st Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
21st Street to 20th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
20th Street to 19th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Metered	2hr Parking Limit 7:00AM-6:30PM	Metered
19th Street to 18th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
18th Street to Connecticut Avenue	No Parking Anytime	None	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted
Connecticut Avenue to 17th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
17th Street to 16th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
16th Street to 15th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
15th Street to Vermont Avenue	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
Vermont Avenue to 14th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
14th Street to 13th Street	No Parking 7AM-9:30am & 4pm-6:30pm	Peak Hour Restricted	2hr Parking Limit 7:00AM-6:30PM	Metered
13th Street to 12th Street	No Parking Anytime	None	2hr Parking Limit 7:00AM-6:30PM	Metered
12th Street to 11th Street	No Parking Anytime	None	No Parking Anytime	None

Table 5. Summary of Alternative Intersection Capacity Analysis, AM [Mid] (PM)

Intersection	Highway Capacity Analysis		
	Level of Service	Average Vehicle Delay (sec/veh.)	V/C Ratio
L Street at 24th Street	C [B] (C)	28.5 [18.1] (21.5)	0.72 [0.43] (0.50)
L Street at 23rd Street	B [B] (B)	16.1 [15.3] (15.1)	0.66 [0.47] (0.67)
L Street at New Hampshire Ave.	**F** [D] (C)	114.7 [42.5] (20.6)	1.18 [0.77] (0.49)
L Street at 21st Street	B [B] (C)	1.53 [18.3] (26.7)	0.58 [0.59] (0.48)
L Street at 20th Street	C [D] (B)	25.7 [36.8] (18.4)	0.80 [0.74] (0.41)
L Street at 19th Street	C [C] (B)	21.8 [24.3] (17.8)	0.69 [0.85] (0.59)
L Street at 18th Street	C [C] (B)	32.7 [24.8] (17.9)	0.73 [0.75] (0.54)
L Street at Connecticut Ave.	B [C] (B)	19.1 [27.9] (15.5)	0.71 [0.77] (0.60)
L Street at 17th Street	C [B] (B)	24.4 [17.2] (19.1)	0.77 [0.71] (0.75)
L Street at 16th Street	C [C] (C)	26.8 [26.4] (32.6)	0.87 [0.72] (0.78)
L Street at 15th Street	B [D] (B)	16.3 [38.8] (14.7)	0.60 [0.75] (0.56)
L Street at Vermont Ave.	A [B] (B)	9.2 [13.2] (13.0)	0.52 [0.55] (0.63)
L Street at 14th Street	C [B] (C)	20.0 [18.1] (23.9)	0.71 [0.71] (0.72)
L Street at 13th Street	C [B] (B)	20.6 [14.6] (15.0)	0.77 [0.51] (0.61)
L Street at 12th Street	B [C] (C)	12.7 [21.2] (21.9)	0.42 [0.41] (0.67)
L Street at 11th Street	B [D] (C)	15.7 [41.6] (27.1)	0.43 [0.35] (0.68)

Table 6. Summary of Queuing Analysis – AM [Mid] (PM)

Intersection	Movement	Block Length from stop bar to upstream cross walk (ft)	95% Queue Length (feet) AM (Mid) [PM]
L Street at 24th Street	EB Through	435	430# (185) [257]
L Street at 23rd Street	EB Through	305	147 (180) [100]
L Street at New Hampshire Ave.	EB Through	225	87 (54) [70]
L Street at 21st Street	EB Through	535	144 (133) [241]
L Street at 20th Street	EB Through	430	90 (380) [72]
L Street at 19th Street	EB Through	345	297 (172) [75]
L Street at 18th Street	EB Through	430	**482#** (146) [189]
L Street at Connecticut Ave.	EB Through	350	**359** (303) [236]
L Street at 17th Street	EB Through	310	**358** (80) [99]
L Street at 16th Street	EB Through	470	204 (460#) [**503#**]
L Street at 15th Street	EB Through	450	346 (**544#**) [120]
L Street at Vermont Ave.	EB Through	325	36 (39) [181]
L Street at 14th Street	EB Through	220	**253** (39) [**502#**]
L Street at 13th Street	EB Through	560	73 (93) [299]
L Street at 12th Street	EB Through	345	109 (241) [9]
L Street at 11th Street	EB Through	210	112 (169) [**254**]

#95th-percentile volume exceeds movement capacity
Note: "**XXX**" queue length is longer than block length

Based on the results of the queuing analysis, residual queues are predicted at seven intersections:

- 18th Street (AM)
- Connecticut (AM)
- 17th Street (AM)
- 16th Street (PM)
- 15th Street (Midday)
- 14th Street (AM and PM)
- 11th Street (PM)

SimTraffic, a microscopic traffic simulation software, was used to 'observe' traffic flow along the L Street corridor under the alternative roadway conditions. The simulation verified the queue spillback at the above noted intersections, however in most cases the spillback was a result of pedestrian/ vehicle conflicts rather then capacity constraints, as turning vehicles waiting for gaps in pedestrian traffic blocked the path of through vehicles.

D. Summary and Recommendations

A roadway diet including a 3- to 5-foot full-time bicycle lane is proposed to be located on the north side of the eastbound L Street corridor between Pennsylvania Ave and 11th Street. The provision of the bicycle lane requires the removal of one vehicular travel and/ or parking lane between L Street at Pennsylvania Avenue and L Street at 11th Street. The following summary of findings is based on the analysis and observations presented in the report:

- Under existing conditions, ***all intersections in the study area are performing at a level of service D or better except L Street at New Hampshire Avenue/22nd Street, which operates at a level of service F during the AM peak hour***.

- Under alternative conditions, it is recommended to ***revise the lane configurations and parking restrictions as shown in Figure 5.***

- With the amendment of lane configurations and parking restrictions, ***all intersections will to perform at a level of service D or better except L Street at New Hampshire Avenue, which will continue to operate at a level of service F during the AM peak hour.***

- Based on the queuing analysis, ***residual queues will be a concern at seven study intersections under the alternative conditions.***

- ***It is recommended to implement additional signal timing and lane use modifications:***

    1. ***L Street at Connecticut Avenue – provide leading pedestrian interval.***
    2. ***L Street at 17th Street – provide leading pedestrian interval.***
    3. ***L Street between 16th and 15th Streets – restrict off-peak (9 AM to 4 PM) parking along north side for 100' from stop line to provide exclusive EB left-turn lane, and increase EB off-peak split by 10 seconds.***
    4. ***L Street at 14th Street – provide leading pedestrian interval.***
    5. ***L Street at Connecticut – due to the potential of a bicycle lane located at peak hours between dual left-turn lanes, further analysis of intersection-specific bicycle treatments such as a bicycle signal with leading pedestrian interval or a floating bicycle lane markings/ signing should be further evaluated depending on the ultimate lane configuration.***

Traffic Analysis – L Street

Intersection	Level of Service (existing)	Level of Service (Alternative)	Δ
L Street at 24th Street	C [B] (C)	C [B] (C)	No Change
L Street at 23rd Street	B [B] (B)	B [B] (B)	No Change
L Street at New Hampshire Ave.	F [D] (C)	F [D] (C)	No Change
L Street at 21st Street	B [B] (C)	B [B] (C)	No Change
L Street at 20th Street	C [D] (B)	C [D] (B)	No Change
L Street at 19th Street	B [C] (B)	C [C] (B)	AM Decrease
L Street at 18th Street	C [C] (B)	C [C] (B)	No Change
L Street at Connecticut Ave.	B [C] (B)	B [C] (B)	No Change
L Street at 17th Street	C [B] (B)	C [B] (B)	No Change
L Street at 16th Street	C [C] (C)	C [C] (C)	No Change
L Street at 15th Street	B [D] (B)	B [D] (B)	No Change
L Street at Vermont Ave.	A [B] (B)	A [B] (B)	No Change
L Street at 14th Street	B [B] (C)	C [B] (C)	AM Decrease
L Street at 13th Street	C [B] (B)	C [B] (B)	No Change
L Street at 12th Street	B [C] (C)	B [C] (C)	No Change
L Street at 11th Street	B [D] (C)	B [D] (C)	No Change
Key: AM [Mid] (PM)			

District Department of Transportation

Key:

AM [Mid] (PM)

Traffic Analysis – I ("Eye") Street

(with north-south timing changes)

Intersection	Level of Service (existing)	Level of Service (Alternative)	Δ
I Street at Pennsylvania Ave. / 21st Street	F [D] (D)	D [C] (C)	AM & Mid-Day Increase
I Street at 20th Street	F [B] (B)	D [B] (B)	AM Increase
I Street at 19th Street	B [A] (C)	C [B] (C)	AM & Mid-Day Decrease
I Street at 18th Street	D [D] (B)	E [C] (B)	AM Decrease; Mid-Day Increase
I Street at 17th Street (west)	E [C] (C)	D [C] (C)	AM Increase
I Street at 17th Street (east) / Connecticut Ave.	C [D] (B)	C [C] (B)	Mid-Day Increase
I Street at 16th Street	B [C] (C)	B [C] (B)	PM Increase
I Street at 15th Street (west) / Vermont Ave.	B [B] (B)	B [B] (B)	No Change
I Street at 15th Street (east)	A [C] (B)	B [C] (B)	AM Decrease
I Street at 14th Street	D [C] (C)	D [C] (C)	No Change
I Street at 13th Street	E [D] (F)	D [C] (C)	AM, Mid-Day & PM Increase
I Street at 12th Street	B [C] (B)	B [C] (B)	No Change
I Street at New York Ave. / 11th Street	C [C] (C)	C [C] (C)	No Change
Key: AM [Mid] (PM)			

Traffic Analysis – Pennsylvania Ave. NW

Intersection	Level of Service (existing)	Level of Service (Alternative)	Δ
Pennsylvania Ave. at 6th St.	B (C)	B (C)	No Change
Pennsylvania Ave. at 7th St.	C(C)	C(C)	No Change
Pennsylvania Ave. at 9th St.	B (C)	B (C)	No Change
Key: AM (PM)			